CYCLOPEDIA

OF

VALUABLE

RECEIPTS.


Arthur Hitchcock

CYCLOPEDIA

OF

VALUABLE RECEIPTS

A

TREASURE-HOUSE

OF

USEFUL KNOWLEDGE

FOR THE EVERY-DAY WANTS OF LIFE.

COMPILED AND EDITED
BY HENRY B. SCAMMELL,
Assisted by Experts in
Every Department.

2000 ILLUSTRATIONS.

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PART 1.

HEALTH AND CHEMISTRY.


PERFUMERY
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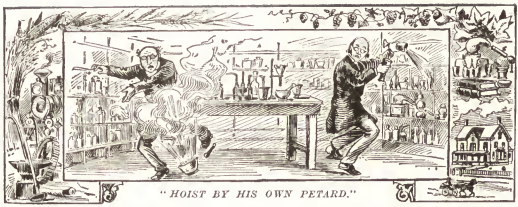
THE PHARMACY
IN THE HOSPITAL
HERBS
HYGEIA



"HOIST BY HIS OWN PETARD."

CHEMIST AND DRUGGIST.

POPULAR MEDICINES.

ALBADERMINE.—A process of removing "tan" and the milder variety of "freckles." (*Solution A.*) Potass. iodid., 2 dr.; iodine, pur., 6 gr.; glycerine, 3 dr.; infus. rosæ, 4 oz; dissolve the iodide of potassium in a small quantity of the infusion and a dr. of the glycerine; with this fluid moisten the iodine in a glass mortar and rub it down, gradually adding more liquid until complete solution has been obtained; then stir in the remainder of the ingredients, and bottle the mixture.—(*Solution B.*) Sodæ hyposulph. thiosulphate, 1 oz. iss.; aqua rosæ exot., 1 pt.; dissolve and filter. With a small camel's hair pencil or piece of fine sponge apply a little of "Albadermine A" to the tanned or freckled surface, until a slight but uniform brownish yellow skin has been produced; at the expiration of fifteen or twenty minutes moisten a piece of cambric, lint or soft rag with "B," and lay it upon the affected part, removing, squeezing away the liquid, soaking it afresh, and again applying until the iodine stain has disappeared. Repeat the entire process thrice daily, but diminish the frequency of the application if tenderness be produced. In the course of three to four days to as many weeks the freckles will either have disappeared entirely or their intensity will be greatly diminished. "Summer freckles" yield very speedily to this treatment.

ALUM GARGLE.—1. Powdered oak bark, 1 oz.; water, 1½ pt.; boil to a pt.; filter, cool, and add of alum, ½ dr., and of brandy, 2 fl. oz.; in inflammation of the mouth and throat.—2. Alum, 3 dr.; water, 6 fl. oz.; dissolve; used in offensive breath.—3. Alum and nitre, of each 3 oz.; cream of tartar, 4 oz.; dilute acetic acid, 4 lbs.; dissolve, evaporate to dryness, and powder the residuum. For use, ½ oz. of the powder is dissolved in water, 8 fl. oz.; recommended in inflammation of the fauces and tonsils.

AMANDINE, For the Skin.—1.(*Opaque.*) White soft soap, 3 oz.; gum mucilage, thick, clear, 4 oz.; pale honey, finest, 6 oz.; mix in a marble mortar; add the yelks of 5 large eggs, previously beaten and strained through gauze; and again thoroughly mix; next add, very gradually, oil of almonds, 2½ lb.; scented with half of the preceding oils, etc., or at will; when the whole is perfectly blended, further add pistachio milk (thick, rich), ½ pt., and triturate until the union is complete.—2. (*Glycerinated*) As the preceding, but adding, with the soap, ¾ to 1 oz. of glycerine for every pound of oil intended to be added. In use, a portion of amandine, about half the size of a small filbert, is rubbed with a few drops of warm water, and the resulting rich white lather applied to the hands, arms, face and neck. In a short time, and while the water on it is still milky, the skin is gently wiped with a soft napkin.—3. Almond oil, 3½ lb.; simple sirup, 2 oz. (made by dissolving 1¾ lb. sugar in 1 pt. water, boil and strain); soft soap (use the very best), 1½ oz.; otto of almonds and bergamot, ½ oz. each; otto of cloves, ¼ oz.; mix the soap and sirup, and mix in the oil gradually; put the perfumes into the almond oil. Great care should be taken in mixing in the oil. For use, make a lather with hot water.

BALSAM, Pectoral. — Tincture of tolu and compound tincture of benzoin, of each, 2 oz.; rectified spirit, 4 oz.; mix. Use as a pectoral in coughs and colds; dose, a teaspoonful.

BEEF, IRON AND WINE.—Liebig's extract of beef, ½ oz. av.; ammonio-citrate of iron, 256 gr.; spirit of orange, ½ fl. oz.; distilled water, 1½ fl. oz.; sherry wine sufficient to make 16 fl. oz.; dissolve the ammonio-citrate of iron in the water, dissolve the extract of beef in the sherry wine, add the spirit of orange and mix the solutions.

BEEF TEA.—(*Bouillon, for Dispensing.*) Concentrated extract of beef, 12 oz.; table salt, 3 oz.; essence or tincture of celery, 1½ oz. or 3 oz. respectively; powdered arrow-root, 1½ oz.; essence of orange or lemon, 1½ oz.; hot water, 3 qts.; if desired, about 1½ dr. of tincture of capsicum may be added; dissolve the extract of beef, arrow-root and salt in hot water; the other ingredients may then be added. Only a small quantity should be prepared at a time.

BRANDRETH'S PILLS.—1. Aloes, 2 lb.; gamboge, 1 lb.; extract of colocynth, 4 oz.; castile soap, ½ lb.; oil of peppermint, 2 fl. dr.; and cinnamon, 1 fl. dr.; mix and form into pills.—2. Gamboge, podophyllin, inspissated juice of phytolacca, saffron adulterated with yellow root, pulverized cloves and oil of peppermint.

BROWN'S BRONCHIAL TROCHES.—Take ½ lb. of pulverized extract of licorice; ¾ of a lb. of pulverized sugar; 2 oz. each pulverized cubebs and gum Arabic; add ½ oz. of pulverized extract of conium.

CAMPHORATED OIL.—Get the common cottonseed table oil, which is sold for sweet oil; half fill a 6-oz. bottle with gum camphor, then fill with oil, and let it stand in a very warm place over night; the oil will take up only so much of camphor, and when it is used off fill with oil again, repeating the process until the camphor is dissolved. This is cheap and clean, and will not soil clothing. It will often entirely dissipate symptoms of an influenza cold, to which persons who have had grip seem peculiarly liable; rub across the forehead, over and between the eyes. It is a relief, too, for the pains in the legs, which remain long after the attack is over; rub with it around the muscles and knee joints, over and under.

CALISAYA CORDIAL.—1. Elixir of calisaya, 1 oz.; orange sirup, 3 oz.—2. Quinine sulphate, 72 gr.; cinchonine sulphate, 24 gr.; quinidine sulphate, 20 gr.; cinchonidine sulphate, 12 gr.; elixir orange, 128 fl. oz.; caramel sufficient to color; triturate the mixed sulphates with 1 pt. of the elixir of orange; pour the mixture into a glass flask, and heat on a water bath till solution is effected; when still hot, add remainder of elixir and caramel; filter when cold.

CATARRH REMEDIES.—1. (*Dr. Sage's*). Carbolic acid, 0·5 grm.; camphor, 0·5 grm.; common salt, 10 grm., which are to be dissolved in 4-7 liter of water and injected into the nostrils. It appears very probable that the wide reputation of this remedy is a deserved one, and the publication of its constituents will rather increase than retard its sale.—2. (*Hall's*). Take of potassium iodide, 1 dr.; comp. tinct. cardamom, 4 fl. oz.; comp. tinct. gentian, 12 fl. oz.; caramel, enough.

CHELTENHAM SALTS.—1. Glauber salts, Epsom salts, common salts, equal parts; powder; mix; dose, ½ oz.—2. (*Effervescing Cheltenham Salts.*) Tartaric acid, dried, 25 parts; tartrate of iron, 1 part; seidlitz salt, 120 parts; mix; dose, a teaspoonful in a glass of water.

CHOLERA MIXTURE.—1. The following is published as the "Cholera Mixture of the British Army": Oil of anise seed, 3 dr.; oil of cajeput, 3 dr.; oil of juniper, 3 dr.; ether, 8 dr.; liquor acid of Haller, 1 dr.; tincture of cinnamon, 4 oz.; mix; dose, 10 drops every quarter of an hour in a tablespoonful of water.—2. A mixture which has accomplished wonders in the writer's hands is this: Acid. tannici, 1 dr.; æth. chlor. (1 in 10), 2 dr.; ac. sulph. dil. 1½ dr.; tinct. zingib., 3 dr.; aq. menth. pip. ad. 8 oz.; mix; one-sixth every two or three hours. See also *Diarrhœa.*

CLOVE LOZENGES.—Cloves (powdered along with sugar), 2 oz., or essential oil, 1 fl. dr., to each lb. of sugar. Carminative and stomachic; also used as a restorative after fatigue; added to chocolate to improve its flavor, and sucked to sweeten the breath.

COCA AND CALISAYA.—Coca wine, 1 oz.; calisaya elixir, 1 oz.; orange sirup, 6 oz.

COD LIVER OIL MIXTURE.—It makes a really delicious emulsion. Yelks of 2 eggs; powdered sugar, 4 oz.; essence oil of almonds. 2 drops; orange flower water, 2 oz.; mix carefully, and add an equal bulk of cod liver oil.

COOK'S PILLS.—Powdered aloes, 100 gr.; powdered rhubarb, 100 gr.; calomel, 75 gr.; powdered castile soap, 25 gr.; make into 100 pills. Dose, 1 to 4 pills.

CORN PLASTERS.—1. (*Anodyne.*) Galbanum plaster or resin plaster, or the product of either Nos. 6 or 7, to each oz. of which 1 dr. of opium, in fine powder has been added. Recommended for painful corns and bunions.—2. (*Argentine.*) Resin plaster, 7 parts; fused nitrate of silver (in fine powder), 1 part; cut into pieces of appropriate size and "put up" in small flat boxes. Intended as a substitute for the direct application of lunar caustic, and to be applied to the corn only.—3. (*Beamish's.*) Said to consist of about equal parts of resin plaster and galbanum plaster, melted together by a gentle heat.—4. (*De Gros'.*) Resin plaster (recent), 5 dr.; melt it with a gentle heat; stir in of sal ammoniæ (in fine powder), 1 dr.; and at once spread it on linen or soft leather. The next day, lightly brush over the surface with strong tincture of benzoin.—5. (*Dupret's.*) Resin plaster (recent), 2 oz.; beeswax (genuine), ½ oz.; olive oil, ½ oz.; melt, stir in of croton oil, ¼ oz., and spread before it cools.

CUCUMBER OINTMENT.—Oil of sweet almonds, 7 fl. oz.; spermaceti, 18 dr.; white wax, 5 dr.; glycerine, 1 fl. oz.; green cucumbers, 4 lbs.; cut the cucumbers in small pieces; mash them in a Wedgewood mortar; let them macerate in their own liquor for 12 hours; express and strain; melt the almond oil, spermaceti and wax together, by means of a water-bath; add to it the strained liquor, stirring constantly, so as to incorporate the whole together; set aside in a cool place till it becomes hard; then beat with a wooden spoon, so as to separate the watery portion of the cucumbers from the ointment; pour off the liquor thus obtained, and mix the glycerine with the ointment, without the aid of heat, by working it with the hands until it becomes thoroughly incorporated; put up in 4 oz. jars; cover with a layer of rose water, and set aside in a cool place. The ointment prepared in this way will keep sweet for 12 months.

DANDELION, Infusion of.—Bruised root of dandelion, 2 oz.; boiling water, 1 pt.; steep 2 hours, and strain. Dose, a wineglassful 3 times a day. It is stimulant, resolvent and tonic.

DIARRHŒA MIXTURE.—1. (*Loomis'.*) Tincture of opium, ½ fl. oz.; tincture of rhubarb, ½ fl. oz.; compound tincture of catechu (U. S. P.), 1 fluid oz.; oil of sassafras, 20 min.;

compound tincture of lavender, enough to make 4 fl. oz.—2. (*Squibb's.*) Tincture of opium, 1 fl. oz.; tincture of capsicum, 1 fl. oz.; spirit of camphor, 1 fl. oz.; purified chloroform, 180 min.; alcohol, enough to make 5 fl. oz.—3. (*Thielemann's.*) Wine of opium, 1 fl. oz.; tincture of valerian, 1½ fl. oz.; ether, ½ fl. oz.; oil of peppermint, 60 min.. fluid extract of ipecac, 15 min.; alcohol, enough to make 4 fl. oz. This preparation is practically identical with the "Mixtura Thielemanni" of the Swedish Pharm. —4. (*Velpeau's.*) Tincture of opium, compound tincture of catechu (U. S. P.), spirit of camphor, each equal volumes.

DIGESTIVE PASTILLES.—(*Borivent's.*) Bismuth subnitrate, 20 parts; calcium phosphate, 30 parts; sodium bicarbonate, 10 parts; magnesium carbonate, 200 parts; iron carbonate, 50 parts; sugar, 1,000 parts; flavor with essence of peppermint, anise or orange flowers. Make into pastilles of 1 grm. each, of which 3 to 12 may be taken daily.

DR. PIERCE'S GOLDEN MEDICAL DISCOVERY.—A $1 bottle holds 220 gr. of a brownish colored clear liquid, consisting of 15 gr. pure honey, 1 gr. extract of poisonous or acrid lettuce, 2 gr. laudanum, 100 gr. dilute alcohol (64 per cent), tasting like fusel oil and wood spirit, with 105 gr. of water.

EFFERVESCING DRAUGHT.—Sesquicarbonate of soda, 30 gr.; water, or peppermint water, 1½ fl. oz.; sirup of orange peel, 2 fl. dr.; tincture of calumba, ½ fl. dr.; tartaric or citric acid, 25 gr.; add the acid last, and drink while effervescing. This is stomachic, tonic and anti-emetic; in acidity, dyspepsia, etc.

FRUIT SALT.—Carbonate of soda, citric acid, fine white sugar and powdered ginger. It makes a pleasant drink, and is an excellent antagonist to indigestion. Ginger is a carminative, and the carbonate of soda destroys the acidity which occasions flatulency. Lamplough's pyretic saline is a mixture of carbonate of soda and tartaric acid, with 2 per cent potassium chlorate.

HOARHOUND SIRUP.—1. Dried hoarhound, 1 oz.; hoarhound water, 2 lb.; digest in a water-bath for 2 hours; strain and add of white sugar, 4 lb.—2. White hoarhound, 1 lb.; boiling water, 1 gal.; infuse for 2 hours; press out the liquor, filter, and add of sugar, q. s. This is a good remedy in coughs and diseases of the lungs. Dose, a tablespoonful at pleasure.

HOLLOWAY'S PILLS.—Albes, 4 parts; jalap, ginger and myrrh, of each 2 parts; made into a mass with mucilage, and divided into 2 gr. pills.

HOOPER'S FEMALE PILLS.—1. Sulphate of iron, 8 oz.; water, 8 oz.; dissolve and add Barbadoes aloes, 40 oz.; canella, 6 oz.; myrrh, 2 oz.; opoponax, ½ oz.; make a mass.—2. Sulphate of iron, 2 oz.; powder of aloes, with canella, 16 oz.; mucilage of tragacanth and tincture of aloes, q. s. to form a mass; divide 60 gr. into 18 pills. According to recent analysis, the iron is in a peroxidized state; probably the sulphate is partially calcined.—3. Barbadoes aloes, 8 oz.; dried sulphate of iron, 2 oz. and 1½ dr.; extract of black hellebore, 2 oz.; myrrh and soap, of each, 2 oz.; cancella, 1 oz.; ginger, 1 oz.; water, q. s. to form a mass; divide into pills of 2½ gr. each.

HYDROKINONE, Wash for the Skin.—Hydrokinone, 48 gr.; acid phosphoric gac, 30 gr.; glycerine, 2 dr.; aqua dest., 6 oz.; misce. This lotion is stated to give excellent results. It has to be applied to the skin of the face, etc., in the usual way, at least twice in the course of 24 hours, after it has been washed and dried carefully. If the skin be of the nature known as "greasy," a preliminary wash with tepid water containing a few drops sal volatile or liq. ammon. fort. is advisable.

ITCH LOTION.—Sulphuret of potassium, 1 dr.; soft soap, 2 dr.; water, 8 fl. oz.; dissolve. This is an excellent remedy for the itch. It leaves little smell behind, and does not soil the linen.

ITCH OINTMENT.—1 Unsalted butter, 1 lb.; burgundy pitch, 2 oz.; spirits turpertine, 2 oz.; red precipitate, pulverized, 1½ oz.; melt the pitch and add the butter, stirring well together; then remove from the fire, and when a little cool, add the spirits of turpentine, and lastly the precipitate, and stir until cold.—2. Alum, nitre and sulphate of zinc, of each, in very fine powder, 1½ oz.; vermillion, ½ oz.; mix; add gradually of sweet oil, ½ pt.; triturate together until perfectly mixed; then further add of lard, 1 lb., with oils of aniseed, lavender and origanum, q. s. to perfume.—3. Carbonate of potassa, ½ oz.; rose water, 1 fl. oz.; red sulphuret of mercury, 1 dr.; oil of bergamot, ½ fl. dr.; sublimed sulphur and hog's lard, of each 11 oz.; mix them.—4. Chloride of lime, 1 dr.; rectified spirit, 2 fl. dr.; sweet oil, ½ fl. oz.; common salt and sulphur, of each 1 oz.; soft soap, 2 oz.; oil of lemon, 20 drops. Cheap, effectual and inoffensive.

LINSEED MEAL POULTICE.—Linseed meal, 4 oz., olive oil, ½ fl. oz.; mix, and add, gradually and constantly stirring, of boiling water, ½ pt. This is the formula of the new British Ph. Emollient, soothing and calefacient. Used to promote the suppuration and ripening of tumors, to allay pain, inflammation, irritation, etc.; applied warm. This is the common emollient and suppurative poultice of both private and hospital surgeons.

LIP SALVES.—1. (*Creme de Psyche.*) White wax, 1 oz.; spermaceti, 1 oz.; oil of sweet almonds, 5 oz.; mecca balsam, 1 dr.; pulverized acetate of lead, ½ dr.; prepare and add, while the mixture is warm, the balsam, and when it is cooled the sugar of lead.—2. (*Cerat d'Amour.*) Spermaceti, 2 oz.; oil of sweet almonds, 4 oz.; milk of roses, 1 dr.; powdered roses, 3 dr.; manipulate after the usual method.

MAGNOLIA BALM.—Florida water, 1 oz.; alcohol, 1 oz.; rose water, 2 oz.; glycerine, ¼ oz.; prep. chalk, 2 oz.; zinc oxide, 1 oz.; soft water, 2 oz.; tint with carmine, if desired.

MONOBROMATED CAMPHOR, Elixir of.—Monobromated camphor, 3 parts; alcohol (90 per cent), 120 parts; orange flower water, 80 parts; glycerine, 100 parts; mix alcohol and

glycerine; dissolve the monobromated camphor by use of heat; add the orange flower water. This solution contains 1 per cent of monobromated camphor.

MUSTARD POULTICES.—Dry mustard; cold water; mix enough cold water with the mustard to make it into a thick paste; when quite smooth, spread it upon a piece of thin old linen, or cotton; sew it round so as to form a bag. Be careful not to make the poultice larger than required; hold it to the fire for a few minutes, so as not to chill your patient; time, from 15 to 30 minutes; have ready a piece of clean soft cotton, or a piece of clean wadding, and when you take off the mustard poultice, put on the wadding or the cotton.

OXIDE OF ZINC OINTMENT.—1. Oxide of zinc, 1 oz.; lard, 6 oz.; mix them together.—2. A very mild oxide of zinc ointment is prepared with the following articles: Olive oil, 2 lb.; spermaceti, 12 oz.; white wax, 9 oz.; white oxide of zinc, 4 oz.; acid, benzoric, 2 dr.; sulphate of morphia, 2 dr.; otto of roses, 20 drops.—3. Oxide of zinc, 1 oz.; simple liniment, 6 oz. These are astringent, desiccative and stimulant; and are useful in excoriations, burns, various skin diseases attended by profuse discharges; in chronic inflammation of the eyes depending on relaxation of the vessels; in sore nipples, indolent sores, ringworm of the scalp, etc.

PAIN-KILLER.—Spirit of camphor, 2 oz.; tincture of capsicum, 1 oz.; tincture of guaiac, ½ oz.; tincture of myrrh, ½ oz.; alcohol; 4 oz.

PEPPERMINT, Infusion of.—Peppermint, 3 dr.; boiling water, ½ pt.; steep 15 minutes, and strain. In flatulence, colic, griping, etc., and as a vehicle for other medicines.

PERUVIAN BARK, Decoction of.—1.—Yellow cinchona of calisaya bark (bruised), 1¼ oz.; distilled water, 1 pt.; boil for 10 minutes in a lightly covered vessel, and when cold, strain, and pour on the bark sufficient water to make up 1 pt.—2. Brown, grey, yellow or red cinchona (bruised), 1 oz.; water, 24 fl. oz.; boil for 10 minutes; when cold, filter the liquor and evaporate it to 16 fl. oz. Dose, 1 to 2 fl. oz., 3 or 4 times daily, as a tonic, stomachic and febrifuge, when the stomach will not bear the administration of bark in powder; in fevers, dyspepsia, convalescence, etc.

PERUVIAN BARK, Infusion of.—Yellow cinchona bark, in coarse powder, 1 oz.; boiling distilled water, 1 pt.; infuse for 2 hours in a covered vessel, and strain. It is a tonic and stomachic, and in very large doses, febrifuge. It is a useful medicine in dyspepsia, debility and during convalescences, and is often a valuable adjunct to more active remedies. Dose, 1 to 3 fl. oz.

PHENOL SODIQUE.—This preparation of carbolic acid is deservedly quite popular with the medical and dental professions, but its composition has not been made public. The following formula is the result of numerous experiments, and will give an article that will compare favorably with the best French phenol sodique: Carbolic acid, in crystals, 188 gr.; caustic soda, 31 gr.; pure water, 4 fl. oz.; mix. The carbolic acid should be free from offensive odor, such as is prepared for medicinal purposes. When first mixed, it is nearly colorless, but in time assumes a wine color; does not deposit any tarry residue, as is too often found in the commercial article. Carbolic acid has a feeble action as an acid, combining definitely with a very small portion of alkali. When the quantity of soda used was just sufficient to neutralize the carbolic acid, the compound did not appear to be as efficient as the one resulting from the above formula.

PHILOCOME, Friend to the Hair.—1. White wax, 10 oz.; fresh rose oil, 1 lb.; acacia oil, ½ lb.; jasmine oil, ½ lb.; fleur d'orange oil, 1 lb.; tuberose oil, 1 lb.; melt the wax in the oils by a water-bath at the lowest possible temperature. Stir the mixture as it cools; do not pour out until it is nearly cool enough to set. Let the jars be slightly warmed.—2. (*Second quality.*) White wax, 5 oz.; almond oil, 2 lb.; otto bergamot, 1 oz.; otto of lemon, ½ oz.; otto of lavender, 2 dr.; otto of cloves, 1 dr.

PICK-ME-UP.—There is no general formula for this. A pick-me-up is simply a tonic draught, somewhat like a liquor.—1. The following is good: Essence of ginger, 10 drops; aromatic spirit of ammonia, ½ dr.; tincture of gentian, 1½ dr.; compound tincture of cardamoms, 3 dr.; sirup, ½ oz.; chloroform water, to 2 oz.; mix, and take as a draught.—2. (*For Dispensing.*) To ½ gal. of sirup, add ¼ oz. soluble extract of ginger, 1 oz. curacoa essence, 1 dr. sulphate of quinine, dissolved in the essence; ½ oz. fruit acid solution; color as desired.

PILE OINTMENT.—1 Burnt alum and oxide of zinc, of each, ½ dr.; lard, 7 dr.—2. Morphia, 8 gr.; melted spermaceti ointment, 1 oz.; triturate together until solution is complete; then add of finely powdered galls, 1½ dr.; essential oil of almonds, 12 to 15 drops, and stir until the mass concretes. This is useful in painful piles, prolapsus, etc.; it does not soil the linen as most other ointments.

POMADES.—1. (*Pommade Divine*) Refined beef marrow, 1 lb.; cypress wood (rasped), 1 oz.; orris root (in coarse powder), 1 oz.; liquid styrax, 1 oz.; cinnamon (powdered, but not dusty), ½ oz.; cloves (well bruised), ½ oz.; nutmegs (well bruised or grated), ¼ oz.; digest by the heat of a water-bath, in a covered vessel, for 5 or 6 hours, and then strain through flannel. Very fine, and much esteemed for the hair, and also as an occasional skin cosmetic.—2. Plain pomade (or soft beef fat), 1 lb.; melt by a very gentle heat, and stir in: Essence of violets, 2 fl. dr.; huile au jasmine, 1½ fl. dr.; oil of bergamot, 1 fl. dr.; oil of lemon, 1 fl. dr.; oil of lavender, ½ fl. dr.; oil of origanum, ½ fl. dr.; neroli, oil of cassia, oil of cloves, oil of verbena, 6 or 8 drops of each. Delightfully and powerfully fragrant, but apparently unnecessarily complicated. The product of the first is, however, the genuine pommade divine. In second and ordinary qualities, double the above proportion of fat is usually employed.

RADWAY'S READY RELIEF LINIMENT.—Soap liniment, 1½ fl. oz.; tincture of capsicum, 1 fl. oz.; water of ammonia, ½ fl. oz.; alcohol, ½ fl. oz.; mix thoroughly.

SAGE'S CATARRH REMEDY.—Powdered yellow root, 5 dr.; indigo, ½ dr.; powdered camphor, 2 dr.; carbolic acid, 2 dr.; common salt, 5) dr.; powder the camphor by means of alcohol, and mix with the salt (previously reduced to a fine powder). Rub the indigo and carbolic acid together, mix with the salt and camphor, and add the powdered yellow root; mix intimately, without pressure, in a mortar.

SALVE FOR PILES.—Cocaine hydrochloride, 20 gr.; morphine sulphate, 5 gr.; atropine sulphate, 4 gr.; tannin, 20 gr.; vaseline, 1 oz.; rose water, sufficient. Apply after each evacuation of the bowels, contents of which should of course be kept in solubie condition.

SARSAPARILLA.—1. Sassafras bark, bruised, 1 lb.; liecrice root, bruised, 7 oz.; water, 2½ gal.; oil of sassafras, 1½ dr.; oil of wintergreen, 2 dr.; alcohol, 95 per cent, 2 oz.; boil the sassafras and liecrice in the water half an hour; strain through flannel, then add the sirup; dissolve the oils in the alcohol, and add them to the sirup; agitate the mixture freely.—2. (*Ayer's.*) Fluid extract of sarsaparilla, 3 oz.; fluid extract stillingia, 3 oz.; fluid extract yellow dock, 2 oz.; fluid extract May apple, 2 oz.; sugar, 1 oz.; potassium iodide, 90 gr.; iron iodide, 10 gr.; mix them.

SEA FOAM, For Barbers.—Dissolve in 8 oz. alcohol, 2 oz. castor oil, 1 oz. ammonia; add this mixture to 1 qt. water.

SEIDLITZ POWDERS.—Rochelle salts, 2 dr.; bicarb. soda, 2 so.; put these into a blue paper; and 35 gr. tartaric acid into a white paper. To use, put each into different tumblers; fill half with water, adding a little loaf sugar to the acid; then pour together and drink quickly.—2. In one bottle: Potassio-tartrate of soda, 12 oz.; bicarbonate of soda, 4 oz.; tartaric acid, 3½ oz.; white sugar, 1 lb. (all in fine powder); dry separately by a gentle heat; add essence of lemon, ½ dr.; mix well; pass the mixture through a sieve, and put it at once in clean, dry bottles. A dessertspoonful or more to a tumblerful of water.—3. Cut blue and white paper to form powders. Into the blue papers, put 1 dr. bicarbonate of soda and 2 dr. Rochelle salts, intimately mixed; the white powder contains ½ dr. tartaric acid. For use, dissolve a powder each in half a tumbler of water; mix and drink while it effervesces.

SIMMON'S LIVER REGULATOR.—Liverwort, 1 oz.; Culver's physic, 1 oz.; Virginia snakeroot, 1 oz.; senna, 1½ oz.; water, 2½ pts.; whisky, ½ pt.; bring the water to a boil, and pour over the drugs; let stand one day; strain, and add the whisky.

ST. JACOB'S OIL.—Oil of sassafras, ½ oz.; oil of origanum, 1 oz.; chloroform, 1 oz.; sulph. ether, 1 oz.; chloral hydrate, 1 oz.; tincture of opium, ½ oz.; gum camphor, 1 oz.; alcohol, ½ gal.; dissolve the camphor in a portion of the alcohol, and rub thoroughly in a mortar; add other ingredients and mix; used externally and internally. Dose, ½ teaspoonful when needed.

STRENGTHENING PLASTER.—Litharge plaster, 24 parts; white resin, 6 parts; yellow wax and olive oil, of each, 3 parts; and red oxide of iron, 8 parts; let the oxide be rubbed with the oil, and the other ingredients added melted, and mix the whole well together. The plaster, after being spread over leather, should be cut into strips 2 inches wide, and strapped firmly around the joint.

SUN CHOLERA MIXTURE.—This medicine has stood the test of experience as a fine remedy for looseness of the bowels. It is claimed that no one who has this by him, and takes it in time, will ever have the cholera. Even when no cholera is anticipated, it is an excellent thing for the ordinary summer complaints—colic, diarrhœa, dysentery, etc. Take equal parts of tincture of cayenne, tincture of rhubard, essence of peppermint and spirits of camphor; mix well. Dose, 15 to 30 drops in a wineglass of water, according to age and violence of the attack. Repeat every 15 or 20 minutes until relief is obtained.

SULPHUR OINTMENT.—1. Flour of sulphur, 8 oz.; white precipitate, ½ oz.; red sulphuret of mercury, ½ oz.; mix well, and add olive oil, 4 oz.; lard, 1 lb.; creosote, 20 drops. Used for the cure of itch, ringworm and other obstinate skin diseases.—2. Flour of sulphur, 8 oz.; oil of bergamot, 2 dr.; lard, 1 lb.; rub freely 3 times a day for itch.

TAR OINTMENT.—1. Tar and suet, of each 1 lb.; melt them together, and press the mixture through a linen cloth.—2. Tar, 5 oz.; beeswax, 2 oz.; melt together, and stir the mixture briskly until it concretes.—3. Tar, ½ pt.; yellow wax, 4 oz.; as the last. A detergent application in ringworm, scald-head, scabby eruptions, foul ulcers, etc.; at first diluted with ½ its weight lard or oil.

THOMPSON'S EYE WATER.—Sulphate of copper, 10 gr.; sulphate of zinc, 40 gr.; rose water, 2 pt.; tincture of saffron, 4 dr.; tincture of camphor, 4 dr.; mix and filter.

TOOTHACHE DROPS.—(*Boerhaave's Odontalgic.*) Opium, ½ dr. troy; camphor (powdered), 4 or 5 dr. avdps.; oil of cloves, 2 fl. dr.; alcohol (90 per cent), 1½ fl. oz.; agitate the mixture occasionally for a week, and, after repose, pour off the clear portion. Often serviceable, and much esteemed by some persons, as toothache drops.—2. Hydrochlorate of morphia, 30 gr.; concentrated tincture of pellitory (made with 90 per cent alcohol), 2½ fl. oz.; oil of cloves, ½ fl. oz.; chloroform, ½ fl. oz.; agitate them together until mixed. Used as toothache drops, observing to shake the bottle well before use, and to keep it closely corked or stopped in a cool place. An excellent remedy.

TOOTHWASH.—(*Eau Odontalgique of Dr. O'Meara, Paris.*) Vitivert of India, 1 dr.; pyrethrum root, ½ oz.; cloves, 6 gr.; orris root, 12 gr.; coriander, 12 gr.; alkanct, 12 gr.; essence of mint (English), 12 drops; essence of bergamot, 6 drops; alcohol (36°), 2 oz.; bruise the solid materials in a mortar and place them, together with the alcohol and essences, in a tightly covered vessel. Macerate for eight or ten days, stirring frequently during the interval, and at the end of that time decant and filter the liquor.—2. (*Odontine.*) Cuttle fish bone, 1 part; castile soap, 1 part; red coral, 1 part; tincture of cochineal (to color), q. s.; honey (to mix), q. s.;

essential oil (to aromatize), q. s.—3. (*Sozodont.*) The reddish liquid consists of a solution of 5 grm. oil soap in 6 grm. glycerine; 30 grm. spirits, 20 grm. water, perfumed with a few drops of oil of peppermint, oil of cloves, oil of cinnamon and oil of anise, and colored with cochineal. The powder is a mixture of carbonate of lime, magnesia and Florentine orris root. None of the ingredients can be considered objectionable.

TURPENTINE LINIMENT.—Oil of turpentine, 16 parts; camphor, 1 part; soft soap, 2 parts; dissolve the camphor in the turpentine; then add the soap; rub till thoroughly mixed.

UNCLE SAM'S NERVE AND BONE LINIMENT.—Oil of origanum, 4 oz.; oil of rosemary. 4 oz.; oil of amber, 4 oz.; oil of hemlock, 4 oz.; turpentine, 4 pts.; oil of linseed, 6 pts.; mix. For external use only.

VICHY SALTS.—Bicarbonate of soda, 2½ oz.; muriate of soda, 22½ gr.; effloresced sulphate of soda, 1½ dr.; effloresced sulphate of magnesia, 1½ scr.; dry tartarized sulphate of iron, 1½ gr.; dry tartaric acid, or dry bisulphate of soda, 1½ oz.; mix the powders, previously dried, and keep in a well-corked bottle.

WEBSTER'S DINNER PILLS.—Powdered socotrine aloes, 360 gr.; powdered mastic, 120 gr.; powdered red rose leaves, 120 gr.; make 200 pills. Dose, 1 to 3.

WRIGHT'S PEARL OINTMENT.—Take of white precipitate, 8 oz.; Goulard's extract, 1 pt.; rub them to a cream, and add the mixture to white wax, 7 lbs., and olive oil, 10 lbs., previously melted together by a gentle heat; lastly, stir the whole until it is nearly cold. Found of great value.

WORM LOZENGES.—Most of the advertised nostrums under this name have a basis of calomel, and require to be followed by a purge a few hours afterwards.—1. Ethereal extract of wormseed, 1 dr.; jalap, starch and sugar, of each, 2 dr.; mucilage of gum tragacanth, q. s.; divide into 60 lozenges.—2. Wormseed, 1 oz.; ethiops mineral and jalap, of each, 3 dr.; cinnamon, 2 dr.; sugar, 7 oz.; rose water, q. s. A very good remedy.

INKS.

WRITING INKS.

REMARKS.—A good ink should be so thin as to flow freely from the pen, and yet should possess sufficient depth of color to retain its blackness for many years. Much of the permanency of ink depends on the material upon which it is written. Ink may consist of either a clear solution of any dye-stuff, or a finely divided insoluble precipitate suspended in water. The principal ingredients which enter into the composition of most black inks are gall-nuts, green vitriol and gum. The gall-nuts should be crushed to a coarse powder and boiled in water, or digested for several hours at a temperature near the boiling point, and the gum and green vitriol added to the filtered decoction in solution. The most permanent writing is done with India ink, because the black coloring matter of this ink consists of finely divided carbon, which is unaffected by chemical reagents. For ordinary use, such ink is recommended as consists either of pure galls and iron, or of some mixture in which these are the chief ingredients. The quantity of sulphate of iron (green vitriol) should not exceed ½ part that of the galls, by which an excess of astringent vegetable matter, which is necessary for the durability of the color, is preserved in the liquid. Gum, by shielding the writing from the action of the air, tends to preserve the color; but if much is employed, the ink flows languidly from the pen. The addition of sugar increases the flowing property, but makes it dry more slowly, and frequently to pass into an acetous state, in which condition it acts injuriously on the pen. Vinegar rapidly softens quill or horn, and corrodes iron and steel. To insure the permanency of the color of the tanno-gallic inks, the best Aleppo or blue nut-galls must alone be used; no second or inferior quality should be employed. Inks depending chiefly on logwood for color, are not considered by ink makers very reliable. Yet some very good logwood inks are made by combination with other chemicals. The quality of aniline inks is steadily improving with the progress of discoveries in aniline colors; so that the prejudice against them is not always warranted.

ALIZARINE BLACK.—Powdered nut-galls, 40 parts; solution of acetate of iron, 15 parts; gum Arabic, 10 parts; wood vinegar, 10 parts; indigo-carmine, 5 parts; water, 100 parts; prepare the solution of acetate of iron by pouring a sufficient quantity of wood-vinegar upon scrap-iron contained in a cask, and allow it to act upon the iron for eight days; macerate the powdered nut-galls for 8 days with the 100 parts of water mixed with the 10 parts of wood-vinegar; before mixing the strained liquid obtained from the nut-galls with the iron solution, in order to ascertain whether the quantity of acetic acid present is sufficient to keep the ferrous acetate in solution, mix 10 volumes of the liquid nut-gall extract with 1 volume of the iron solution; if a clear mixture results of a dark green color in thin layers, the liquid contains enough acid; but if a black, opaque liquid results, add very gradually more wood-vinegar from a measured volume, until the liquid is clear and dark green; add this requisite amount of acid to the extract of nut-galls; dissolve the gum Arabic in the latter; add the iron solution, then the indigo-carmine, or as much as may be required to produce the desired tint.—2. Digest 24 parts of Aleppo galls with 3 parts of Dutch madder, and 120 parts of warm water; filter; mix 1.2 parts of solution of indigo; 5.2 parts of sulphate of iron; and 2 parts

of crude acetate of iron solution. Alizarine ink may be evaporated to dryness and formed into cakes; 1 part, mixed with 6 of hot water, will then form an excellent writing fluid.

ANILINE BLACK is now made almost exclusively from nigrosine dissolved in soft water; about 130 gr. to the qt. is a good proportion. It makes an excellent ink.

BLACK (Elderberries).—Place bruised elderberries in an earthen vessel, and keep in a warm place for 3 days; press out and filter; add to $12\frac{1}{2}$ oz. of this, 1 oz. of sulphate of iron and the same quantity of pyroligneous acid. This ink is violet at first and afterwards becomes black.

BLACK (Logwood).—1. Extract of logwood, 100 parts; lime water, 800 parts; carbolic acid, 3 parts; common hydrochloric acid, 25 parts; distilled water, 600 parts; gum Arabic, 30 parts; bichromate of potassium, 3 parts; and a sufficient quantity of distilled water to bring the whole to a total of 1,800 parts; dissolve the logwood in the lime water over a steam-bath, using a porcelain or thoroughly enamelled iron vessel, and stir frequently; add the carbolic and hydrochloric acids; after heating half an hour over the steam-bath, let the mixture cool and then strain; add the bichromate of potassium and the gum, each separately dissolved in a considerable quantity of distilled water; and then add enough water to make up 1,800 parts. This ink writes red, but soon changes to a deep black.—2. Chipped logwood, 8 lbs; water, 8 gals.; boil $\frac{3}{4}$ of an hour, and add 2 oz. of bichromate of potassa. Cheapest black ink that can be made.—3. Dissolve 15 parts of extract of logwood in 900 parts of water; allow it to deposit; heat to boiling, and add 4 parts of crystallized sodium carbonate; dissolve in 100 parts of water, 1 part of yellow potassium chromate, and add this drop by drop, with constant stirring, to the logwood solution; after standing for a few hours, the ink will have assumed a full bluish-black color.

BLACK (Nut-galls and Iron).—1. Aleppo galls, well bruised, 4 oz.; clean soft water, 1 qt.; macerate in a corked bottle for 10 days, or longer, with frequent agitation; then add of gum Arabic, dissolved in a wineglassful of water, $1\frac{1}{2}$ oz.; lump sugar, $\frac{1}{2}$ oz.; mix well; add sulphate of iron, $1\frac{1}{2}$ oz.; agitate occasionally for 2 or 3 days, when the ink may be poured off for use. Or the ingredients may at once be put into a bottle and agitated daily until the ink is made; boiling water instead of cold being used.—2. Bruised Aleppo nut-galls, 1 lb.; sulphate of iron or copperas, 4 oz.; sulphate of copper, $\frac{1}{2}$ oz.; burnt sugar, 3 oz.; gum Arabic, 4 oz.; perchloride of mercury, 10 gr.; rain water, 1 gal.; mix; macerate 2 weeks; stir occasionally, and filter.—3. Digest for 24 hours with gentle heat, $62\frac{1}{2}$ dr. powdered nut-galls, with 17 oz. of alcohol of 82°; and in another vessel, $22\frac{1}{2}$ dr. of ferrous sulphate, and $22\frac{1}{2}$ dr. of gum Arabic, with 17 oz. of distilled water; mix the two liquids slowly; allow it to stand for 8 days; strain, and add 3 or 4 drops of vanadic acid.—4. Extract of logwood, 4 oz.; sulphate of copper, 1 oz.; nutgalls, 15 oz.; sulphate of iron, 6 oz.; gum Arabic, 6 oz.; cloves, 2 oz.; rain water, $3\frac{1}{2}$ qts.; vinegar, 4 oz.; pyroligneous acid, 8 oz.; add a little carbolic acid; this, with the pyroligneous acid, will prevent the ink from mildewing.—5. Bruised Aleppo nut-galls, 2 lbs.; water, 1 gal.; boil in a copper vessel for 1 hour, adding water to make up for that lost by evaporation; strain, and again boil the gall with 1 gal. of water, and strain; mix the liquors, and add 10 oz. of copperas, in coarse powder, and 8 oz. of gum Arabic; agitate until solution of the latter is effected; add a few drops of a solution of potassium permanganate; strain through a piece of hair cloth, and, after permitting it to settle, bottle.—6. 8 oz. of galls, in coarse powder; 4 oz. of logwood, in thin chips; boil in 12 pts. of rain water for 1 hour; strain the liquor; add 4 oz. of green copperas; 3 oz. of powdered gum Arabic; 1 oz. of blue vitriol; and 1 oz. of coarse sugar; stir until the whole is dissolved; then let it settle for 24 hours, and strain for use.—7. Gall-nuts, broken, 1 lb.; sulphate of iron, $\frac{1}{2}$ lb.; gum acacia and sugar candy, of each, $\frac{1}{4}$ lb.; water, 8 qts.; place the whole of these ingredients in a vessel where they can be agitated once a day; after standing for 14 or 21 days, the ink is ready for use.—8. Powdered galls, 42 oz.; Senegal, powdered, 15 oz.; distilled, or rain water, 18 qts.; sulphate of iron (free from copper), 18 oz.; liquor of ammonia, 3 dr.; spirit of wine, 24 oz.; mix in an open vessel, stirring frequently until the ink attains the desired blackness.—9. Bruised galls, 1 lb.; to this add 1 gal. of boiling water; $5\frac{1}{2}$ oz. of sulphate of iron in solution; 3 oz. of gum Arabic, previously dissolved; a few bruised cloves, or a few drops of crcosote or carbolic acid, dissolved in methylated spirit; allow the galls to macerate for 24 hours, then strain the infusion, and add the other ingredients.—10. Tannic acid and gallic acid, of each 20 gr.; dissolve in 2 oz. of water; crystallized sulphate of iron, and crystallized subsulphate of iron, of each 15 gr.; dissolve in 2 oz. of water; mix the 2 solutions; and add $2\frac{1}{2}$ fl. dr. of mucilage, and 2 drops of oil of cloves.—11. (*Asiatic.*) Logwood shavings and powdered galls, of each, 2 lbs.; green vitriol, 1 lb.; gum, $\frac{1}{2}$ lb.; pomegranate bark, $\frac{1}{4}$ lb.; water, 1 gal.; infuse 14 days with frequent agitation, or boil.

BLACK (Nut-galls and Iron Dissolved in Sulphate of Indigo).—This new form of the old nut-gall and iron ink, is one of the greatest discoveries ever made in the manufacture of inks. It is the basis of the famous Arnold's and Carter's writing fluids. Its peculiarity lies in the nut-gall and iron ink, which is an imperfect solution, being entirely dissolved in dilute sulphate of indigo, making the most perfectly fluid ink known. This action makes the ink write a pale bluish green, which, however, turns, after some hours, to a deep black.—1. 15 parts of bruised gall-nuts and 200 parts of water; boil for about an hour; strain; and then add to the liquor 5 parts of sulphate of iron, 4 parts of fine iron shavings, and a solution of $\frac{1}{2}$ pt. of powdered indigo in 3 parts of sulphuric acid. This ink writes green, but turns black after a few days.—2. Aleppo galls, bruised, $4\frac{1}{2}$ oz.; bruised cloves, 1 dr.; cold water, 40 oz.; sulphate of iron, $1\frac{1}{2}$ oz.; sulphuric acid, 35 min.; sulphate

of indigo, in thin paste, ¼ oz.; place the galls with the cloves in a 50 oz. bottle; pour upon them the water, and digest, shaking often for a fortnight; press, and filter through paper into another 50 oz. bottle; next, put in the iron, dissolved completely and filtered; then the acid, and shake briskly; lastly, add the indigo, and thoroughly mix by shaking; filter again through paper; no gum or sugar is required, and on no account must the acid be omitted.

BLACK (Waterproof).—Shellac, 4 oz.; borax, 2 oz.; water, 1 qt; boil till dissolved; add 2 oz. gum Arabic, dissolved in a little hot water; boil, and add enough of a well-triturated mixture of equal parts of indigo and lampblack, to produce the proper color; after standing several hours, draw off and bottle. Nearly indelible, but too gummy, and not a clear solution.

BLUE.—1. Aniline blue (of which there are many kinds), dissolved in soft water. Cotton blue will do.—2. Prussian blue, 6 parts; oxalic acid, 1 part; mix with water to a smooth paste; dilute with rain water.—3. Dissolve 2 or 3 oz. of sulphate of indigo in 1 gal. of water; or rub together 1 oz. of oxalic acid and 2 oz. of fine Prussian blue; to this add 1 qt. of boiling water; the excess of iron in the Prussian blue must be first removed by a strong mineral acid, then wash in rain water.—4. Soluble indigo of commerce makes a good blue ink, when slightly diluted with hot water.—5. Dissolve 10 parts of yellow prussiate of potassa in 160 parts of pure distilled water; gradually, and while stirring, add to that solution a mixture of 5 parts of a solution of perchloride of iron, and 160 parts of water; collect the precipitate on a filter, and wash with distilled water until the water begins to assume a blue color; dissolve the precipitate, which will then have become soluble in distilled water, in 400 parts of that liquid.—6. Prepare a solution from iodine, iron and water; add to the solution ½ as much iodine as first used; pour this solution into a semi-saturated solution of ferro-prussiate of potash, containing nearly as much of the salt as the whole weight of iodine; collect the precipitate, wash it, and finally dissolve it in water, to form the blue ink.—7. Chinese blue (ferro-cyanide of iron) is ground in water with binoxalate of potash and gum Arabic, in the following proportions: 7 oz. of water to 3 dr. of Chinese blue, 1 dr. of binoxalate of potash, and 1 dr. of gum Arabic.

BROWN.—1. Boil ½ oz. of catechu with 8 oz. of water until dissolved, and strain; dissolve 60 gr. of bichromate of potash in 1½ oz. of water; add it gradually to the solution of catechu until the desired shade is obtained.—2. Add to violet ink, finely powdered bichromate of potash, in the proportion of from 15 to 30 gr. to 1 oz.; various shades of brown and snuff color are obtained.—3. Mix a strong decoction of logwood with a very little bichromate of potash.

COPYING, Black. — Add a little sugar, or other saccharine matter, glycerine, or soluble gum, to any ordinary black ink, which, for this purpose, should be rich in color. Railroad, or multiple copying inks, capable of producing several copies from one writing, are simply inks loaded with extra color and more glycerine or sugar than are put in an ordinary copying ink. Writing executed with this ink may be copied even after many hours, by passing it through a copying press, in contact with thin, unsized paper, slightly dampened, inclosed between 2 sheets of thick oiled or waxed paper, when a reversed transcript will be obtained, which can be read in proper order when the back of the copy is turned upwards. In the absence of a press, a copy may be taken (when the ink is

Copying Press.

good and the writing very recent) by rolling the sheets, duly arranged on a ruler, over the surface of a smooth, flat table, employing as much force as possible, and avoiding any slipping or crumpling of the paper; or by passing a warm flat-iron over the paper laid upon the writing.—1. Mix 30 gr. of extract of logwood, 7 gr. of crystal soda, and ½ oz. of water; boil till dissolved; then, while stirring well, add 30 gr. of glycerine, 1 gr. of chromate of potash, previously dissolved, and 4 gr. of powdered gum Arabic. This receipt requires no press, but the writing may be copied by placing a damp sheet of copying-paper on the writing intended to be copied; above this sheet of copying-paper a sheet of ordinary writing paper must be placed, and then pressed with a paper-knife.—2. Dissolve ½ oz. of gum and 20 gr. of Spanish licorice in 13 dr. of water; add to it 1 dr. of lampblack, previously mixed with 1 teaspoonful of sherry; if the lampblack is greasy, it should be heated to redness in a covered crucible.—3. Malt wort, 1 pt.; evaporate it to the consistence of a syrup; then dissolve it in good black ink, 1½ pts.—4. Solazza juice, 2 oz.; mild ale, ½ pt.; dissolve, strain, and triturate with lampblack (previously heated to dull redness in a covered vessel), ¼ oz.; when the mixture is complete, add of strong black ink, 1½ pts.; mix well; in 2 or 3 hours decant the clear.

COPYING-PAD INK.—This is simply aniline violet ink, of 10 to 15 times the ordinary strength, with a little alcohol added to assist the keeping of so much aniline in solution. Take 40 gr. of methyl violet, BB; dissolve it in 2 oz. of hot rain water; add 2 teaspoonfuls of alcohol; bottle, and keep stopped tight when not in use. If too much alcohol is put in, the ink will spread on the paper, and some of the spirit should be allowed to evaporate. Other

aniline colors can be similarly used, but none give the satisfaction of violet.

COPYING, Red.—Treat a solution of campeachy-wood with 1 per cent. alum and 1 per cent. lime-water, so as to get a permanent precipitate; add a few drops of weak calcium chloride, the fluid becoming a blue-black; into this drop hydrochloric acid until the fluid turns red; add a little gum Arabic and ½ per cent. of glycerine.

COPYING, Violet.—For blue violet, dissolve in 300 parts of boiling water methyl violet, 5B; or Hofmann violet, 3B; or gentiana violet, B; for reddish violet, dissolve in a similar quantity of water methyl violet, RR. A small quantity of sugar added to these inks improves their copying qualities. If the writing, when dry, retains a bronzy appearance, more water must be added.

FADED BLACK INK, To Restore.—1. Cover the letters with a solution of ferrocyanide of potassium, with the addition of diluted muriatic acid; upon the application of which the letters will change to a deep blue color. To prevent the color from spreading, the ferrocyanide should be put on first and the dilute acid added upon it.—2. Dampen a piece of soft white paper; lay it on the faded writing; press it down closely; put a tablespoonful of spirits of hartshorn in a tin vessel with a candle or lamp under it; hold the soft damp paper over it, so as to receive the fumes of the hartshorn; if the writing is not exhibited on the soft paper plain enough, dampen it again and repeat the whole process until it is plain enough.—3. Faded ink on old parchments may be restored so as to render the writing perfectly legible by moistening the paper with water, and then passing over the lines in writing a brush which has been dipped in a solution of sulphide ammonia. The writing will immediately appear quite dark in color, and this color, in the case of parchment, it will preserve. On paper, the color gradually fades again; but it may be restored at leisure by the application of the sulphide.

DRAWING.—1. Dissolve shellac in a hot water solution of borax and rub up in this solution a fine quality of India ink; after using, dip the drawing pen in alcohol and wipe dry, to keep it clean and bright.—2. The addition of 1 part of carbolic acid to 80 parts of the fluid India ink, causes it to dry rapidly even in heavy lines, so that they can be varnished over. The proper amount of carbolic acid to be added may be ascertained by adding, drop by drop, the ordinary apothecary's solution of it in alcohol until varnishing does not affect the definition of a test line by causing it to run. The addition of too much carbolic acid is indicated by the transparency of the line and the inability to draw fine lines, which may be remedied by adding more fluid ink.

GILDING WRITING, Methods of. — Letters written on vellum or paper are gilded in three ways: 1. A little size is mixed with the ink, and the letters are written as usual; when they are dry a slight degree of stickiness is produced by breathing on them, upon which the gold leaf is immediately applied, and by a little pressure may be made to adhere with sufficient firmness.—2. Some white lead or chalk is ground up with strong size and the letters are made with this by means of a brush; when the mixture is almost dry, the gold leaf may be laid on and afterwards burnished.—3. Mix up some gold powder with size, and make the letters of this by means of a brush.

GLASS, Ink for Writing on.—Mix barium sulphate, 3 parts; ammonium fluoride, 1 part; and sulphuric acid, sufficient quantity to decompose the ammonium fluoride and make the mixture of a semi-fluid consistency; prepare in a leaden dish, and keep in a gutta-percha or leaden bottle.

GLUTEN.—Dissolve wheat gluten, free from starch, in weak acetic acid, of the strength of common vinegar; mix 10 gr. of lampblack, and 2 gr. of indigo, with 4 oz. of the solution, and a drop or two of the oil of cloves. Almost indelible.

GOLD.—1. Gold, 24 leaves; bronze gold, ½ oz.; spirits of wine, 30 drops; best honey, 30 gr.; gum Arabic, 4 dr.; rain water, 4 oz.; rub the gold with the honey and gum, and having mixed it with the water, add the spirit.—2. Mix fine bronze powder or gold leaf, ground with a little sulphate of potash, and washed from the salt, with water and a sufficient quantity of gum.—3. Rub genuine gold leaf with honey or thick gum water, on a plate of agate or ground glass, by means of a flat pestle, until the whole presents a uniform mass in which no distinct particles of gold can be recognized; remove this mass carefully into a vessel with water, which will dissolve the honey and leave the gold in a finely divided state behind; renew the water 2 or 3 times, until all the saccharine matter is washed away; mix the remaining gold with a sufficient quantity of a solution of gum Arabic, shaken well. The writing is to be rubbed after drying, with a flat piece of ivory, when it will present the lustre of pure gold.—4. Gold, 1 part; nitro-hydrochloric acid, 3 parts; mix and evaporate until chlorine in vapor is given off; cool, and mix with ether by shaking well together; thicken with naphtha or any essential oil.—5. Rub scales of iodide of lead with mucilage; if it is not dark enough, add a little iodine; shake well before using.

GREEN.—Dissolve 180 gr. bichromate of potassa in 1 fl. oz. of water; add while warm ½ oz. spirit of wine; decompose the mixture with concentrated sulphuric acid until it assumes a brown color; evaporate this liquor until its quantity is reduced to ½; dilute it with 2 oz. distilled water; filter; add ½ oz. alcahol, followed by a few drops of strong sulphuric acid; let it stand, and after a time it will assume a beautiful green color; add a small quantity of gum Arabic and it is ready for use.—2. 2 parts acetate of copper; 1 part carbonate of potash; 8 parts water; boil till half is evaporated, and filter.—3. Crystallized acetate of copper, 1 oz.; soft water, 1 pt.; mix.—4. A solution of verdigris in vinegar.—5. Rub 3½ drs. of Prussian blue and 3 dr. of gamboge, with 2 oz. of mucilage; add ½ pt. of water.—6. Calcine aceto-nitrate of chrome; dilute the green powder with sufficient

water.—7. Mix good clear blue and yellow inks in the proportions necessary to give the desired tint.—8. Verdigris, 2 oz.; cream of tartar 1 oz.; water ½ pt.; boil to ½, and filter. 9. Dilute a solution of recently precipitated hydrated oxide of chromium in liquor of ammonia, with distilled water.—10. Dissolve sap green with a little alum.—11. Galls (in powder), 50 parts; hot water, 800 parts; digest 24 hours; strain, and add of green sulphate of iron and gum Arabic, of each 25 parts; when dissolved, add the following solution and mix well: Sal ammoniac, 8 parts; gum, 2 parts; oil of lavender, 1 part; boiling water, 16 parts.—12. Digest 1 part of gamboge with from 7 to 10 parts of the blue ink.—13. To powdered bichromate of potassa, 8 parts, contained in a porcelain dish, add oil of vitriol, 8 parts, previously diluted with 64 of water; then heat, while evaporating, add gradually 24 parts of alcohol, and reduce to 56 parts, which filter, and in the clear liquor dissolve 8 parts of gum Arabic.

HORTICULTURAL, For Tree Labels.—1. Dissolve muriate of ammonia and crude sal ammoniac in strong vinegar; this is to be used with quill pens only.—2. For large labels, dip your pen in concentrated sulphuric acid, and write on the zinc, previously greased; a sharp point of copper wire is better than a pen; quench in water; wash thoroughly from fluid when your writing is plain enough.—3. First let the label oxidize a little by dipping it in water for a day or two before using; then write with a common lead-pencil.—4. Dissolve a small quantity of chloride of platinum in hot distilled water, adding a very few drops of aqua regia. The liquid should be of a pale amber color; for zinc tree labels.—5. Dissolve 1 part of copper in 10 parts of nitric acid; dilute with 10 parts of water.—6. Squeeze the juice out of a lemon into a pot; put into it a small piece of copper; let it stand for a day or two; write with a quill pen.

INCORRODIBLE.—This name has been given to preparations of a resinous character, capable of resisting the action of damp and acids. They are employed for writing labels on bottles containing strong acids and alkaline solutions. They are better employed with stamps, types or stencil plates, by which greater neatness will be secured than can be obtained with either a brush or pen. (See *Black Waterproof*, also *Indestructible* Inks.)—1. Boiled linseed oil, ground with a sufficient quantity of lampblack and Prussian blue to impart a deep black color; thin with oil of turpentine.—2. Genuine asphaltum, 1 part; oil of turpentine, 4 parts; dissolve, and add lampblack or black lead to bring it to a proper consistence.—3. Cobalt (in powder), 25 gr.; oil of lavender, 200 gr.; dissolve by a gentle heat; add of lampblack, 3 gr.; indigo, 1 gr. (both in impalpable powder); or sufficient vermilion.

INDESTRUCTIBLE.—1. Dissolve 25 gr. of powdered gum copal in 200 gr. of lavender oil by the aid of a gentle heat; add 2½ gr. of lampblack, and ½ gr. of powdered indigo.—2. In 18 oz. of water, boil shellac, 2 oz., and borax, 1 oz.; when cold, filter and mix with 1 oz. gum Arabic dissolved in 2 oz. of water; to this add powdered indigo and lampblack to color.—3. Dissolve real India ink in common black ink; or add a small quantity of lampblack previously heated to redness, and ground perfectly smooth, with a small portion of the ink.—4. Dissolve 20 gr. of sugar in 30 gr. of water; add to the solution a few drops of concentrated sulphuric acid; heat the mixture, when the sugar will carbonize by the action of the acid.—5. (*Hausmann's.*) Mix 1 part genuine Trinidad asphaltum with 4 parts oil of turpentine; color with a sufficiency of plumbago for black, or vermilion for red ink.—6. (*Stephen's.*) Mix common soda of commerce with resinous matters (as shellac or resin), in about equal parts by weight; add water according to the strength required; boil the solution until the resin has become dissolved; mix in a mortar with the requisite quantity of fine lampblack, and add any suitable colored solution.

INDIA.—1. Grind lampblack (finest) to a paste with very weak liquor of potassa; diffuse this paste through water slightly alkalized with potassa; after which collect it; wash with clean water, and dry; rub the dry powder to a smooth stiff paste, with a strong filtered decoction of Carrageen or Irish moss, or of quince seed; add a few drops of essence of musk, and about half as much essence of ambergris towards the end of the process; mold the mass into cakes, and ornament with Chinese characters and devices as soon as they are dry and hard.—2. Purify fine lampblack by washing it with a solution of caustic soda; dry, and make into a thick paste with a weak solution of gelatine; containing a few drops of musk essence and about half as much ambergris; mold and dry. Instead of gelatine the following solution may be used: seed lac, 1 oz.; borax, ¼ oz.; water, 1 pt.; boil until a solution is effected, and make up with water to ¾ pt.—3. Mix pure lampblack with asses' skin glue, and scent with musk.—4. Calcined lampblack, 100 parts; boghead shale black, in impalpable powder, 50 parts; indigo-carmine in cakes, 10 parts; carmine lake, 5 parts; gum Arabic (best quality) 10 parts; purified ox-gall, 20 parts; alcoholic extract of musk, 5 parts; dissolve the gum in 50 to 60 parts of pure water; filter through a cloth; mix the indigo, carmine, lake, lampblack, and shale black with the liquid and grind the whole on a slab with a muller like ordinary colors, but much longer; add the ox-gall and ext. of musk slowly, grinding well in; next dry in the air away from dust; mold into cakes and dry again; when quite firm, compress into bronze molds with any desired design; wrap up in tin foil and again in gilt paper.—5. Dissolve horn strip with caustic kali root till it is melted; boil the brown liquid in an iron kettle until it is thick; then pour on it boiling water, double its weight, and precipitate it with dissolved alum; dry; grind; mix it with gum water and pour it in a mold; a few drops of essence of musk, or of ambergris, may be added as perfume.—6. Boil a weak solution of fine gelatine at a high temperature in a Papin's digester for two hours, and then in an open vessel for one hour more; filter the liquid and evaporate to a

proper consistence, either in a steam or salt-water bath; lastly, make into a paste, with pure lampblack which has previously been heated to dull redness in a well-closed crucible. This will not gelatinize in cold weather, like the ordinary imitations.—7. Dissolve superfine glue in water; add a strong solution of nut-galls; wash the precipitate in hot water; then dissolve it in a fresh solution of glue; filter; evaporate to a proper thickness, and form it into a paste with purified lampblack.—8. Horse-beans or the kernels of the stones of apricots; burn in an oven till perfectly black; grind to a fine powder, and make into a paste with a solution of gum Arabic; then form into cakes.—9. Boil parchment slips or cuttings of glove leather in water till it forms a size, which, when cool, becomes of the consistence of jelly; then having blackened an earthen plate, by holding it over the flame of a candle, mix up, with a camel-hair pencil, the fine lampblack thus obtained, with some of the above size, while the plate is still warm. This black requires no grinding, and produces a perfectly transparent ink, which works freely with the pencil.

JAPAN.—Dissolve in ½ a pt. of soft water ⅜ oz. of potassium bichromate; add the solution to 6 oz. of logwood extract; dissolve in 1 gal. of water; then dissolve in 1 gal. of water by continued boiling, borax, 6 oz., shellac, 1½ oz.; mix all together while warm, and add 3 oz. of ammonia. Distinguished for its gloss after writing. But any ink may be made quite glossy by adding a large proportion of gum Arabic or yellow dextrine.

LUMINOUS.—Phosphorus, ½ dr.; oil of cinnamon, ½ oz.; mix in a vial; cork tightly; heat it slowly until mixed. A letter written in this ink can only be read in a dark room, when the writing will have the appearance of fire.

METALS, Ink for Writing on.—1. Verdigris and sal ammoniac, of each, ½ oz.; levigated lampblack, ½ oz.; common vinegar, ½ pt.; mix thoroughly. This may be used on either zinc, iron or steel.—2, Mix 1 oz. of powdered sulphate of copper and ½ oz. of powdered sal ammoniac with 2 oz. of diluted acetic acid, adding lampblack or vermilion.—3. See *Horticultural Ink*, no. 5. The above receipts will answer for writing on steel, tin plate or sheet zinc.—4. For writing on zinc, see *Horticultural Ink*, nos. 1 and 2.

MOLDINESS IN INK, To Prevent.—1. Add a few bruised cloves, a little oil of cloves, a few grains of corrosive sublimate, or a few drops of carbolic acid or creosote.—2. A small quantity of salicylic acid, ½ gramme to the liter, will prevent ink from molding even when kept in open bottles.

PARCHMENT.—1. ½ lb. each, of pulverized copperas and Honduras logwood; 1 lb. of best Aleppo nutgalls; 4 oz. of gum Arabic, and 2 gal. of rain water; first boil the galls in the water until the strength is out; then add and boil the other articles; add as much additional water as the mixture will bear; let it settle, and strain before bottling.—2. Galls, 1 lb.; gum Arabic, 6 oz.; alum, 2 oz.; green vitriol, 7 oz.; kino, 3 oz.; logwood raspings, 4 oz.; soft water, 1 gal.; mix, and macerate all thoroughly.

POWDERS, Black.—1. 1 lb. nut-galls; 7 oz. copperas and 7 oz. gum Arabic; pulverize and mix. This amount of ink powder will make 1 gal. of good black ink. 2 or 3 powdered cloves should be mixed with each lb. of powder to prevent molding.—2. Take 100 parts dry extract of logwood, well mixed and ground with 1 part fine bichromate of potash. ½ oz. is sufficient to change a whole pt. of water into a beautiful black ink.—3. Gallic acid, 2 lbs.; sulphate of iron (copperas), 1 lb.; gum Arabic, ½ lb.; powder as finely as possible; rub all together, adding a few grains of powdered cloves; dissolve in hot or cold water.—4. Reduce best quality of the aniline nigrosine to powder by grinding. The powder dissolves in water, forming an excellent ink.

POWDERS, Colored.—Any of the best qualities of soluble aniline dyes make good ink powders.

PURPLE.—1. Add to a decoction of 12 parts Campeachy wood in 120 parts of water, 1 part subacetate of copper, 1¼ parts alum, and 4 parts gum Arabic; let stand for 4 or 5 days.—2. Boil 1 oz. of ground logwood in 1½ pts. of soft water, with ½ oz. of pulverized alum; boil 20 minutes; strain, and bottle for use. Exclude the air, and it will keep a long time.—3. 40 gr. methyl or Hoffmann's violet RRR to 1 qt. soft water.

RED.—1. Boil Brazil wood, 2 oz., in 32 oz. of water; to this add, after the decoction has been strained, ½ oz. of chloride of tin, and 1 dr. of powdered gum Arabic; then evaporate to 16 fl. oz.—2. Brazil wood, ground, 4 oz.; white wine vinegar, hot, 1½ pts.; digest in glass or a well-tinned copper or enamel saucepan, until the next day; then gently simmer for half an hour; add towards the end gum Arabic and alum, of each, ½ oz.—3. Boil 2 oz. of good Brazil wood; ½ oz. of alum, and ½ oz. of cream of tartar, in 16 oz. of rain water, till reduced to ½; strain, and dissolve in it ½ oz. of gum Arabic; add a tincture made with 1½ drs. of cochineal in 1½ oz. of spirits of wine.—4. 4 oz. of ground Brazil wood and 3 pts. of vinegar; boil till reduced to 1½ pts.; add 3 oz. of powdered rock alum.—5. Tincture of red sanders, with a solution of rock alum; mix.—6. Triturate 1 dr. of cochineal and 1 dr. of carbonate of potash, with a little boiling water; add 1 dr. of burnt alum, 2 drs. of cream of tartar, and water to bring it to the desired color.—7. Cochineal (in powder), 1 oz.; hot water, ½ pt.; digest, and when quite cold, add of spirits of hartshorn, ½ pt. or liquor of ammonia, 1 oz., diluted with 3 or 4 oz. of water; macerate for a few days longer; then decant the clear.—8. Dissolve 25 parts, by weight, of saffranine in 500 parts warm glycerine; stir in carefully 500 parts alcohol, and an equal quantity of acetic acid; then dilute with 9,000 parts of water, in which is dissolved a little gum Arabic.—9. Dissolve 4 gr. of carmine in 1 oz. of aqua ammonia; add 6 gr. of gum Arabic.—10. (*Permanent.*) Vermilion, 4 parts; sulphate of iron, 1 part; drying oil to mix. Any other color will answer besides red. This ink will resist most of the usual reagents.

SCARLET.—1. Take garancine of best quality, 1 oz.; digest with liquor ammonia, 1 oz.; add 1 pt. of cold distilled water; triturate together in a mortar; filter, and dissolve in the solution ½ oz. of gum Arabic, or take pure carmine, 20 gr.; liquor ammonia, 3 fl. oz.; dissolve and add 18 gr. of powdered gum.—2. Use the aniline color called *eosine*.—3. (*Stephen's.*) Take some common soda, potash, or carbonate of ammonia; add to it, at intervals, twice its weight of crude argol in powder; when effervescence has ceased, pour off the solution, or filter it from insoluble matter; add to it, by measure, half the quantity of oxalate of alumina, prepared by adding to precipitated alumina in a damp state as much oxalic acid as will dissolve it; into this mixture when cold, put as much powdered cochineal as will give it a fine red color; after letting it stand for 48 hours, strain for use.

SILVER.—1. Triturate, in a mortar, equal parts of silver foil and sulphate of potassa, until they are reduced to a fine powder; wash the salt out, and mix the residue with a mucilage of equal parts of gum Arabic water.—2. Mix to a proper consistency finely ground mica with a solution of gum Arabic, in water.

SYMPATHETIC.—Fluids which, when used for writing, remain invisible until the paper is heated, or acted on by some other chemical agent. Sympathetic inks have been frequently employed as the instruments of secret correspondence, and have often escaped detection; but by using the proper reagent, the whole of them may be rendered visible.—(*Black.*) 1. A weak solution of galls; this is turned black by immersing the paper in a weak solution of protosulphate of iron.—2. A weak solution of sulphate of iron; turns black when moistened with infusion of galls.—3. Dissolve 1 fl. oz. of common oil of vitriol in 1 pt. of soft water; stir well and allow it to cool; write with a clean pen; when dry, it will be invisible; held to the fire, it turns black.—4. Writing done with a solution of nitrate of silver, will be invisible until exposed to the sun's rays or heat, when it will become permanently black.—(*Blue.*) 1. Make a simple solution of acetate of cobalt; use it as you would common ink, on a fine textured paper and with a clean quill pen; the writing will be invisible when cold, but on holding it before a fire it will assume a blue tint.—2. A weak solution of sulphate of iron; turns blue when moistened with a weak solution of prussiate of potassa.—3. A weak solution of protosulphate of iron; turns blue when moistened by a weak solution of prussiate of potash.—(*Brown.*) 1. Put into a vial ½ oz. of distilled water, 1 dr. of bromide of potassium, and 1 dr. of pure sulphate of copper; the solution is nearly colorless, but becomes brown when heated.—2. A diluted solution of nitrate of silver becomes dark brown when exposed to the sunlight.—3. A solution of acetate of lead, colorless; becomes brown when exposed to sulphuretted hydrogen gas.—(*Green.*) 1. Write with a solution of muriate of cobalt; the writing, while dry, will not be perceptible; but if held toward the fire will gradually become visible.—2. Digest 1 oz. of zaffre, or oxide of cobalt, at a gentle heat, with 4 oz. of nitro-hydrochloric acid, till no more is dissolved; add 1 oz. of common salt and 16 oz. of water. If this be written with, and the paper held to the fire, the writing becomes green, unless the cobalt should be quite pure, in which case it will be blue. The addition of a little nitrate of iron will impart the property of becoming green.—(*Gray.*) A weak solution of alum in lemon juice or tartaric acid; turns gray when the paper is immersed in water.—(*Purple.*) 1. Write with a weak solution of sulphate of copper, using a quill pen. The writing will remain invisible until it is held over the fumes of ammonia, when it will become purple. The color may then be expelled by holding it near the fire.—2. Write with a dilute solution of terchloride of gold; becomes purple when exposed to the sunlight.—(*Red.*) 1. Solutions of nitrate of silver and terchloride of gold become permanently dark when exposed to sunlight.—2. Boil oxide of cobalt in acetic acid; if a little nitre is added it becomes a pale rose color.—(*Yellow.*) 1. Pound and rub down some muriate of ammonia; pour upon it a small quantity of the solution of sulphate of copper; mix well, and filter the solution, which will then be a muriate of copper; when dry and cool, the characters written or drawn upon the paper will be invisible, but will turn yellow on exposure to heat.—2. Sulphate of copper and sal ammoniac, equal parts, dissolved in water; writes colorless, but turns yellow when heated.—3. Lemon juice; a very weak solution of either aquafortis, oil of vitriol, common salt, or saltpeter, will turn yellow or brown on exposure to the fire.—4. Dissolve crystals of chloride of cobalt in water; add a sufficient quantity of nitrate of copper; heat, and an ink of rich greenish yellow color will result. When the paper is laid aside, moisture is absorbed and the writing disappears, but if much heat is applied the traces will become permanent.—(*Landscape.*) 5. Draw a landscape with India ink, and paint the foliage of the vegetables with muriate of cobalt, some of the flowers with acetate of cobalt, and others with muriate of copper. While this picture is cold, it will appear to be merely an outline of a landscape, or winter scene; but when gently warmed, the trees and flowers will be displayed in their natural colors, which they will preserve only while they continue warm. This may be often repeated.

TRANSFER INKS (For Lithographing and Art Work).—For the manufacture of the following inks an iron pot and lid must be procured.—1. White wax, 8 oz.; white soap, 2 to 3 oz.; melt, and when well combined, add of lampblack, 1 oz.; mix well; heat it strongly; then add of shellac, 2 oz.; again heat it strongly, stir well together; cool a little, and pour it out as before. With this ink, lines may be drawn of the finest to the fullest class, without danger of its spreading, and the copy may be kept for years before being transferred.—2. White soap and white wax, of each 10 oz.; mutton suet, 3 oz.; shellac and mastic, of each, 5 oz.; lampblack, 3½ oz.; mix as above. Both the above are used for writing on lithographic paper. When the last

is employed, the transfer must be made within a week. The above inks are rubbed down with a little water in a small cup and saucer for use, in the same way as common water-color cakes or india ink. In winter, the operation should be performed near the fire, or the saucer should be placed over a basin containing a little tepid water. Either a steel pen or a camel-hair pencil should be employed with the ink.—3. (*Chalks.*) Virgin wax, 16 parts; tallow, 2; white soap, 12; lampblack, 3½; melt the wax and tallow, and mix with an iron spoon; then add the soap, which must be previously cut into strips; when melted, apply a light, and allow to burn until the whole is decreased to the same bulk as existed before the addition of the soap; carefully add the shellac, bit by bit, stirring the whole time to effect perfect amalgamation; next add the black, and mix the whole well while in a liquid state; then pour into a mold, or on a slab, and cut to the required size while warm. The same method of proceeding is alike applicable to the manufacture of transfer writing ink, proceeding with the wax only, there being no tallow.—4. (*Copper-plate Transfer Ink.*) Litho. writing ink, 4 parts; thin varnish, 1 part; wax, 1 part; tallow, ½ part; soap, 1 part; carefully melt the ingredients; when in a liquid state pour into molds, or cut to the required size.—5. (*Stone Re-transfer Ink.*) Litho. printing ink, 2 parts; writing ink, 2 parts; thin varnish, 2 parts; tallow, ½ part.—6. (*Stone Writing Ink.*) Virgin wax, 4 parts; tallow, 3 parts; soap, 13 parts; shellac, 6 parts; lampblack, 3 parts. To dissolve solid lithograph ink, warm the pot at the fire or gas, using rain or distilled water to rub it down with, as it is softer than other water. The pen will be found to work better at first if it is dipped in oil, and then wiped previous to writing.

VANISHING.—1. A piece of sal ammoniac is placed for 4 or 5 days in nitric acid, and then powder of touchstone, such as jewelers use for trying gold and silver, is mixed with the liquid in sufficient quantity. This gives a writing fluid which bleaches after 6 to 8 days.—2. A still better ink of this kind may be obtained as follows: Boil 4 oz. crushed gall-nuts in diluted nitric acid, and add 2 oz. of sulphate of iron and some chloride of ammonium. Writing done with this mixture will disappear in a few days.

VIOLET.—1. Boil 8 oz. of logwood in 3 pts. of water till reduced to 1½ pts.; strain, and add 1½ oz. of gum and 2½ oz. of alum.—2. Cudbear, 1 oz.; pearlash, 1½ oz.; hot water, 1 pt.; allow to stand for 12 hours; strain, and add about 2 oz. of gum; if required to keep, add 1 oz. spirits of wine.—3. Aniline violet, BBB; stir till dissolved in boiling water.

WHITE.—1. Mix pure freshly precipitated barium sulphate, or "flake white," with water containing enough gum Arabic to prevent the immediate settling of the substance. Starch or magnesium carbonate may be used in the same way. They must be reduced to impalpable powders.—2. Rub up fine French zinc white, or white lead, with gum-water to the proper consistency.

WHITE, For Black Bottles. — Grind flake white, or sulphate of baryta, with a little oil of turpentine, and any light colored varnish to a proper consistence.

WHITE, For Colored Paper.—1 part muriatic acid, and 20 parts starch-water. Very dilute oxalic acid may also be used. Write with a steel pen.

YELLOW.—1. Triturate gamboge with water, and add a little alum.—2. Boil 8 oz. of French berries with 1 oz. of alum in a qt. of water; strain, and add 1 oz. of gum.—3. 1 part fine orpiment: rub up well with 4 parts of thick gum-water.—A little alum, added to saffron, in soft hot water, makes a beautiful yellow ink.

INDELIBLE INKS.

ANILINE BLACK.—1. Dissolve bichloride of copper, 8½ gr., in distilled water, 30 gr.; add common salt, 10 gr.; and liquid ammonia, 9½ gr.; add a solution of 30 gr. of hydrochlorate of aniline in 20 gr. of distilled water to 20 gr. of solution of gum Arabic, containing 2 pt. of water. 1 pt. of gum Arabic, and 10 gr. of glycerine; mix 4 parts of the aniline solution, thus prepared, with 1 part of the copper solution. This ink can be used with a steel pen. It is green at first, but becomes black in a few days, or by the application of a hot iron. The finest devices can be written with it. It is better to mix the two solutions just before using.—2. Dissolve 4 parts of aniline black in 16 parts (by weight) of alcohol, with 60 drops of strong hydrochloric acid; dilute the dark blue solution with 90 parts (by weight) of water, in which 6 parts of gum Arabic have been previously dissolved. This ink may be used either with a pen or a stencil plate and brush; if it does not flow freely from the pen, it may be diluted with a little water. After exposure to the air this becomes black; or it may be changed to a black color immediately by passing a hot iron over the back of the fabric, or heating it over the flame of a spirit lamp. As a dry heat is apt to make the fibre saturated with the ink, brittle, it is preferable to hold the marked fabric over a vessel containing water in full ebullition. After steaming, the writing should be washed in hot soapsuds, which gives the ink a fine blue shade. This ink is not acted upon by acids or alkalies, and if the fibres are well saturated with the ink, there is no danger of its being removed by washing.—3. Dissolve ½ oz. nitrate of silver in about 2 oz. of distilled water; add carbonate of soda so long as a precipitate falls; wash this precipitate, and add tartaric acid till effervescence ceases; wash the insoluble tartrate of silver, and dissolve in 1 oz. of strong solution of ammonia. Use this with a quill pen, and hot iron as generally directed.—4. Dissolve with the assistance of heat, 20 parts of brown shellac, in a solution of 30 parts of borax in 300 to 400 parts of water, and filter the solution while hot; then add to the filtrate a solution of 10 parts of aniline black, soluble in water, 3-10 part of tannin, 1-10 part of picric acid, 15 parts spirit sal ammoniac and ½ oz. water.

BLACK.—1. Dissolve nitrate of silver, ½ oz., in water, ¾ oz.; add as much of the strongest liquor of ammonia as will dissolve the precipitate formed on its first addition; add of mucilage, 1½ dr., and a little sap green, syrup of buckthorn, or finely powdered indigo, to color. Writing executed with this ink turns black on being pressed over by a hot flat-iron, or held near the fire.—2. Dissolve nitrate of silver, 100 gr., in distilled water, 1 oz.; gum Arabic, 2 dr.; sap green, 1 sc. The linen is first to be dampened with the following: Sub-carbonate of soda, 1 oz.; water, 8 oz.; dried and rubbed smooth; then written on by a clean quill or bone pen.—3. Rub together 1 oz. of nitrate of silver and 1 oz. of bitartrate of potash; add 4 oz. of liquor of ammonia; when dissolved, mix in 6 dr. of white sugar, 10 dr. of powdered gum Arabic, ½ oz. of archil, and water to make up 6 oz., by measure. Press the part written on with a hot iron.—4. Dissolve separately nitrate of silver, 1 oz.; crystal carbonate of soda, 1½ oz.; mix, and collect the precipitate on a filter; wash well; then introduce the moist precipitate into a mortar; add 8 sc. of tartaric acid; triturate till effervescence ceases; add a sufficient quantity of strong liquor of ammonia to dissolve the tartrate of silver; to which add 4 fl. dr. of archil; 4 dr. of powdered white sugar, and 12 dr. of powdered gum Arabic; and make up to 6 fl. oz., if required, with distilled water. Press the part written on with a hot iron.—5. Dissolve 2 dr. of lunar caustic, and ½ oz. of gum Arabic in a gill of rain water; dip whatever is to be marked in strong pearlash water; when perfectly dry, iron it very smooth; the pearlash water turns it a dark color, but washing will efface it. After marking the linen, put it near a fire, or in the sun to dry.—6. Dissolve 1 part of hypophosphite of soda and 2 parts of gum Arabic in 16 parts of distilled water. The linen or cotton to be marked must be thoroughly moistened with the liquid, and then left to dry; when well dried, the following liquid, composed of 1 part of nitrate of silver and 6 parts of gum, dissolved in 6 parts of distilled water, is used as marking ink with a quill pen.—7. Varnish (such as is used for ordinary printing ink), 1 lb.; black sulphuret of mercury, 1 lb.; nitrate of silver, 1 oz.; sulphate of iron, 1 oz.; lampblack, 2 tablespoonfuls; grind all well together; thin with spirits of turpentine as desired.—8. Sulphate of manganese, 2 parts; lampblack, 1 part; sugar, 4 parts; all in fine powder; rub to a paste with a little water. This is to be used with types or stencil plates; the part, when dry, being well rinsed in water.—9. Heat to redness equal weights of black oxide of manganese and caustic potash, and mix it with an equal weight of pipe-clay, and sufficient water to give it a due consistence. This is to be applied with types or stencils. It becomes brown and does not wash out.—10. Add caustic alkali to a saturated solution of cuprous chloride until no further precipitate forms; allow the precipitate to settle; draw off the supernatant liquid with a siphon, and dissolve the hydrated copper oxide in the smallest quantity of ammonia. It may be mixed with about 6 per cent. of gum dextrine for use.—11. Combine lampblack ground in a lye of caustic soda, with a mixture of gentin and caustic soda.—12. Borax, 1 oz.; shellac, 2 oz.; water, 18 fl. oz.; boil in a covered vessel until dissolved; strain; add of thick mucilage 1 oz.; triturate it with levigated indigo and lampblack, of each sufficient quantity to give a good color; settle for 2 hours; then decant it from the dregs, and bottle for use.—13. Lampblack, previously heated to dull redness in a covered vessel, ½ oz.; triturate with good black ink (gradually added), 1 pt.—14. Dissolve 20 parts of potassa in boiling water; add 10 parts of fine cut leather chips, and 5 parts of flowers of sulphur; heat the whole in an iron kettle until it is evaporated to dryness; continue the heat until the mass becomes soft, care being taken that it does not ignite; remove the pot from the fire; allow it to cool; add water; strain the solution, and preserve it in bottles. This ink flows easily from the pen.—15. A strong solution of chloride of platinum, with a little potassa, sugar and gum to thicken.—16. Phosphate of magnesia, 1 oz.; muriatic acid, 2 oz.; anthracene, 4 dr.; bichromate of potassa, 2 dr.; water, 2 dr.; sufficient gum Arabic; dissolve the phosphate of magnesia in the muriatic acid; to the solution add the anthracene and the bichromate, dissolved in the water; and, lastly, enough gum Arabic to thicken the liquor.—17. The fluid contained between the kernel and shell of the cashew nut, when used on linen and cotton, turns gradually black, and is very durable.

BLUE.—1. Dissolve 5 parts of oxide of molybdenum in the smallest necessary quantity of muriatic acid; also dissolve 2 parts of extract of licorice, and 6 of gum Arabic, in 200 parts of water; mix the solutions, and write with them on the linen to be marked; after writing, moisten with a solution of chloride of tin in water. This is not only indelible in ordinary washing, but in acids and alkalies.—2. Dissolve 22 parts of carbonate of soda in 25 parts of distilled water; 17 parts of crystal nitrate of silver in 24 parts of ammonia; liquefy 20 parts of gum in 60 parts of water and mix with the soda solution; afterwards with the nitrate of silver, and, lastly, add 33 parts of sulphate of copper. This writes a rich blue.—3. Mix powdered ultramarine with sufficient turpentine to make it thin enough to flow from the pen.

CRIMSON.—1. Dissolve 1 oz. of nitrate of silver, and 1½ oz. of carbonate of soda in crystals, separately in distilled water; mix the solutions; collect and wash the precipitate on a filter; put the washed precipitate, still moist, into a Wedgewood mortar; add to it tartaric acid, 2 dr. and 40 gr., rubbing together till effervescence ceases; dissolve carmine, 6 gr., in liquor ammoniæ, 6 oz.; add to it the tartrate of silver; mix in white sugar, 6 dr.; powdered gum Arabic, 10 dr.; add as much distilled water as will make 6 oz.—2. Powdered cochineal, 2 oz.; cream of tartar, 2 oz.; carbonate of potassa, 1 oz.; alum, 1 oz.; gum Arabic, 1 oz.; boiling water, sufficient; boil the cochineal and cream of tartar with 8 oz. of the water; strain; add the carbon-

ate of potassa; then the alum and gum Arabic; if the color of the liquid partakes too much of the scarlet shade, add enough carbonate of potassa to turn it to the hue desired.

NORMANDY'S. — Frankfort lampblack, 24 lbs.; ground with mucilage, made by adding 24 lbs. of gum to 60 gals. of water, and the mixture filtered through a very coarse flannel; then add 4 lbs. of oxalic acid, with as much decoction of cochineal and sulphate of indigo as will yield the shade of color desired.

PINK.—Write with a solution of chloride of gold on linen previously starched and pressed; expose the part written on to the sunlight, and the letters will become of a bright, rose-pink color.

PURPLE. — 1. Moisten the material to be marked with a solution of chloride of tin; then write with a solution of chloride of gold.—2. Terchloride of gold, 1½ dr.; water, 7 fl. dr.; and a sufficient quantity of sap green, to color. This is to be written with on a ground prepared with a weak solution of protochloride of tin, and dried.

RED.—Moisten the place where the letters have to be written with a solution of 1 dr. of carbonate of soda, and 1 dr. of gum Arabic in ½ oz. of water; smooth the spot with a warm iron; write with a quill pen, using the following solution: bichloride of platinum, 1 dr.; water, 2 oz.; when the writing is dry, write over the letters only with the following solution: Protochloride of tin, 1 dr.; water, 2 oz.—2. Mix and reduce to a fine powder ½ oz. of vermilion; 1 dr. of the salt of steel; and linseed oil to render it of the consistency of good ink.—3. (*Welger's.*) Mix enough finely pulverized cinnabar to form a moderately thick liquid, with egg albumen previously diluted with an equal bulk of water, beaten to a froth, and filtered through fine linen. Write with a quill pen; after the letters have become dry, press the cloth on the other side with a hot iron. This ink should be kept in well closed bottles.

MARKING INKS.

ANILINE BLACK.—Dissolve 4 parts of soluble nigrosine in 15 parts of hot water.

BLACK.—1. Mix ½ oz. of bichromate of potassa and 4 oz. of extract of logwood in a stone jar or demijohn, with 2 gals. of hot water; shake well and let it stand, shaking occasionally.—2. Mix lampblack thoroughly with sufficient turpentine to make it thin enough to flow from the brush.—3. Triturate together 1 pt. pine soot and 2 pts. Prussian blue with a little glycerine; add 3 pts. gum Arabic and sufficient glycerine to form a thick paste.

BLUE.—Shellac, 4 parts; borax, 1 part; dissolve in a small quantity of boiling water and dilute with hot water to the consistency of very thin syrup; to this add soluble Prussian blue or blue carmine.

STENCIL.—1. Take of shellac, 2 parts; borax, 1 part; soft water, 10 parts; gum Arabic, 1 part; lampblack and indigo, sufficient quantity; boil the shellac and borax in the water until they are dissolved; add the gum Arabic, and withdraw the mixture from the fire; when cold add lampblack to bring it to a suitable color and consistence, and lastly a very small quantity of finely-powdered indigo. Keep in glass or earthenware vessels.—2. Boil 1 lb. of logwood chips in 1 gal. of water at boiling point 10 minutes; stir in ½ oz. of bichromate of potash; boil this 10 minutes longer; add, when cold, ½ lb. of common gum, previously dissolved, and stir well in. This will mark bags with either the stencil plate or block.

WATERPROOF.—Pitch, 11 lbs.; lampblack, 1 lb.; turpentine, sufficient; mix with heat. This is suitable for tombstones.

TICKETING INK, For Grocers.—Dissolve 1 oz. of gum Arabic in 6 oz. water, and strain; this is the mucilage; for *black* color, powder and grind drop black with the mucilage to extreme fineness; for *blue*, use ultramarine in the same manner; for *green*, emerald green; for *white*, flake white; for *red*, vermilion, lake or carmine; for *yellow*, chrome yellow; when ground too thick thin with a little water; apply to the cards with a small brush. The cards may be sized with a thin glue, and afterwards varnished, if it is desired to preserve them.

BALES, Ink for Marking.—Shellac, 2 oz.; borax, 2 oz.; water, 25 oz.; gum Arabic, 2 oz.; Venetian red, sufficient to color.

BLUE.—Silver nitrate, 4 grm.; ammonia, 12 grm.; sodium carbonate, 4 grm.; powdered gum Arabic, 6 grm.; cupric sulphate, 20 grm.; distilled water, 16 grm.; dissolve the silver salt in the ammonia, and the soda, gum and copper salt in the distilled water, and mix the two solutions.

LEATHER AND WOOD, Ink for Marking.—The following is an ink that does not corrode steel pens: Triturate 3·65 gr. of aniline black with 22 gr. of alcohol and 4 drops of hydrochloric acid; a porcelain mortar is employed, and the paste thus produced is mixed with 1·82 gr. of gum Arabic, previously dissolved in 85 gr. of hot water. If this ink be added to an alcoholic solution of shellac (21 gr. of shellac to 85 of alcohol), a black product results, suitable for coloring leather and wood.

STAMPING INK, For Rubber Type,—(*Black.*) Rub lampblack into a smooth paste with a sufficient quantity of glycerine, A solution of nigrosine in alcohol and glycerine, may also be used. Fats and oils being injurious to india-rubber, should be avoided.—(*Colored.*) 1. Can be made of glycerine, mixed with ordinary paints, such as Prussian blue, carmine, chrome green, chrome yellow, etc.—2. Dissolve fine aniline red, violet, or any other aniline color, in boiling water (as little as possible); then stir up a sufficient quantity of this with pure concentrated glycerine.

WHITE, For Lantern Slides.—1. Use ordinary Chinese white for marking lantern slides, or the following solution can be employed for writing on the film: Potassium iodide, 10 parts; water, 30 parts; iodine, 1 part; gum Arabic, 1 part. Use an ordinary pen, writing on the dark portions of the film. The solution converts the silver into silver iodide, thus pro-

ducing white letters on a black or dark ground. —2. Grind zinc white (oxide of zinc) with water till smooth, adding a little clean gum Arabic.

Copying Processes.

ADLER'S PROCESS.—This is a multiplying process based upon the use of the glue plate, consisting of gelatine, glycerine and water, used in the hektograph and other similar processes. (See the receipt for *Gelatine Copying-Pad.*) For writing or drawing use a concentrated solution of alum, to which, in order to render the writing or drawing visible upon the paper, add a few drops of some aniline color. Before laying the writing or drawing upon the gelatine surface pass a damp sponge over the latter, and allow the moisture to sink in for a few minutes so as to have a greater effect upon the alum; then lay the written side downward upon the gelatine, and, after the lapse of a few minutes, on removing it the writing will be found reversed and eaten into the gelatine film as if it were engraved; by means of an India-rubber roller a little common printing ink is spread over the plate and absorbed by the lines sunk by the alum, and again rejected on the application of moisture upon the paper laid down upon it, and smoothed over it by the flat hand. When removed this paper will have upon it the first impression of the writing or drawing; for each succeeding impression the plate must be inked by the India-rubber roller.

ALISOFF'S PROCESS.—Instead of a tray filled with a compound, sheets of prepared paper may be used. Coat sized or unsized paper on one side with the following composition: 80 lbs. animal glue or gelatine; 20 lbs. glycerine; 20 lbs. soap; 200 lbs. water. If the paper thus prepared be found to be too sticky for use (which will depend on the surrounding temperature and the quality of the materials employed), wash the prepared paper with a solution of alum, the strength of which can only be determined by experiments in each case. The paper may be of different thicknesses, and if not transparent may be made so by any of the ordinary and well-known means. The aniline ink is prepared by dissolving about 1 lb. of aniline of commerce in about 1½ lbs. of alcohol, and adding thereto, when dissolved, as much water as is necessary to render it sufficiently fluid. It may then be bottled for use. To produce the matrix take a sheet of prepared paper, and lay it on a sheet of damp flannel or cloth placed upon a zinc plate or an oil paper; sponge it with clean water, or, in hot weather, with water containing a little alum, and place the dry original upon the prepared paper; over that place another piece of damp flannel, zinc or oil paper, and put the whole pile into an ordinary copying press. A good matrix can be obtained by mere pressure of the hands without a press. The text must be written, drawn or printed with aniline ink, taking care that the pen be quite clean and always full of ink. The ink, when dry, ought to shine like a metallic surface. In taking copies from the matrix after having detached the original therefrom by pulling off, the sheets of paper on which copies are desired to be made are placed face downward in the same place, gently rubbed on evenly, then likewise pulled off and laid aside to dry. They will at first be curled up, but can be very easily and quickly straightened out under a weight when dry; but if copies or matrices are to be taken from 2, 4, 6 or 8 pages at once, place a sheet of damped prepared paper on each page with damp flannels and zinc sheets between the leaves of prepared paper, and proceed in the way above described. The prepared paper may be bound into copying books which can be used like ordinary copying books made of tissue paper, and copies on ordinary paper may be taken from the matrices thus preserved, even after a considerable time. After a few copies have been taken the written text can be read from the reverse side of the matrix. Should it be found desirable to obtain manifold copies of printed matter, this may be accomplished by employing, in combination with prepared paper, a special printing ink. (See *Polygraphic Printing Ink.*)

GELATINE COPYING PAD.—This wonderful invention is beautiful in its simplicity, but will not give satisfaction unless thoroughly understood and neatly managed. A little patience and experience will make it a valuable labor saver at trifling cost. Take any shallow tin or other plate of rectangular shape; or, better, have the tinman make a pan about 9 by 12 in. (or any size wanted), and ½ in. deep, with a loose

Copying Pad.

cover. Take a two-quart (or larger) tin cup or kettle, which must sit in a water-bath, like a glue-kettle, to avoid spoiling the contents with too much heat; put in it ½ lb. of powdered or granulated gelatine (glue will not do so well), and thoroughly mix with 1 pt. of water; let it stand ½ hour; then place it in the water-bath, and over a gentle heat, till entirely dissolved; do not add more water if it can be avoided; add 1½ lbs. of glycerine (crude glycerine will do, if obtainable); mix well and raise heat to boiling point; add a few grains of salicylic (or carbolic) acid to prevent molding; prepare one or two pieces of stiff paper, cut squarely to 2x3 in.; pour out into the pan; skim off all scum and bubbles, with the pieces of paper, till the whole surface is like a sheet of glass; put on the cover

till entirely cooled, which will take several hours. To make copies of any writing, first write an original with the special ink, for which we elsewhere give the receipt. (*See Copying-pad Ink.*) When dry, lay the sheet (writing down) on the face of the tablet, evenly and with care; rub it down gently all over with the balls of the fingers; let it remain 15 minutes; pull it off; copies can now be taken by rubbing on other sheets only for a minute in the same way, to the number of from 20 to sometimes nearly 100. When through, the ink must be washed out of the tablet at once, with an abundance of water and a soft sponge, and all surplus water wiped off; after being allowed to dry, another writing can be copied on the same surface. In case of extreme cold weather, it may be necessary to add more glycerine; if hot weather more gelatine, to suit, or as experience shows. In case of the tablet's smooth surface being cut or broken up, all can be re-heated in a water-bath, and a new surface made.

STENCIL PROCESS.—By the following process, 1,000 or more copies of writings or drawings may be obtained with the gelatine tablet. Coat fine linen or bank-note paper over, on one side, by means of a camel-hair varnish brush, with a clear solution of 1 oz. of pine resin in 4 oz. of absolute alcohol; when this coat has dried, put on another. The ink used on this prepared paper is made as follows: Water, 1 oz.; caustic potash, 1 oz.; Vandyke brown, to color, a sufficient quantity. Write or draw with an ordinary pen, on the coated side of the paper; then float the paper on the surface of clear water, written side up, with care to avoid wetting the upper side; in about 10 minutes take the paper out by one corner and place, writing downward on a blotter; wash the back of the paper over with a camel-hair brush filled with water; then turn the paper on the blotter and wash in a similar manner until the ink disappears; dry the sheet between blotters, when it is ready for use. The tablet composition is prepared by dissolving by the aid of heat over a salt water-bath, 1 oz. of fine gelatine, previously softened by soaking it in a little cold water over night, in 6 oz. of best glycerine, and pouring the solution out in a shallow tin pan; this pan may be ½ in. deep, 10 in. wide, and 14 in. long; when the composition is poured in, it should stand level, and should remain in this position for 12 hours; the surface of the tablet should be sponged over with cold water and allowed to dry before using. Place the stencil paper, written side down, smoothly upon the tablet, and with a small paste brush paint over the back of the paper with an ink prepared from aniline violet (best), 1 oz.; glycerine (pure), 1 oz.; triturate together in a hot mortar; and allow the ink to stand for 12 hours or more before using it. Place over the inked sheet another blank sheet of the prepared paper; rub the hand firmly over it, and put a weight of 2 or 3 lbs on it; a book or smooth board, with a quantity of printing paper beneath it, does very well; in about ½ hour remove this weight, and carefully separate the stencil paper from the tablet, leaving a strip of ½ in. of it adhering at the side and turning the sheet over the edge of the pan. If the manipulations have been properly conducted, a reversed copy, in the aniline ink, will be found on the tablet; and from this a large number of positive copies may be obtained, by spreading a blank sheet of paper on the tablet and passing the hand gently over the paper. When the print becomes faint, the stencil may be folded over and pressed against the tablet as before, the adhesion of the edge of this stencil securing, with a little care, proper registration, and the rubbing re-enforcing the transfer; a few minutes is all that is required for this re-enforcing. The stencil should be turned back on a card-board, keeping the blank sheet under it. This stencil paper is semi-translucent, so that in copying drawings, wood engravings, etc., it may be used as a tracing paper. In floating the stencil on the water, care should be taken that no air-bubbles are left under the paper.

SUGAR PAPER.—Mix white sugar, 1½ dr., with 1 oz. of ink; use this with an ordinary pen; place over the writing a moistened sheet of unsized paper; lay both leaves between two layers of carpet; put the whole under a piece of board large enough to cover; then stand on the board for a few seconds; an excellent impression will be found on the copying paper.

HEKTOGRAPH SHEETS.—Soak 4 parts of best white glue in a mixture of 5 parts of water and 3 parts of solution of ammonia, until the glue is soft; warm the mixture until the glue is dissolved, and add 3 parts of granulated sugar and 8 parts of glycerine, stirring well and letting come to the boiling point; while hot paint it upon white blotting paper with a broad copying brush, until the paper is thoroughly soaked and a thin coating remains on the surface. Allow it to dry for 2 or 3 days. An aniline ink should be used, and before transferring to the blotting paper, wet the latter with a sponge, and allow it to stand 1 or 2 minutes; then proceed in the ordinary way. If the sheets are laid aside for 2 days, the old writing sinks in, and does not require to be washed off. These sheets will give satisfaction.

EXPLOSIVES AND FIREWORKS.

EXPLOSIVES.

CARTRIDGES.—These are paper or metallic cases, which contain the exact charge of a musket, rifle or fowling-piece. Both the bullet and powder are placed in them. In modern practice, a fulminate is placed in the end, to be struck by the trigger, to explode the cartridge, If they are for a heavy gun, the charge of powder should be made up in a bag of serge.

Blank cartridges contain powder, but no bullet. Cartridges for sporting purposes contain small shot. The outer paper covering should contain a wire net-work and a charge of shot intermixed with bone-dust; at the end place wadding; make them waterproof by any compound of grease and gum used for that purpose.

DYNAMITE.—Mix infusorial silica with about 75 per cent. of nitro-glycerine, which it readily absorbs; it is exploded by percussion priming.

FULMINATE OF MERCURY.—1. Mercury, 1 part; nitric acid, 12 parts; dissolve; add at intervals to this solution, alcohol, 16.3 parts; apply heat, till the effervescence and cloud of gas disappears; add gradually, on the action becoming violent, 16.3 parts more of alcohol.—2. Mercury, 100 parts; nitric acid, 1,000 parts; dissolve by a gentle heat; when the solution has acquired the temperature of 130° Fahr., slowly pour it through a glass funnel tube into alcohol, 880 parts; as soon as the effervescence is over and white fumes cease to be evolved, filter through double paper; wash with cold water, and dry by steam or hot water; then pack in 100 gr. paper parcels, and store in a tight box or corked bottle.

FULMINATE OF SILVER.—1. Digest oxide of silver (recently precipitated and dried by pressure between bibulous paper) in concentrated liquor of ammonia, for 12 or 15 hours; pour off the liquid, and cautiously dry the black powder in the air, in divided portions; the decanted ammoniacal liquor, when gently heated, yields, on cooling, small crystals, which possess a still more formidable power of detonation than the black powder, and will scarcely bear touching even while under the liquid.—2. Metallic silver, 40 to 50 gr.; nitric acid, $\frac{3}{4}$ fl. oz.; dissolve by the aid of a gentle heat; add, while the solution is still hot, alcohol, 2 fl. oz.; again apply heat until reaction commences; the fulminate slowly separates from the hot liquid under the form of small, brilliant, white crystalline plates, which, after being slightly washed with a little cold distilled water, are to be distributed upon separate pieces of filtering paper, in portions not exceeding 1 to 2 gr. each, and left to dry in the air; when dry, the papers are to be folded up, and carefully preserved in a box or bottle.

FULMINATING POWDER. — 1. Mix together, in a warm mortar, 3 parts of pulverized nitre, 2 of dry carbonate of potash, and 1 of sulphur; a small quantity, heated on an iron shovel or ladle, till it fuses, suddenly explodes with great violence.—2. Sulphur, 1 part; chlorate of potassa, 3 parts; when triturated with strong pressure, in a marble or Wedgewood-ware mortar, it produces a series of loud reports; it also fulminates by percussion.

GREEK FIRE.—A solution of phosphorus in bisulphide of carbon; not strictly an explosive, but an agent in ancient warlike naval operations; burns on water.

GUN COTTON.—Mix $4\frac{1}{2}$ oz. of pure dry nitrate of potash with 30 fl. dr. of sulphuric acid; after cooling thoroughly, stir into this mixture, carefully, 30 dr. of best carded cotton; as soon as saturation is complete, throw the cotton into a tubful of clear rain water, and change the water repeatedly until litmus ceases to show the presence of acid; then squeeze it in a cloth, and after being well pulled out, dry it cautiously at a temperature not exceeding 140° Fahr.; it is now explosive, and too much caution cannot be observed in handling it.

GUNPOWDER, Blasting.—Saltpeter, 62 parts; sulphur, 20; charcoal, 15.

GUNPOWDER, Sporting.—79.6 parts of saltpeter; 9.6 of sulphur; and 13.5 of charcoal.

GUNPOWDER, War.—1. 75 parts of nitre, recrystallized; 15 of best quality of charcoal; 10 of distilled sulphur.—2. Well dried yellow prussiate of potash, 1 part; white sugar, 1 part; chlorate of potash, 2 parts; let the ingredients be separately reduced to a fine powder, and the powders mixed by the hand, or by means of a leathern barrel turning on its axis.

NITRO-GLYCERINE.—This is prepared by the action of strong nitric and sulphuric acids on glycerine at a low temperature. Sulphuric acid, $4\frac{3}{4}$ lbs.; nitric acid, $2\frac{1}{2}$ lbs.; glycerine, 1 lb. Nitro-glycerine collects at the bottom of the vessel, and is freed from the acids by carefully washing in a copious supply of water; the explosion is caused by the rapid transformation from the liquid to the gaseous state.

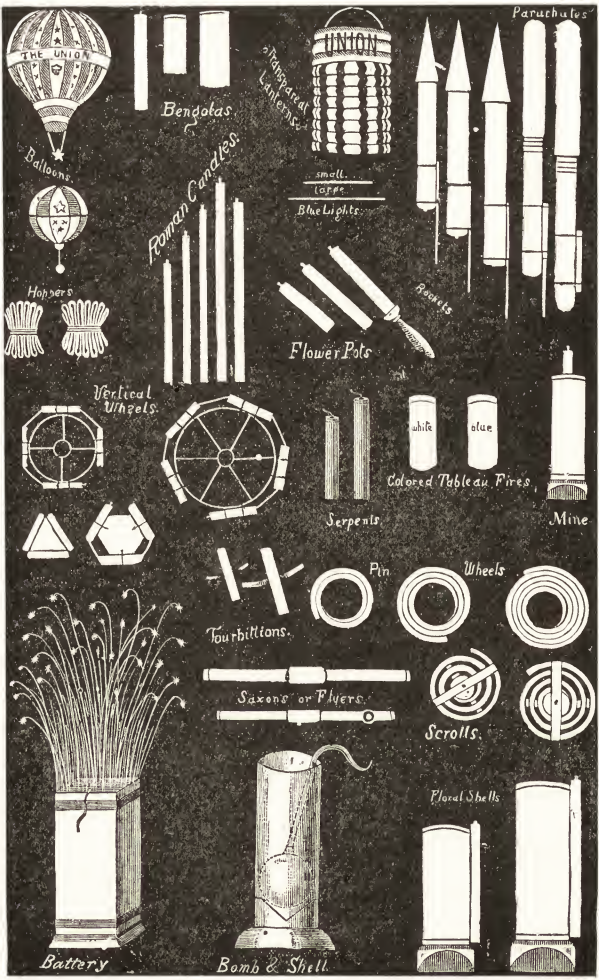
NITROLIN.—From 5 to 20 parts of sugar or syrup are mixed with from 25 to 30 parts of nitric acid in a wooden or gutta-percha vessel; of this compound, 25 to 30 parts are mixed with 13 to 35 parts of nitrate of potassa and from 13 to 15 parts of cellulose.

PERCUSSION CAPS.—These are small copper receptacles containing fulminating powder and a little fulminate of mercury; they are then covered with paper. They are placed in the lock of the gun to explode the powder. They are made waterproof by various compounds of grease and gum.

TORPEDOES, For War.—These are used to blow up ships; they are of two kinds—the self-acting, and those fired by electricity. The self-acting consists of a hollow iron cone, water-tight, with a ring at the point, by which it is anchored; the part nearest the base is left empty, while the portion near the point is filled with gunpowder, from 100 to 300 lbs.; at the top of the powder is an iron case, filled with lime, and in it a thin glass tube, containing sulphuric acid; the upper part of the tube is enclosed by the ringed end of an iron rod, which passes through the base of the cone, some distance above it; the rod moves on a joint at the point it intersects the base; at its upper extremity are placed horizontal bars, called feelers. The ship touches the feeler, the rod moves, the ring breaks the glass tube, and the sulphuric acid explodes the powder. Those fired by electricity are similar in form, fired by a battery on shore or on a ship. Fish torpedoes are intricate in construction and usually patented.

FIREWORKS.

REMARKS.—The three prime materials of the art of pyroteehny, are nitre, sulphur and char-


THE UNION
Balloons.
Hoppers
Bengolas.
Roman Candles.
Vertical Wheels.
UNION
2 Pronged Red Lanterns.
small.
large.
Blue Lights.
Parachutes
Rockets
Flower Pots
white
blue
Colored Tableau Fires.
Mine
Serpents.
Pin Wheels
Tourbillions.
Saxons or Flyers.
Scrolls.
Floral Shells
Battery
Bomb & Shell.

coal, along with filings of iron, steel, copper, zinc and resin, camphor, lycopodium, etc. Gunpowder is used either in grain, half-crushed or finely ground, for different purposes. The longer the iron filings, the brighter red and white sparks they give; those being preferred which are made with a coarse file and quite free from rust. Steel filings and cast-iron borings contain carbon, and afford a very brilliant fire, with wavy radiations. Copper filings give a greenish tint to flame; those of zinc, a fine blue color; the sulphuret of antimony gives a less greenish blue than zinc, but with much smoke; amber affords a yellow fire, as well as colophony and common salt, but the last must be very dry. Lamp-black produces a very red color with gunpowder, and a pink with nitre in excess; it serves for making golden showers. The yellow sand, or glistening mica, communicates to fireworks golden radiations. Verdigris imparts a pale green; sulphate of copper and sal ammoniac, a palm-tree green. Camphor yields a very white flame and aromatic fumes, which mask the bad smell of other substances. Benzoin and storax are used also on account of their agreeable odor. Lycopodium burns with a rose color and a magnificent flame. Iron tools must never be used in making fireworks of any kind, as they are liable to throw out sparks when striking against a hard stony substance, besides which the sulphur used would injure the iron. Brass tools may be used, but copper tools are preferable.

BALLOONS.—Use, in making these, fine, thin, close-textured tissue paper. Having determined that the balloon shall consist of a specific number of gores, or sections, make a pattern for cutting them by, of pasteboard, or some tolerably hard substance. Suppose the circumference of the balloon intended to be made is to be 12 ft., and the number of gores 12, an elegant shape will be got by making the pattern of a semi-lanceolate shape, being 3 in. wide at one end, 12½ in. wide at the broadest point, and coming to a point at the other end; the broadest part should be about ⅓ of the length from the point, if the balloon is intended to have a pear-like shape with open neck. Put them together with gum-water, or clean, thin paste; after pasting or gumming about ½ in. of one of the gores, lay the edge of another about midway across the part pasted; then double over about ¼ in. of it, dabbing it lightly from end to end with a clean cloth, to insure its holding securely; two of the gores being thus united, unite two others in like manner, and so on, until, if there were 12 gores in all, the number is reduced to 6, and then to 2; hanging the sections up at every pasting, so that they may get thoroughly dry while proceeding; the 2 halves are last of all to be connected in the same way; a circle of wire about 12 in. in diameter should be worked into the bottom of it, to keep the fabric of the balloon at a sufficient distance from the flame of the spirit; fix another wire across this circle to hold a piece of sponge, which should be immersed in spirits of wine; a smouldering piece of brown paper held underneath the aperture will, in a few minutes, put the balloon in an ascending condition; when inflated, ignite the piece of sponge and let it rise. When it is intended to inflate the balloon with hydrogen or coal gas, the latter apparatus is not needed; but a light car, or any other ornament proportioned to the ascending power of the balloon, may be appended to it, which will have the effect of maintaining it in the right position, and also of keeping it longer in sight than would otherwise be the case.

BATTERY.—Wooden boxes about 4 in. wide and 8 in. long, of the depth of an 8 ball Roman candle, made to stand on a small base, to be filled with Roman candles; a few small pieces of quick match laid on the top, covered over with paper, leaving an end of match protruding; when the match is lighted, all the Roman candles go off, forming a magnificent fountain of stars.

BENGOLAS (Bengal Lights). — Small paper cases, about 4 in. long and 1 in. in diameter, filled with colored fires, and joined with touch-paper; they are burned for the purpose of illuminating.

BLUE LIGHTS.—Same as bengolas, but are smaller, being about the size of a lead-pencil.

BOMB SHELLS.—These are paper cases, containing stars or other pyrotechnics, made with a fuse to burn 1 or 2 seconds; to be projected high into the air from a gun or mortar made for the purpose, made of either steel or hooped board; a small cartridge of rifle powder is attached to the fuse in the inside of the shell; this bursts the shell open, ignites the stars, which, flying and spreading over a large space, produce a beautiful effect.

COLORED FIRES.—The ingredients for these compounds must be dry, not too finely powdered, and mixed very uniformly; the ingredients should always be reduced to powder separately, and mixed very lightly with the other powders; the whole must then be passed through a sieve once or twice. Great caution is required when dealing with chlorate of potash. The following compositions form the different colors:—(*Blue.*) 1. Sulphur, 4 oz.; mealed powder, 4 oz.; antimony, 2 oz.; lampblack, 16 oz. — 2. Sulphur, sulphate of potassa, and ammonio-sulphate of copper, of each, 15 parts; nitre, 27 parts; chlorate of potassa, 28.—3. From metallic antimony, 1 part; sulphur, 2 parts; nitre, 5 parts.—4. Realgar, 2 parts; charcoal, 3 parts; chlorate of potassa, 5 parts; sulphur, 13 parts; nitrate of baryta, 77 parts. — (*Crimson.*) Charcoal, 4½ parts; sulphuret of antimony, 5½ parts; chlorate of potassa, 17½ parts; sulphur, 18 parts; nitrate of strontia, 55 parts.—(*Green.*) 1. Nitrate of baryta, 80 parts; chlorate of potash, 32 parts; sulphur, 24 parts; calomel, 16 parts; fine charcoal, 3 parts; shellac, 2 parts.—2. Chlorate of baryta, 2 oz.; nitrate of baryta, 3 oz.; sulphur, 1 oz. — 3. Metallic arsenic, 2 parts; charcoal, 3 parts; chlorate of potassa, 5 parts; sulphur, 13 parts; nitrate of baryta, 77 parts.—4. Lampblack, 1 part; chlorate of potassa, 4 parts; sulphur, 6 parts; dry nitrate of baryta, 18 parts.—(*Lilac.*) 1. Black oxide of copper, 6 parts; dry chalk, 20 parts; sulphur, 25 parts; chlorate of potassa, 49 parts.—2. From

black oxide of copper, 3 parts; dried chalk, 22 parts; sulphur, 25 parts; chlorate of potassa, 50 parts.—(*Orange.*) Sulphur, 14 parts; chalk, 34 parts; chlorate of potassa, 52 parts.—(*Pink.*) 1. Charcoal, 1 part; chalk and sulphur, of each, 20 parts; chlorate of potassa, 27 parts; nitre, 32 parts.—2. Chlorate of potash, 12 oz.; saltpeter, 5 oz.; milk sugar, 4 oz.; lycopodium, 1 oz.; oxalate of strontia, 1 oz. — (*Purple.*) 1. Chlorate of potash, 5 parts; nitrate of strontian, 16 parts; realgar, 1 part; sulphur, 2 parts; lampblack, 1 part.—2. Chlorate of potash, 2 oz.; sulphur, 1 dr.; oxide of copper, 1 oz.—3. Sulphuret of antimony, $2\frac{3}{8}$ parts; black oxide copper, 10 parts; sulphur and nitrate of potassa, of each, $22\frac{3}{4}$ parts; chlorate of potassa, 42 parts.—(*Red.*) 1. Nitrate of strontia, $37\frac{1}{2}$ parts; flowers of sulphur, 10 parts; charcoal, $1\frac{1}{4}$ parts; powdered chlorate of potash, 5 parts; black sulphur of antimony, $3\frac{1}{8}$ parts.—2. Sulphur, sulphuret of antimony and nitre, of each, 1 part; dried nitrate of strontia, 5 parts.—3. Chlorate of potash, 32 parts; nitrate of strontia, 48 parts; calomel, 20 parts; shellac, 12 parts; Chertier's copper, 4 parts; fine charcoal, 1 part.—(*Violet.*) 1. Charcoal, 8 parts; sulphur, 10 parts; metallic copper, 15 parts; chlorate of potassa, 30 parts.—2. Alum and carbonate of potassa, of each, 12 parts; sulphur, 16 parts; chlorate of potassa, 60 parts.—3. Sulphur, 14 parts; alum and carbonate of potassa, 16 parts; chlorate of potassa, 54 parts.—(*White.*) 1. From nitre, 60 parts; sulphur, 20 parts; black antimony, 10 parts; meal powder, 6 parts; powdered camphor, 4 parts.—2. Nitre, 16 oz.; mealed powder, 4 oz.; sulphur, 8 oz.—(*Yellow.*) 1. Nitre, 2 oz.; sulphur, 4 oz.; nitrate of soda, 20 oz.; lampblack, 1 oz.—2. From sulphur, 16 parts; dried carbonate of soda, 23 parts; chlorate of potassa, 61 parts.

COLORED FLAMES.—(*Green.*) Mix chloride of copper or boracic acid with alcohol.—(*Red.*) Mix alcohol with nitrate of strontium, nitrate of iron or nitrate of lime.—(*Yellow.*) Mix alcohol with nitrate of soda.

FLAME or ELECTRIC PAPER. — 1. Soak Swedish filtering paper for 10 minutes in a mixture of 4 parts of oil of vitriol with 5 parts of strong nitric acid, both by measure; when the strips are removed from the acid they must be thoroughly washed, first with cold, then with hot rain or distilled water, till the washings cease to be acid; then make different solutions, not too strong, of such of the chlorates of the metals as give the desired flame reactions; make them slightly warm, and saturate the papers separately with them; dry the papers before the fire previous to lighting them; they show to best advantage when a slip is loosely crumpled up into a pellet, lighted quickly at one corner, and thrown into the air against a dark background. By briskly rubbing these papers on a woolen surface, they become highly magnetic, and interesting experiments may be made with them.—2. Dry 1,000 grains of pure nitre at a moderate heat; place it in a dry retort; pour on it 10 dr. by measure of strong sulphuric acid; distil until 6 dr. of nitric acid have passed over into the receiver; dry some thin unsized paper, such as filter paper, and weigh out 60 gr. of it; mix 5 measured dr. of the nitric acid with an equal volume of strong sulphuric acid in a small glass vessel; allow the mixture to cool; immerse the paper; press it down with a glass rod; cover the vessel with a glass plate; set it aside for 15 or 20 minutes; lift the paper out with a glass rod; throw it into a bucket of water; wash it thoroughly in a stream of water till it no longer tastes acid or reddens blue litmus paper; dry it by exposure to the air, or at a very gentle heat.

FLOWER POTS.—Are the same as showers, but with wooden handles, to be held in the hand.

FLYERS, SAXONS, or REVOLVING CRACKERS.—These crackers are charged at each end with clay to a depth of two lines; fill with a composition without gunpowder; the clay prevents the fire streaming out at the ends, and it escapes through two holes placed opposite each other; the two holes are united at the same time by connecting them by means of a quick-match, and a rotary motion is thus communicated to the cylinder.

FLYERS, WITH BRILLIANT FIRE.—1. 8 parts of meal powder; 1 of sulphur; and 2 of iron filings.—2. 36 of meal powder; 1 of sulphur; and 8 of steel filings.—3. 18 of meal powder; 1 of sulphur; 2 of litharge; and 3 of steel filings.

FLYERS, WITH CHINESE FIRE.—1. 9 parts of meal powder; 6 of saltpetre; 1 of sulphur; $1\frac{1}{2}$ of charcoal; and 5 of fine iron.—2. 6 of meal powder; 8 of saltpetre; 2 of sulphur; $1\frac{1}{2}$ of charcoal; and 5 of sand.

GRASSHOPPERS.—The case is made of cartridge paper, the dimensions required being 15 in. by $3\frac{1}{2}$ in.; 1st fold down one edge, about $\frac{3}{4}$ of an in. broad, then turn down the double edge about $\frac{1}{4}$ of an in. and bend back the single edge over the double fold, so as to form within a channel, which is to be filled with mealed powder, not ground very fine; the powder is then to be covered by the folds on each side; the whole is to be pressed by a flat ruler; the part containing the powder is to be folded into the remainder of the paper, every fold being pressed down; then double backwards and forwards in folds about $2\frac{1}{2}$ in., which are pressed quite close, and a piece of twine is passed twice round the middle across the folds, and the joinings secured by causing the twine to take a turn round the middle at each fold successively; one of the ends of the folds may be doubled short under, which will produce an extra report; the other must project a little beyond the rest for the purpose of being primed. For the composition use:—1. 5 parts of meal powder and one of fine charcoal.—2. 8 of meal powder; 2 of fine charcoal; and one of saltpeter.—3. 16 of meal powder; 17 of fine charcoal; 1 of sulphur; and 7 of saltpeter.—4. 6 of meal powder; 6 of coarse charcoal; 2 of sulphur; and 16 of saltpeter.

GERBES.—Make the cases and drive in the composition, a hadleful at a time; after putting in each hadleful, give the drift 12 blows with the mallet; fill the cases until there remains a space of 2 in. only unoccupied at the end; into this end put a gun charge and a half of gunpowder;

with a brad-awl separate one or two of the inner folds of the paper of the case; turn these down on top of the powder; for filling in the ends of the cases melt in an earthern pipkin a mixture of 2 parts of common resin and 1 of wax; pour this into the ends of the cases upon the paper that has been turned down; it will harden in a few minutes, and will be found to ensure a good report from the powder. To prime these cases (if the point of the nipple is not too long), all that is needed is to press into the mouth of the case some meal-powder paste; but if a cavity has been left in the composition, this must be filled up before priming, or the case will inevitably burst; it is an excellent plan to take for the first ladleful, not any of the compositions for Chinese fire, but a ladleful of some slower fire containing no iron borings; these gerbes or jets are exhibited, when finished, by being attached to strong frames of wood or metal, arranged in such a manner as the exhibitor may wish, to produce any desired effect; the mouths of the cases are connected by means of a quick-match. The following are the compositions used: (*Brilliant.*) 1. 16 oz. of meal powder; 6 oz. of saltpeter; 3 oz. of sulphur; 3 oz. of fine charcoal; 10 oz. of bright steel filings. It is important to see that the interior of the cases are quite smooth and free from wrinkles.—2. Meal powder, 16 parts; nitre, 8 parts; sulphur, 4 parts; charcoal, 4 parts.—(*Chinese.*) 1. Meal powder, 16 parts; nitre, 16 parts; sulphur, 4 parts; charcoal, 4 parts; iron borings, 14 parts.—2. Saltpeter, 1 lb.; sulphur, 3 oz.; charcoal, 4 oz.; iron sand, 7 oz.; moisten the iron sand with spirits of wine; mix this with the coal and saltpeter.—(*White Chinese.*) 1. Meal powder, 16 parts; nitre, 6 parts; sulphur, 3 parts; iron borings, 10 parts.—2. Saltpeter, 1 part; bruised powder, 12 parts; charcoal, 7 parts; iron sand, 11 parts.

GOLDEN RAIN.—Procure a piece of brass rod, the diameter of which is 3-16 of an inch, or rather less; the length from 6 to 8 in.; cut thin brown paper into short strips, about 2 in. wide, and long enough, when wrapped round the former, to make a case whose external diameter should be ¼ in., or rather more; the former should have a small cup-shaped hollow cut in one of its ends, into which the paper may be turned, to form a closed end to the cases; paste the strips of paper all over; rub some paste on the former; then roll the paper round the former, and draw it out so as to leave its cupped end ¼ of an in. inside one of the ends of the case; pinch in the paper that projects beyond the former, and drive it down with a tap upon the pasting slab, so that the twisted end is pressed into the cup of the former; dip this into warm size or glue; if a little red-lead is mixed with this size, it will solidify much more rapidly; dipping the ends of the cases into size should not be done until they are dry from the paste; for filling the cases a tin funnel is used that will exactly fit into the mouth of golden-rain cases; when the case is charged, the funnel must be removed, and the space that was occupied by its nozzle filled with gunpowder or meal powder, moistened with gum water; take care that this paste is pressed well into the mouth of the cases, and fills them. The compositions used are:—1. Nitre, 16 oz.; sulphur, 11 oz.; mealed powder, 4 oz.; lampblack, 3 oz.; flowers of zinc, 1 oz.; gum Arabic, 1 oz. All the materials used must be in the state of fine powders and perfectly dry.—2. 16 parts of saltpeter; 8 of sulphur; 2 of fine charcoal; 2 of pen soot; and 4 of meal powder.—3. 4 of saltpeter; 2 of sulphur; 4 of fine charcoal; and 16 of meal powder.

JAPANESE MATCHES (Scintellettes).—Lampblack, 5 parts; sulphur 11 parts; gunpowder from 26 to 30 parts, this last proportion varying with the quality of the powder; grind very fine; make the material into a paste with alcohol; form it into dice about ¼ in. square, with a knife or spatula; let them dry rather gradually on a warm mantelpiece, not too near a fire; when dry, fix one of the little squares into a small cleft made at the end of a lavender stalk, or, what is better, the solid straw-like material of which housemaids' carpet brooms are made; light the material at a candle; hold the stem downward; after the first blazing off, a ball of molten lava will form, from which the curious coruscations will soon appear.

LANCES.—These are used to make up devices, such as names, mottoes, wreaths, and so on. They consist of small cases, generally made round a piece of glass or brass rod or tube 2-11 of an in. in diameter; tubes are always best for these; they are about 2 or 2½ in. long, with one end pinched or turned in; two rounds of thin demy or double crown white paper, pasted, will give sufficient thickness and substance for the case; procure a board of sufficient size for the design, or make a wooden framework of the shape that is required; sketch the design upon one side of the board, or, if larger than a board will allow, make a plain rough framework describing the letters; when this is done, decide upon the distance at which to place the lances one from another; this distance is generally about 2 in.; upon the outlines of the sketch make little pencil circles wherever it is intended to place a lance; as far as possible, arrange that the lances shall be equidistant one from another; with a center-bit, or what is better, a pin-bit, bore a hole about ¼ in. deep where the circles are pencilled; these holes must be of such a size that the closed ends of the lances will fit easily into them; get either some glue or some of the mixture of size and red-lead, and when it is liquid, dip into it the closed end of each of the lances; enough of the mixture will adhere to the lances to allow of their being secured firmly in the holes that have been bored; in a very short time all will be hard and dry, and you will then have a series of lances projecting at right angles with your board or framework, each having its mouth primed, and all being the same length. They should be connected with each other by means of a quick-match, so that they will burn simultaneously. The compositions are as follows: (*Blue.*) Chlorate of potash, 12 parts; Chertier's copper, 6 parts; sulphur, 4 parts; calomel, 1 part.—(*Emerald Green.*) Chlorate of baryta, 18 parts; calomel, 7 parts;

very fine shellac, 8 parts.—(*Green.*) Chlorate of potassa, 60 parts; nitrate of baryta, 41 parts; calomel, 49 parts; powdered sugar, 30 parts; shellac, 1 part.—(*Lilac.*) Chlorate of potash, 12 parts; prepared chalk, 4 parts; sulphur, 5 parts; calomel, 3 parts; sulphide of copper, 10 parts.—(*Red.*) Chlorate of potash, 13 parts; nitrate of strontia, 10 parts; calomel, 8 parts; shellac, 3 parts; dextrine, 1 part; Chertier's copper, 1 part.—(*Rose Colored.*) Chlorate of potash, 24 parts; sulphur, 2 parts; stearine, 3 parts; oxalate of strontia, 4 parts.—(*Violet.*) Chlorate of potash, 26 parts; calomel, 24 parts; carbonate of strontia, 4 parts; Chertier's copper, 3 parts; sugar, 14 parts.—(*Yellow.*) 1. Chlorate of potash, 72 parts; oxalate of soda, 60 parts; stearine, 6 parts; sulphur, 6 parts.—2. Chlorate of potash, 40 parts; oxalate of soda, 16 parts; shellac, 8 parts; stearine, 3 parts.—(*White.*) 1. Nitre, 16 parts; sulphur, 8 parts; meal powder, 6 parts.—2. Nitre, 16 parts; sulphur, 4 parts; meal powder, 6 parts.

MARROONS.—These are small cubical boxes filled with an explosive composition which explodes suddenly, making a loud report. The boxes are made of pasteboard, the corners being made tight by pasting paper over them, but leaving the top open until they are filled; they are filled with coarse gunpowder, when the top is closed with strong paper well cemented, and the whole box is wrapped round two or three times with a lind cord dipped in strong glue; a hole is made in one of the corners, into which a quick-match is introduced, and the marroon is ready for action.

MINES.—Take large paper cases made strongly; place in the center a Roman candle with a hole made in the bottom, so the fire will come out; in the bottom of the large case place a small cartridge of rifle powder arranged so that the Roman candle will set fire to it; fill up the large case to about ⅓ of its height with stars; pack a little tow on top as a wad; the Roman candle, when lighted, will, as it burns, carry fire to the cartridge, which exploding, ignites all the stars, which, rising in the air, spread in every direction.

PAPER CAPS.—Small drops of fulminating powder, placed between two small pieces of paper, pasted together, so arranged that the fulminate will explode by concussion; used in toy pistols.

PHARAOH'S SERPENTS (Eggs).—1. These consist of the powder of sulphocyanide of mercury made up in a conical mass of about ½ in. in height; ignited at the apex an ash is protruded, long and serpentine in shape. The fumes evolved are very poisonous.—2. Bichromate of potassium, 2 parts; nitrate of potassa, 1 part; white sugar, 3 parts; pulverize each of the ingredients separately, and then mix them thoroughly; make small paper cones of the desired size; press the mixture into them; they will then be ready for use but must be kept from light and moisture, and are non-poisonous.—3. Fuse in a crucible equal parts by weight of yellow prussiate of potash and flower of sulphur; frequently it is advisable, if the heat cannot be well regulated, to include a little carbonate of potash; wash the mass with water and filter; the filtrate will be sulphocyanide of potassium, which, upon being added to a solution of mercury dissolved in nitric acid, gives a copious precipitate of sulphocyanide of mercury; collect this; wash well with water and dry; roll into a small pyramid, cover with tin-foil, and when dry it is ready to be lit.

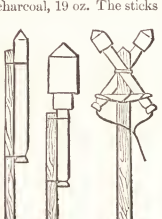
PIN or SCROLL WHEELS. — A long wire about 3-16 in. in diameter is the former; on this wire are formed the pipes, which being filled with composition, are afterwards wound around a small circle of wood so as to form a helix or spiral line; the cases are generally made of double-crown paper (yellow wove), and cut into strips so as to give the greatest length, and of width sufficient to roll about four times round the wire, and pasted at the edge so as to bite firmly at the end of the last turn; when a number of pipes are made and perfectly dry, they are filled with composition; these cases are not driven for filling, but are filled by means of a tin funnel with a tube ¾ in. long, made to pass easily into the mouth of the case, which is gradually filled by lifting a wire up and down in this tube, the diameter of the charging wire being half that of the tube; the dry composition being placed in the funnel, the moment an action of the wire takes place the composition begins to fall into the case, which the charging wire compresses by continuous motion until you have filled the pipe to within ¾ in. of the top; the pipe is then removed, and the mouth neatly twisted, which will be the point for lighting. When a number of pipes are ready, place them on a damp floor, or in any damp situation, until they become very pliant, but by no means wet; then commence winding them round a circle of wood whose substance must be equal to the thickness of the diameter of the pipe; either close together or openly in the form of a scroll; when wound, secure the end with sealing wax, to prevent its springing open; after winding the required quantity, let them dry; cut some strips of crimson or purple paper 3-16 in. wide, and in length twice the diameter of the wheel; then paste all over thoroughly; take a strip and paste it across the wheel diametrically; rub it down, then turn the wheel over and place the ends down to correspond with the opposite side; when dry, the wheel will be ready for firing; they may be fired on a large pin or held in the hand, but it is preferable to drive the pin into the end of a stick, which will prevent any accident, should a section of the wheel burst; The following are the compositions used: (*Brilliant.*) Nitre, 1 part; sulphur, 1 part; mealed powder, 16 parts; and steel filings, 7 parts.—(*Chinese.*) Nitre, 1 part; sulphur, 1 part; mealed powder, 7 parts; and cast iron filings, 7 parts.—(*Common.*) Nitre, 6 parts; sulphur, 1 part; mealed powder, 16 parts; charcoal, 6 parts.—(*White.*) Nitre, 6 parts; sulphur, 7 parts; and mealed powder, 16 parts.

PORTFIRE.—Make the cases of brass, and not less than ¼ in. in diameter, and the wire for filling them not less than ⅛ in.; prepare them in precisely the same manner as that described for *Golden Rains*, and also prime in the same

way. The following are the compositions usually employed for portfires: 1. Nitre, 6 parts; sulphur, 2 parts; meal powder, 1 part.—2. Saltpeter, 2 lbs.; sulphur, 3 lbs.; and antimony, 1 lb.

QUICK-MATCH.—Make a thick paste of gunpowder and hot water, with a small quantity of gum in it; take about 4 strands of cotton, such as is sold in balls and used for making the wicks of lamps; steep this in the solution of nitre used for making touch-paper, and wring it as dry as possible; rub well into the gunpowder paste, till it is thoroughly impregnated with it; dry on a frame, each strand kept separate; inclose in paper tubes for use, as it will not burn with the necessary rapidity if not covered. When thoroughly dry, it should be stiff and hard, and the less it is bent or doubled, the better. To use this match for connecting the mouths of different fireworks, make some long paper tubes round a wire former which has a diameter of not less than 3-16 of an inch; thread these pipes on the match, and cut a piece away at their side wherever they are inserted into the mouth of a case, in order that the match may be laid bare and convey its fire to the priming of the cases.

ROCKETS.—Make the cases of any kind of thick stiff paper, either cartridge paper (or what is equally good and much cheaper, common bag-paper); roll up the cases with a smooth, round ruler, exactly the size of the cavity of the rocket, and 10 or 12 times as long; lay a sheet of the paper upon a slab of slate, marble or glass, and paste 4 or 5 in. along the end of it, leaving the rest of the sheet of paper without paste; roll it smoothly over the ruler, dry end first, until the whole is rolled up, when of course the paste will stick and a thin ease be formed; keep rolling it along the slab with the hands, in the same way as a rolling-pin is used, for 2 or 3 minutes, until the various folds of the paper set close and tight to each other; put on another sheet in the same way, and so on, till the case is thick enough; that is, until the sides are a trifle more than ¼ the thickness of the ruler; the length of the rocket case, and consequently the width that the sheets of brown paper are to be cut before pasting, varies with the size of the rockets; in small rockets the length of the case may be 6 times the diameter; in larger rockets 4 or 5 times is sufficient; now choke the case; then fasten a thin cord at one end to a staple in the wall, and by the other tied round the waist of the operator; as he may lean back, of course the cord would be tightened and the sides of the case brought together until they nearly touch. When the case is sufficiently compressed, tie it with 2 or 3 turns of strong string. Put the cases in the mold (as elsewhere described) with the piercer in it, and put enough composition in to fill about 1 in. of the case; take the rammer, ram it down with 3 or 4 strong blows with a mallet; put in the same quantity of composition again and ram that down in the same manner, and so on till the case is filled to the top of the piercer and 1 diameter above it; separate some of the central folds of the paper, which it has been observed is not parted, and turn them down upon the composition, ramming them down hard upon it; or, what will do as well, put in a piece of paper as wadding; when this is rammed down, and firm, bore with a brass brad-awl 3 or 4 holes through it; these holes serve to make the requisite communication between the rocket and the head. The rocket being charged, the head or pot must be fixed; this is a paper case made upon a wooden former, turned cylindrical, about 4 in. in length, and a shade larger in diameter than the exterior of the rocket case; take some thick brown paper and cut it in strips large enough to go twice round the former; paste and roll as for the case; pinch one end, and a cylinder of paper will be thus made which should fit nicely over the clay end of the rocket; now fix upon the pinched end a conical cap made upon a former of like shape; trim the end which was choked, which is still open, and which has a hole passing up it, which the piercer occupied; fill up the hole with loose gunpowder made into a stiff paste with very weak gum water, and paste a piece of touch-paper over it. For the composition use, nitre, 26 oz.; sulphur, 5½ oz.; and charcoal, 19 oz. The sticks are fastened on to the case by means of wires or strings and are of the following sizes: 2-lb. rockets require sticks 9 ft. 4 in. long, 1 in. square at top, and rather more than ½ in. square at bottom; 1 lb. rocket sticks are 8 ft. 2 in. long, ¾ in. square at top and ⅝ in. at bottom; 8-oz. rocket sticks are 6 ft. 2 in. long, ¾ in. square at top, and ⅝ in. at bottom; 4-oz. rocket sticks are 5 ft. 3 in. long, ⅝ in. by ½ in. at top, and ¼ in. square at bottom; 2-oz. rocket sticks are 5 ft. 1 in. long, 3-10 in. by ½ in. at top, 4-10 in. at bottom; 1-oz. rocket sticks 3 ft. 6 in. long, and so on for other various sizes; the weight and the length of the stick must be such, as that when tied on, the rocket shall balance on the finger, at a point about 1 inch from the part choked.



Rockets.

ROCKETS. Mold for.—This consists of a solid foot of wood; upon the centre of this stands a short cylinder about ½ in. high, and exactly of the size of the mold, to be placed over it, as afterwards described; this short cylinder has a shoulder above, and terminates in a round top; out of the middle of the top is a tapering thick brass wire, projecting some inches upwards; the whole is so arranged, that when one of the newly made cases is put upon the wire and forced down, the wire fills up the choke-hole, the round top fits into the small parts of the case below the choke, the shoulder of the cylinder bears the extreme end of the case, and the short cylinder agrees in size with the outsides of the ense; there fits over this a strong wooden or metal tube; so that it is seen that there is no cavity

anywhere, except the inside of the rocket case, and even in this a thick wire runs up nearly to the top of that part of the case where the composition is rammed, or nearly ⅔ of the whole case from the choke upwards; all rockets must be placed in the mold to be filled, as well as to smooth and consolidate the part choked.

ROMAN CANDLES have a composition to burn in the intervals between the stars, which will throw a jet of fire uniformly good throughout. To have stars of tolerably rapid combustion (otherwise they will not be ignited before they are blown into the air), and to have the charges of powder for blowing the stars regulated to a great nicety, the former for the cases must be ⅛ in. in diameter and 18 in. long. The cases require rather a large amount of straw board for their manufacture, but otherwise they are made similar to rocket cases. The following are the compositions used between the stars: 1. Nitre, 18 parts; sulphur, 6 parts; fine charcoal, 7 parts; meal powder, 4 parts. — 2. Nitre, 16 parts; meal powder, 8 parts; fine charcoal, 6 parts; sulphur, 6 parts. — 3. Nitre, 16 parts; meal powder, 11 parts; sulphur, 6 parts; antimony, 4 parts. The next thing is to fill the case; before charging, tamp a little clay in the bottom of the case, to prevent blowing out; ram down as much composition as will fill the case ⅓ of its height; over this put a small piece of paper covering about ⅔ of the diameter; then a little rifle powder, and upon that a star, observing that the star is rather smaller than the diameter of the case; over this first ball more of the composition must be put, and rammed lightly down to prevent breaking the ball, till the case is ½ full; then a little powder, and another ball as before, till the case is filled with balls and composition; take care to place composition above the highest ball; when the case is thus filled, cap it with touch-paper by pasting it round the orifice, and add a little priming of powder.

SHOWERS.—1. Mealed powder, 1 lb.; sulphur, 2 oz.; iron filings, 5 oz.—2. Mealed powder, 1 lb.; charcoal, 2 oz. Mold small paper cases on a rod 2-10 in. in diameter and 2½ in. in length; do not choke them, as it will be sufficient to twist the end of the case; and having put the rod into it, beat it to make it assume its form; when the cases are filled (which is done by immersing them in the composition), fold down the other end, and then apply a match; fix on a frame with leaders, to be fired simultaneously.

SILVER RAIN.—1. Saltpeter, 4 oz.; sulphur, mealed powder and antimony, of each, 2 oz.; sal prunella, ½ oz.—2. Salpeter, 8 oz.; sulphur, 2 oz.; charcoal, 4 oz.—3. Saltpeter, 1 lb.; antimony, 6 oz.; sulphur, 4 oz.—4. Saltpeter, 4 oz.; sulphur, 1 oz.; powder, 2 oz.; steel dust, ¾ oz. Used in similar cases, and treated in the same way as *Golden Rain.*

SPARKS (Trail Stars).—Fine gunpowder, 1 part; powdered saltpeter, 3 parts; powdered camphor, 4 parts; place in a mortar; pour some weak gum water, in which a little gum tragacanth has been dissolved, over it; work the whole up to a thin paste; some lint, prepared by boiling it in vinegar or saltpeter, and afterwards dried and unravelled, is placed in the composition so as to absorb the whole; then pour into balls about the size of a pea; dry and sprinkle with fine gunpowder.

SQUIBS.—Roll cartridge paper in slips of 6 or 8 in. in breadth round a former; the case having been choked at one end, fill by inserting a funnel into the case; fill the funnel with composition; gently move a rod or rammer up and down the funnel-pipe, the rod being introduced before the composition; a piece of touch-paper is fastened to the end; ram in hard a thimbleful of coarse gunpowder before filling the case. The following compositions are used: 1. Mealed powder, 1 lb., 8 oz.; charcoal, 4 oz.; sulphur, 1 oz.; saltpeter, 3 oz.—2. Saltpeter, 16 parts; sulphur, 8 parts; fine gunpowder, 4 parts; antimony, 1 part; after having rammed this down into the case tolerably tight, fill the remainder of the space with grained or corned powder.

STARS.—These are made as follows: Moisten the compositions very slightly; the mold in which stars are shaped is a brass tube, of a size proportioned to the dimensions required. The drift with which the composition is pressed into the tube, is made of boxwood or metal and fits easily into the tubular mold; at one of its ends there is a wire point; place the end having the point in the mold as far as it will go; it will leave a space at the end of the mold unoccupied by the drift; press this empty end of the tube into the slightly moistened composition until it is filled by it, so that the drift being driven down upon the composition will compress it into a firm cylindrical mass, into the centre of which the wire point projects; when the star is thus formed in the mold, the drift must be withdrawn, reversed, its long plain end inserted, and the star pushed out and placed separately upon a tray to dry. The following compositions are used: (*Blue.*) 1. Chlorate of potash, 8 parts; sulphide of copper, 6 parts; Chertier's copper, 5 parts; sulphur, 4 parts.—2. Chlorate of potash, 16 parts; Chertier's copper, 12 parts; calomel, 8 parts; stearine, 2 parts; sulphur, 2 parts; shellac, 1 part.—3. Nitre, 12 parts; sulphuret of antimony, 2 parts; sulphur, 4 parts; lampblack, 2 parts.—(*Brilliant.*) 1. Mealed powder, ¾ oz.; saltpeter, 3½ oz.; sulphur, 1½ oz.; spirits of wine, 1½ oz.—2. Nitre, 16 parts; sulphur, 8 parts; sulphuret of antimony, 4 parts; meal powder, 8 parts.—(*Crimson.*) 1. Chlorate of potash, 24 parts; nitrate of strontia, 32 parts; calomel, 12 parts; sulphur, 6 parts; shellac, in fine powder, 6 parts; sulphide of copper, 2 parts; fine charcoal, 2 parts.—2. Chlorate of potash, 12 parts; nitrate of strontia, 20 parts; sulphur, 11 parts; charcoal, 2 parts; antimony, 2 parts; mastic, 1 part.—(*Green.*) 1. Chlorate of potash, 20 parts; nitrate of baryta, 40 parts; calomel, 10 parts; sulphur, 8 parts; shellac, 3 parts; fine charcoal, 1 part; fused sulphide of copper, 1 part.—2. Nitrate of baryta, 42 parts; realgar, 2 parts;

Star Mold.

sulphur, 8 parts; lampblack, 1 part.—3. Chlorate of potash, 28 parts; nitrate of baryta, 12 parts; sulphur, 15 parts; mastic, 1 part. —(*Lilac.*) Potash, 50 parts; sulphur, 25 parts; chalk, 22 parts; black oxide of copper, 3 parts.—(*Rose.*) Chlorate of potash, 20 parts; carbonate of strontia, 8 parts; calomel, 10 parts; shellac, 2 parts; sulphur, 3 parts; fine charcoal, 1 part.—(*Violet.*) Chlorate of potash, 9 parts; nitrate of strontia, 4 parts; sulphur, 6 parts; carbonate of copper, 1 part; calomel, 1 part; mastic, 1 part. —(*White.*) Mealed powder, 4 oz.; saltpeter, 12 oz.; sulphur, 6½ oz.; oil of spike, 2 oz.; camphor, 5 oz.—(*Yellow.*) 1. Chlorate of potash, 20 parts; bicarbonate of soda, 10 parts; sulphur, 5 parts; mastic, 1 part.—2. Nitrate of soda, 74½ parts; sulphur, 19½ parts; charcoal, 6 parts.

SUN CASES.—These are gerbes, without an explosion, and filled with brilliant fires.

TORPEDOES (Toy).—Are made by inclosing a small quantity of fulminate of silver with a little common gravel, washed free from dirt, in a piece of paper twisted together; the gravel is to make weight; the torpedo explodes by concussion on being dropped upon the floor.

TOUCH or PRIMING PAPER. — Dissolve 2 oz. of the best saltpeter in 1 qt. of warm water, and take care that the water is very clean; after the mixture has stood for ½ hour, pour off 1½ pts. into a white basin; cut your sheets of dark blue double-crown paper in half; place the paper on a slab sufficiently large to give you room to use a small piece of sponge, with which you use the liquor to wet the paper; cover each half sheet with the liquor as quickly as possible, on one side only, and immediately this is done place it on a line, the wet side outwards, and when nearly dry, if you have a great number of sheets, place them together as evenly as possible under a press for one hour; then lay them out to dry, after which they will be quite smooth and ready for use. In pasting this paper on the work, take care that the paste does not touch that part which is to burn; to use this paper correctly, cut it in strips sufficiently long to go twice round the mouth of the case, or even more if requisite; when you paste on the strips, leave a little above the mouth of the case not pasted; in small cases a little meal powder is put into the mouth; then the paper is twisted to a point; in larger cases damp priming is used, and when dry, the capping process is proceeded with.

TOURBILLIONS.—A stout case filled with a strong sparkling composition, and closed very tightly at both ends; in this case are bored four holes, at which the fire is to find vent; two of these holes are made underneath the case; from these the fire issues in a downward direction and gives the piece the power of ascending perpendicularly; the outer two holes are made in opposite sides of the case near each end; the fire issuing from these causes the cases to revolve in a horizontal direction while it is ascending. Make the cases as for rockets, about 8 in. in length and ¾ in. in their bore; their external diameter will be found to be about 1¼ in.; make a mold of a hollow cylinder of wood; divide it longitudinally in half; keep the halves together by means of iron rings; put into the mold the tourbillion; fasten it in tightly with the rings; put in as much clay as will, when rammed in tight, fill ⅜ of an in. of the case; now drive in the composition, a ladleful at a time, until ½ in. of the upper end of the case is empty; into this vacant space drive the same quantity of clay that was put into the lower end, and be sure that it is rammed in very firmly; find the exact central point at which the case balances, at which point the stick should be placed; the two extreme holes, which are on opposite sides of the case, are made at the ends of the composition; the fire issuing from these gives the tourbillion a horizontal revolution round its center of balance; the two inner holes, which are on the under side of the case, should be the same distance from one another that they are from the extreme holes; the fire issuing from these gives the tourbillion its ascending power; now connect all these holes with quick-match, in order that the composition may take fire at all the four points simultaneously; begin at one of the under holes; press into the end a piece of uncased quick-match; take care that the match reaches the composition; then carry the match on to the nearest side hole, and press it into it; carry on the quick-match over the upper side of the tourbillion to the side hole at the other end of the case; press it in there; carry it on to the remaining under hole and press it into it; cut some strips of thin paper, about 1 in. wide; paste them well over, covering the quick-match with them, holes and all; adjust the stick, which shall have the effect of keeping its under side downwards, and so of compelling it to move upwards perpendicularly; this stick is usually made of rattan, 8 in. long, about ½ in. thick, and of a curved shape; attach the stick by a flat-headed nail, driven into the tourbillion at its balance point; the stick must, of course, lie at right angles with the case; to fire the tourbillion, place it stick downwards on a level board, and see that it spins easily and freely on the head of the nail; then with a portfire burn through the quick-match in the middle on the upper side; the tourbillion will make a few revolutions on the board before it begins to rise. Take care to keep the head from over it. The following compositions are used:—1. Nitre, 8 parts; meal powder, 16 parts; sulphur, 4 parts; charcoal, 4 parts.—2. Meal powder, 16 parts; nitre 8 parts; sulphur, 3 to 4 parts; fine charcoal 3 parts; steel filings, 6 parts.

TRIANGLES AND VERTICAL WHEELS are made by using three or more driving cases arranged on a frame to be pivoted in the center so that as the cases are discharged they will cause the frame to revolve, thereby forming a wheel or circle of fire. The driving cases are made similar to a rocket case, but without the pot or head; the cases are to be connected together with quick-match, so that the fire will communicate from one to another.

PERFUMERY.

ACETIC AND AMMONIATED PERFUMES.

REMARKS.—Perfume is a substance that emits or casts off volatile particles, which, diffused through the atmosphere, agreeably affect the olfactory organ. The principal source of perfume is the vegetable kingdom. A few perfumes, as musk, ambergris and civet, are derived from the animal kingdom; but none of the latter compare with the former in delicacy and variety of scents. The animal scents excel those of the vegetable kingdom in strength.

Musk will not hold its perfume indefinitely. It loses its odor in a short time when exposed to outward air. It is too rank by itself, but combined with the aroma of flowers, and used as the basis of a "bouquet," there is produced a lingering scent belonging only to the costliest and choicest inventions. Of the four animal perfumes, musk holds the most distinguished position, though civet is fast displacing it. It is by far the most delicate, yet has the greatest pungency. Ambergris, a product of the whale, and castor, a secretion of the castor beaver, and nearly obsolete in the perfume trade, have but little odor until infused in spirit, when it is developed in a remarkable degree. Ambergris is found but rarely, and only in the bowels of sperm whales, a result of disease. Like musk, ambergris extract is used for mixing, and sweetened with fleeting scents its odor can still be detected on fabrics which have passed through the wash. The secretion of the castor beaver is more like that of the civet cat. The qualities that recommend it are those of economy. The little animals secreting the pods are found on the lands of the Hudson's Bay Company and in Siberia. Large quantities of civet are sent to this country from Abyssinia, where the civet cat is a household pet. The substance secreted in an external pouch is in its natural state a most disgusting odor, but when infinitesimally combined its perfume is agreeable. So it is with the concentrated attars or "ottos," such as patchouly, thyme and neroli. The extract of civet is obtained by mixing it in a mortar with orris root powder, or any like rough substance that will separate the civet, and then adding rectified spirits. After a month of maceration, the preparation is ready to combine with delicate "ottos."

Musk "pods," so called by the trade, which contain the "grain musk," are obtained from an organ of the musk deer, which inhabits the great chain of the Himalayas, the northern belt of India, Siberia and China. The difficulty and danger in capturing these graceful little creatures account for the enormous price of musk. Oftentimes the wily natives adulterate the contents of the pods by extracting the grains and putting back a mixture of animal matter and musk. The three kinds of musk vary in price, according to quality. The Russian, from its comparative poverty in fragrance, does not sell for more than $1.25 an ounce; the Assam, next in value, has a strong rank odor, and brings but about $4.50 in the pod, while the Chinese musk, the most prized, sells in the pod for over $5. Two ounces of grain musk, added to one gallon of rectified spirit, will, after a month's maceration, give the commercial extract of musk, which is used for mixing with other perfumes, thereby modifying it with the various attars. The scent of musk is wonderfully diffusive and subtle, the articles in its vicinity soon becoming impregnated and long retaining its odor. Of the famous nosegays that have musk for their basis, are the Empress Eugenie's, "the Fleur D'Italie," which has also the costly ambergris as an ingredient, "Wood Violet" and "West End." Of the best dry perfumes, nearly all have grains of musk mixed in their compounds, while among expensive scented soups, such as Paris "Windsor," which owes its great reputation among the elite to its delightful odor, is simply the duly modified fragrance of musk. The finest floral perfumes can have no enduring scent without the aid of the grosser animal odors.

AROMATIC VINEGARS.—These are solutions of aromatics in acetic acid, and are highly esteemed as reviving perfumes, both for the toilet and sick room. They are generally dropped on a small piece of sponge placed in a stoppered bottle or vinaigrette. They are corrosive, and should be kept from the skin and clothes.—1. Dried rosemary and origanum, of each, 1 oz.; lavender flowers, ½ oz.; bruised cloves ½ dr.; acetic acid, 1½ pt.; macerate for 7 days; express and filter. A fragrant and refreshing perfume.—2. Prepare as the last, but use distilled vinegar instead of the strong acid. Inferior.—3. Camphor, 2 oz.; oil of lavender, 10 gr.; oil of cinnamon, 20 gr.; oil of cloves, 30 gr.; concentrated acetic acid, 1 pt. Very fragrant and refreshing.—4. Oil of cloves, 1 dr.; oils of lavender and citron, of each, 2 sc.; oils of bergamot and thyme, of each, 1 sc.; oil of cinnamon, 10 drops; strongest acetic acid, 1 oz., mix. Limpid, yellow-brown; highly fragrant and refreshing.—5. Glacial acetic acid, 1 lb.; oil of cloves, 1½ dr.; oil of rosemary, 1 dr.; oils of bergamot, cinnamon pimento and lavender, of each, ½ dr.; neroli, 20 drops; camphor, 2½ oz.; rectified spirit, 2 fl. oz.; mix. Very fine.—6. Glacial acetic acid, 8 oz.; true oil of rosemary, 20 gr.; bergamot, 15 gr., lavender, 9 gr.; cloves, 24 gr.; neroli, 4 gr.; cinnamon, 20 gr.; dissolve the oils in 2 dr. rectified spirit.—7. Strongest acetic acid, 1 lb.; camphor, 1 oz.; dissolve, and add 1 oz. each of oil of lavender, oil of cloves and oil of lemon.—8. Oil of rosemary, oil of juniper, oil of lemon, of each, 1 part; oil of thyme, 2 parts; oil of cloves, 5 parts; tincture of cinnamon, 100 parts;

aromatic tincture, 50 parts; diluted acetic acid, 200 parts; distilled water, 1,000 parts; mix; keep for 3 days in a cool place, then filter.—9. 1 oz. of dried tops of rosemary; 1 oz. of dried leaves of sage; 1 oz. of dried flowers of lavender; 1 dr. of cloves; 1 dr. of camphor; 1½ pts. of distilled vinegar; macerate for 14 days with heat, then filter.—10. Camphor, 1 oz.; rectified spirit, 1 fl. dr.; pulverize and dissolve in strong acetic acid, 10 fl. oz. This preparation is also useful as an embrocation in rheumatism and neuralgia; as an extemporaneous vesicant and counter-irritant, and as a fumigation in fevers.

Lavender Vinegar.—Fresh lavender flowers, 1 lb.; vinegar, 12 lbs.; macerate. It is sometimes distilled, drawing off 8 lbs.

Rose Vinegar.—1. Red roses, picked and dried, ½ lb.; best vinegar, 8 lbs.; macerate for a fortnight, with occasional stirring, and strain; then filter.—2. Dried rose leaves, 4 oz.; otto of roses, 90 drops; rectified spirit, 10 oz.; diluted acetic acid, 40 oz.; macerate in a closed vessel for 14 days.

Thieves' Vinegar. — Dried tops of large and small (pontic) wormwood, rosemary, sage, mint, rue, lavender flowers, of each 2 oz.; calamus root, cinnamon, cloves, nutmeg, garlic, of each ½ oz.; camphor, ½ oz.; concentrated acetic acid, 2 oz.; strong vinegar, 8 lbs.; macerate the herbs, etc., in the vinegar for a fortnight; strain, press and add the camphor dissolved in the acetic acid.

Vinaigre de Bully.—Essence of bergamot, 40 drops; essence of lemon, 30 drops; oil of rosemary, 20 drops; oil of balm, 6 drops; oil of cloves, oil of lavender, oil of neroli, of each 4 drops; dissolve in rectified spirits, 9 oz; then mix with tincture of benzoin; tincture of styrax, tincture of Tolu, of each 1 dr.; distilled water, 14 oz.; diluted acetic acid, 5 oz.; mix well, let stand, and filter.

Vinaigre de Cologne.—To each pt. of eau de cologne add an ounce of strong acetic acid.

Vinaigre de Flore.—Equal parts of rose vinegar, vinaigre virginal, and orange flower vinegar.

Vinaigre de Jouvence. — Spirit of cucumber, 4 oz.; spirit of storax, 2 lbs.; strong vinegar, 8 lbs.

SMELLING SALTS may be prepared by simply adding a sufficient quantity of ammonia to the liquid perfumes. When the articles are to be distilled, a cheaper plan is to add about 5 dr. of sal ammoniac and 8 dr. of carbonate of potassa to each pint of the article just before distillation.—1. Chloride of ammonium, 5 dr.; carbonate of potash, 8 dr.; eau de cologne, 12 oz.; essential oil of cedrat and of bergamot, of each 15 drops, dissolved in 1 oz. of rectified spirit; orange flower water, 8 oz.; mix and carefully distil 15 or 16 oz.—2. English oil of lavender, 1 oz.; spirit of ammonia, 2 lbs.; dissolve.—3. Sesquicarbonate of ammonia, 40 oz., broken into small pieces not larger than a filbert, put into an air-tight ½ gal. jar; pour over it 20 oz. strong solution of ammonia (sp. gr. .880), previously perfumed according to taste, and immediately fix on the lid of the jar, taking care that it is properly secured; keep in a cool place, opening and stirring with a stiff spatula every other day for a week; allow it now to remain for 2 or 3 weeks, at the end of which time it will have become hard.—4. Oil of cinnamon, 6 drops; otto of roses, 12 drops; oil of cloves, 1 fl. dr.; essence of bergamot, 2 fl. dr.; oil of lavender, 4 fl. dr.; essence of musk, 5 fl. dr.; liquor of ammonia, 1 pt.; mix in a cold place, and shake the bottle until the whole is combined.—5. Essence of violets and oil of cinnamon, of each 12 drops; neroli, essence of jasmine and otto of roses, of each ½ dr.; oil of lavender, 1 dr.; essence royale and essence of bergamot, of each 2½ dr.; liqtor of ammonia, 1 pt.; as the last.—6. Oils of lemon and bergamot, of each 5 fl. dr.; oil of lavender, 1½ fl. dr.; otto of roses, 1 fl. dr.; oils of cassia, neroli, cloves and cedrat, of each ½ fl. dr.; oil of sandal wood, 15 drops; liquor of ammonia, 1 pt. — 7. Essence of bergamot, 6 fl. dr.; oil of lavender, 4 fl. dr.; oil of cloves, 3 fl. dr.; oil of cassia, 1½ fl. dr.; oil of verbena (lemon grass), 1 fl. dr.; otto of roses, 30 drops; liquor of ammonia, 18 fl. oz.—8. Oil of bergamot, 3 oz.; essence of lemons, 2 oz.; oil of lavender, 6 dr.; essence of jasmine, 4 dr.; oil of sassafras, 3 dr.; oil of neroli, 2 dr.; otto of roses, 1½ dr.; oil of origanum and essence of ambergris, of each 1 dr.; musk, 20 gr.; macerate for a week, and decant the clear portion. Add to the strongest liquor of ammonia in proportion of 1½ oz. to the pint.—9. English oil of lavender and essence of bergamot, of each 1 dr.; oil of orange peel or of cedrat, 8 drops; oil of cinnamon, 4 drops; oil neroli, 2 drops; alcohol and strongest water of ammonia, of each 2 oz. (or 4 oz. of strong ammoniated alcohol).—10. Ammoniated alcohol, 12 fl. oz.; English oil of lavender, essence of bergamot and essence of lemon, of each 1 dr.; cloves, ½ dr.; camphor, ½ oz.; macerate for 1 week, and filter.

Eau de Lavange.—To lavender water, 1 pt., add of liquor of ammonia ½ fl. oz.

Eau de Luce.—Mastic, 2 dr.; rectified spirits, 9 dr.; dissolve, and add to the clear tincture 30 drops of oil of lavender; 10 drops of bergamot, and 1 pint of strong water of ammonia. Agreeable.

DISTILLED WATERS AND OILS.

REMARKS.—Perfumes can be distilled by using a glass retort, with a napkin wetted with cold water covering the tube, attached to a receiver placed upon a table, having a lamp burning under the retort at a moderate distance, taking care that the liquid never runs, but passes drop by drop; when inclined to run, remove the lamp a greater distance. Very convenient stills for making perfumes may be purchased at mathematical instrument makers; these perform the operation in a better way than the above contrivance. For perfumery, the still

should have a high and narrow neck, to prevent the liquor from spirting over, and should be furnished with a steam jacket or a bath to prevent injury from excessive heat. Dry, hard or fibrous substances should be bruised or macerated in water before distillation. Salted or pickled flowers, herbs, etc., are superior to fresh ones; then the waters keep better and reach the full development of their odor in a shorter time. Ebullition should begin as quickly as possible and be continuous, and the heat regulated. Waters distilled from plants are apt to have a smoky odor at first, even when the greatest care has been observed. Exposure for a short time to the air will remove this, after which they should be kept in closely stoppered bottles entirely filled. The simple distilled waters (without spirit) used in perfumery, are chiefly those of rose, elder and orange flower, cinnamon, etc. The points requisite to be attended to are, that the flowers be fresh, gathered after the sun has risen and the dew has exhaled, and that sufficient water be used to prevent the flowers being burned, but no more.

Waters prepared without distillation are seldom so effective for perfumery purposes as those distilled from the flowers.

ANGEL WATER.—1. Orange flower and rose water, of each 1 pt.; myrtle water, ½ pt.; essence of ambergris, ½ fl. oz.; essence of musk, ¼ fl. oz.; shake well together for some hours, then filter the mixture through paper.—2 Myrtle flowers, 3½ lbs.; water, 2 gals.; distil 1 gallon. A pleasant perfume.—3. From benzoin, 4 oz.; storax, 2 oz.; cloves, ½ oz.; calamus and cinnamon, of each ½ oz.; coriander seeds, 1 dr. (all bruised); water, 3 qts.; distil 2 qts.

AROMATIC WATER.—1. Coriander seed, ground, 5 oz.; star anise and cinnamon, of each 5 oz., cloves, nutmeg, and fresh orange peel, of each 2½ oz.; mix in a still with 12 pts. of water and distil eight pints.—2. Oil of star anise, cinnamon and coriander, of each 10 drops; oil of cloves, nutmegs and orange, of each 5 drops; carbonate of magnesia, 120 gr.; water, 2 pts.; triturate the oils with the magnesia; add the whole quantity of water and filter, adding enough water through the filter to make the filtrate measure 2 pints.

CINNAMON WATER.—A gallon should be distilled from 20 oz. of fine cinnamon (bruised) and 2 gallons of water.

EAU DE NAPHRE.—Orange flowers, 7 lbs.; fresh yellow peel of the bigarade or Seville orange, ½ lb.; water, 2 gals.; macerate 24 hours, and distil 1 gal. In many cases ordinary orange flower water is sold for eau de naphre.

ODORS OF FLOWERS, To Extract.—Procure a quantity of the petals of any flower of an agreeable odor; card thin layers of cotton wool, which dip into the finest Florence oil; sprinkle a small quantity of fine salt on the flowers, and place layers of flowers and cotton, alternately, until an earthen or wide-mouthed glass vessel is quite full; tie the top close with a bladder, and lay in a south aspect exposed to the sun, and in 15 days a fragrant oil may be squeezed away from the whole mass; little inferior, if roses are used, to the dear and highly valued otto or odor of roses.

ORANGE FLOWER WATER.—Orange flowers, 12 lbs.; water, 36 lbs.; distil 24 lbs. for double orange flower water; this, with an equal quantity of distilled water forms the single. The flowers should not be put into the still until the water nearly boils.

OTTO OF ROSES.—Roses (and all flowers containing perfumed oils) may be made to yield their aromatic properties by steeping the petals or flower leaves in a saucer or flat dish, and setting it in the sun. The petals should be entirely covered with soft or rain-water; a sufficient quantity should be allowed for evaporation, and the vessel left undisturbed a few days, when a film will be found on the water. This is the essential oil of the flower, and every particle is impregnated with its odor. It should be taken up carefully and put into tiny vials, which should be kept open until all watery particles are evaporated. A very small quantity of this oil will last a long time.

ROSE WATER.—The quantities usually directed are, roses, 15 lbs.; water, 40 lbs.; distil 15 lbs. for single, and the same water with 15 lbs. of fresh roses, for double rose water.

STRAWBERRY WATER.—Bruised strawberries, 4 lbs.; water, 1 gal.; macerate for 12 hours, and distil 6 pints.

DRY PERFUMES.

REMARKS.—Dry perfumes are simply sweet smelling gums, resins and herbs, powdered or ground up together. They form incense, used for burning in churches, and sachet powders, for laying in ladies' boxes and drawers, where handkerchiefs and gloves are kept, and which thus become fragrant.

FRANGIPANNI POWDER.—Powdered violet roots, 3 lbs.; powdered sandal wood, ½ lb.; orange oil, rose oil, oil of sandal wood, of each 1 dr.; pulverized musk, 1 oz.; pulverized civet, 2 dr.

INCENSE.—1. Olibanum 2 or 3 parts; gum benzoin, 1 part.—2. Olibanum, 7 parts; gum benzoin, 2 parts; cascarilla, 1 part; on a hot plate, or burned, it exhales an agreeable perfume.—3. Benzoin and storax, of each 4 oz.; labdanum and myrrh, of each 6 oz.; cascarilla, 3 oz.; oil of cinnamon, 8 minims; oils of bergamot and lavender, of each 20 minims; oil of cloves, 10 minims; mix, and pass through a coarse sieve.—4. Styrax, 2½ oz.; benzoin, 12 oz.; musk, 15 gr.; burnt sugar, ½ oz.; frankincense, 2½ oz.; gum tragacanth, 1½ oz.; rose water, sufficient to form a mass; to be divided into small tablets.—5. Powdered cascarilla, 2 oz.; myrrh, styrax, benzoin and Bergundy pitch, each 1 oz.; mix.

PASTILS. For Burning.—1. Benzoin, 4 oz.; cascarilla, ½ oz.; nitre and gum Arabic, of each

3 dr.; myrrh, 1 dr.; oils of nutmeg and cloves, of each 25 drops.; charcoal, 7 oz.; all in fine powder; beat to a smooth, ductile mass with cold water; form into small cones with a tripod base and dry in the air.—2. Yellow sanders, 3 oz.; styrax, 4 oz.; benzoin, 3 oz.; olibanum, 6 oz.; cascarilla, 6 oz.; ambergris, 1 dr.; Peruvian balsam, 2 dr.; myrrh, 1½ oz.; nitre, 1½ oz; oil of cinnamon, 20 drops; oil of cloves, ½ dr.; otto, 30 to 60 drops; oil of lavender, 1½ drs.; balsam of Tolu, 1½ oz.; camphor, ½ oz.; strong acetic acid, 2 oz.; charcoal, 3 lbs.; mix; beat into a paste with mucilage of tragacanth, and form into conical pastils. Poorer qualities may be made by using more charcoal.—3. Benzoin, 2 oz.; balsam of Tolu, ½ oz.; labdanum, 1 dr.; yellow sanders, ½ oz.; light charcoal, 6 oz.; nitre, ¼ oz.; mucilage of tragacanth, a sufficient quantity; reduce the substances to powder; form into a paste with the mucilage, and divide into small cones with a tripod base.—4. Powdered cascarilla, 8 oz.; benzoin, 4 oz.; yellow sanders, 2 oz.; styrax calamita, 2 oz.; olibanum, 2 oz.; charcoal, 3 lbs.; nitre, 1½ oz.; mucilage of tragacanth, q. s.—5. Benzoin and cascarilla, of each 1 oz.; myrrh, 8 scruples; oil of nutmeg and oil of cloves, of each 4 sc.; nitre, ½ oz.; charcoal, 6 oz.; mucilage of tragacanth, q. s.

POMADE SCENTS. To Perfume Pomades and Hair Oils.—1. (*Cowslip.*) Essence of bergamot, 8 oz.; essence of lemon, 4 oz.; oil of cloves, 2 oz.; essence de petit grain, 1 oz.—2. (*Jonquil.*) Essence of bergamot and lemon, of each 8 oz.; oils of orange peel and cloves, of each 2 oz.; oil of sassafras, 1 oz.; liquid storax, ½ oz.; digest with warmth and agitation for a few hours, and decant the clear portion in a week.—3. (*Millefleur.*) From essence of ambergris (finest), 4 oz.; essence of lemon, 3 oz.; oil of cloves and English oil of lavender, of each 2 oz.; essence de petit grain, essence of bergamot and balsam of Peru (genuine), of each 1 oz.; then as the last.

PORTUGAL.—Dried orange peel, 1 oz.; dried bergamot peel, ½ oz.; cloves, 4 oz.; storax, 1 dr.; ambergris, 8 gr.; benzoin, 1 dr.; musk seed, 1 sc.; musk, 4 gr.

POT POURRI.—A mixture of odorous flowers, gums, resins, roots, etc., preserved in a mass to use as wanted as a base for varied compounds.—1. Gather the petals of the most fragrant kinds of roses (other flowers may be mixed in small proportion); spread them out to dry in the sun, or in a warm room; sprinkle a little salt on them, and put them into a jar, in which they are to be kept covered up till wanted for use; take of these rose leaves, 4 oz.; dried lavender flowers, 8 oz.; vanilla, cloves, storax and benzoin (all bruised), of each 1 dr.; ambergris, 20 gr.; otto of roses, 20 drops; mix.—2. Calamus root and yellow sanders, of each 1 oz.; vanilla, 1 dr.; musk and ambergris, of each 8 gr.; cascarilla, 1 oz.; orris root, 3 oz.; cinnamon and lavender flowers, of each 1 oz.; styrax, benzoin and cloves, of each 2 dr.; coriander seed, 1 oz.; nutmegs, 2 dr.; otto of roses, 20 drops; oil of neroli, 10 drops; coarsely bruise the dry ingredients; mix.—3. Take the petals of the pale and red roses, pinks, violets, moss rose, orange flower, lily of the valley, acacia flowers, clove-gilliflower, mignonette, heliotrope and jonquils; with a very small quantity of the flowers of myrtle, balm, rosemary and thyme; spread out for some days, and as they become dry put into a jar with alternate layers of dry salt, mixed with orris powder, till the vessel is full; close for a month; then stir the whole up, and moisten it with rose water.—4. Orris root, 16 oz.; dried acacia flowers, 8 oz.; dried bergamot peel, 2 oz.; musk seed, ½ oz.; cloves, ½ oz.; pound them together.—5. Dry rose leaves quickly on a wicker tray in a warm place; to a pint of the petals add powdered orris, 2 oz.; pimento, ½ oz.; cascarilla, ½ oz.; musk, 2 gr.; otto of roses, 2 drops; bruised cloves, ½ oz.

POUDRE DE CHYPRE.—Oak moss is macerated in clean water for a day or two, and strongly pressed in a cloth; it is then moistened with rose water mixed with ½ of orange flower for 2 days; pressed and pulverized. It serves as a basis for other perfumes, the power of which it is said to increase.

POUDRE A LA MARESCHALE.—Oak moss, in powder, 2 lbs.; plain starch powder, 1 lb.; cloves, 1 oz.; calamus, cyperus and rotten oak-wood powder, of each 2 oz.; mix.

POUDRE A LA MOUSSELINE.—Orris root, 16 oz.; coriander seed, 8 oz.; musk seed, 2 oz.; cinnamon, cloves and sandal wood, each 1 oz.; star aniseed, ½ oz.; mace, ginger and violet ebony, of each 2 oz.; beat them to a powder, and pass through a sieve.

POUDRE A L' ŒILLET.—Red roses, 48 oz.; orris, 48 oz.; cloves, 6 oz.; bergamot peel, 20 oz.; musk seed, 24 oz.; cinnamon, 6 oz.; long cyperus, 6 oz.; pale roses, 26 oz.; dried acacia flowers, orange flowers and clove stalks, of each 8 oz.

ROSE POWDER.—Pulverized rose leaves, 1 lb.; pulverized sandal wood, ½ lb.; rose oil, 2 dr.

SACHET POWDERS.—1. From orris root, 2 oz.; cassia, 1½ oz.; cloves, 1 oz.; yellow sandal wood, ¼ oz.; oils of lavender and bergamot, of each 1 dr.; otto of roses, 20 drops; musk and ambergris, of each, rubbed with a little sugar, 6 gr.; reduce the dry ingredients to coarse powder, mix them, and add the oils.—2. From corianders, orris root, rose leaves and calamus aromaticus, of each 4 oz.; lavender flowers, 8 oz.; rhodium wood, 1 dr.; musk, 20 gr.—3. From corianders, orris, calamus aromaticus and red roses (dried), of each 1 oz.; lavender flowers, 2 oz.; mace and cloves, of each 1 dr.; essential oil of almonds, 10 drops.—4. As last, but substituting musk, 5 grs., for the oil of almonds.—5. From patchouly, 8 oz.; lavender flowers (lightly dried), 3 oz.; orris root, 2 oz.; cloves, 1 oz.; essence of bergamot, 1 dr.; essences of ambergris and musk, of each ½ dr.—6. ½ lb. of lavender flowers; ½ oz. each of dried thyme and dried mint; ½ oz. each of cloves and caraway seeds; 1 oz. of common salt; rub the lavender flowers from the stalk; reduce the thyme and mint to powder; and bruise the cloves and caraway seeds in a mortar; then mix the whole with the salt, which must be well dried before it is used;

when the ingredients have been thoroughly mixed, the compound may be put into silk or paper bags for use.

SACHET, CASSIA.—Flowers of acacia farnesiana and powdered orris root, equal parts; mix.

SACHET, HELIOTROPE.—Take of powdered orris root, 2,000 parts; rosa centifolia, 1,000 parts; tonka bean, 500 parts; cut vanilla bean, 250 parts; powdered musk, 10 parts; essential oil of bitter almonds, 1 part; pound the musk and vanilla bean together, and add the rest; pass through a not close sieve. An excellent imitation of heliotrope.

SACHET, LAVENDER.—Take of powdered lavender, 75 parts; powdered benzoin, 20 parts; oil of lavender, 1 part; mix.

SACHET A LA MARESCHALE.—Take of sandal wood and orris root, each 280 parts; rosa centifolia, cloves and cassia bark (Laurus cassia), each 140 parts; musk, 1 part; powder coarsely.

SACHET, MILLEFLEURS.—Take lavender flowers, ground orris root, rose leaves and benzoin, of each 1 lb.; tonka beans, vanilla, sandal wood and ground cloves, of each ¼ lb.; cinnamon and allspice, of each 2 oz.; mustard, civet, each 2 dr.

SACHET FOR PERFUMING LINEN.—Orris root, rosa centifolia, of each 125 parts; nutmegs, 8 parts; grana moschata, 15 parts; powder coarsely, and mix.

SPIRITUOUS WATERS.

REMARKS.—The two terms, essences and extracts, are applied somewhat indiscriminately in perfumery to the strong spirituous solutions of the essential oils and to the odorous principles of flowers. Like cologne water, the finest quality of the imported extracts are prepared by distillation from the flowers, but those in common use are solutions of their fragrant matters, previously separated by maceration in strong deodorized alcohol.

ALMOND ESSENCE.—Essential oil of almonds, 1 fl. oz.; deodorized strong alcohol, 19 fl. oz.; mix and agitate, or shake them together until united.

AMBERGRIS ESSENCE.—1. Ambergris (cut very small), 5 dr.; rectified spirit, 1 pt.; place them in a strong bottle or tin can; secure the mouth very firmly and expose it to the heat of the sun, or in an equally warm situation for 1 or 2 months, frequently shaking it during the time; lastly decant and filter through paper.—2. Ambergris, 4 oz.; musk, 2 oz.; tincture of musk seed, 7 pts.; digest with a gentle heat.

AMBERGRIS TINCTURE.—Ambergris, 30 gr.; orris powder, 1 dr.; alcohol, 8 oz.; beat the ambergris with the orris root to a powder; then add the alcohol and macerate for 30 days with occasional agitation, and filter.

AROMATIC WATER.—Sage leaves, 4 parts; rosemary leaves, peppermint, lavender flowers, of each 2 parts; fennel seed and cassia bark, of each 1 part; alcohol, 26 parts; common water, 130 parts; let the cut and bruised ingredients macerate for 24 hours; distil 72 parts.

ARQUEBUSADE WATER.—1. Sage, angelica, wormwood, savory, sweet fennel, hyssop, balm, sweet basil, rue, thyme, marjoram, rosemary, angelica seed, origanum, red calamine, creeping thyme, lavender flowers, of each 10 oz.; sweet flag root, 5 oz.; rectified spirit, 2 gals.; water sufficient; distil 3 gals.—2. Balm, rosemary, thyme, calamus root, angelica seeds, lavender flowers, of each 4 oz.; rectified spirit, 3 pts.; water, q. s.; macerate for a day, and distil 4 pts.

BALM OF A THOUSAND FLOWERS.—1. White castile soap, 2 oz.; honey, 4 oz.; water, 12 oz.; alcohol, 4 oz.; melt the castile soap and honey in the alcohol and water with a gentle heat, and flavor with wintergreen, sassafras and rose.—2. Deodorized alcohol, 1 pt.; nice white bar soap, 4 oz.; shave the soap, and when put in stand in a warm place till dissolved; then add oil of citronella, 1 dr., and oils of neroli and rosemary, of each ½ dr.

BALSAM OF PERU SPIRIT.—Balsam, 3 parts; spirit, 15 parts; carbonate of potash, 1 part; macerate for three days, and distil by water bath.

BENZOIN TINCTURE.—Benzoin, 2 oz.; alcohol, 1 pt.; mix.

BERGAMOT ESSENCE.—Spirits of wine, ½ pt.; bergamot peel, 4 oz.

BOUQUET D' AMOUR.—From esprits de rose, jasmin, violette, and cassie (flowers of *acacia farnesiana*) of each 2 parts; essences of musk and ambergris, each 1 part; mix, and filter.

BOUQUET ESSENCE.—Rose spirit, 2 oz.; ambergris tincture, 2 dr.; orris tincture, 1 oz.; bergamot otto, 1 dr.; lemon otto, 15 min.; mix.

BRIDAL BOUQUET.—Vanilla tincture, 2 dr.; musk, benzoin and orris tinctures, of each 1 dr.; cassie essence, 4 oz.; tuberose essence and jasmine essence, of each 2 oz.; bergamot otto, 16 min.; orange flower otto, 6 min.

CEDRAT ESSENCE.—Essence of bergamot, 1 oz.; essence of neroli, 2 dr.

CIVET TINCTURE.—Civet, 30 gr.; orris root powder, 1 dr.; alcohol, 8 oz.; triturate the civet with the orris root until thoroughly mixed; then add the alcohol, and macerate for 30 days, with occasional agitation, and filter.

CLOVE ESSENCE.—Spirits of wine, ½ pint; bruised cloves, 1 oz.; other essences in the same manner.

COLOGNE ESSENCE.—1. Take 8 times the quantity of ingredients ordered for cologne water, and use the strongest rectified spirit.—2. Oils of lemon and cedrat, of each 2 dr.; oil of rosemary, 1 dr.; oil of bergamot, 1 oz.; spirit of neroli, 2 fl. oz.; purest rectified spirit, 5 fl. oz. Use as a condensed perfume.

COLOGNE WATER.—For the production of good eau de cologne it is absolutely essential that the spirit be of the purest description, both tasteless and scentless, and that the oils be genuine and recently distilled. A very excellent

eau de cologne may be produced by simple solution of the oils or essences in the spirit, provided they be new, pale colored and pure.—1. Essences of bergamot and lemon, of each 1 fl. dr.; oil of orange, ½ dr.; oil of neroli, 20 drops; oil of rosemary, 10 drops; essence of ambergris and musk, of each 1 drop; rectified spirit, ½ pt.; mix.—2. Oil of bergamot, 8 oz.; oil of lemon, 3 oz.; oil of orange, 2 oz.; oil of rosemary flower, 1 oz.; oil of neroli bigarade, 2 oz.; oil of neroli (petit grain), 2 oz.; oil of cloves, 4 dr.; extract of orange flower, 10 oz.; tincture of orris root, 4 oz.; tincture of benzoin, 4 oz.; alcohol, deodorized, 6 gals.; orange flower water, sufficient; dissolve the essential oils in 5½ gals. of the alcohol; add the extract and the tinctures; and lastly orange flower water by small portions, until the mixture acquires a slight milky tint that no longer disappears on shaking; then add the remainder of the alcohol; set the mixture aside for 2 or 3 weeks, then filter through paper.—3. Pure alcohol, 6 gals.; oil of neroli, 4 oz.; oil of rosemary, 2 oz.; oil of orange and citron, of each 5 oz.; oil of bergamot, 2 oz.; mix with agitation, then allow it to stand for a few days perfectly quiet before bottling.—4. The following affords a good article, but not equal to the preceding: pure alcohol, 6 gals.; oil of neroli, 2½ oz.; oil of rosemary, 2 oz.; oil of orange peel, lemon and bergamot, of each 4 oz.; treat in the same way.—5. Take of rectified spirit, 5 gals.; calamus aromaticus, sage and thyme, of each ½ dr.; balm-mint and spearmint, of each 1 oz.; angelica root, 10 gr.; camphor, 15 gr.; petals of roses and violets, of each 3 dr.; lavender flowers, 1½ dr.; orange flowers, 1 dr.; wormwood, nutmeg, cloves, cassia lignea, and mace, of each 20 gr.; oranges and lemons sliced, of each 2 in number; bruise or slice the solids; macerate, with agitation, for 48 hours; then distil off ⅔, and add to the product essences of lemon, cedrat, balm-mint and lavender, of each 1 fl. dr.; pure neroli and essence of the seeds of anthos, of each 20 drops; essences of jasmine and bergamot, of each 1 fl. oz.; mix well, and filter if necessary.—6. Alcohol, 1 pint; oil of bergamot, oil of orange peel, true oil of rosemary, cardamom seeds, of each 1 dr.; orange flower water 1 pt.; mix and distil 1 pt. by water-bath.—7. Oil of lavender, oil of bergamot, oil of lemon, oil of neroli, of each 1 oz.; oil of cinnamon, ½ oz.; spirit of rosemary, 15 oz.; highly rectified spirit, 8 pts.; let them stand 14 days, then distil in a water-bath.—8. (*Golden Farina Cologne.*) Tincture of Canada snake-root, 4 oz.; tincture of orris root, 12 oz.; oils of bergamot, lavender and lemon, of each 6 dr.; essence of musk, 1 dr.; oil of neroli, cinnamon, cloves, of each 1 dr.; orange flower water, 8 oz.; cologne spirits, sufficient to complete, 6 pts.—9. (*Verbena Cologne.*) Otto of lemon grass, 3 dr.; otto of lemon peel (fresh), 2 oz.; otto of orange peel (fresh), 4 dr.; pure spirit, 4 pts.; mix, and after standing a month, filter.

EAU D' AMBRE ROYALE.—Rectified spirit, 2 lbs.; tincture of musk seed, 1 lb.; essence of ambergris, 1 oz.; tincture of musk, 1 oz.; reduced with a proper proportion of orange flower water.

EAU D' ANGE.—Flowering tops of myrtle (bruised), 1½ lbs.; rectified spirit, 7 pts.; water, 3 pts.; digest a week; add of common salt, 2 lbs., and distil 1 gal.

EAU BOTOT.—Tincture of cedar wood, 1 pt.; tincture of myrrh and rhatany, each 4 oz.; oil of peppermint and rose, of each 10 drops; mix.

EAU DE BOUQUET.—1. 2 oz. each of storax, lemon peel and nutmeg; 6 oz. each of coriander and calamus aromaticus; 1½ oz. cloves; 4 oz. iris of Florence; ½ oz. essence of bergamot; 1 dr. essence of lemon; 1 dr. of rosemary; 15 drops otto of roses; ½ dr. of ambergris; ½ dr. of vanilla; 3½ gals. of spirits of wine; 1 qt. of orange flower water; bruise all the solids except the iris, amber and vanilla, and infuse in the spirits of wine for several days, then distil, and add the amber, iris and vanilla; infuse for several days; filter the mixture, and add the orange flower water; when used as a cosmetic dilute with water.—2. Spirits of rosemary and essence of violets, of each 1 fl. oz.; essences of bergamot and jasmine, of each 1 fl. dr.; oils of verbena and lavender, of each ½ fl. dr.; orange flower water, 1 fl. oz.; eau de rose, ½ pt.; rectified spirit, 1 qt.; mix.

EAU DE BOUQUET DE FLORE.—Spirits of rosemary and roses and essence of violets, of each ½ fl. oz.; oil of cedra and essence of ambergris, of each 1 fl. dr.; orange flower water, 5 fl. oz.; rectified spirit, 1 pt.

EAU D' ELEGANCE.—Spirit of jessamine, 2 lbs.; spirit of styrax, 1 lb.; spirit of hyacinth, 1 lb.; spirit of star aniseed, 4 oz.; tincture of balsam of Tolu, 4 oz.; tincture of vanilla, 2 oz.

EAU DE FRAMBOISES.—Strawberries (bruised), 16 lbs.; rectified spirit, 1 gal.; digest, and distil to dryness in a salt-water or steam bath.

EAU DE HELIOTROPE.—Essence of ambergris, ½ fl. dr.; vanilla, ½ oz.; orange flower water, ½ pt.; rectified spirit, 1 qt.; digest a week, and filter.

EAU DE HONGRIE.—A fragrant stimulant and cosmetic; sweetened with sugar, it is also used as a liquor. It is prepared as follows:—1. Rosemary tops in blossom, 4 lbs.; fresh sage, ½ lb.; bruised ginger, 2 oz.; rectified spirit, 1½ gals.; water, ½ gal.; macerate for 10 days; add of common salt, 3 lbs., and then distil 11 pts.—2. Oil of rosemary, ½ fl. dr.; oil of lavender, ½ dr.; orange flower water, ½ pt.; rectified spirit, 1½ pts.; mix.

EAU D' ISPAHAN.—Essential oil of bitter orange peel, 4 oz.; oil of rosemary, 3 dr.; oil of mint, 1 dr.; oil of cloves, 7 sc.; neroli, 7 sc.; spirits of wine, 14 pts. It is used for the same purposes as eau de cologne.

EAU DE MARESCHALE.—Spirit of wine, 1½ pts.; spirit of jessamine, 1 oz.; essence of bergamot, ¼ oz.; essence of violets, 1 oz.

EAU DE MELISSE.—Fresh flowering balm, 24 oz.; yellow rind of lemon, cut fine, 4 oz.; cinnamon, cloves and nutmeg (bruised), of each 2 oz.; coriander seed (bruised), 1 oz.; dried angelica root, 1 oz.; rectified spirit, 1 gal.; macerate for 4 days, and distil in a water bath.

EAU DE MILLEFLEURS.—1. Rectified spirit, 2 pts.; balsam of Peru, ¼ oz.; essence of bergamot, ½ oz.; oil of cloves, ¼ oz.; essence of neroli, ½ dr.; essence of musk, 1 dr.; orange flower water, 2

oz.—2. Balsam of Peru and essence of cloves, of each 1 oz.; essences of bergamot and musk, of each 2 oz.; essences of neroli and thyme, of each ½ oz.; eau de fleurs d'oranges, 1 qt.; rectified spirits, 9 pts.; mix well; very fine.

EAU DE PORTUGAL.—To rectified spirit, 1 gal., add the following essential oils: of orange peel, 6 oz.; of lemon peel, 1 oz.; of lemon grass, ½ oz.; of bergamot, 1 oz.; and of otto of roses, ¼ oz.

EAU SANS PAREILLE.—Essence of bergamot, 5 dr.; essence of lemon, 8 dr.; essence of citron, 4 dr.; Hungary water, 1 pt.; rectified spirit, 6 qts.; mix, and distil.

EAU SPIRITUEUSE DE HELIOTROPE.—Vanilla, 3 dr.; double orange flower water, 6 oz.; rectified spirit, 1 qt.; macerate for 3 days, and distil in a water bath. It may be colored with cochineal. But the essence de heliotrope of some perfumers appears, by the color, not to have been distilled.

EAU DE VIOLETTES.—Macerate 5 oz. of fine orris root in 1 qt. of rectified spirits, for some days, and filter.

ESPRIT DE BOUQUET.—English oil of lavender, oil of cloves and of bergamot, of each 2 dr.; otto of roses and oil of cinnamon, of each 20 drops; essence of musk, 1 dr.; rectified spirit, 1 pt.; mix.

ESPRIT DE JASMIN ODORANTE.—Spirit of jasmine and rectified spirit, of each 1 pt.; essence of ambergris, 1 fl. dr.

ESPRIT DE LA REINE.—Oil of bergamot, 1 fl. oz.; essence of ambergris, 2 fl. dr.; otto of roses, 1 fl. dr.; rectified spirit, 1 qt.

ESPRIT DE RONDELETIA.—Mitcham oil of lavender, 3 oz.; oil of cloves, 1½ oz.; oil of bergamot, 1 oz.; essences of musk and ambergris, of each 2 fl. dr.; rectified spirit, 3 pts.

ESPRIT DE ROSE.—1. Macerate the fresh and picked flowers of the most fragrant varieties of the rose, with ½ their weight of rectified spirit, and distil in a water-bath to dryness.—2. Dissolve from 20 to 30 drops of otto in 1 pt. of rectified spirit. A stronger solution, 6 or 8 drops of otto to 1 oz. of alcohol, forms essence of roses, or *esprit de rose triple.*

ESPRIT DE SUAVE.—The essences of cloves and bergamot, of each 1 fl. dr.; neroli, ½ fl. dr.; essence of musk, 1 fl. oz.; spirit of tube rose and rectified spirit, of each 1 pt.; spirits of jasmine and cassia, of each 1 qt.; dissolve; then add of eau de rose, 1 pt., and mix well.

ESPRIT DE VIOLETTES.—Florentine orris root (reduced to coarse powder), ¼ lb.; rectified spirit, 1 pt.; by simple maceration for a fortnight. A stronger and finer article is prepared from orris root, 5 lbs.; rectified spirit, 1 gal.; by percolation.

FLORAL BOUQUET.—Musk tincture, 2 oz.; orris, tonka and vanilla tinctures, of each 6 dr.; ambergris tincture, 1 oz.; rose spirit, 4 oz.; mix.

FLORIDA WATER.—Dissolve ½ oz. each of the oils of lemon, lavender and bergamot; ½ dr. each of the oils of cinnamon and cloves, in 1 qt. of the best deodorized alcohol; add 2 qts. of filtered water, and bottle for toilet use.

FRANGIPANNI BOUQUET.—Essence of vetiver, 3 oz.; oil of neroli, 15 min.; oil of sandal wood, ½ dr.; otto of roses, 40 min.; essence of musk, 3 dr.; esprit de violette, 3 oz.; essence of ambergris, 6 dr.; rectified spirit to make up 20 oz.

FRANGIPANNI EXTRACT.—Tuberose essence, 1 oz.; vetiver spirit, ½ oz.; sandal, rose and orange flower ottos, of each 15 min.; alcohol, ½ oz.; musk tincture, 2 oz.; orris tincture and orange flower essence, of each 1 oz.; mix.

GERANIUM WATER.—Oil of rose geranium and tincture of orris root, of each 1 oz.; tincture of musk, two dr.; alcohol, 2 pts.; rose water, 4 oz.

GUIBOURT'S ROYAL ESSENCE. For the Handkerchief.—Ambergris, 25 parts; musk, 12 parts; civet, 5 parts; oil of rose, 2 parts; oil of cinnamon, 3 parts; oil of wood of Rhodes, 2 parts; oil of orange flowers, 2 parts; carbonate of potash, 6 parts; alcohol, at 90°, 860 parts; macerate 15 days, and filter.

HELIOTROPE ESSENCE, Artificial.—1. Vanilla (cut in pieces), 12 parts; alcohol, at 85°, 1,000 parts; water of orange flower, 125 parts; macerate for 8 days, then filter.—2. Spirituous extract of vanilla, ½ pt.; French rose pomatum, ¼ pt.; orange flower pomatum, 2 oz.; ambergris, 1 oz.; add 5 drops of the essential oil of almonds.

HELIOTROPE EXTRACT.—Orange flower essence and rose spirit, of each 1 oz.; vetiver spirit, 2 oz.; vanilla tincture, 1 oz.; orris tincture, 2 oz.; tonka tincture and orange flower spirit, of each 1 oz.; ambergris tincture, 4 dr.; sandal wood otto, 10 min.; clove otto, 4 min.; mix.

HONEY WATER.—1. 2½ oz. coriander seeds (ground small in a starch mill); a few slips of sweet marjoram, in flower, dried and stripped from the twigs; 1 dr. of calamus aromaticus; 1 dr. of yellow sanders; and 1 dr. of orange and lemon peel; let the three last named articles be separately beaten to a fine powder; mix these ingredients, and put them into a still that will hold 3 pts., and add to them 1 pt. of rain-water and 1 pt. of proof spirit; lute well all the joints of the apparatus, and leave the ingredients in this state, without fire, for 48 hours; begin to distil by a very gentle heat, or the flowers and leaves will rise in the still-head, stop up the worm and spoil the process; increase the fire after the first ½ hour, and keep it at a regular heat till the termination of the process.—2. Rectified spirits, 8 pts.; oils of cloves, lavender and bergamot, of each ½ oz.; musk, 15 gr.; yellow sanders shavings, 4 oz.; digest for 8 days, and add 2 pts. each of orange flower and rose waters.—3. Oil of sandal, 20 drops; tincture of musk and essence of bergamot, of each 2½ oz.; oils of cloves and lavender, of each 5 dr.; rose water and orange flower waters, of each 2 pts.; spirit of wine, 1 gal.; mix, and filter.—4. White honey and coriander seed, of each 8 oz.; fresh lemon peel, 1 oz.; cloves, ¾ oz.; nutmeg, benzoin and styrax calamita, of each 1 oz.; rose and orange flower waters, of each 4 oz.; rectified spirit, 3 pts.; digest for a few days, and filter. Some receipts add 3 dr. of vanilla, and direct only ½ oz. of nutmeg, storax and benzoin.—5. 1 oz. of essence of bergamot; 3 dr. of oil of lavender; ½ dr. each of oil of cloves and aromatic vine-

gar; 6 gr. of musk or ambergris; 1½ pts. of spirits of wine; mix, and distil. Very superior perfume is produced.

HONEYSUCKLE ESSENCE. — Spirituous extract of rose pomatum, 1 pt.; of violet, 1 pt.; of tuberose, 1 pt.; extracts of vanilla and Tolu, of each 1 pt.; oil of neroli, 10 drops; essential oil of almonds, 5 drops.

HOVENIA ESSENCE.—Rectified spirit, 1 qt.; rose water, ½ pt.; essential oil of lemons, ½ oz.; otto of roses, 1 dr.; oil of cloves, ½ dr.; oil of neroli, 10 drops.

JASMINE EXTRACT.—Jasmine essence, 4 oz.; vanilla tincture, ½ oz.; ambergris tincture, 2 dr.; mix.

JASMINE WATER.—12 oz. white jasmine flowers; essence of bergamot, 8 drops; spirits of wine, 1 gal.; water, 2 qts; digest for 2 days in a close vessel; then draw off by distillation 1 gal. and sweeten with loaf sugar.

JOCKEY CLUB BOUQUET. — Extract of orris root, 2 pts.; esprit de rose triple, 1 pt.; esprit de pomade de rose, 1 pt.; extracts of pomade of cassia and tuberose, ½ pt. each; extract of ambergris, ½ pt.; oil of bergamot, ½ oz.

JOCKEY CLUB EXTRACT.—Tuberose essence, rose spirit, rose essence, of each 2 oz.; ambergris tincture, 1½ oz.; civet and musk tinctures, of each 2 dr.; bergamot otto, 3 min.; clove otto, 10 min.; mix.

JONQUIL ESSENCE.—Spirituous extract of jasmine pomade, 1 pt.; of tuberose, 1 pt.; of orange flower, ½ pt.; add extract of vanilla, 2 oz.

KISS ME QUICK.—Spirit, 1 gal.; essence of thyme, ½ oz.; essence of orange flowers, 2 oz.; essence of neroli, ½ oz.; otto of roses, 30 drops; essence of jasmine, 1 oz.; essence of balm-mint, ½ oz.; petals of roses, 4 oz.; oil of lemon, 20 drops; calorus aromaticus, ½ oz.; essence of neroli, ½ oz.; mix and strain.

LAVENDER ESSENCE.—Essential oil of lavender, 3½ oz.; rectified spirit, 2 qts.; rose water, ½ pt.; tincture of orris, ½ pt.

LAVENDER WATER.—1. Spirit of wine, ½ pt.; essential oil of lavender, 1 dr.—2. Lavender flowers (free from stalks), 2 lbs.; rectified spirit, 8 pts.; water, 16 pts.; distil 8 pts.—3. 2 dr. oil of lavender; 30 gr. of bergamot; 1 gr. essence of musk; 1 pt. rectified spirits of wine; 1 gill of clear spring water; mix, and let it stand 10 days before filtering.—4. Oil of lavender, 4 oz.; spirit, 3 qts.; rose water, 1 pt.; mix, and filter. —5. An excellent lavender water, obtained by simple mixture, is produced from the following formula: oils of lavender and bergamot, of each 3 dr.; otto of rose and oil of cloves, of each 6 drops; oil of rosemary and essence of musk, of each ½ dr.; benzoic acid, ½ dr.; honey, 1 oz.; alcohol, 1 pt.; esprit de roses, 2 oz.; mix well, and keep till old.—6. The flowering tops of lavender, 7 lbs.; rectified spirit, 2 gals.; macerate for a week; add of water, ½ gal (holding in solution) common salt, 3 lbs.; and distil 2 gals.—7. From Mitcham oil of lavender, 8 oz.; essence of musk, 4 oz.; essence of ambergris and oil of bergamot, of each 1½ oz.; rectified spirit, 2 gals.; mix well; very fine.—8. Oil of lavender, 20 oz.; oil of bergamot, 5 oz.; essence of ambergris, ½ oz.; rectified spirit, 5 gals.; mix. The product of the last formula is better for distillation; but in that case the essences of ambergris and musk should be added to the distilled spirit.

LEMON ESSENCE.—Spirits of wine, ½ pt.; fresh lemon peel, 4 oz.; let it stand for a month; strain and bottle.

LILY OF THE VALLEY ESSENCE.—Mix the following extracts: of tuberose, ½ pt.; of jasmine, 2 oz.; of orange flower, 2 oz.; of vanilla, 3 oz.; of cassia, ¼ pt.; of rose water, ¼ pt.; add 3 drops of hydrocyanic acid; keep together for a month, then bottle.

LISBON WATER.—To rectified spirit, 1 gal., add the essential oils of orange peel and lemon peel, of each 3 oz.; and of otto of roses, ¼ oz.

MAGNOLIA ESSENCE. — Spirituous extract of orange flower pomatum, 1 pt.; of rose pomatum, 2 pts.; of tuberose pomatum, ½ pt.; of violet pomatum, ½ pt.; essential oil of citron, 2 dr.; and essential oil of almonds, 10 drops.

MIGNONETTE ESSENCE.—Digest 1 lb. of pomade de réséda in rectified spirit, 1 pt., for 14 days; filter off, and add 1 oz. of extrait d' ambre.

MISTURA ODORATA.—Rectified spirit, 48 oz.; tincture of benzoin, 4 oz.; tincture of vanilla, ½ oz.; tincture of musk, ½ oz.; balsam of Peru, ½ oz.; oils of cloves, mace and cinnamon, of each ½ oz.; oil of bergamot, 1 oz.; oil of cedrat, 2 oz.

MOSS ROSE ESSENCE. — Otto of rose, 1½ dr.; essence of ambergris, 2½ oz.; essence of musk, 1 oz.; alcohol, 15 oz.; concentrated rose water, 10 oz.; mix, and shake frequently for 1 week.

MOSS ROSE EXTRACT.—Rose spirit, 3 oz.; orange flower essence, 1 oz.; ambergris tincture, ½ oz.; musk tincture, 2 dr.; mix.

MUSK ESSENCE.—1. 1 pt. proof spirit; add 2 dr. of musk; let it stand a fortnight, with frequent agitation.—2. Finest pure grain musk, ½ oz.; civet and ambergris, of each 1 dr.; strong deodorized alcohol, 1 pt.; spirits of hartshorn, ½ dr.; bottle and cork closely, and proceed as directed for essence of ambergris.

MUSK EXTRACT.—Musk and civet tinctures, of each 2 oz.; rose otto, 10 min.; alcohol, 1 oz.; mix.

MUSK TINCTURE.—Tonquin grain musk, 1 dr.; hot water, 4 dr.; alcohol, 1 pt.; digest the musk in the hot water for 3 or 4 hours; then add the alcohol, and macerate for 30 days, with occasional agitation, and filter.

MYRTLE ESSENCE.—1. Take the following extracts: of vanilla, ½ pt.; of roses, 1 pt.; of orange flower, ½ pt.; of tuberose, ½ pt.; of jasmine, 2 oz.; mix, and allow to stand for a fortnight.—2. Myrtle tops (in blosson), 2½ lbs.; proof spirit, 9 pts.; digest 3 days, then distil 1 gal. A pleasant perfume.

NEROLI ESSENCE.—1. Neroli, 3 dr.; rectified spirit of wine, 1 pt.; mix. A delicious perfume.—2. Oil of orange, 2 dr.; orris root (bruised), ½ oz.; ambergris, 10 gr.; neroli, 25 drops; spirits of wine, 1 pt.; digest 14 days, and filter. Very fragrant, but less refined than the last.—3. Spirits of wine, ½ pt.; orange peel (cut small), 3 oz.; orris root (in powder), 1 dr.; musk, 2 gr.; let it stand in a warm place for 3 days, and filter.

NEW MOWN HAY EXTRACT.—Moss rose extract, 1 oz.; benzoin tincture, 1 oz.; tonka tincture, 4 oz.; musk tincture, 1 oz.; rose geranium otto, 40 min.; bergamot otto, 40 min.; alcohol, 1 oz.; mix.

ODOR DELECTABILIS.—1. 4 oz. of distilled rose water; 4 dr. of orange flower water; 1 dr. each of oils of cloves and lavender; 2 dr. of oil of bergamot; 2 gr. each of ambergris and musk; and 1 pt. of spirits of wine; dissolve the musk and ambergris in the spirit; then mix the whole; it will be better for being passed over a still.—2. Oils of lavender, bergamot, rose geranium and cloves, of each 1 fl. dr.; eaux de rose and fleurs d' orange, of each ¼ pt.; rectified spirit, 1½ pts.

ORANGE FLOWER SPIRIT.—1. Orange flower otto, 40 min.; alcohol, 8 oz.; mix.—2. Fresh flowers, 1 lb.; rectified spirit, 4 lbs., or pts.; water, 2 lbs.; distil 4 lbs. or pints.

ORANGE FLOWER WATER.—Oil of neroli, 8 drops; rectified spirits, 2 dr.; magnesia, ½ dr.; rub together in a mortar, gradually adding a pt. of distilled water; filter the liquid through white blotting paper.

ORANGE PEEL SPIRIT.—Fresh peel, 1 lb.; rectified spirit, 6 lbs.; macerate for 2 days, and distil in a water-bath to dryness; or 1 oz. of the essential oil to 2 pts. of spirit.

ORRIS TINCTURE.—Orris root powder, 2 oz.; alcohol, 4 oz.; macerate the orris root for 7 days and filter; then percolate the orris root with alcohol sufficient to make the measure up to 4 fl. oz.

PARFUM DES ROIS.—Spirit of wine, 2 gals.; styrax, 6 oz.; benzoin, 16 oz.; aloes-wood, 8 oz.; spirit of rose and spirit of orange flowers, of each, 2 pts.; essence (tincture) of ambergris, 8 oz.; tincture of musk, 8 oz.; tincture of vanilla, 16 oz.

PATCHOULY ESSENCE.—1. Indian patchouly (leaves or foliaceous tops), 2½ lbs.; rectified spirit, 9 pts.; digest for a week; add of water, 1 gal.; oil of lavender, 3 dr.; common salt, 2 lbs.; agitate well together; distil over (rapidly) 1 gal., and add essence of musk, 3 fl. dr. This is a very fashionable perfume.—2. Patchouly, 3 oz.; rectified spirit, 1 pt.; digest 1 week, press, and filter. A commoner kind is made with proof spirit.

PATCHOULY EXTRACT.—Patchouly otto, 2 dr.; rose otto, 20 min.; alcohol, 15 oz.; mix.

PEACH BLOSSOM EXTRACT.—Take essence of lemons, 1 oz.; pure balsam of Peru, 2 dr.; essence (oil) of bitter almonds, 1 dr.; rectified spirit, 3 pts.; spirit of orange flowers, 1 pt.; spirit of jasmine, ½ pt.; mix. This is a pleasant and powerful perfume.

PRINCESS BOUQUET.—Bergamot and clove ottos, of each ½ dr.; lavender otto, 1 dr.; musk, vanilla and ambergris tinctures, of each 2 dr.; rose spirit, 1 oz. and 2 dr.; alcohol, 8 oz.; mix.

RONDOLETIA ESSENCE.—Essence of bergamot, essence of lemon, oil of cloves, of each 1 dr.; otto of roses, 6 drops; rectified spirit, 1 pt.

RONDOLETIA EXTRACT.—Lavender otto, 1 dr.; clove otto, 15 min.; bergamot otto, 30 min.; musk, vanilla and ambergris tinctures, of each 2 dr.; rose spirit, 1½ oz.; alcohol, 8 oz.; mix.

ROSE ESSENCE.—1. Otto of roses, 2 dr.; alcohol, 1 pt.; agitate frequently until they unite.—2. Otto of roses, 1 oz.; rectified spirit, 1 gal.; mix in a close vessel, and assist the solution by placing it in a bath of hot water; as soon as the spirit gets warm, take it from the water and shake it till quite cold; the next day filter.—3. Rose otto, 50 min.; rose geranium otto, 40 min.; alcohol, 8 oz.; mix.

ROSE WATER.—1. Procure a glass bottle with a wide mouth and ground glass stopper; fill ⅔ full with deodorized alcohol; add rose leaves until no more can be forced into the bottle; let it stand several months, keeping it airtight; strain when the virtue has left the leaves; white roses are best.—2. Take otto of roses, 25 drops; rub it in with 1 oz. white sugar and 4 dr. of carbonate of magnesia; then add gradually ½ gal. of water, and 4 oz. of proof spirits.

ROYAL ESSENCE.—Ambergris, 1 dr.; civet, 15 gr.; musk, 30 gr.; carbonate of potash, 20 grs.; triturate together, and add oil of cinnamon, 10 drops; oils of rhodium and neroli, 6 drops; otto of roses, 6 drops; rectified spirit, ¼ pt.; digest and filter.

SANDAL WOOD EXTRACT.—Sandal wood otto, 3 dr.; rose otto, 20 min.; alcohol, 8 oz.; mix.

SPRING FLOWERS EXTRACT.—Rose essence, tuberose essence and rose spirit, of each 2 oz.; musk tincture, ½ oz.; ambergris tincture, 1½ oz.; clove otto, 10 min.; bergamot otto, ½ dr.; mix.

STRAWBERRY OR RASPBERRY SPIRIT.—Fresh fruit, 3 lbs.; rectified spirit, 1 lb.; macerate 24 hours, and distil 2 lbs.

SWEET BRIAR ESSENCE.—Spirituous extract of French rose pomatum, 1pt.; of cassia and orange flowers, of each ¼ pt.; esprit de rose, ¼ pt.; with oils of neroli and lemon grass, of each ½ dr.

SWEET PEA ESSENCE.—Essences of tuberose, orange flower and rose pomatum, of each ½ pt.; essence of vanilla, 1 oz.

TUBEROSE EXTRACT.—Tuberose essence, 4 oz.; orris and ambergris tinctures, of each ½ oz.; mix.

UPPER TEN.—Spirits of wine, 4 qts.; essence of cedrat, 2 dr.; essence of violets, ½ oz.; essence of neroli, ½ oz.; otto of roses, 20 drops; orange flower essence, 1 oz.; oil of rosemary, 30 drops; oils of bergamot and neroli, of each ½ oz.

VANILLA TINCTURE.—Vanilla beans, 6 troy dr.; alcohol, 1 pt.; beat the vanilla to coarse powder; macerate with gentle heat for 4 hours, and filter; while macerating, keep a wet towel over the mouth of the bottle, using a water-bath.

VERBENA ESSENCE.—Rectified spirit of wine, ½ pt.; otto of verbena, ½ dr.; otto of bergamot, 1 dr.; and tincture of tolu, ½ oz.; mix them together, and it is ready for use; it does not stain the handkerchief, and is very economical.

VERBENA EXTRACT.—Verbena otto (true), 1 dr.; lemon otto, 1 dr.; alcohol, 8 oz.; mix.

VERBENA WATER.—1. Rectified spirits, 1 pt.; grass-oil (verbena-oil), 3 dr.; oil of lemon peel, 2 oz.; oil of orange peel, ½ oz.; mix, and let stand for a few hours; filter, if necessary, and fill in bottles.—2. A very superior article, sold un-

der the name of *Extrait de Verbene*, is made according to the following receipt: Rectified spirit, 1 pt.; oil of orange peel, 1 oz.; oil of lemon peel, 2 oz.; oil of lemon, 1 dr.; grass-oil (verbena oil), 2½ dr.; essence of orange flowers, 7 oz.; essence of tuberose, 7 oz.; essence of rose, ½ pt.

BUCKINGHAM PALACE BOUQUET.—Extract fleur d'orange, extract cassie, extract jasmine, extract rose, from pomade of each, 1 pt.; extract of orris, extract of ambergris, of each, ½ pt.; otto of neroli, ½ dr.; otto of lavender, ½ dr.; otto of rose, 1 dr.

COLOGNE, Cheap.—Oil of bergamot, 1 fl. dr.; oil orange, 1 fl. dr.; oil rosemary, 1 fl. dr.; orange flower water, 1 pt.; alcohol, 1 pt.; cardamom seeds, 1 dr.; mix, digest, and distill over 1 pt.

CREOLE WATER.—Orris root, 6¾ oz., cut in small pieces, put in 1½ pt. French brandy; allow it to stand for 2 weeks, stir frequently; filter; then add 3 pt. French brandy, 3 dr. oil of orange blossoms, ¾ fl. oz. oil geranium. Distill, and add a little cumarin essence.

EAU DE PARIS.—Eighty-five per cent alcohol, 2,000 parts; Portugal oil, 15½ parts; oil of lemon, 15½ parts; oil of bergamot, 15½ parts; neroli, 3½ parts; oil of rosemary, 2 parts.

EAU DE COLOGNE.—It consists of alcohol perfumed with essential oils. Lebeaud and Fontenelle give the following recipe: Dried rosemary, thyme, sweet marjorum, wormwood, balm, and hyssop, 1 oz. each; cloves, cinnamon, angelica root, juniper berries, anise, cummin, fennel, and caraway-seeds, fresh orange peel, and oil of bergamot, 1 oz. each; cardamoms, lavender flowers, and bruised nutmegs, each, 2 oz., the whole to be digested in 10 qts. of alcohol several days, and then distilled to dryness by water-bath. Purity of the ingredients, and freedom, especially of the alcohol, from fusel oil, are essential to the perfection of the perfume.

EAU DE LUCE.—A strong solution of ammonia, scented and rendered milky by the addition of a little mastic and oil of amber. It is considered an effective remedy in India against the bite of poisonous snakes.

EAU DES ALPES.—Alcohol, 400 parts; oil of bergamot, 9½ parts; oil cedrat, 9½ parts; oil of orange blossoms, 9½ parts; Portugal oil, ¾ part; oil of lemon, ¾ part; oil of wormwood, 2 parts; oil of cloves, 1 part.

EAU SPIRITUEUSE D'ANIS.—Angelica seed, 6 oz.; anise, 6 oz.; brandy, 8 lb.; bruise the seeds, and after some days' infusion with the brandy, distill.

EAU ROMAINE.—1. Jasmine water, 3 qt.; vanilla water, 1 qt.; acacia water, 1 qt.; tuberose water, 1 pt.; essence of amber, 2 oz.; tincture of benzoin, 8 oz.—2. Essence of ambergris, 1 fl. dr.; tincture of benzoin, 4 fl. dr.; spirit of tuberose, 1½ fl. oz.; tincture of vanilla, 2 fl. oz.; esprit de fleurs d'acacia, 2½ fl. oz.; esprit de jasmin, 7½ fl. oz.; essence de petit grain, 8 or 10 drops; mix. The last essence is often omitted, and the tincture of benzoin reduced in quantity.—3. Essence of ambergris, 1 fl. oz.; tincture of benzoin, 4 fl. oz.; spirit of tuberose, ½ pt.; spirit of acacia flowers, 1 pt.; tincture of vanilla 1 pt.; spirit of jasmin, 3 pt.

MARIE STUART.—Extract musk, 4 oz.; extract civet, 4 oz; extract benzoin, 4 oz.; extract orange flower, 16 oz.; extract oil of rose, Kissanlik, 60 min.; oil bergamot, 60 min.; extract tonka, 4 oz.; alcohol, 1 gal.; water, 1 pt.

NIGHT BLOOMING CEREUS.—1. Spirit of rose, 4 oz.; essence of jasmine, 4 oz.; tincture of tonka, 2 oz.; tincture of civet, 2 oz.; tincture of benzoin, 4 oz.; cost $1.65 per pint.—2. Extract vanilla, 8 oz.; extract civet, 2 oz.; extract benzoin, 2 oz.; oil bergamot, 2 oz.; alcohol, 2 gal.; water, 3 pt.

PARADISE WATER.—Distill 90 per cent alcohol Tr., 2⅜ gal.; cardamoms, ½ oz.; anise seed, 1⅜ oz.; rosewood, 1 oz.; calamus, 1⅜ oz.; orris root, 1 oz.; angelica root 1⅜ oz.; fresh lemon peel, 1½ lb.; to this add 13½ lb. sugar sirup and 1½ gal. water; color green; add a little silver leaf rubbed fine.

PASSY WATER.—Sulphate of iron, 2 gr.; chloride of sodium, 3 gr.; carbonate of soda, 4 gr.; chloride of magnesium, 2 gr.; aerated water, 1 pt.

PEACH WATER.— Eighty-degree alcohol, 3 pt.; tincture of tolu, 3 oz.; oil of almonds (essential), 1½ dr.; extract of jasmine, 6 oz.; extract orange flower, 6 oz.; pleasant toilet water.

SWEET PINK.—Oil ylang ylang, 1 dr.; oil bergamot, 2 dr.; extract benzoin, 2 dr.; civet, 2 dr.; extract rose from pomade, 8 oz.; alcohol, 1½ qt.

VETIVER ESSENCE.—2 lb. of the root of vetiver (cut small); moisten with a little water; macerate for 24 hours; then beat in a marble mortar; macerate it in sufficient spirit to cover, for 8 or 10 days, and strain with pressure; filter through paper, and in a fortnight repeat the filtration.

VIOLET ESSENCE.—Digest 1½ oz. of coarsely powdered best Florentine orris root in 36 oz. of strong deodorized alcohol for 2 weeks; then express and filter; or prepare by percolation.

VIOLET EXTRACT.—Violet essence, 4 oz.; cassia essence, 1 oz.; rose essence, 3 dr.; orris tincture, 1 oz.; ambergris and civet tinctures, of each, 2 dr.; almond spirit, 20 min.; mix.

WEST END.—Rose spirit, 3 oz.; benzoin and musk tinctures, of each, 1 oz.; verbena extract and civet tincture, of each, ½ oz.; sandal wood otto, 10 min.; mix.

WHITE LILAC ESSENCE.—Spirituous extract of tuberose pomade, 2 pt.; of orange flower pomade, ½ pt.; add essential oil of almonds, 3 drops, and extract of civet, ½ oz.

WHITE ROSE EXTRACT.—Rose spirit, 4 oz.; violet and jasmine essence, of each, 2 oz.; patchouly extract, ½ oz.; mix.

YLANG YLANG EXTRACT.—1. Extract of jasmine, 8 oz.; extract of rose, 16 oz.; tincture of orris root, 8 oz.; tincture of civet, 4 oz.; oil of ylang ylang, 4 dr.; alcohol, 2 pts.—2. Tincture of tonka beans, 3 oz.; tincture of musk and extracts of tuberose and cassia, of each, 4 oz.; tincture of orris root, 8 oz.; oil of orange (fresh), 2 dr.; neroli, ½ dr.; alcohol, sufficient to make 4 pts.

TABLES.

ABBREVIATIONS AND SIGNS Used in Medical Prescriptions and in Some Receipts:

R.....	Recipe..... Take
aa.....	Ana..... Of each
lb.....	Libra..... Pound
℥ or oz.....	Uncia..... Ounce
ʒ or dr.....	Drachma..... Drachm
℈ or sc.....	Scrupulus..... Scruple
Cong.....	Congius..... Gallon
O or pt.....	Octarius..... Pint
f ℥.....	Fluid Uncia..... Fluid Ounce
f ʒ.....	Fluid Drachma..... Fluid Drachm
M.....	Minimum..... Minim
Chart.....	Chartula..... Small Paper
Coch.....	Cochlear..... Spoonful
Collyr.....	Collyrium..... Eye Water
Decoct.....	Decoctum..... Decoction
Ft.....	Fiat..... Make
Garga.....	Gargarisma..... Gargle
Gr.....	Granum..... Grain
Gtt.....	Gutta..... Drop
Haust.....	Haustus..... Draught
Infus.....	Infusum..... Infusion
M.....	Misce..... Mix
Mass.....	Massa..... Mass
Mist.....	Mistura..... Mixture
Pulv.....	Pulvis..... Powder
Q. S.....	Quantum Sufficit Sufficient Quantity
Sig. or S.....	Signa..... Write
Ss.....	Semis..... Half

½ gr.....	½ grain
gr. j, or gr. i.....	1 "
gr. iss.....	1½ "
gr. ii, or gr. ij.....	2 "
gr. iiss.....	2½ "
gr. iv.....	4 "
gr. viii, or gr. viij.....	8 "
℈ ss.....	½ scruple
℈i, or ℈j.....	1 "
℈ iss.....	1½ "
℈ ii, or ℈ ij.....	2 "
ʒ i. or ℥ j.....	1 drachm
ʒ iss.....	1½ "
ʒ ii, or ℥ ij.....	2 "
ʒ iii, or ℥ iij.....	3 "
ʒ iiiss.....	3½ "
ʒ viiss.....	7½ "
℥ ss.....	½ ounce
℥ i, or ℥ j.....	1 "
℥ iss.....	1½ "
Oss.....	½ pint
O.....	1 "

The following table may be of assistance in prescribing fluid preparations. They are:

Teaspoonful.....	about	1	fl. Drachm
Dessertspoonful.....	"	2	"
Tablespoonful.....	"	4	"
Wineglassful.....	"	2	fl. Ounces
Teacupful.....	"	4	"
Breakfastcupful.....	"	8	"
Tumblerful.....	"	8	"
Thimbleful.....	"	¾	fl. Drachm
Pinch (of leaves and flowers)	"	1	dr. (Troy)
Handful (leaves and flowers)	about	10	dr.(Troy)

8 wineglassfuls (each 2 fluid ounces) in a pint
24 dessertspoonfuls (each 2 fluid drachms) in 6 fluid ounces.
16 dessertspoonfuls (each 2 fluid drachms) in 4 fluid ounces.
32 teaspoonfuls (each 1 fluid drachm) in 4 fluid ounces.
16 teaspoonfuls (each 1 fluid drachm) in 2 fluid ounces.
8 teaspoonfuls (each 1 fluid drachm) in 1 fluid ounce.

WEIGHTS AND MEASURES, For Domestic Purposes.—Wheat flour, one pound is a quart.

Indian meal, one pound two ounces is one quart.

Butter, when soft, one pound is one quart.

White sugar, when powdered, one pound one ounce is one quart.

Best brown sugar, one pound two ounces is one quart.

Liquids.—Eight large tablespoonfuls are one gill.

Twenty-five drops are equal to one teaspoonful.

A common tumbler is equal to a half pint.

Four large tablespoonfuls are half gill.

A common wineglass is equal to a half gill.

SPECIFIC GRAVITIES OF LIQUIDS.—

NAMES.	Spec. Grav.	Imp. Gal. In Lbs.
Acid, sulphuric.....	1850	18.5
—— nitric.....	1271	12.7
—— muriatic.....	1200	12.0
—— fluoric.....	1060	10.6
—— citric.....	1034	10.3
—— acetic.....	1062	10.6
Water from the Baltic.....	1015	10.2
—— from the Dead Sea.....	1240	12.4
—— from the Mediterranean...	1029	10.3
—— from the Irish Channel...	1028	10.2
—— ice.....	1001	10.0
—— distilled.....	1000	10.0
Oils, expressed—linseed.....	940	9.4
—— ———— sweet almond.	932	9.3
—— ———— whale.....	923	9.2
—— ———— hempseed.....	926	9.3
—— ———— olive.....	915	9.2
Oils, essential—cinnamon.....	1043	10.4
—— ———— lavender.....	894	8.9
—— ———— turpentine....	870	8.7
—— ———— amber.....	868	8.7
Alcohol of commerce, at 60° Fhr	825	8.2
———— absolute.....	797	7.9
Ether, nitric.....	908	9.1
——— muriatic.....	729	7.3
Proof spirit.....	922	9.2
Tar.....	1015	10.1
Vinegar, distilled.....	1009	10.1

Gases and Vapors.—Atmospheric air =1.000. Hydrogen, .0692; nitrogen, .972; oxygen (Graham, 1.1056; carbonic oxide, .972; carbonic acid (carbonic anhydride), 1.524; light carburetted hydrogen, .5595; olefiant gas, .981; chlorine, 2.470 (2.421 Graham); vapor of eth-

er, 2.582; vapor of water, .622; vapor of sulphur at 900°, 6.617 (Graham); vapor of phosphorus, 4.284; vapor of iodine, 8.716.

TABLES OF MEASURES.—Most liquid substances are dispensed by measure instead of by weight.

Apothecaries' or Wine Measure is the official or standard system in use by the pharmacists of the United States. Its denominations are gallon, pint, fluid ounce, fluid drachm and minim, and the signs used to express them and their relative value are:

Cong.		O.		F. Oz.		F. Dr.		Minims.
1	=	8	=	128	=	1,024	=	61,440
		1	=	16	=	128	=	7,680
				1	=	8	=	780
						1	=	60
								1

Imperial Standard Measure is the system in use by British pharmacists. Its denominations and their relative value are:

Gal.		Qts.		Pts.		F. Oz.		F. Dr.		Minims.
1	=	4	=	8	=	160	=	1,280	=	76,800
		1	=	2	=	40	=	320	=	19,200
				1	=	20	=	160	=	9,600
						1	=	8	=	480
								1	=	60

The relative value of United States Apothecaries' and British Imperial Measure is as follows:

U. S. Apothecaries' Measure.		Imperial Measure. Pt.	F. oz.	F. dr.	Drops.
1 Gal. = .83311 Imp. Gal., or		6	13	2	22.85
1 Pint = .83311	" Pt., "		16	5	17.86
1 F.oz.=1.04139	" F. oz., "		1	0	19.76
1 F. dr.=1.04139	" F. dr., "			1	2.48
1 Min. =1.04139	" Minim,"				1.04

TABLES OF WEIGHTS.—Apothecaries' Weight is used by apothecaries in compounding medicines, and is the official standard of the *United States' Pharmacopeia.* In buying and selling medicines not ordered by prescriptions, avoirdupois weight is used. The denominations of apothecaries' weight and their relative values are:

Pound.		Ounces.		Drachms.		Scruples.		Grains.
1	=	12	=	96	=	288	=	5,760
		1	=	8	=	24	=	480
				1	=	3	=	60
						1	=	20

Avoirdupois Weight is used for weighing all goods except those for which troy and apothecaries' weights are employed, and for compounding receipts for domestic purposes and for the arts. Its denominations and their relative values are:

Ton.	Cwt.	Qrs.	Lbs.	Ozs.	Drs.
1	= 20	= 80	= 2,240	= 35,840	= 573,440
	1	= 4	= 112	= 1,792	= 28,672
		1	= 28	= 448	= 7,168
			1	= 16	= 256
				1	= 16

The common standard weight by which the relative values of these systems are compared, is the *grain*, which for this purpose may be regarded as the unit of weight. The pound troy and that of apothecaries' weight have each 5,760 grs; the pound avoirdupois has 7,000 grs. The relative proportions and values are as follows:

TROY.		AVOIRDUPOIS. Oz.	Dr.
1 pound	=	13	2.65
1 ounce	=	1	1.55
1 dwt.	=		0.877

		APOTHECARIES'. Lb.	Oz.	Dr.	Sc.	Gr.
1 pound	=	1	0	0	0	0
1 ounce	=		1	0	0	0
1 dwt.	=			1	0	4
1 grain	=					1

APOTHECARIES'.		AVOIRDUPOIS. Oz.	Dr.
1 pound	=	13	2.65
1 ounce	=	1	1.55
1 drachm	=	6	2.19
1 scruple	=	0	0.73

		TROY. Lb.	Oz.	Dwt.	Gr.
1 pound	=	1	0	0	0
1 ounce	=		1	0	0
1 drachm	=			2	12
1 scruple	=				20

AVOIRDUPOIS.		TROY. Lb.	Oz.	Dwt.	Gr.
1 ton	=	2,922	2	13	8
1 cwt.	=	146	1	6	16
1 quarter	=	34	0	6	16
1 pound	=	1	2	11	16
1 ounce	=		1	8	5$\frac{1}{2}$
1 drachm	=			1	3$\frac{11}{32}$

		APOTHECARIES'. Lb.	Oz.	Dr.	Sc.	Gr.
1 pound	=	1.	2	4	2	0
1 ounce	=		7	0	0	17$\frac{1}{2}$
1 drachm	=			1	0	7$\frac{1}{2}$

Troy Weight is used by jewelers and at the mints, in the exchange of the precious metals. Its denominations and their relative value are as follows:

Pound.		Ounces.		Pennyweights.		Grains.
1	=	12	=	240	=	5,760
		1	=	20	=	480
				1	=	24

TABLES OF BOTH WEIGHTS AND MEASURES.

Metric System.—This system of weights and measures is very simple. It does not consist of a number of foreign terms, as many suppose. The terms *meter, liter, gram, are,* etc., and the prefixes, *milli, centi, deci, deka, hekto, kilo* and *myria,* are no part of the metric system at all, and could be dropped if other names and numerals were found preferable. The essential characteristics of the metric system are:—1. That it rests upon a basis of a constant of nature (the measure of a ten-millionth part of the quadrant of the earth).—2. That it is harmonious throughout, so that the units for the measurement of surface, volume and weight, all bear the simplest relation possible to the unit of length, which is the basis for all.—3. That it is decimal and corresponds with our arithmetic. The prefixes used in the metric system are simply numerals: milli means 1-1000th; centi means 1-100th; deci means 1-10th;

deka means 10; hekto means 100; kilo means 1,000, and myria means 10,000. The only prefixes used to any great extent in medicine and pharmacy are kilo, centi and milli.

1 meter is equal to 39.370432 English inches.

1 liter is equal to 1.056717 wine quarts, or about 34 United States fluid oz.

1 cubic centimeter is equal to 16.231 United States' minims.

1 gram is equal to 15.43234874 troy grs.

Physicians and pharmacists use only weights and fluid measures. The following contains all that is necessary of the metric weights and fluid measures: 1 kilogram = 1,000 grams; 1liter = 1,000 fluigrams. As 1 United States fluidrachm weighs very nearly 1 drachm (really only 57.047 troy grains), it is customary to use the terms drachm and fluid drachm, ounce and fluid ounce, almost indiscriminately, thus saying "an ounce of water," when a *fluid* ounce of water is meant, etc. In the metric system, 1 liter of water and 1 kilogram of water is actually the same quantity; and 1 gram of water is just 1 cubic centimeter of water: therefore it is very convenient to drop the term cubic centimeter, and to give to it the name fluigram instead, so as to show the intimate relationship between the gram and fluigram. For all practical purposes in medicine and pharmacy, it is perfectly proper to ignore the interminable fractions given above in comparing the metric units with those of the old system. The difference is so insignificant that it would be absurd to suppose that any therapeutic objection exists against ignoring it. The metric units compare with the old units as follows: 1 gram = 15 troy grs.; 1 troy gr. = 1-15 gram; 1 fluigram = 15 minims; 1 minim = 1-15 fluigrams. Or—1 dr. = 4 grams; 1 gram = ¼ drachm; 1 fluidrachm = 4 fluigrams; 1 fluigram = ¼ fluidrachms. If now the centigram be called a cent, and the milligram a mill, and if we call the 10th part of 1 fluigram a fluidime, we will then have an Americanized metric system of weights and measures such as will be very easy indeed to learn. Weights: 1 kilogram = 1,000 grams; 1 gram = 100 cents, or about 1,000 mills. Measures: 1 liter = 1,000 fluigrams; 1 fluigram = 10 fluidimes, or 100 fluicents, or 1,000 fluimills. As 1 fluidime is equal to only 1½ United States' minim, a smaller unit for fluid measures would be useless. 1 cent is equal to about ⅛ troy gr.; 1 mill = 1-64 troy gr. In writing metric quantities it is most convenient to spell and abbreviate as follows: Meter; liter; cubic centimeter, C.C.; gram, Gm.; fluigram, fGm.; fluidime, fD.

RULES FOR CONVERSION.

1. To convert troy grs. into cents (centigrams), multiply by 6.

2. cents (centigrams), into troy grs. divide by 6.

3. Troy grs. into mills (milligrams), multiply by 60.

4. Mills (milligrams), into troy grs., divide by 60.

5. Troy grs. into grams, or min. into fluigrams, divide by 15.

6. Grams into grs., or fluigrams into min., multiply by 15.

7. Drachms into grams, or fluidrachms into fluigrams, multiply by 4.

8. Grams into drachms, or fluigrams into fluidrachms, divide by 4.

1 troy gr. = 6 cents; 1 dr. = 4 grams; 1 troy oz. = 30 grams; 1 min. = 1-15 fluigram; 1 fluidrachm = 4 fluigrams; 1 drop = about ½ fluidime. The average drop is about 0.05 fGm.; a teaspoonful is about 5 fGm; a dessertspoonful is about 10 fGm.; a tablespoonful is about 20 fGm.; a winglassful is about 75 fGm.

APPROXIMATE EQUIVALENTS.

A.

Apothecaries' Weights (and Measures). Troy Grains (or Minims).	*Metric Weights (and Measures).*
1-500	0.12½ (or ⅛) mill
1-400	0.16 " ¼ "
1-300	0.20 " 1-5"
1-250	0.25 " ¼ "
1-200	0.32 " ⅓ "
1-100	0.65 " ⅜ "
1-64	1 "
1-50	1.3 mills
1-40	1.6 "
1-32	2 "
1-25	2.5 "
1-20	3 "
1-16	4 "
1-12	5 "
⅛	8 "
1/16	1 cent
¼	1.50 cts.
1/12	2 "
⅓	3 "
⅜	4 "
¾	4.50 "
1	6 "
1½	10 "
2	13 "
2½	15 "
3	20 "

Apothecaries' Weights (and Measures). Troy Grains (or Minims).	*Metric Weights (and Measures).*
4	25 cts.
5	30 "
8	50 "
10	65 "
15	1 gram or fluigram
30	2 gram or fluigram

Drs. or Fluidrachms.	Grams or Fluigrams.
1	4
2	8
4	16
6	24

Troy ozs., or Fl. ozs.	
1	30
2	60
3	90
4	120
6	180
8	240
	Grams or Fluigrams.
10	300
12	360
16	600

B.

Metric Weights (and Measures).	*Apothecaries' Weights (and Measures).* Grains (or Minims).
1 Mill	1-64
2 Mills	1-32
3 "	1-20
4 "	1-16
5 "	1-12
6 "	1-16
8 "	1-8
10 " (or 1 cent)	1-6
15 " (or 1½ cts.)	1-4
20 " (or 2 "	1-3
3 Cents	1-2
4 "	2-3
4.50 "	3-4
6 "	1
10 "	1½

Metric Weights (and Measures).	*Apothecaries' Weights (and Measures).* Grains (or Minims).
15 "	2½
20 "	3
30 "	5
65 "	10
1 Gram	15
2 "	30
3 "	45
	Drachms or Fluidrachms.
4 "	1
5 "	1¼
6 "	1½
8 "	2
10 "	2½
15 "	4
30 "	8

TEMPERATURES.—In English pharmacy it is customary to measure the degree of heat by Fahrenheit's thermometer. When a boiling heat is directed, 212° is meant. A gentle heat is that

which is denoted by any degree between 90° and 100° Fahr. Whenever specific gravity is mentioned, the substance spoken of is supposed to be of the temperature of 62° Fahr. In chemical works in this country, generally, the specific gravities of bodies are taken at, or referred to, the temperature of 60° Fahr. The following data may be useful to the pharmacist:

Degrees of Fahr.

644 Mercury boils (Daniell); 662 (Graham).
640 Sulphuric acid boils (Magrignac); 620 (Graham).
630 Whale oil boils (Graham).
600 Linseed oil boils.
518 Bismuth melts (Gmelin).
380 Arsenious acid volatilizes.
356 Metallic arsenic sublimes.
315 Oil of turpentine boils (Kaure).
302 Etherification ends.
257 Saturated sol. of sal ammonic boils (Taylor).
256 Saturated sol. of acetate of soda boils.
239 Sulphur melts (Miller); 226 (Fownes).
238 Saturated sol. of nitre boils.
221 Saturated sol. of salt boils (Paris Codex).
220 Saturated sol. of alum, carb. soda and sulph. zinc, boil.
218 Saturated sol. of chlorate and prussiate potash, boil.
216 Saturated sol. of sulph. iron, sulph.copper, nitrate of lead, boil.
214 Saturated sol. of acetate lead, sulph. and bitartrate potash, boil.
213 or 213.5 Saturated sol. of water begins to boil in glass.
212 Water boils in metal, barometer at 30".
207 Sodium melts (Regnault).
145 White of egg begins to coagulate.
185 Nitric acid 1.52 begins to boil.
180 (about) Starch forms a gelatinous compound with water.
176 Rectified spirit boils, benzol distils.
173 Alcohol (sp. gr. .796 to .800) boils.
151 Beeswax melts (Kane); 142 (Lepage).
150 Pyroxylic spirit boils (Scanlan).
141.8 Chloroform and ammonia of .945, boil.
44.5 Potassium melts (Bunsen).
132 Acetone (pyroacetic spirit) boils (Kane).
122 Mutton suet and styracin melt.
116 Bisulphuret of carbon boils (Graham).
115 Pure tallow melts (Lepage); 92 (Thomson).
112 Spermacetti and stearin of lard melt.
111 Phosphorus melts (Miller).
98 Temperature of the blood.
95 Ether (.720) boils.
95 Carbolic acid crystals become an oily liquid.
88 Acetous fermentation ceases, water boils *in vacuo*.
77 Vinous ferm. ends, acetous ferm. begins.
64.4 Oil of anise liquefies.
59 Gay Lussac's *Alcoomètre* graduated at.
55 Syrups to be kept at.
30 (about) Olive oil becomes partially solid.
32 Water freezes.
5 Cold produced by snow 2 parts, and salt 1 part.
—37.9 Mercury freezes.

DRUGGISTS' RECIPES.

BUG DESTROYER.—Tincture of tobacco, 200 parts; boric acid, 6 parts; carbolic acid, 6 parts; salicylic acid, 12 parts; oil of Indian balm, 1 part.

CAMPHORATED CHALK, For the Teeth.—Precipitated chalk, 1 lb.; powdered orris root, ½ lb.; powdered camphor, ¼ lb.; reduce the camphor to powder by rubbing it in a mortar with a little spirit; then sift the whole well together.

COMPLEXION POWDERS. — 1. (*Pozzoni's White.*) It imparts a brilliant transparency to the skin, removes all pimples, freckles and discolorations, makes the skin delicately soft; perfectly harmless, containing no arsenic or other deadly material. Found upon examination to be: French chalk, 55·95 per cent; calcium carbonate, 31·25 per cent; bismuth oxy-chloride, 12·8 per cent.—2. (*Wright's.*) A harmless face powder, claimed by its manufacturer to be entirely free from lead or other poisonous minerals, and no more hurtful in use than common starch. Upon examination, it proved to be: French chalk, 25·48 per cent; corn starch, 33·73 per cent; bismuth oxide, 0·8 per cent; calcium sulphate, 40·19 per cent. The foregoing are analyses merely, and are not to be taken as formulæ, from which the various preparations may be compounded. Perfumes have to be added, and it is not necessary to adhere rigidly to the quantities given.—3. (*Violet.*) Best starch, 25 lb.; terra alba, 25 lb.; talc (without mica), 25 lb.; French chalk, 25 lb.; pulverized orris, 10 lb.—4. (*Rose Face Powder.*) Rice starch, 7 lb.; rose pink, ½ dr.; otto of rose, 2 dr.; otto of santal, 2 dr.

FLY PAPER.—1. Oil the paper, and coat with turpentine varnish.—2. (*Cobalt.*) Quassia chips, 150 parts; chloride of cobalt, 10 parts; tartar emetic, 2 parts; tincture of long pepper (1 to 4 of proof spirit), 80 parts; water, 400 parts.—3. Powdered black pepper is mixed with sirup to a thick paste, which is spread by means of a broad brush upon coarse blotting paper; common brown sirup will answer; but sirup made from sugar is preferable, as it dries quicker. For use, a piece of this paper is laid upon a plate and dampened with water. The paper may also be made directly at the mill by adding sugar to the pulp and afterward ¼ to ⅓ of powdered black pepper and rapidly working it into a porous absorbent paper.—4. To 1 lb. resin add 2 fl. dr. linseed oil; while the mixture is warm, spread it on foolscap paper.—5. Make a solution of 2 parts arseniate of potassium, or arseniate of sodium; 4 parts white sugar; 40 parts water; saturate stout unsized paper in this solution; then dry. To use the paper, moisten it with water, and place in saucers.

Great care should be taken with this paper, as it is poisonous.—6. (*Free from Poison.*) Half lb. quassin wood; 1 qt. water; pour the water over the wood, and allow it to stand over night; strain and boil the liquid down to 1 pt.; boil the wood again with 1 pt. water until ½ pt. remains; mix the two infusions; add ½ lb. sugar; when the sugar has dissolved, pass the paper through the liquid; drain and dry.

FUMIGATING PASTILS.—1. (*Indian or Yellow.*) Santal wood, in powder, 1 lb.; gum benzoin, 1½ lb.; gum tolu, ¼ lb.; otto of santal, otto of cassia, otto of cloves, of each; 3 dr.; nitrate of potass., 1½ oz.; mucilage of tragacanth, q. s. to make the whole into a stiff paste. The benzoin, santal wood and tolu are to be powdered, and mixed by sifting them, adding the ottos; the niter being dissolved in the mucilage, is then added; after well beating in a mortar, the pastils are formed in shape with a pastil mold, and gradually dried.—2. Gum benzoin, powdered, 4 oz.; cascarilla, powdered, 1 oz.; niter, powdered, ½ oz.; gum tragacanth, powdered, 3 dr.; charcoal, powdered, ½ lb.; oil of nutmeg, ½ fl. dr.; oil of cloves, ½ fl. dr.; beat them to a stiff, ductile mass, with cold water, q. s.; mold it and dry the pastils by exposure to the air. The product may be varied by omitting one, or both, the essential oils; or by the addition of a little styrax (liquid or in tears), or balsam of Peru. Some persons add 1 to 2 dr. of myrrh.—3. (*For Mosquitoes.*) Charcoal, 1 lb.; saltpeter, 2 oz.; carbolic acid, 1½ oz.; Persian insect powder, 8 oz.; tragacanth mucilage, q. s.

FUMIGATING RODS.—Gum benzoin, 6 parts; balsam of tolu and powdered sandal wood, each, 4 parts; powdered tragacanth and labdanum, each, 1 part; powdered niter and gum Arabic, each, 2 parts; cinnamon, 12 parts; light charcoal (linden), 48 parts; form into smooth ductile mass by aid of heat; mold and cool.

INSECT POWDER, Constituents of.—An investigation has recently been made of Dalmatian insect powder, the object being to ascertain why some powders of commerce differ from the proprietary powders. A portion of the powder was first submitted to the ordinary process for the distillation of essential oil, and a distillate was obtained which was opaque, owing to the presence of a very small quantity of essential oil, possessing the characteristic odor of the flowers. Some bugs and ants were put along with a portion of this odorous substance under a bell glass, but after eight hours they were as lively as ever, entirely unaffected by the volatile essence. It has been shown that the essential oil of pyrethrum carneum is without influence on insect life, and the same is also true of the pyrethrum of the Caucasus. The resinous matter of the powder being extracted by means of ether, obtains 5·6 per cent of dry product, 3·8 of it being fatty matter and 1·8 resin. An alcoholic solution of the entire residue was placed on paper, the alcohol allowed to evaporate, and some insects placed on the paper. Immediately the insects showed symptoms of much agitation, and within five minutes they died. A solution of the resin alone had exactly the same effect. Alcoholic and aqueous extracts of the powder were also made, but these proved to be innocuous to insects, and it is concluded it is the ether-soluble resin which is the insect-killing constituent, and that the finer the powder is the more active it is. The following is the result of the complete analysis of the powder: Essential oil, a trace; fatty bodies, soluble in ether, 3·8 per cent; resin, soluble in ether, 1·8 per cent; brown resin, soluble in alcohol, 4·8 per cent; vegetable albumen, 1·75 per cent; gummy matter, 14·75 per cent; inulin and starch, 8·5 per cent; mineral salts, 7·88 per cent; woody matter, 56·72 per cent. The ash—7·885 per cent—consisted of potassium chloride, 1·94; calcium carbonate, 4·15; calcium phosphate, 0·17; silica and iron, 1·625. A mere trace of iron was only found. In a recent investigation it was ascertained that the active principle of pyrethrum flowers is an acid (pyrethrotoxic acid) soluble in alcohol, amylic alcohol, ether and chloroform, which may be isolated by means of ether after having been converted into an alkaline salt and decomposed by tartaric acid in aqueous solution. Apparently this is the resin above mentioned.

MOTH POWDER.—Lupulin (flour of hops), 1 dr.; Scotch snuff, 2 oz.; gum camphor, 1 oz.; black pepper, 1 oz.; cedar sawdust, 4 oz; mix thoroughly and strew, or put in papers, among the furs or woolens to be protected.

SHOW BOTTLES.—The large ornamental carboys and jars, filled with colored liquids, displayed in the shop windows of druggists, are striking objects when the solutions are bright and of a deep pure tint, especially at night, when they are seen by transmitted light. In making these, distilled water should be used, and rather more made of the color than will fill the carboys, to avoid the necessity of adding water to fill up after filtration, as this sometimes renders them turbid. The carboys should be perfectly clean and dry, or rinsed out with a portion of the filtered liquid.

Amber.—1. Deep chrome yellow, 3 oz.; pearlash, 9 oz.; water, 2 gal.; boil gently for ½ hour; take it off to cool, and add 6 oz. hydrochloric acid, and water to the desired color.—2. Dragon's blood in coarse powder, 1 part; oil of vitriol, 4 parts; digest, and when the solution is complete, dilute the mixture with distilled or soft water, q. s.

Blue.—1. Dissolve 1 oz. of vitriol in 1 qt. of water; add the same quantity of alum, and afterwards a little oil of vitriol.—2. Dissolve sulphate of indigo in water.—3. Dissolve Prussian blue in water.—4. Dissolve blue stone in water, and add spirits of hartshorn.—5. Sulphate of copper, 4 to 8 oz.; water, 1 gal.; oil of vitriol, 1 oz.—6. (*Royal Blue.*) Sulphate of copper, 8 oz.; water, 1 gal.; dissolve, and add water of ammonia till the full color is developed; then water to make up 2 gals.—7. (*Finest Royal Blue.*) Nitrate of copper, 3 oz.; water, sufficient to dissolve it; add water of ammonia as long as the color becomes deeper, then water to make up 2 gals.—8. (*Paler Blue.*) Crystallized acetate of copper, ½ oz.; hydrochloric

acid, 1½ oz.; water of ammonia, q. s.; water, to make up 2 gals.—9. (*Light Blue.*) Crystallized acetate of copper, 1 sc.; water of ammonia, 2 oz.; water, 2 gals.

Crimson.—Iodine and iodide of potassium, of each, 2 dr.; triturate with 1 dr. of water, then add 3 gals. water and 4 oz. muriatic acid.

Green.—1. Dissolve common verdigris in 3 oz. oil of vitriol, and add 2 qts. of water.—2. Add distilled vinegar and blue vitriol to a strong decoction of turmeric acid.—3. (*Emerald Green.*) Nickel, 3 oz.; muriatic acid, 4 oz.; nitrous acid, 2 oz.; digest for 24 hours; add 2 gals. water, and filter.

Lilac.—Smalts, 4 oz.; nitric acid, 4 oz.; let it stand 24 hours; add 2 gals. of water, 1 oz. of alum, and 4 oz. of water of ammonia.

Magenta.—Acetate of rosaniline, dissolved in water, q. s.

Olive.—Dissolve sulphate of iron and oil of vitriol, equal weights, in water, and add of nitrate of copper enough to strike the color.

Orange.—1. A solution of bichromate of potash in water, either with or without the addition of some hydrochloric or sulphuric acid.—2. Dissolve gamboge or annatto in liquor of potassa; dilute with water and add a little spirit.

Purple.—1. A solution of sulphate of copper, 1 oz., in water, 1 qt., or q. s., with the addition of sesquicarbonate of ammonia, 1½ oz.—2. To the last add a sufficient quantity of the first pink to turn the color.—3. To an infusion of logwood, add carbonate of ammonia or of potassa, q. s.—4. Sugar of lead, 3 oz.; powdered cochineal, 1 dr.; water, q. s. — 5. Add sulphate of indigo, nearly neutralized with chalk, to an infusion of cochineal, till it turns purple.—6. Verdigris, 2 dr.; spirits of hartshorn, 4 oz.; water, 1½ pts.—7. Sugar of lead, 1 oz.; cochineal, 1 sc.; water, to fill up.

Red.—1. Dried rose petals, 8 oz.; boiling water, 1 gal.; digest for 12 hours; strain; digest the roses with more water and strain; mix the infusions; add 1 pt. of diluted sulphuric acid, and filter.—2. Cochineal, ½ oz.; boiling water, 1 gal.; digest, and strain; add ½ oz. of sulphuric acid, and water to make up 2 gals.—3. Dissolve carmine in liquor of ammonia and dilute with water.—4. Digest powdered cochineal in a weak solution of ammonia or of sal ammoniac, and afterwards dilute with water.—5. Add oil of vitriol, 4 oz., to water, 1 gal., and digest dried red rose leaves, 8 oz., in the mixture 24 hours.—6. Dissolve madder lake in a solution of sesquicarbonate of ammonia, and dilute the solution with water.

Violet.—To a solution of nitrate of cobalt in a solution of sesquicarbonate of ammonia, add solution of ammonio-sulphate of copper, q. s., to strike the color.

Yellow.—1. A solution of scsquioxide or rust of iron, ½ lb., in hydrochloric acid, 1 qt., diluted with water.—2. To a strong decoction of French berries add a little alum.—3. Chromate or bichromate of potash with water, q. s.—4. Bichromate of potash, 2 dr.; pure water, 4 oz.; dissolve, and add 4 oz. sulphuric acid and 2 gals. water.—5. Bichromate of potash, nitrate of potash and water.

STORM-GLASS.—A thin glass tube, about 12 inches long and ¾ inch in diameter, about ⅔ filled with the following liquid, and covered with a brass ear, having an almost capillary hole through it, or else tied over with bladder. Take of camphor, 2 dr.; nitre, 1½ dr.; sal ammoniac, 1 dr.; proof spirit, 2½ fl. oz.; dissolve and place in the tube. When the liquid is clear in all but the lower portion of the tube, it denotes clear weather; when the cloudy appearance arises in the middle, a change in the weather is indicated; when the whole contents of tube become clouded with the mixture, rainy or stormy weather is betokened. Thus a simple barometer may be made for home or office use. This invention will be more reliable in action if the glass is kept in the outer air, under shelter.

Tests for Purity.

REMARKS.—No attempt is here made to give a full list, but only to briefly touch on some of the commonest difficulties met with in procuring pure articles. And the instances given relate chiefly to adulterations—not to impurities remaining from the processes of manufacture. The prominence given to oils results from their frequent high cost, which tempts adulteration.

ALCOHOL.—Alcohol burns with a flame of a bluish color, when strong; but yellowish, when weak. It is often adulterated with fusel oil; this may be detected by adding a little of the solution of nitrate of silver to the alcohol, and then exposing it to a bright light; if the oil be present, it will be converted into a black powder by the action of the oxide of silver. Official alcohol will not withstand this test, as the best contains a little oil. Four fl. oz. treated with 25 min. of a solution of 1 part of nitrate of silver in 40 of distilled water, exposed to a bright light for 24 hours, and then freed from the black powder which forms, by being passed through a filter, purified by weak nitric acid, undergo no farther change when exposed to the light with more of the test. If the oil is not all removed by the amount of test prescribed, it is deemed to be present in too large an amount to constitute a good rectified spirit.

ALMONDS, Oil of.—Equal weights of pure concentrated sulphuric acid, red fuming nitric acid and water are mixed, and the mixture allowed to cool. The test is applied by mixing 5 parts of the oil with one part of the acid liquid, when true almond oil will give a yellowish white liniment; oil of peach kernels assumes red color of peach blossoms, turning to dark orange; benne oil turns pale yellowish-red, then dirty orange-red; poppy oil and walnut oils yield a somewhat whiter liniment than almond oil. This test permits the detection of 5 per cent. of peach kernel and benne oil. Mixed with pure nitric acid (sp. gr. 1.40), pure

almond oil yields a pale yellowish liniment.

ALOES yields its active matter to cold water, and when good is almost wholly dissolved by boiling water; but the inert portion is deposited as soon as the solution cools; it is also soluble in alcohol, rectified or diluted. It is inflammable, swelling up and decrepitating when it burns, and giving out a thick smoke which has the odor of the drug.

ANISEED, Oil of.—When pure, oil of aniseed congeals into a solid crystalline mass on being cooled to 50° Fahr., and does not melt again until heated to about 63°. Treated with iodine it quickly congeals into a solid hard mass, with a perceptible increase of temperature, and the development of orange-colored and gray fumes. Sulphuric acid, with heat, turns it of a rich purple-red color, and the compound soon afterwards becomes inspissated and hard. In alcohol, .806, it is soluble in all proportions; but rectified spirit, .838, dissolves only 42 per cent. of this oil.

BALSAM OF PERU is frequently adulterated with either resin, gum, benzoin, storax, copaiba, or castor oil. The specific gravity of a pure article varies from 1.138 to 1.147, and as all the adulterants mentioned are lighter than the pure balsam, the specific gravity becomes an important indication of its purity.

BEESWAX.—The following are tests for beeswax: For water—knead the wax with well-dried copper sulphate, which will give a blue color. For mineral and starchy matters—solve in turpentine; these remain unsolved. Sulphur—by igniting, when sulphurous acid gas is given off. Resin gives to wax a terebinthinate odor, and makes it adhere to the teeth, if chewed. Paraffin makes the wax brittle, and lowers its melting point. Lard is indicated by fatty odor and touch.

BERGAMOT ESSENCE OIL.—Similar in adulteration and test to *Coriander*, which see.

BITTER ALMONDS, Oil of.—When it is pure, mixed with oil of vitriol, it strikes a clear, crimson-red color without visible decomposition; mixed with an alcoholic solution of potassa, crystals are eliminated; iodine dissolves only partially and slowly in it, without further visible results; chromate of potassa does not affect it; nitric acid causes no immediate reaction, and in the course of 3 or 4 days crystals of benzoic acid begin to appear; but if only 8 or 10 per cent. of alcohol or rectified spirit is present, a violent effervescence speedily commences, and nitrous fumes are evolved. By using nitric acid (sp. gr. 1.5) the smallest quantity of alcohol may be detected.

CAJEPUT, Oil of.—Oil of rosemary or turpentine, impregnated with camphor and colored with resin of milfoil, is sometimes employed to adulterate this. The best test is iodine, which, after a moderately energetic reaction, with little increase of temperature, and but a slight development of orange vapors, occasions immediate inspissation into a loose coagulum, which soon becomes a dry, greenish-brown, brittle mass.

CARAWAY SEED OIL is adulterated with essential oil derived from caraway chaff, and this chaff oil is first mixed with rectified spirit of turpentine; this can be detected by its insolubility in 95 per cent. alcohol.

CARBONATE OF LEAD. — This is usually adulterated with earthy or metallic sulphates. These are detected by their insolubility in diluted nitric acid. Chalk may be detected as follows: Dissolve the suspected substance in nitric acid, and precipitate the lead by hydrosulphuric acid; boil and filter the solution, in which will be contained nitrate of lime, recognizable by a test with oxalic acid.

CASTOR OIL, when pure, mixes in all proportions with alcohol and ether, and also dissolves, to a certain extent, in rectified spirit, but the portion of the oil separates on standing. Camphor and benzoic acid increase its solubility in spirit. By long exposure to the air, it becomes rancid, thick, and is ultimately transformed into a transparent yellow mass; light hastens these changes. Exposed to cold, a solid white crystalline fat separates from the liquid portion, and when cooled to 0° it congeals into a yellow transparent mass, which does not again liquefy until the temperature rises to about 18° Fahr.

CHLOROFORM.—Chloroform is liable to contain alcohol and ether, both of which lower its specific gravity. Drop into distilled water a small quantity of the chloroform. If pure, it remains transparent at the bottom of the glass; but if it contain even a small proportion of alcohol, the globules acquire a milky appearance. It is easily set on fire, and burns with a smoky flame, chlorine being among the products of its combustion. It is heavier than water, and has an acrid, penetrating odor like that of the other oil. Pure chloroform, when mixed with an equal volume of the acid, does not color it; but when contaminated with these oils gives the acid a color, varying from yellow to reddish-brown, according to the amount of impurity present. In applying this test, several fl. oz. of chloroform should be used; as a slight change of color cannot easily be seen in a test-tube.

CINNAMON OIL.—Oil of cassia and highly rectified spirit are the substances usually employed for this purpose. The increased sp. gr. resulting from the first, and the diminished sp. gr. from the second, afford ready means of detecting frauds. The presence of oil of cassia may also be detected by an experienced person by the odor, which differs a little from that of pure oil of cinnamon. Oil of cassia is less limpid than oil of cinnamon, and it stands a greater degree of cold without becoming turbid or congealing. Nitric acid converts it nearly into a uniform crystalline mass. During this reaction the odor of bitter almonds is perceptible. Both oil of cassia and oil of cinnamon are thus converted into a brown balsam; with oil of cassia, however, a brisk decomposition occurs sooner, and at a slighter heat; it also forms a crystalline compound with ammonia. These reactions, unfortunately, are not characteristic.

CITRIC ACID.—Citric acid is frequently met with adulterated with tartaric acid; the fraud is easily detected by dissolving the acid in a little cold water, and adding to the solution a small quantity of acetate of potash. If tartaric

acid be present, a white crystalline precipitate of cream of tartar will be produced on agitation. When pure, it is devoid of color, and entirely, or almost entirely, decomposed by heat. It is soluble in water and in spirit, and what is thrown down from its watery solution by acetate of lead, is dissolved by nitric acid. No salt of potassium precipitates anything with citric acid except the tartrate. When a few drops of a solution of citric acid are added to lime water, a clear liquid results, which, when heated, deposits a white powder, soluble in acids without effervescence. By the action of nitric acid, citric acid is converted into oxalic acid.

CLOVES, Oil of.—Pure oil of cloves forms a butyraceous coagulum when shaken with pure liquor of ammonia, which crystallizes after fusion by a gentle heat; treated with an alcoholic solution of potassa, it entirely congeals into a crystalline mass, with total loss of its characteristic odor.

COD-LIVER OIL.—The most reliable tests are the sensible properties of odor and taste. If there be none of the peculiar shoe-leather smell and taste, or if a strong lamp-oil odor is perceptible, the oil may be suspected. Little of importance can be inferred from the color.

COPAIBA.—The fixed oils are the most frequent addition, especially castor oil, which, in consequence of its solubility in alcohol, cannot, like the others, be detected by the agency of that fluid. The simplest test is to boil 1 dr. of the copaiba in 1 pt. of water, till the liquid is wholly evaporated. If the copaiba contain a fixed oil, the residue will be more or less soft, according to the quantity present; otherwise it will be hard. Turpentine, which is said to be sometimes added to copaiba, may be detected by its smell, especially if the copaiba be heated.

CORIANDER ESSENCE OIL is adulterated with colorless rectified oil of orange, on account of the lower cost of the latter, and may be detected by its insolubility in 95 per cent. alcohol. The pure oil dissolves in all proportions; the mixed one makes a turbid mixture.

CREOSOTE.—This is frequently adulterated with oil of tar, camphor and a substance like almond oil. These impurities are readily detected by mixing separate portions of the suspected liquid with acetic acid and caustic potash: pure creosote is completely soluble in these fluids; not so the adulterated.

CROTON OIL.—This is often adulterated with other fixed oils. When agitated with an equal volume of alcohol and gently heated, it forms a clear solution, from which about $\frac{3}{4}$ of the oil separates on cooling.

CUBEBS, Oil of.—When pure, iodine has little action on this oil, and immediately gives it a violet color, without any very marked reaction; nitric acid turns it opaque, and the mixture changes to a pale red when heated; sulphuric acid turns it to a crimson red. When adulterated with oil of turpentine, both its viscidity, solubility in rectified spirit, and its density, are lessened; when mixed with castor oil it leaves a greasy stain on paper.

GINSENG.—This is sometimes mixed with a root so closely resembling ginseng as to defy detection, unless every root is broken and carefully examined. Sometimes leaden plugs are inserted in the root to add to the weight.

GLYCERINE.—1. When treated slowly with sulphuric acid, it should not turn brown; with nitric acid and nitrate of silver, it should not become cloudy; and when rubbed between the fingers it should not emit a fatty smell.—2. To 5 drops of glycerine add 100 to 120 drops of water, 0.4 to 0.6 grain of ammonium molybdate, 1 drop pure nitric acid, and boil for $1\frac{1}{2}$ minutes. If sugar or dextrine is present it will turn deep blue.

GUAIACUM is adulterated with the resin of the pine, which may be detected by the terebinthinate odor exhaled when it is thrown upon burning coals, and by its partial solubility in hot oil of turpentine. This dissolves resin, but leaves pure guaine untouched. Amber is said to be another adulteration. If paper moistened with the tincture be exposed to the fumes of nitric acid, it speedily becomes blue.

GUM ARABIC.—Powdered gum Arabic is adulterated with flour or farina, or with Senegal or other inferior gums. The first may be detected by agitating a little of the powder with cold water; the pure gum dissolves rapidly, whilst the starch or flour falls to the bottom of the vessel. Or, a little of the powder may be mixed with boiling water, and when cold, tested with tincture of iodine; if it contains starch or flour, the paste will assume a blue color. If it contains cherry-tree gum or tragacanth, it will be only partly soluble in cold water, and the paste will be partly colored, and interspersed with gelatinous clots.

GUM TRAGACANTH.—Powdered tragacanth is adulterated with flour of starch, and with the commoner varieties of gum Arabic. This is detected by making a mucilage of the suspected gum, and adding to it a few drops of alcoholic tincture of guaiacum, stirring it all the while. If it contains gum Arabic, the mixture assumes a fine blue color; 5 per cent. of gum Arabic can be thus detected. When the quantity is very small, 1 to 4 hours may elapse before the color is developed.

JALAP is adulterated with mechoacan and other substances. It should be rejected when light, of a whitish color internally, of a dull fracture, spongy or friable.

JUNIPER, Oil of.—This is adulterated with oil of turpentine, but may be detected by the sp. gr. which is less than that of the unadulterated oil. The sp. gr. of the pure oil is .879 to .911.

LAVENDER, Oil of.—Sulphuric acid turns it reddish-brown, and the reaction is accompanied by strong inspissation. It fulminates quickly and violently with iodine, and the thick, syrupy residue possesses a pungent, acid, balsamic odor. The presence of alcohol weakens the action of this test, unless it is added in an equal volume, when only a lively effervescence and a disengagement of orange-colored vapors are produced by the iodine, without fulmination. Santaline is nearly insoluble in pure oil of lavender, and exerts no marked action on it, but is freely soluble in oil of lavender adulterated with alcohol or rectified spirit.

LEMON OIL.—This is commonly adulterated

with oil of turpentine, and occasionally with nut or poppy oil. These leave a permanent stain on paper when present. When pure, it is soluble in all proportions in absolute alcohol, but rectified spirit only dissolves 16 per cent. of it. It also boils at 148° Fahr., whereas oil of turpentine boils at 312°, and mixtures of the two at intermediate temperatures, depending on the proportions.

LINSEED OIL.—An excess of crude nitric acid mixed with a suspected oil and agitated, will indicate the presence of fish oil by the dark brown discoloration of the oil which follows. Pure linseed oil under the same treatment would be changed to a sea-green and finally greenish yellow, while the acid itself becomes yellow. Rosin oil to any extent is also indicated by adding to 1 part of the suspected oil in a small vial 3 parts of pure linseed oil. If the samples contain a rosin oil the pure linseed oil floats on the top and the line of contact is plainly visible.

MYRRH.—To test myrrh triturate a small quantity of the powder of the suspected article with an equal amount of chloride of ammonium, adding water gradually; if the whole is readily dissolved, the myrrh is genuine; otherwise it is adulterated with some inferior substance.

NEROLI, Oil of.—This is frequently adulterated with oil of bergamot and orange leaves. The pure oil of neroli is neutral to test-paper, of a density of 889, exhibits a bright violet florescence when mixed with alcohol, and assumes an intense permanent crimson hue on being shaken with a concentrated solution of bisulphite of sodium.

NITRATE OF SILVER.—Fused nitrate of silver is likely to contain free silver from having been exposed to too high a heat, the nitrates of lead and copper from the impurity of the silver dissolved in the acid, and nitrate of potassa from fraudulent admixture. Free silver will be left undissolved, as a black powder, after the action of distilled water. A very slight residue of this kind is hardly avoidable; but if there be much free silver, it will be shown by the surface of a fresh fracture of one of the sticks presenting an unusually dark gray color. In order to detect nitre, a solution of the suspected salt should be precipitated by muriatic acid in excess, and sulphuretted hydrogen, to remove the silver, and other metals if they happen to be present. The filtered solution, if the salt be pure, will entirely evaporate by heat; if it contain nitre, this will be left, easily recognizable by its properties as a nitrate.

NITRE increases the combustion of many substances in a remarkable degree. When thrown on burning coals, it deflagrates with bright scintillations. Nitre may be readily recognized by its effect in increasing the combustion of live coals, when thrown upon them; and by evolving white or reddish vapors on the addition of sulphuric acid. Its most usual impurity is common salt, which is seldom entirely absent, and which injures it for the manufacture of gunpowder. The presence of this salt or chloride of potassium will cause a precipitate with nitrate of silver. If a sulphate be present, a precipitate will be formed with chloride of barium. 100 gr. of the pure and dry salt, treated with 60 gr. of sulphuric acid, and the whole ignited until it ceases to lose weight, yield 86 gr. of sulphate of potassa. If the residue weighs less, part of it is probably sulphate of soda, and the nitre tested may be assumed to have contained nitrate of soda.

NITRIC ETHER.—Inferior articles are those diluted with water and spirits of wine. Aldehyd and acid of nitrogen are accidental impurities often present, and may be detected by the flavor, and by taking the sp. gr.; its density is .834. Acid of nitrogen may be detected by litmus, and by the effervescence produced on the addition of alkaline carbonates.

OLIVE OIL.—1. When pure olive oil is shaken in a vial, only half filled, the bead (or bubbles) rapidly disappear; but if the sample has been mixed with poppy or other oil, the bubbles continue longer before they burst. —2. Olive oil congeals at 36° Fahr., and is completely solidified when a small bottle containing it is surrounded by ice or a freezing mixture; but when mixed with poppy oil it remains partly liquid, even when the latter forms only $\frac{1}{4}$ of the mass; if more than $\frac{1}{4}$ of poppy oil is present, it does not solidify at all, unless cooled much below the freezing point of water.—3. About 1 teaspoonful of oil is put into a test-tube, and a thermometer suspended in the oil, which is now to be heated to 472° Fahr. For a comparison, a second test-tube of pure oil may be treated in the same manner. Pure olive oil, when heated, grows rather lighter in color, but most other oils, like cotton seed, peanut oil, etc., grow darker. The latter, also, evolve a penetrating and disagreeable odor, but olive oil has a pleasant smell, not unlike strawberries.

OXALIC ACID. — The crystals of oxalic acid of commerce are sometimes contaminated with nitric acid. In this state they have usually a faint odor, and stain the cork of the bottle yellow. From the general resemblance which the crystallized oxalic acid bears to Epsom salt, many fatal mistakes have occurred in consequence of its being sold for that saline purgative. Nothing, however, can be easier than to distinguish them; for, upon tasting a minute portion of the acid (which may be done with perfect safety), it will be found strongly sour, whereas the salt in question is bitter.

PEPPERMINT, Oil of. — Much of this oil is adulterated with oil of pennyroyal, and gives as a reliable test a solution of 2 parts of chloral in 1 part of sulphuric acid, to which is added 5 per cent. of alcohol. This test, mixed with suspected oil in equal proportion, gives a fine cherry color to pure oil, and a dark olive green if mixed with pennyroyal.

POTASSIUM, Iodide of.—Often largely adulterated with carbonate of potash. The impure salt may be distinguished by its wanting any regular crystalline form; by adding a few particles of it to lime water, a milky fluid is obtained, whereas the liquid remains transparent

if the iodide be pure; by its destroying the color of tincture of iodine, whereas, the pure salt does not affect it; and, lastly, by alcohol, which dissolves iodide of potassium, but not carbonate of potash.

QUINIA, Sulphate of. — Sulphate of quinia has often been adulterated. Sulphate of lime and other alkaline or earthy salts, gum, sugar, mannite, starch, stearin or margarin, caffeine, salicin, and sulphate of cinchonia, are among the substances which have been fraudulently added. By attending to the degree of solubility of the sulphate in different menstrua, and to its chemical relations with other substances already described, there can be little difficulty in detecting these adulterations. The presence of any mineral substance not readily volatilizable, may be at once ascertained by exposing the salt to a red heat, which will completely dissipate the sulphate of quinia, leaving the mineral behind. A volatile ammoniacal salt may be detected by the smell of ammonia emitted upon the addition of potassa. Gum and starch are left behind by alcohol, and fatty matters by water acidulated with sulphuric acid. Sugar and mannite cause a solution of the salt in acidulated water to have a sweet taste, after the precipitation of the quinia by an alkaline carbonate. Salicin imparts the property of becoming red upon the contact of sulphuric acid when the proportion of salicin exceeds 1-10. Caffeine alters the solubility of the medicine in different menstrua.

ROSEMARY, Oil of.—This is sometimes adulterated with oil of turpentine, which may be detected by mixing the suspected liquid with an equal volume of pure alcohol; the oil of rosemary is dissolved and that of turpentine left.

ROSES, Oil of.—This is adulterated with sandal-wood oil, other volatile oils, fixed oils, spermaceti, etc. The volatile additions may be detected by not being concrete; the fixed, by the greasy stain they leave upon paper when heated.

SAFFRON.—Water is often added to increase its weight; oil is also added for the same purpose, or to improve its appearance; sometimes the flowers of other plants are mixed with it, particularly safflower, officinal marigold, and arnica; they may be known by their shape, which is rendered obvious by throwing a portion of the suspected mass into hot water, which causes them to expand. Other adulterations are fibres of dried beef, the stamens of the crocus distinguishable by their yellow color. The flowers of a Brazilian plant have lately been used to adulterate saffron; they may be detected by shaking gently but repeatedly a large pinch of the suspected saffron over a piece of paper. The flowers of fuminella, being smaller and heavier, separate and fall, and may be seen to consist of very small fragments, with a color like that of saffron, but with a rusty tint which the latter does not possess. Sulphuric acid instantly changes the color of pure saffron to indigo blue.

SULPHURIC ETHER.—An easy method for detecting and measuring any alcohol which may be present in ether, is to agitate it, in a minim measure, with half its volume of a concentrated solution of chloride of calcium. This will remove the alcohol, and the reduction of the volume of the ether, when it rises to the surface, will indicate the amount of the former. Heavy oil of wine may be discovered by the ether becoming milky upon being mixed with water.

WINTERGREEN, Oil of.—This is adulterated with alcohol and chloroform, and also with oil of sassafras. The first two may be detected by fractional distillation. Chloroform will make itself evident on warming a sample of suspected oil. Strong nitric acid will detect oil of sassafras, turning the sample red and throwing down a dark resinous mass. In pure oil this test leaves the oil unchanged for some time, and finally deposits white crystals of methyl-nitro-salicylic acid. A second method is to distil from the sample the chloroform—generally added with the sassafras to give the correct specific gravity; add to the residue $\frac{1}{4}$ its weight of potassium hydrate solved in 4 parts of hot water, when the odor of the sassafras will be apparent.

A VERY SERIOUS CASE.

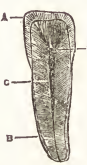
HEALTH AND DISEASE.

ANATOMY.

REMARKS.—This description of human anatomy is chiefly adapted from Professor Huxley's popular treatise on physiology. By him the body is separated into *head*, *trunk* and *limbs*; in the head, the brain-case or *skull* is distinguishable from the *face*; the trunk is divided into the chest or *thorax*, and the belly or *abdomen*; of the limbs there are two pairs—the upper, or *arms*, and the lower, or *legs*; the legs and arms again are subdivided by their joints into parts which obviously exhibit a rough correspondence; *thigh* and *upper arm*, *leg* and *fore arm*, *ankle* and *wrist*, *fingers* and *toes*; the two last, as they are similar, receive the same name of *digits*; while the several joints of the fingers and toes have the common denomination of *phalanges*.

ABDOMEN.—The *abdomen* is the belly, or that part of the body between the diaphragm and the inner surface of the pelvis. It contains, in addition to its segment of the alimentary canal and of the sympathetic system, the two *kidneys*, one placed against each side of the vertebral column, the *liver*, the *pancreas* or sweetbread, and the *spleen*.

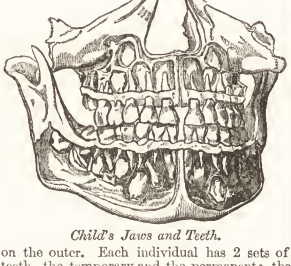
ALIMENTATION, Organs of.—The *alimentary canal* traverses the abdomen and thorax from one end to the other, piercing the diaphragm. It is the great source of gain to the blood and the only channel by which any appreciable amount of solid matter leaves the body in an undissolved condition. It contains all the organs of mastication and digestion. The organs of alimentation are the mouth, pharynx, gullet, stomach, and intestines, with their appendages. They first receive and then grind the food. They then act upon it with chemical agents, of which they possess a store which is renewed as fast as it is wasted; and in this way separate it into a fluid containing nutritious matters in solution or suspension, and innutritious dregs or *fæces*. In the mouth are 32 *teeth*, each of which consists of a *crown* and one or more *fangs*, which are imbedded in sockets called *jaws*. A tooth is made up of 4 separate tissues, the enamel, cementum, dentine and pulp. The *enamel* is a very hard tissue which encases the crown of the tooth; it is thickest on the cutting edges and masticating surfaces, gradually becoming thinner towards the neck, at which point it is met, or slightly overlapped by the cementum. The *cementum* is a layer of hard tissue covering the roots of the teeth. It is intermediate in hardness between dentine and bone, resembling the latter more than either of the other hard tissues found in the tooth. The *dentine* constitutes the bulk of the tooth, giving each tooth its size and shape. If the enamel and cementine were removed, the dentine would still preserve the general form of the tooth. It is usually highly sensitive both to variations of temperature and to contact with foreign substances. It owes nearly all its sensitiveness to the pulp of the tooth. The *pulp*, incorrectly called the nerve, occupies a cavity in the centre of the tooth; it is a mass composed of nerves and blood-vessels, held together by a cobweb connective tissue, and supplies nourishment to the tooth. It is acutely sensitive, not only to contact with foreign substances, but to variations of temperature. When the pulp dies the tooth loses its brilliancy, the dentine loses its sensibility, and it gradually changes in color. The nerves and blood vessels which supply the pulp with nutritive material enter through a small canal in the root of the tooth; and with the exception of this small aperture, the pulp is surrounded by solid dentine. The 8 teeth on opposite sides of the same jaws are constructed upon exactly similar patterns; but the 8 which bite against each other, though similar, differ in the details of their patterns; the 2 in each 8 nearest the middle line, in front of the jaw, have wide but sharp



Structure of a Tooth.

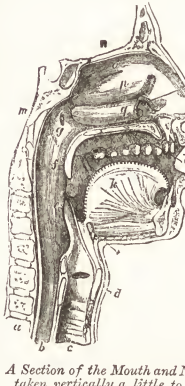
A tooth split vertically so as to show the various parts. *A*, is the cutting surface, covered, as in the entire crown, with enamel; *B*, the cementum covering the root; *C*, the dentine; *D*, the pulp cavity.

and chisel-like edges, hence called *incisors*, or cutting teeth. The tooth which comes next is a tooth with a more conical and pointed crown, called the *canine* or eye-tooth. The next 2 teeth have broader crowns, with two cusps, or points, on each crown, one on the inside and one on the outside, termed *bicuspid* teeth, and sometimes false grinders. All these teeth have usually one fang each, except the bicuspid, the fangs of which may be more or less completely divided into 2. The remaining teeth have 2 or 3 fangs each, and their crowns are much broader. As they crush and grind the matters which pass between them, they are called *molars*, or true grinders. In the upper jaw their crowns present 4 points at the 4 corners, and a diagonal ridge connecting 2 of them. In the lower jaw, the complete pattern is five-pointed, there being 2 cusps on the inner side and 3



Child's Jaws and Teeth.

on the outer. Each individual has 2 sets of teeth, the temporary and the permanent; the former being contained in the jaws at birth, and taking their proper positions within the first 3 years of childhood, the latter being at the same time developed in the jaws and appearing from 6 to 21 years. The temporary teeth are 20 and the permanent 32 in number. In the illustration the whole of the temporary teeth are seen in their proper positions, and in addition, the crowns of 4 of the permanent teeth have appeared through the gum at the back of the temporary set. The remaining permanent teeth are those embedded in the jaws and at present imperfectly developed. The teeth of the 2 jaws correspond in number and form, and the temporary teeth are as follows: In the centre of each jaw are 4 cutting or incisor teeth; on each side of these is a pointed canine or eye-tooth; and beyond these again 2 grinding or molar teeth. When solid food is taken into the mouth, it is cut and ground by the teeth, the fragments which ooze out upon the outer side of their crowns being pushed beneath them again by the muscular contractions of the cheeks and lips. The cavity of the mouth is a chamber with a fixed roof, formed by the *hard palate*, and with a movable floor, constituted by the lower jaw, and the tongue which fills up the space between the two branches of the jaw. Besides the teeth, this cavity includes the cheeks at the sides, and the lips in front. When the mouth is shut, the back of the tongue comes into close contact with the palate; and, where the hard palate ends, the communication between the mouth and the back of the throat is still further impeded by a sort of fleshy curtain, the *soft palate* or *velum*, the middle of which is produced into a prolongation, the *uvula*, while its sides, skirting the sides of the passage, or *fauces*, form



A Section of the Mouth and Nose taken vertically a little to the left of the Middle Line.

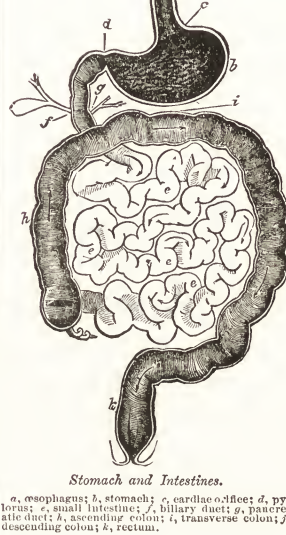
a, the vertebral column; *b*, the gullet; *c*, the windpipe; *d*, the thyroid cartilage of the larynx; *e*, the epiglottis; *f*, the uvula; *g*, the opening of the left Eustachian tube; *h*, the opening of the left lachrymal duct; *i*, the hyoid bone; *k*, the tongue; *l*, the hard palate; *m*, *n*, the base of the skull; *o*, *p*, *q*, the superior, middle, and inferior turbinal bones. The letters *g*, *f*, *i*, are placed in the pharynx.

double muscular pillars, termed the *pillars* of the fauces; between these, the *tonsils* are situated, one on each side. The velum with its uvula comes into contact below with the upper part of the back of the tongue, and with a sort of gristly, lid-like process connected with its base, the *epiglottis*. Behind the partition thus formed lies the cavity of the *pharynx*, a funnel-shaped bag with muscular walls, the upper margins of the slanting, wide end of which are attached to the base of the skull, while the lateral margins are continuous with the sides, and the lower with the floor of the mouth. The narrow end of the bag passes into the gullet or œsophagus, a muscular tube, which affords a passage into the stomach. There are 6 distinct openings into the front part of the pharynx; 4 in pairs, and two single ones in the middle line. The two pairs are, in front, the hinder openings of the nasal cavities; at the sides, close to these, the apertures of the *Eustachian* tubes. The two single apertures are, the hinder opening of the mouth between the soft palate and the epiglottis, and, behind the epiglottis, the upper aperture of the respiratory passage, or the *glottis*. The mucus membrane which lines the mouth and the pharynx is beset with minute

glands, the *buccal* glands; but the great glands from which the cavity of the mouth receives its chief secretion are the 3 pairs which are called *parotid*, *submaxillary*, *sublingual*, and which secrete the principal part of the saliva. Each parotid gland is placed just in front of the ear, and its duct passes forwards along the cheek until it opens in the interior of the mouth, opposite the 2nd upper grinding tooth. The submaxillary and sublingual glands lie between the lower jaw and the floor of the mouth, the submaxillary being situated further back than the sublingual. Their ducts open in the floor of the mouth below the tip of the tongue. The secretion of these salivary glands, mixed with that of the small glands of the mouth, constitutes the saliva, a fluid which, though thin and watery, contains a small quantity of animal matter, called *Ptyalin*. The *stomach* consists of a tube with muscular walls composed of smooth muscular fibres, and lined by an epithelium; it differs from the gullet in several circumstances. Its cavity is larger, and its left end is produced into an enlargement which, being on the heart side of the body, is called the *cardiac* dilatation. The opening of the gullet into the stomach, termed the cardiac aperture, is nearly in the middle of the whole length of the organ, which presents a long, convex, greater curvature, along its front or under edge, and a short concave, lesser curvature, on its back or upper contour. Towards its right extremity the stomach narrows, and, where it passes into the intestine, the muscular fibres are so disposed as to form a sort of sphincter around the aperture of communication. This is called the *Pylorus*. The *intestines* form one long tube, with mucous and muscular coats. Both the intestines and the stomach are enveloped in peritoneum. The intestines are divided into two portions, the small intestines and the large intestines; the latter having a much greater diameter than the former. The small intestines again are subdivided into the *duodenum*, the *jejunum*, and the *ileum*, but there is no natural line of demarcation between these. The duodenum (see *Circulation, Organs of,*) is distinguishable as that part of the small intestine which immediately succeeds the stomach, and is bent upon itself and fastened by the peritoneum against the back wall of

The Mouth widely opened to show the Tongue and Palate.

Tn., the uvula; *Tn.*, the tonsil between the anterior and posterior pillars of the fauces; *C.p.*, circumvallate papillæ; *F.p.*, fungiform papillæ. The minute filiform papillæ cover the interspaces between these. On the right side the tongue is partially dissected to show the course of the filaments of the glossopharyngeal nerve, *VIII.*



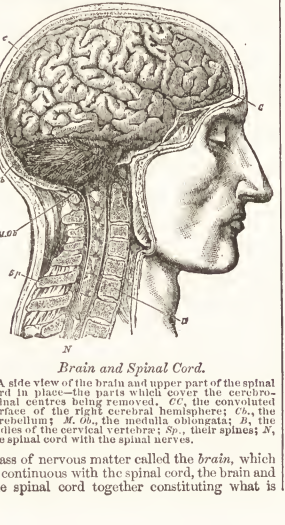
Stomach and Intestines.

a, œsophagus; *b*, stomach; *c*, cardiac orifice; *d*, pylorus; *e*, small intestine; *f*, biliary duct; *g*, pancreatic duct; *h*, ascending colon; *i*, transverse colon; *j*, descending colon; *k*, rectum.

the abdomen. The ileum is no wider than the jejunum or duodenum, so that the transition from the small intestine to the large is quite sudden. The opening of the small intestine into the large is provided with prominent lips which project into the cavity of the latter, and oppose the passage of matters from it into the small intestine, while they readily allow of a passage the other way. This is the *ileo-cæcal* valve. The large intestine forms a blind dilatation beyond the ileo-cæcal valve, which is called the *cæcum*; and from this an elongated, blind process is given off, which, from its shape, is called the *vermiform appendix* of the cæcum. The cæcum lies in the lower part of the right side of the abdominal cavity. The *colon*, or first part of the large intestine, passes upwards from it as the ascending colon; then making a sudden turn at a right angle, it passes across to the left side of the body, being called the transverse colon in this part of its course; it next suddenly bends backwards along the left side of the abdomen; it then becomes the descend-

ing colon. This reaches the middle line and becomes the *rectum*, which is that part of the large intestine which opens externally. The mucous membrane of the whole intestine is provided with numerous small and simple glands which pour into it a secretion, the intestinal juice, the precise functions of which are unknown, though it appears in some creatures at least to possess the power of converting starch into sugar, and proteids into peptone. At the commencement of the duodenum are certain racemose glands, called the glands of Brunner, whose function is wholly unknown. Structures peculiar to the small intestine are the *valvulæ conniventes*, transverse folds of the mucous membrane, which increase the surface; and the *villi*, which are minute thread-like processes of the mucous membrane on the valvulæ conniventes and elsewhere, set side by side, like the pile of velvet. Each villus is coated by epithelium, and contains in its interior the radicle or commencement of a lacteal vessel, between which and the epithelium lies a capillary network with its afferent artery and efferent vein.

CEREBRO SPINAL SYSTEM. — Where the body is succeeded by the head, the uppermost of the vertebræ is followed by a continuous mass of bone, which extends through the whole length of the head, and separates a dorsal chamber from a ventral one. In the dorsal chamber which opens into the spinal canal is found a

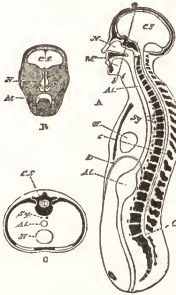


Brain and Spinal Cord.

A side view of the brain and upper part of the spinal cord in place—the parts which cover the cerebro-spinal centres being removed. *CC*, the convoluted surface of the right cerebral hemisphere; *Cb.*, the cerebellum; *M. Ob.*, the medulla oblongata; *B*, the bodies of the cervical vertebræ; *Sp.*, their spines; *N*, the spinal cord with the spinal nerves.

mass of nervous matter called the *brain*, which is continuous with the spinal cord, the brain and the spinal cord together constituting what is termed the cerebro-spinal axis. It is a complex organ, consisting of several parts, the hindermost of which, termed the *medulla oblongata*, passes insensibly into, and in its lower part has the same structure as, the spinal cord. Above, it widens out, and the central canal, spreading with it, becomes a broad cavity. This cavity is termed the *fourth ventricle*. Overhanging the fourth ventricle is a great laminated mass, the *cerebellum*. On each side, this organ sends down several layers of transverse fibres, which sweep across the brain and meet in the middle line of its base, forming a kind of bridge in front of the medulla oblongata. The longitudinal nerve-fibres of the medulla oblongata pass forwards, among and between these layers of transverse fibres, and become visible, in front of the bridge, as two broad diverging bundles, called *crura cerebri*. Above the crura cerebri lies a mass of nervous matter raised up into 4 hemispherical elevations, called *corpora quadrigemini*. Between these and the crura cerebri is a narrow passage, which leads from the fourth ventricle into what is termed the third ventricle of the brain. The third ventricle is a narrow cavity lodged between two great masses of nervous matter, called *optic thalami*, into which the crura cerebri pass. The roof of the third ventricle is merely membranous; and a peculiar body of unknown function, the *pineal* body, is connected with it. The floor of the third ventricle is produced into a sort of funnel, which ends in another anomalous organ, the *pituitary* body. The third ventricle is closed in front by a thin layer of nervous matter; but beyond this, on each side, there is an aperture in the boundary wall of the third ventricle which leads into a large cavity. The latter occupies the centre of the cerebral hemisphere, and is called the lateral ventricle. Each hemisphere is enlarged backwards, downwards and forwards into as many lobes; and the lateral ventricle presents corresponding prolongations, or *cornua*. The floor of the lateral ventricle is formed by a mass of nervous matter, called the *corpus striatum*, into which the fibres that have traversed the optic thalamus enter. If a body be cut in half, $\frac{1}{2}$ of the body would exhibit, in the trunk, the cut faces of 33 bones, joined together by a very strong and tough substance into a long column, which lies much nearer the *dorsal* (or back) than the *ventral* (or front) aspect of the body; the bones, thus cut through, are called the *vertebræ*. The vertebræ are connected by thick plates of elastic fibro cartilage, which give to the whole column considerable play and springiness, and yet prevent any great amount of motion between the several vertebræ. This lies on the dorsal side of the vertebræ, which separates it from the spacious chamber of the chest and abdomen, which lies upon their ventral side. The spinal canal contains a long white cord, the *spinal cord*, which is an important part of the nervous system. It is a column of grayish-white soft substance, extending from the top of the spinal canal, where it is continuous with the brain, to about the second lumbar vertebra, where it tapers off into a fila-

ment; a deep fissure, the *anterior fissure*, divides it in the middle line in front, nearly down to its centre; and a similar cleft, the *posterior fissure*, extends nearly to its centre in the middle line behind; the pia matter extends into each of these fissures, and supports the vessels which supply the cord with blood; each half of the cord is divided longitudinally into three equal parts, the anterior, lateral and posterior columns, by the lines of attachment of two parallel series of delicate bundles of nervous filaments, the roots of the spinal nerves; the roots of the nerves arising along the line nearest the posterior surface, are called posterior roots; those along the anterior surface, the anterior. A certain number of anterior and posterior roots, on the same level on each side of the cord, converge and form anterior and posterior bundles; and then the two bundles, anterior and posterior, unite into the trunk of a spinal nerve; before this union, the posterior bundle presents an enlargement, the ganglion. Besides the alimentary canal, a long double series of distinct masses of nervous substance, called *ganglia*, are connected together by nervous cords, and, constituting the so-called sympathetic system, traverses the abdomen and thorax. It consists chiefly of a double chain of ganglia, lying at the sides and in front of the spinal column, and connected with one another, and with the spinal nerves by commissural cords. From these ganglia nerves are given off which for the most part follow the distribution of the vessels, but which, in the thorax and abdomen, form great networks, or *plexuses*, upon the heart and about the stomach. The sympathetic nerves influence the muscles of the vessels generally, and those of the heart, of the intestines, and of some other viscera; and it is probable that their ganglia are centres of reflex action to afferent nerves from these organs.



Spinal Cord.

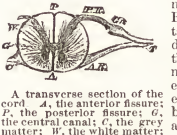
A. A diagrammatic section of the human body taken vertically through the median plane. *C.S.*, the cerebro-spinal nervous system; *N*, the cavity of the nose; *M*, that of the mouth; *Al.*, *Al.*, the alimentary canal represented as a simple straight tube; *H*, the heart; *D*, the diaphragm; *Sy.*, the sympathetic ganglia.

B. A transverse vertical section of the head taken along the line *a b*; letters as before.

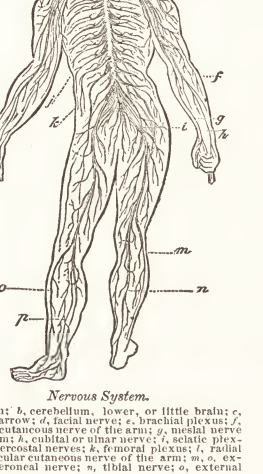
C. A transverse section taken along the line *c d*; letters as before.

Sections of Spinal Cord.

A front view of a portion of the cord. On the right side the anterior roots, *A.R.*, are entire; on the left side they are cut to show the posterior roots, *P.R.*



A transverse section of the cord. *A*, the anterior fissure; *P*, the posterior fissure; *G*, the central canal; *C*, the grey matter; *W*, the white matter; *A.R.*, the anterior root; *P.R.*, the posterior root; *Gn.*, the ganglion; and *T*, the trunk of a spinal nerve.



Nervous System.

a, brain; *b*, cerebellum, lower, or little brain; *c*, spinal marrow; *d*, facial nerve; *e*, brachial plexus; *f*, internal cutaneous nerve of the arm; *g*, mesial nerve of the arm; *h*, cubital or ulnar nerve; *i*, sciatic plexus; *j*, intercostal nerves; *k*, femoral plexus; *l*, radial and muscular cutaneous nerve of the arm; *m*, *o*, external peroneal nerve; *n*, tibial nerve; *o*, external saphenous nerve.

CIRCULATION, Organs of.—A system of minute tubes with very thin walls, termed *capillaries*, is distributed through the whole organism, except the epidermis and its products, the epithelium, the cartilages, and the substance of the teeth. On all sides these tubes pass into others, which are called arteries and veins; while these, becoming larger and larger, at length open into the heart, an organ which is placed in the thorax. During life, these tubes

and the chambers of the heart, with which they are connected, are full of liquid, which is for the most part, blood. The walls of the heart are muscular, and contract rhythmically, or at regular intervals. By means of these contractions the blood which its cavities contain is driven in jets out of these cavities into the arteries and thence into the capillaries, whence it returns by the veins back into the heart. This is the circulation of the blood. Almost all parts of the body are vascular; that is to say, they are traversed by minute and very close-set canals, which open into one another so as to constitute a small-meshed network, and confer upon these parts a spongy texture. The canals, or rather tubes, are provided with distinct but very delicate walls, composed of a structureless membrane in which at intervals small oval bodies termed *nuclei* are imbedded. These tubes are the capillaries. They vary in diameter from 1-2000th to 1-1500th of an inch, and are sometimes disposed in loops, sometimes in long, sometimes in wide, sometimes in narrow meshes; the interspaces between the capillaries are sometimes hardly wider than the diameter of a capillary, sometimes many times as wide. Capillaries are so exceedingly thin that their fluid contents readily exude through the delicate membrane of which they are composed, and irrigate the tissues in which they lie. Of the capillary tubes thus described, one kind contains, during life, *blood*, while the others are filled with a pale, watery or milky fluid, termed *lymph*, or *chyle*. The capillaries which contain blood, are continued on different sides into somewhat larger tubes, with thicker walls, which are the smallest *arteries and veins*. The walls of these vessels are thicker than those of the capillaries; the walls of the arteries and veins are thus rendered far less permeable to fluids, and that thorough irrigation of the tissues, which is effected by the capillaries, cannot be performed by them. The most important difference between these vessels and the capillaries, however, is that their walls are more complex, being composed of several coats, one, at least, of which is muscular. The number, arrangement, and even nature of these coats differ according to the size of the vessels, and are not the same in the veins as in the arteries, though the smallest veins and arteries tend to resemble each other. They are similar in structure, but the larger arteries and veins differ widely; the larger arteries have walls so thick and stout that they do not sink together when empty; and this thickness and stoutness arises from the circumstance that not only is the muscular coat

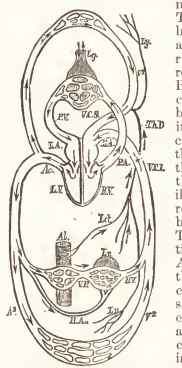
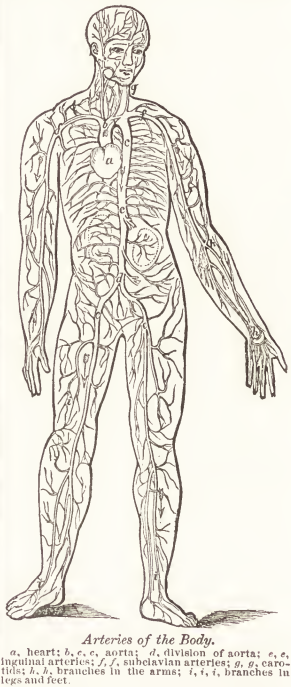


Diagram of the Heart and Vessels, with the Course of the Circulation, viewed from behind.

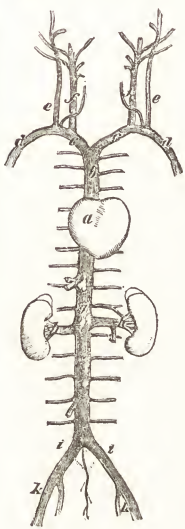
L. A., left auricle; *L. V.*, left ventricle; *Ao.*, aorta; *Al*, arteries to the upper part of the body; *A2*, arteries to the lower part of the body; *H. A.*, hepatic artery, which supplies the liver with part of its blood; *V1*, veins of the upper part of the body; *V2*, veins of the lower part of the body; *V. P.*, vena portæ; *H. V.*, hepatic vein; *V. C. I.*, inferior vena cava; *V. C. S.* superior vena cava; *R. A.*, right auricle; *R. V.*, right ventricle; *P. A.*, pulmonary artery; *Lg.*, lung; *P. V.*, pulmonary vein; *Lc.*, lacteals; *Ly.*, lymphatics; *Th. D.*, thoracic duct; *Al.*, alimentary canal; *Lr.*, liver. The arrows indicate the course of the blood, lymph and chyle. The vessels which contain arterial blood have dark contours, while those which carry venous blood have light contours.



Arteries of the Body.

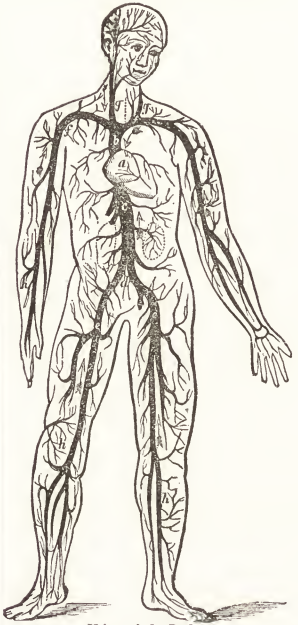
a, heart; *b*, *c*, *c*, aorta; *d*, division of aorta; *e*, *e*, inguinal arteries; *f*, *f*, subclavian arteries; *g*, *g*, carotids; *h*, *h*, branches in the arms; *i*, *i*, *i*, branches in legs and feet.

very thick, but that, in addition, and more especially, several layers of a highly elastic, strong fibrous substance become mixed up with the muscular layers. The larger veins, on the other hand, contain but little of either elastic or muscular tissue. Hence, their walls are thin, and they collapse when empty. Another great difference is the presence of what are termed *valves* in a great many of the veins, especially in those which lie in muscular parts of the body. They are absent in the largest trunks, and in the smallest branches, and in all the divisions of the portal, pulmonary, and cerebral veins. These valves are pouch-like folds of the inner wall of the vein. The bottom of the pouch is turned towards those capillaries from which the vein springs. The free edge of the pouch is directed the other way, or towards the heart. The veins of the stomach, intestines and pancreas combine into the *vena portæ*, which, having reached the liver, enters it and breaks up into capillaries, which ramify through the liver, and become connected with those into which the artery of the liver, called the *hepatic artery*, branches. From this capillary mesh-work veins arise, and unite, at length, into a single trunk, the *hepatic vein*, which emerges from the liver and opens into the inferior *vena cava*. The portal vein is the only great vein in the body which branches out and becomes continuous with the capillaries of an organ like an artery. The *heart* is an organ, the size of which is roughly estimated as equal to that of the closed fist of the person to whom it belongs, and which has a broad end turned upwards and backwards, and rather to the right side, called its *base*; and a pointed end, which is called its *apex*, turned downwards and forwards, and to the left side, so as to lie opposite the interval between the fifth and sixth ribs. It is lodged between the lungs, nearer the front than the back wall of the chest, and is inclosed in a sort of double bag, the *pericardium*. One-half of the double-bag is closely adherent to the heart itself, forming a thin coat upon its outer surface. At the base of the heart, this half of the bag passes on to the great vessels which spring from



Great Veins.

a, heart; *b*, ascending vena cava; *c*, *c*, subclavian veins; *d*, *d*, brachial veins, in the arms; *e*, *e*, veins from the outside of the head; *f*, *f*, veins from the brain; *g*, descending, or abdominal vena cava; *h*, *h*, veins from the kidneys; *i*, *i*, great branches of veins in the groins; *k*, *k*, veins from the lower extremities.

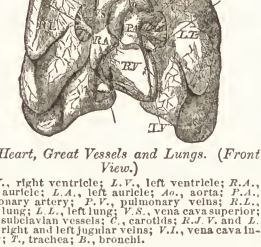


Veins of the Body.

a, heart; *b*, *c*, vena cava; *d*, division; *e*, *e*, inguinal veins; *g*, *g*, jugular veins; *h*, *h*, branches.

or open into that organ; and becomes continuous with the other half, which loosely envelops the heart and the adherent half of the bag. Between the two layers of the pericardium, there is a completely closed narrow cavity, lined by an epithelium, and secreting into its interior a small quantity of clear fluid. The outer layer of the pericardium is firmly connected below with the upper surface of the diaphragm. Inside, the heart contains two cavities, separated

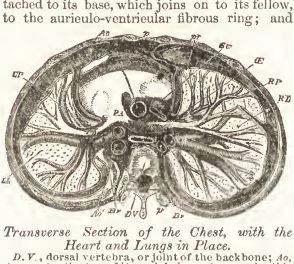
by a fixed partition, extending from the base to the apex of the heart; these are subdivided transversely by a movable partition. The cavity above the transverse partition, on each side, is called the *auricle*; the cavity below, the



The Heart, Great Vessels and Lungs. (*Front View.*)

R.V., right ventricle; *L.V.*, left ventricle; *R.A.*, right auricle; *L.A.*, left auricle; *Ao.*, aorta; *P.A.*, pulmonary artery; *P.V.*, pulmonary veins; *R.L.*, right lung; *L.L.*, left lung; *V.S.*, vena cava superior; *S.C.*, subclavian vessels; *C.*, carotids; *R.J.V.* and *L.J.V.*, right and left jugular veins; *V.I.*, vena cava inferior; *T.*, trachea; *B.*, bronchi.

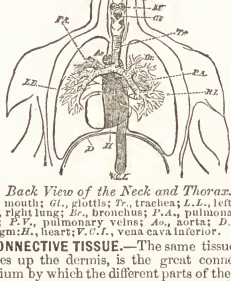
ventricle; right or left, as the case may be. There are three of these partitions attached to the circumference of the right auriculo-ventricular aperture, and two to that of the left. Each is a broad, thin, but very tough and strong triangular fold of the endocardium, attached to its base, which joins on to its fellow, to the auriculo-ventricular fibrous ring; and



Transverse Section of the Chest, with the Heart and Lungs in Place.

D.V., dorsal vertebra, or joint of the backbone; *Ao.*, *Ao.*, aorta, the top of its arch being cut away in this section; *S.C.*, superior vena cava; *P.A.*, pulmonary artery, divided into a branch for each lung; *L.P.R.P.*, left and right pulmonary veins; *Br.*, bronchi; *R.L.L.*, right and left lungs; *Œ.*, the gullet or œsophagus; *p.*, outer bag of pericardium; *pl.*, the two layers of pleura; *v.*, azygos vein.

hanging with its point downwards into the ventricular cavity. On the right side there are, therefore, three of these broad, pointed membranes, whence the whole apparatus is called the *tricuspid valve*. On the left side there are but two, which bear the name of the *mitral valve*. The *thorax* is a completely shut, conical box, with the small end turned upwards, the back of the box being formed by the spinal column, the sides by the ribs, the front by the breast bone, the bottom by the diaphragm, and the top by the root of the neck. The two lungs occupy almost all the cavity, which is not taken up by the heart.



Back View of the Neck and Thorax.

M., mouth; *Gl.*, glottis; *Tr.*, trachea; *L.L.*, left lung; *R.L.*, right lung; *Br.*, bronchus; *P.A.*, pulmonary artery; *P.V.*, pulmonary veins; *Ao.*, aorta; *D.*, diaphragm; *H.*, heart; *V.C.I.*, vena cava inferior.

CONNECTIVE TISSUE.—The same tissue that makes up the dermis, is the great connecting medium by which the different parts of the body are held together. It passes from the dermis between all the other organs, ensheathing the muscles, coating the bones and cartilages, and eventually reaching and entering into the mucous membranes. And so completely and thoroughly does the connective tissue permeate almost all parts of the body, that if every other tissue could be dissected away, a complete model of all the organs would be left composed of this tissue. Connective tissue varies very much in character; sometimes being very soft and tender, at others, as in the tendons and ligaments, which are almost wholly composed of it, attaining great strength and density.

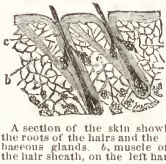
DIAPHRAGM.—The ventral chamber, or front aspect of the body, is divided into the two subordinate cavities of the thorax and abdomen by a remarkable, partly fleshy and partly membranous, partition, the *diaphragm*, which is concave towards the abdomen, and convex towards the thorax. From its middle, which is tendinous, muscular fibres extend downwards and outwards to the ribs, and two which are called the *pillars of the diaphragm*, to the spinal column. When these muscular fibres contract, they tend to make the diaphragm flatter, and to increase the capacity of the thorax at the expense of that of the abdomen, by pulling down the bottom of the thoracic box.

EXCRETORY ORGANS.—The fluid containing the dissolved or suspended nutritive matters which are the result of the process of digestion, traverses a very thin layer of soft and permeable tissue, which separates the cavity of the alimentary canal from the cavities of the innumerable capillary vessels which lie in the walls of that canal, and enters the blood, with which those capillaries are filled. Whirled away by the torrent of the circulation, the blood, charged with nutritive matter, enters the heart, and is thence propelled into the organs of the body. To these

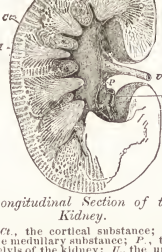
organs it supplies the nutriment with which it is charged; from them it takes their waste products, and, finally, returns by the veins, loaded with useless and injurious excretions, which sooner or later take the form of water, carbonic acid, and urea. These excretory matters are separated from the blood by the *excretory organs*, the *skin*, the *lungs*, and the *kidneys*. They are constructed upon the same principle. Each consists of a very thin sheet of tissue, like so much delicate blotting-paper, the one face of which is free, or lines a cavity in communication with the exterior of the body, while the other is in contact with the blood which has to be purified. The excreted matters are strained from the blood through this delicate layer of filtering-tissue, and on to its free surface, whence they make their escape. Each of the organs is especially concerned in the elimination of one of the chief waste products (water, carbonic acid, and urea), though it may at the same time be a means of escape for the others. The lungs are especially busied in getting rid of carbonic acid, but at the same time they give off a good deal of water. They also import oxygen, which, introduced by the blood, by which it is absorbed, into all corners of the organism, seizes upon those organic molecules which are disposable, lays hold of their elements, and combines with them into the new and simpler forms, carbonic acid, water, and urea. The duty of the kidneys is to excrete urea (together with other saline matters), but at the same time they pass away a large quantity of water and a trifling amount of carbonic acid; while the skin gives off much water, some amount of carbonic acid, and a certain quantity of saline matter, among which urea is, at all events, sometimes present. The two lungs occupy all the cavity of the thorax not occupied by the heart. Each is inclosed in its serous membrane, the *pleura*, a double bag very similar to the pericardium which surrounds the heart; the inner bag closely covers the lung and the outer forms a lining to the cavity of the chest. So long as the walls of the thorax are entire, the cavity of each pleura is practically obliterated, that layer of the pleura which covers the lung being in close contact with that which lines the wall of the chest; but if a small opening be made into the pleura, the lung shrinks to a small size, and thus develops a great cavity between the two layers of the pleura. (See illustration in *Circulation, Organs of.*) The human skin consists of two portions: a superficial layer, which is constantly being shed in the form of powder or scales, composed of minute particles of horny matter, and is called the *epidermis;* and the deeper part, the *dermis*, which is dense and fibrous. The epidermis, if wounded, neither gives rise to pain nor bleeds. The dermis, under like circumstances, is very tender, and bleeds freely. The skin can be readily enough removed from all parts of the exterior, but at the margins of the apertures of the body it seems to stop, and to be replaced by a layer which is much redder, more sensitive, bleeds more readily, and which keeps itself continually moist by giving out a more or less tenacious fluid, called *mucus*. Hence, at these apertures, the skin is said to stop, and to be replaced by *mucous membrane*, which lines all those interior cavities, such as the alimentary canal, into which the apertures open. But, in truth, the skin does not really come to an end at these points, but is directly continued into the mucous membrane, which last is simply an integument of greater delicacy, but consisting fundamentally of the same two layers, a deep, fibrous layer, containing blood-vessels and nerves, and a superficial, insensible, and bloodless one, now called the *epithelium*. The dermis, and the deep, sanguine layer, which answers to it in the mucous membranes, are chiefly made up of a filamentous substance, which yields abundant *gelatine* on being boiled, and is the matter which tans when hide is being made into leather. This is called *areolar, fibrous,* or better, *connective* tissue. The skin is one of the three sets of organs charged with the office of continually excreting carbonic acid, water and urea. There are two kidneys placed at the back of the abdominal cavity, one on each side of the lumbar region of the spine. From the middle of the concave side of each kidney, a long small tube, the *ureter*, proceeds to the bladder. The latter, situated in the pelvis, is an oval bag, the walls of which contain abundant unstriped muscular fibre, while

The Skin.

A section of the skin showing the sweat-glands. *a*, the epidermis; *b*, its deeper layer, the *rete Malpighii*; *c*, *d*, the dermis or true skin; *f*, fat cells; *g*, the coiled end of a sweat gland; *h*, its duct; *i*, its opening on the surface of the epidermis.

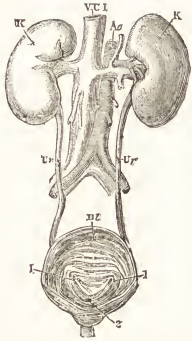


A section of the skin showing the roots of the hairs and the sebaceous glands. *b*, muscle of *c*, the hair sheath, on the left hand.



Longitudinal Section of the Kidney.

Ct., the cortical substance; *M.* the medullary substance; *P.*, the pelvis of the kidney; *U.* the ureter; *R.A.*, the renal artery.

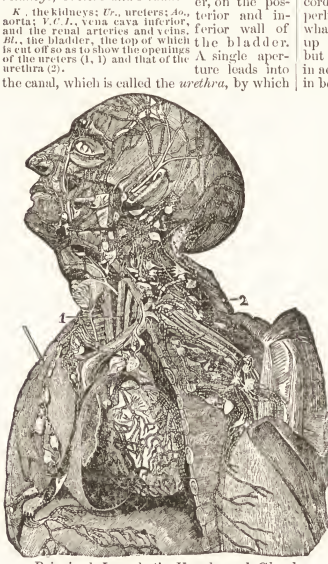


Kidneys, Ureters and Bladder.

K, the kidneys; *Ur.*, ureters; *Ao.*, aorta; *V.C.I.*, vena cava inferior, and the renal arteries and veins; *Bl.*, the bladder, the top of which is cut off so as to show the openings of the ureters (1, 1) and that of the urethra (2).

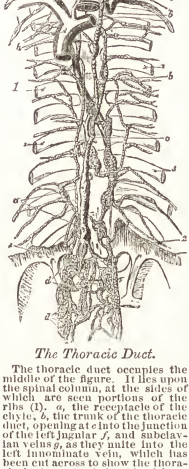
it is lined, internally, by mucous membrane, and coated externally by a layer of the peritoneum, or double bag of serous membrane, which has exactly the same relations to the cavity of the abdomen and the viscera contained in them, as the pleuræ have to the thoracic cavity and the lungs. The ureters open side by side, but at some little distance from one another, on the posterior and inferior wall of the bladder. A single aperture leads into the canal, which is called the *urethra*, by which the cavity of the bladder is placed in communication with the exterior of the body. The openings of the ureters enter the walls of the bladder obliquely, so that it is much more easy for the fluid to pass from the ureters into the bladder than for it to get the other way, from the bladder into the ureters. When a longitudinal section of a kidney is made, the upper end of the ureter seems to widen out into a basin-like cavity, which is called the *pelvis* of the kidney. Into this sundry conical elevations, called the *pyramids*, project; their summits present multitudes of minute openings, the final terminations of the *tubuli*, of which the thickness of the kidney is chiefly made up. If the tubuli be traced from their openings towards the outer surface, they are found at first to lie parallel with one another in bundles, which radiate towards the surface, and subdivide as they go; but at length they spread about irregularly and become interlaced.

LYMPHATICS AND GLANDS. — Besides the capillary network and the trunks connected with it, which constitute the blood-vascular system, all parts of the body which possess blood capillaries, except the brain and spinal cord, the eyeballs, the gristles, tendons, and perhaps the bones, also contain another set of what are termed *lymphatic* capillaries, mixed up with those of the blood-vascular system, but not directly communicating with them, and in addition, differing from the blood capillaries in being connected with larger vessels of only one kind. That is to say, they open only into trunks which carry fluid away from them, there being no large vessels which bring anything to them. In the skin, muscles and internal organs, they begin as a network of fine, hair-like tubes. These collect together, forming two trunks, which empty their contents into the large vein situated under the left collar-bone. The lymphatic trunks differ from the veins, in that they do not rapidly unite into larger and larger trunks, which present a continually increasing calibre, and allow of a flow without interruption to the heart. On the contrary, remaining nearly of the same size, they, at intervals, enter and ramify in rounded bodies called *lymphatic glands*, whence new lymphatic trunks arise. In these glands the lymphatic capillaries and passages are closely interlaced with blood capillaries. Sooner or later, however, the great majority of the smaller lymphatic trunks pour their contents into a tube, which is about as large as a crow-quill, lies in front of the backbone, and is called the *thoracic duct*. This opens at the root of the neck into the cojoined trunks of the great veins which bring back the blood from the left side of the head and the left arm. The remaining lymphatics are connected by a common canal with the corresponding vein on the right side. The liver is a dark, red colored viscus, lying on the right side of the body, immediately below the dia-



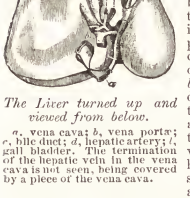
Principal Lymphatic Vessels and Glands.
1 and 2, thoracic duct, forming an arch.

phragm, while its lower surface touches the intestines and the right kidney. The liver is invested by a coat of peritoneum, which keeps it in place. It is flattened from above downwards, and convex and smooth above, where it fits into the concavity of the lower surface of the diaphragm. Flat and irregular below, it is thick behind, but ends in a thin edge in front. Viewed from below, the *inferior vena cava* is seen to traverse a notch in the hinder edge of the liver as it passes from the abdomen to the thorax. The trunk of the *vena portæ* divides into the chief branches which enter into, and ramify through, the substance of the organ. The *hepatic artery*, coming almost directly from the aorta, similarly divides, then enters the liver, and ramifies through it; the single trunk of the duct, called the *hepatic duct*, conveys away the bile brought to it by its right and left branches from the liver. Opening into the hepatic duct is the duct of a large oval sac, the *gall-bladder*. The duct is smaller than the artery, and the artery than the portal vein. The *spleen* lies upon the left side of the stomach in the abdominal cavity. It is an elongated flattened red body, abundantly supplied with blood by an artery called the *splenic artery*, which proceeds almost directly from the aorta. The blood which has traversed the spleen is collected by the *splenic vein*, and is carried by it to the *vena portæ*, and so to the liver. A section of the spleen shows a dark red spongy mass dotted over with minute whitish spots. Each of these last is the section of one of the spheroidal bodies called *corpuscles of the spleen*, which are scattered through its substance, and consist of a solid aggregation of minute bodies, traversed by a capillary network, which is fed by a small twig of the splenic artery. The dark red part of the spleen, in which these corpuscles are imbedded, is composed of fibrous and elastic tissue supporting a very spongy vascular network. The blood of the splenic vein is found to contain proportionally fewer red corpuscles, but more colorless corpuscles and more fibrin, than that in the splenic artery. All the veins of every part of the body, except the lungs, the heart itself and certain viscera of the abdomen, join together into larger veins, which, sooner or later, open into one of two great trunks termed the *superior* and the *inferior vena cava*, which debouch into the upper, or broad end of the right half of the heart. All the arteries of every part of the body, except the lungs, are more or less remote branches of one great trunk, the *aorta*, which springs from the lower division of the left half of the heart.



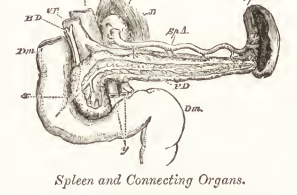
The Thoracic Duct.

The thoracic duct occupies the middle of the figure. It lies upon the spinal column, at the sides of which are seen portions of the ribs (1). *a*, the receptacle of the chyle; *b*, the trunk of the thoracic duct, opening at e into the junction of the left jugular *f*, and subclavian veins *g*, as they unite into the left innominate vein, which has been cut across to show the thoracic duct running behind it; *d*, lymphatic glands placed in the lumbar regions; *h*, the superior vena cava formed by the junction of the right and left innominate veins.



The Liver turned up and viewed from below.

a, vena cava; *b*, vena portæ; *c*, bile duct; *d*, hepatic artery; *l*, gall bladder. The termination of the hepatic vein in the vena cava is not seen, being covered by a piece of the vena cava.

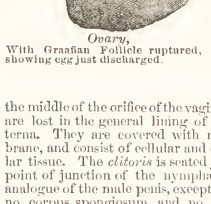


Spleen and Connecting Organs.

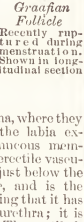
The spleen, *Spl.*, with the splenic artery, *Sp.A.* Below this is seen the splenic vein running to help form the vena portæ *V.P.* &c., the aorta; *D.*, a pillar of the diaphragm; *P.D.*, the pancreatic duct exposed by dissection in the substance of the pancreas; *Dm.*, the duodenum; *B.D.*, the biliary duct uniting with the pancreatic duct into the common duct, *x*, *y*, the intestinal vessels.

GENITALS, Female. — These are generally divided into the *external* and *internal*. The external consist of the *mons veneris*, *labia externa*, *perineum*, *clitoris*, *nymphæ*, *vestibule*, *meatus urinarius*, *hymen* in virgins, and *caruncule myrtiformes* in matrons. The internal are the *vagina*, *uterus*, and *uterine appendages*, which latter are the *broad ligaments*, *round ligaments*, *two ovaries*, and *two Fallopian tubes*. The *mons veneris* is placed at the lower part of the abdomen, and upper part of *symphysis pubis*; it consists of dense fibro-cellular and adipose tissue, and is covered, in the adult, with hair, among the roots of which are num-

erous sebaceous follicles. The *labia externa* are two folds of skin and mucous membrane, which commence in front of the symphysis pubis, and extend downwards and backwards to the perineum, where they again meet. The superior junction is called the *anterior commissure* of the vulva; the posterior is called the *posterior commissure*. Their texture is principally *cellular* and *vascular*, and their use is to protect the organs situated between them. The *perineum* extends from the lower union of the labia externa backwards towards the anus. It is capable of great distension. The *nymphæ*, *labia interna*, or *minora*, arise from nearly the same point, at the anterior commissure, and run downwards and backwards about an inch, to

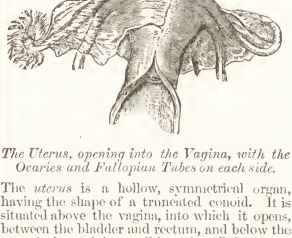


Ovary, With Graafian Follicle ruptured, showing egg just discharged.



Graafian Follicle Recently ruptured during menstruation. Shown in longitudinal section

the middle of the orifice of the vagina, where they are lost in the general lining of the labia externa. They are covered with mucous membrane, and consist of cellular and erectile vascular tissue. The *clitoris* is seated just below the point of junction of the nymphæ, and is the analogue of the male penis, excepting that it has no corpus spongiosum, and no urethra; it is erectile, and extremely sensitive. The *vestibule* is a triangular space, bounded superiorly by the clitoris, and laterally by the nymphæ, it is covered by smooth mucous membrane, and at its lower portion we find the orifice of the urethra. The *urethra* is about an inch and a half long, dilatable, and extends from before backwards and upwards, running under and behind the symphysis pubis. The *hymen* is a fold of mucous membrane, generally of a crescentic shape, with its concavity upwards, which is found just within the orifice of the vagina; it is generally ruptured at the first sexual intercourse, and its remains constitute the *carunculæ myrtiformes*. The space between the hymen and the fourchette is called the *fossa navicularis*. The *vagina* is a musculo-membranous canal, extending from its origin in the vulva obliquely through the cavity of the pelvis to the uterus, in its progress describing a curve, which is greater even than that of the sacrum and coccyx, having the neck of the bladder, the urethra, and the symphysis pubis anteriorly, and the rectum posteriorly. It is about 5 inches long, and 3 in circumference, being shorter and more capacious in those who have borne children.



The Uterus, opening into the Vagina, with the Ovaries and Fallopian Tubes on each side.

The *uterus* is a hollow, symmetrical organ, having the shape of a truncated conoid. It is situated above the vagina, into which it opens, between the bladder and rectum, and below the convolutions of the small intestine. It is flattened from before backward, and is nearly an inch in thickness. It is two inches broad at its highest part, and becomes narrower towards the vagina, terminating in a contracted portion, called the *cervix*, or neck. The *cavity* of the uterus is triangular, its base being directed upwards; in size it is about equal to a split almond, and the internal walls are nearly always in contact. Its inferior angle communicates with the vagina through the canal of the cervix, which is barrel-shaped, and from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long. The contraction at the upper extremity of the canal is called the *internal os uteri*, while that at the lower extremity is called *os uteri* or *os tincæ*. In the mucous membrane of the cervix are found the *glandulæ Nabothi*. The *broad ligaments* of the uterus are two duplicatures of peritoneum, one on either side, extending from the sides of the uterus to the ilia; they act as *stays* to the uterus, and contain the *Fallopian tubes*, which run along their upper margin, and the *ovaries*, which are inclosed in a posterior fold. The *Fallopian tubes* are two cylindrical canals, about 4 inches long, which arise from the superior angles of the uterus. They open *obliquely* into the uterus. In their unimpregnated state they are about the size of a bristle. At their terminal extremity they expand into a trumpet-shaped enlargement, called *fimbria*, or *morsus diaboli*, which applies itself to the ovary. They are looked upon as the excretory ducts of the ovaries. The *ovaries* are two in number, and are the analogues of the male testis. They are situated on the posterior face of the broad ligaments, and are attached to the uterus by a ligament of their own, called the *ligamentum ovarii*. They are oval in shape.

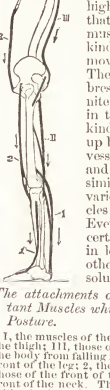
GENITALS, Male.—The male genitals are the *penis*, *prostate gland*, *seminal vesicles*, and

testicles. The *penis* is a hollow, spongy organ, through which runs the passage from the bladder called the *urethra*, by which the urine escapes, and which serves also for the exit of the *semen* (impregnating fluid). Its body consists of two distinct parts, very different in size, of which the upper and larger (in two halves) is called the *corpora cavernosa*, and the under the *corpus spongiosum*. Both parts extend from the pubes at the body to the glans situated at the end of the penis. The corpora cavernosa and corpus spongiosum are, as their names indicate, cavernous, spongy or hollow tissues. This formation has the special design of allowing great enlargement and rigidity for erection, by the blood attracted to and firmly distending the organ when congested by sexual excitement. The parts relax, contract and resume their normal size and proportions after this congestion subsides. The whole organ is surrounded with skin (excepting the end), the inner fold of which is attached to the end of the corpus cavernosum, while the outer fold is extended beyond, so that it may partly or wholly cover the glans, or, not being attached to it, can be drawn back. This loose skin is called the *foreskin* or *prepuce*, and is the part cut off in the Jewish rite of circumcision. It is a protection to the glans, but in some persons the foreskin extends so far over the glans as to make circumcision a necessity; but in most persons the glans is partly exposed. In structure the *glans penis* is an enlargement of the peculiar erectile tissue surrounding the end of the urethra; the skin covering it is very thin and sensitive, and quickly susceptible to excitement; in form it is cone-like, and on the under side the froeskin is attached nearly at the end by a cord, called the *frænum* or *bridle*. The *urethra* is the urinary canal or tube from the bladder, and perforates the corpus spongiosum. The *prostate gland* is a dense, hard structure, about the size of a horse-chestnut, which surrounds the neck of the bladder and the commencement of the urethra. It is placed between the rectum, which is behind, and the triangular ligament in front. The secretion of this gland, together with the secretion of Cowper's glands—two little glands about the size of a pea, situated in front of it—are suppose to lubricate the urethra, and also to mix with the secretion of the testicles to form the semen. The *seminal vesicles* consist of two convoluted tubes placed at the posterior and inferior portion of the bladder. They are oblong in shape, and converge downwards and forwards. Each appears to be about 2 inches in length, but, when unravelled, it is a tube 5 inches in length with numerous pouches. The *duct* of the vessel is joined by the *vas deferens* on either side in the prostate gland; the junction forms the *ductus ejaculatorius* which, passing through the prostate, opens into the urethra. They serve as receptacles for the semen, after it has been secreted by the testicles. The *testicles* (*1* next figure) are the glands for the secretion of semen. They are 2 in number, oval in shape, and flattened laterally. They hang obliquely by the spermatic cord, being attached above the middle of the posterior edge; the right being higher than the left.

1, the testicle; 2, *tunica albuginea*, the coat which covers and shapes it; 3, one of those *tubules*, which form the testicle; 4, a *tubulus seminiferus*, where it has become straight, forming the *vas rectum*; 5, the *rete testis*; or *corpus highmorianum*; 6, the *vasa efferentia*; 7, the united *coni vasculosi*, forming the commencement of the *epididymis*, or *globus major*; 8, the *epididymis*; 9, the lower part of the *epididymis*, or *globus minor*; 10, the *vas deferens*, which forms a part of the spermatic cord; 11, the *vasculum aberrans*, a small, blind, convoluted duct, connected with the *epididymis*, and pursuing a course generally parallel with the *vas deferens*.

Testicle.

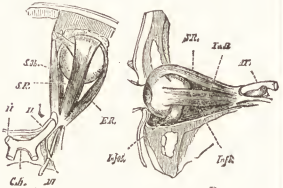
MUSCLES.—The great *intermittent sources of gain of waste products* to the blood are the muscles, every contraction of which is accompanied by a pouring of certain products into the blood. That much of this waste is carbonic acid is certain from the facts that the blood which leaves a contracting muscle is always highly venous, far more so than that which leaves a quiescent muscle. Muscles are one of the kinds of organs that produce the movements of the human body. They are accumulations of fibres, each fibre having a definite structure which is different in the *striated* and *unstriated* kinds. These fibres are bound up by fibrous tissue with blood-vessels, etc., into small bundles; and these bundles are again similarly bound up together in various ways so as to form muscles of various shapes and sizes. Every fibre has the power, under certain conditions, of shortening in length, while it increases its other dimensions, so that the absolute volume of the fibre remains unchanged. This power is called *muscular contractility*; and whenever, in virtue of this power, a muscular fibre *contracts*, it tends to bring its two ends, with whatever may be fastened to them, together. The



The attachments of some of the most important Muscles which keep the Body in the erect Posture.

I, the muscles of the calf; II, those of the back of the thigh; III, those of the spine. These tend to keep the body from falling forward. 1, the muscles of the front of the leg; 2, those of the front of the thigh; 3, those of the front of the abdomen; 4, 5, those of the front of the neck. These tend to keep the body from falling backwards. The arrows indicate the direction of action of the muscles, the foot being fixed.

muscles are imbedded in and ensheathed by the connective tissue. The different muscles of the human body are: 1. Those of the ear; namely, stapedius, which passes from the floor of the tympanum to the orbicular bone and tensor tympani, from the front wall of the drum to the malleus. — 2. Those of the eyeball; namely, four straight muscles, or *recti*, and two oblique muscles, the *obliqui*. The straight muscles are



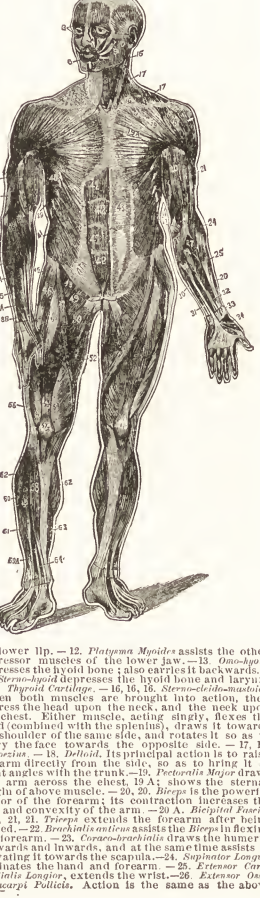
Muscles of the Eye.

A, the muscles of the right eyeball viewed from above, and B of the left eyeball viewed from the outer side. *S.R.*, the superior rectus; *Inf.R.*, the inferior rectus; *E.R.*, *In.R.*, the external rectus; *S. Ob.*, the superior oblique; *Inf.Ob.*, the inferior oblique; *Ch.*, the chiasma of the optic nerves (*II.*); *III.*, the third nerve which supplies all the muscles except the superior oblique and the external rectus.

attached to the back of the orbit, round the edges of the hole through which the optic nerve passes, and run straight forward to their insertions into the sclerotic—one, the *superior rectus*, in the middle line above; one, the *inferior*, opposite it below; and one half-way on each side, the *external* and *internal recti*. The eyeball is completely imbedded in fat behind and laterally; and these muscles turn it as on a cushion; the superior rectus inclining the axis of the eye upwards, the inferior downwards, the external outwards, the internal inwards. — 3. Those of the heart.—4. Those of the mouth.—5. Those of the vessels.—6. Those of the voice. These are found passing from one arytenoid cartilage to the other, at their posterior surfaces and are called the *posterior arytenoid*. There are also two sets connecting each arytenoid with the cricoid, called the posterior and lateral crico-arytenoid.—7. Those of motion and locomotion; these are found in the arms and limbs.

Muscles—Front View.

1. *Occipito-frontalis*. The frontal portion of this raises the eyebrows and skin over the root of the nose; at the same time throwing the integument of the forehead into transverse wrinkles, as seen in the emotions of delight and surprise. — 1 a. *Tendinous Aponeurosis* of above muscle, covering the vertex of the skull. — 2. *Temporal* raises the lower jaw against the upper jaw with great force.—3. *Orbicularis Palpebrarum* closes the eye; when acting, strongly, the integuments of the forehead, temple and cheek are drawn inwards towards the inner angle of the eye. — 4. *Levator Labii Superioris Alæque Nasi*. Its most important action is on the nose, which it dilates to a considerable extent, at the same time lifting the upper lip. It is the principal agent in the expression of contempt.—5. *Levator Labii Superioris*. It elevates the upper lip, at the same time carrying it a little outwards, as in laughing. — 6. *Orbicularis Oris*. It contracts the lips. — 7. *Zygomaticus Major*.—8. *Zygomaticus Minor*. Both these muscles have the same action as the *Levator Labii Superioris*.—9. *Masseter superficial portion*.—10. Is a deep portion of the same muscle. Action is similar to that of the *temporal* muscle. — 11. *Depressors of the lower lip*; viz., Depressor Labii Inferioris, Depressor Anguli Oris. They depress

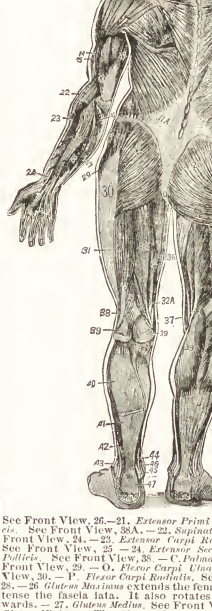


the lower lip. — 12. *Platysma Myoides* assists the other depressor muscles of the lower jaw.—13. *Omo-hyoid* depresses the hyoid bone; also carries it backwards.—14. *Sterno-hyoid* depresses the hyoid bone and larynx. —15. *Thyroid Cartilage*. — 16, 16, 16. *Sterno-cleido-mastoid*. When both muscles are brought into action, they depress the head upon the neck, and the neck upon the chest. Either muscle, acting singly, flexes the head (combined with the splenius), draws it towards the shoulder of the same side, and rotates it so as to carry the face towards the opposite side. — 17, 17. *Trapezius*. — 18. *Deltoid*. Its principal action is to raise the arm directly from the side, so as to bring it at right angles with the trunk.—19. *Pectoralis Major* draws the arm across the chest. 19 A; shows the sternal origin of above muscle. — 20, 20. *Biceps* is the powerful flexor of the forearm; its contraction increases the size and convexity of the arm. —20 A. *Bicipital Fascia*. —21, 21, 21. *Triceps* extends the forearm after being flexed.—22. *Brachialis anticus* assists the *Biceps* in flexing the forearm. —23. *Coraco-brachialis* draws the humerus forwards and inwards, and at the same time assists in elevating it towards the scapula.—24. *Supinator Longus*, supinates the hand and forearm. — 25. *Extensor Carpi Radialis Longior*, extends the wrist.—26. *Extensor Ossis Metacarpi Pollicis*. Action is the same as the above

muscle.—27. *Pronator Radii Teres*, pronates the hand and forearm.—28. *Flexor Carpi Radialis*, assists in the flexion of the wrist.—29. *Palmaris Longus*, a tensor of the palmar fascia; when this action has been fully effected, it flexes the hand upon the forearm.—29 A. *Palmar Fascia*.—30. *Flexor Carpi Ulnaris*, flexor of the wrist.—31. *Flexor Sublimis Digitorum*, flexes the fingers.—32. *Flexor Longus Pollicis* flexes the last phalanx of the thumb.—33. *Annular Ligament* extends across the wrist, binding the muscular tendons down and keeping them in position.—34. *Abductor Pollicis*, abducts the thumb from the palm.—35. *Extensor Carpi Radialis Longior*, extensor of the wrist.—35 A. *Extensor Carpi Radialis Brevior*. Action same as the above.—36. *Extensor Communis Digitorum*, extends the fingers.—37. *Extensor Carpi Ulnaris*, assists in extending the wrist.—38 A. *Extensor Primi Internodii Pollicis*.—38. *Extensor Secundi Internodii Pollicis*. Both muscles extend the thumb.—39. *Latissimus Dorsi*, (See II, Back View.)—40. *Serratus Magnus*. It is the most important external inspiratory muscle. When the shoulders are fixed, it elevates the ribs, and so dilates the cavity of the chest. This muscle, especially its middle and lower segments, draws the base and inferior angle of the scapula forwards, and so raises the point of the shoulder by causing a rotation of the bone on the side of the chest, assisting the *trapezius* muscle in supporting weights upon the shoulder.—41, 41, 41. *Obliquus Externus*.—41 A. *Abdominal Fascia*.—42, 42, 42. *Rectus Abdominis*.—43. *External Sheath of the Rectus*.—44. *Pyramidalis*.—45. *Gluteus Medius*. See Back View, 27.—46. *Tensor Vaginæ Femoris*, a tensor of the fascia lata, and also assists in the rotation of the thigh inwards.—47. *Sartorius*, flexes the leg upon the thigh, and, continuing to act, flexes the thigh upon the pelvis, at the same time drawing the limb inwards so as to cross one leg over the other.—48. *Psoas Magnus* flexes the thigh upon the pelvis, at the same time rotates the thigh outwards; also serves to maintain the erect position by supporting the spine and pelvis upon the femur, and assists in raising the trunk when the body is in the recumbent position.—49. *Pectineus*. Actions same as two following muscles.—50. *Adductor Longus*.—51. *Adductor Magnus*. The pectineus and adductors adduct the thigh powerfully; they are especially used in horse exercise, the flanks of the horse being grasped between the knees by the action of these muscles. In consequence of the obliquity of their insertion, they rotate the thigh outwards, assisting the external rotators, and when the limb has been adducted, they draw it inwards, carrying the thigh across that of the opposite side. They also assist in flexing the thigh upon the pelvis.—52. *Gracilis* assists the sartorius in flexing the leg and drawing it inwards; also an adductor of the thigh.—53. *Rectus Femoris*.—54. *Vastus Internus*.—54 A. *Vastus Externus*. The rectus and vasti have the same action, which is to extend the leg upon the thigh. Taking its fixed point from the leg, as in standing, these muscles will act upon the femur, supporting it perpendicularly upon the head of the tibia, and thus maintaining the entire weight of the body.—56. *Fascia Lata*.—57. *Patella*. See Fig. 21, No. 30.—58. *Tibialis Anticus* flexes the ankle; also raises the inner border of the foot.—59. *Extensor Longus Digitorum* extends the phalanges of the toes.—59 A. *Peroneus Tertius* assists in the flexion of the ankle.—60. *Peroneus Longus* extends the foot upon the leg; it also turns the sole of the foot outwards.—61. *Peroneus Brevis* assists in the extension of the foot.—62. *Gastrocnemius*. Front View. See Back View, 39.—63. *Soleus*. See Back View, 40.—64. *Extensor Proprius Pollicis* extends the great toe.

Muscles—Back View.

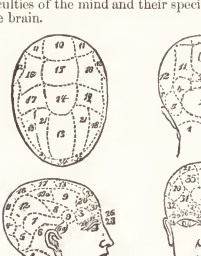
1. *Occipito-frontalis*. See Front View, 1.—2. *Temporal*. See Front View, 2.—3. *Masseter*. See Front View, 9.—4 *Sterno-cleido Mastoid*. See Front View, 16, 16.—5. *Splenius Capitis and Colli*. The splenii muscles of the two sides, acting together, draw the head directly backwards; while, acting separately, they assist (6 and 4) in drawing it to one or the other side, and slightly rotate it.—6. *Trapezius* draws the head backwards or from side to side. It also assists in supporting the head in the erect position.—7 *Ligamentum Nuchæ*. In man it is merely the rudiment of an important elastic ligament, which, in some of the lower animals, serves to sustain the weight of the head.—8. *Deltoid*. See Front View, 24.—9. *Supraspinatus*. *Infraspinatus*. The *supraspinatus* assists the deltoid in raising the arm from the side, and fixes the head of the humerus in its socket. *Infraspinatus* assists in rotating the head of the humerus outwards. When the arm is raised, they assist in retaining it in that position and carrying it backwards.—11. *Rhomboideus Major* assists in drawing the scapula backwards and upwards.—10. *Teres Major* assists the *Latissimus Dorsi* in drawing the humerus downwards and backwards when previously raised, and rotating it inwards when the arm is fixed.—11. *Latissimus Dorsi*. When it acts upon the humerus, draws it backwards and downwards, at the same time rotates it inwards. It also assists in forcible inspiration; and, when the arms are fixed, the two muscles may assist the abdominal and great pectoral muscles in drawing the whole trunk forwards, as in climbing, or walking on crutches. See Front View, 39.—11 A. *Lumbar Aponeurosis*.—12. *Obliquus Externus*. See Front View, 41, 41, 41.—E. *Bicipital Fascia*. See Front View, 20 A.—13. *Triceps*. See Front View, 21, 21, 21.—14. *Brachialis Anticus*. See Front View, 22.—15. *External Head of the Biceps*. See Front view, 20.—16. *Anconeus* assists the triceps in extending the forearm.—17. *Extensor Carpi Ulnaris*. See Front View, 37.—18. *Extensor Minimi Digiti* extends the little finger.—19. *Extensor Communis Digitorum*. See Front View, 36.—20. *Extensor Ossis Metacarpi Pollicis*.



See Front View, 26.—21. *Extensor Primi Internodii Pollicis*. See Front View, 38A.—22. *Supinator Longus*. See Front View, 24.—23. *Extensor Carpi Radialis Longior*. See Front View, 25.—24. *Extensor Secundi Internodii Pollicis*. See Front View, 38.—C. *Palmaris Longus*. See Front View, 29.—O. *Flexor Carpi Ulnaris*. See Front View, 30.—P. *Flexor Carpi Radialis*. See Front View, 28.—26 *Gluteus Maximus* extends the femur, and makes tense the fascia lata. It also rotates the thigh outwards.—27. *Gluteus Medius*. See Front View, 45.—28. *Gluteus Minimus*. The *Gluteus Maximus* and *Minimus* rotate the thigh inwards, etc. Taking their fixed point from the femur, the glutei muscles act upon the pelvis, supporting it and the whole trunk upon the head of the femur, which is especially obvious in standing on one leg.—29. *Tensor Vaginæ Femoris*. See Front

View, 46. — 30. *Fascia Lata.* See Front View, 56. — 31. *Biceps.* Actions, see below. — 32. *Semitendinosis.* Actions, see below. — 32 A. *Semitendinosis* its short head. — 33. *Adductor Magnus.* See Front View, 51. — 34. *Semimembranosus.* The biceps forms the outer hamstring; the inner one being formed by the semitendinosis, semimembranosus, gracilis, and sartorius. The hamstring muscles flex the leg upon the thigh. When the knee is semiflexed, the biceps, in consequence of its oblique direction downwards and outwards, rotates the leg slightly outwards; and the semimembranosus, in consequence of its oblique direction, rotates the leg inwards, assisting the Popliteus. Taking their fixed point from below, these muscles serve to support the pelvis upon the head of the femur, and to draw the trunk directly backwards, as in feats of strength, when the body is thrown backwards in the form of an arch. — 35. The short head of the *biceps.* — 36. *Gracilis.* See Front View, 52. — 37. *Sartorius.* See Front View, 47. — 38. *Plantaris.* 39. *Gastrocnemius.* Actions, see below. — 40. *Soleus.* The muscles of the calf possess considerable power, and are constantly called into use in standing, walking, dancing, leaping; hence the large size they usually present. In walking, these muscles draw powerfully upon the os calcis, raising the heel, and with it the entire body from the ground; the body being thus supported on the raised foot, the opposite limb can be carried forward. In standing, the soleus, taking its fixed point from below, steadies the leg upon the foot, and prevents the body from falling forward. The gastrocnemius, acting from below, serves to flex the femur upon the tibia. — 41. *Tendo-Achillis*, the thickest and strongest tendon in the body. — 42. *Peroneus Longus.* See Front View, 60. — 43. *Peroneus Brevis.* See Front View, 61. — 44. *Flexor Longus Digitorum.* Action, see below. — 45. *Flexor Longus Pollicis.* The above two muscles are direct flexors of the toes or phalanges, and, continuing their action, extend the foot upon the leg. — 46. *Tibialis Posticus* extends the ankle; it also assists in turning the sole of the foot inwards. — 47. *Os Calcis* serves to transmit the weight of the body to the ground, and forms a strong lever for the muscles of the calf, to which they are attached. — A. *Cornco-brachialis.* See Front View, 23. — D. *Coccyx.*

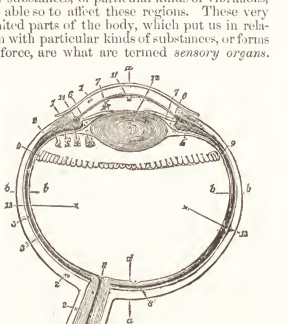
PHRENOLOGY.—Phrenology is the science of special functions of the parts of the brain, or of the supposed connection between the various faculties of the mind and their special organs in the brain.



Phrenological Divisions.

1, amativeness; 2, philoprogenitiveness; 3, concentrativeness; 3a, inhabitiveness; 4, adhesiveness; 5, combativeness; 6, destructiveness; 6a, alimentiveness; 7, secretiveness; 8, acquisitiveness; 16, conscientiousness; 17, hope; 18, wonder; 19, ideality; 19a, (not determined); 20, wit; 21, imitation; 22, individuality; 23, form; 24, size; 25, weight; 26, coloring; 27, locality; 28, number; 29, order; 30, eventuality; 31, time; 32, tune; 33, language; 34, comparison; 35, causality.

SENSORY ORGANS. — Only very few and comparatively small portions of the bodily frame-work are competent to be affected in such a manner as to cause the sensations of taste or smell, of sight or of hearing: and only a few substances, or particular kinds of vibrations, are able so to affect these regions. These very limited parts of the body, which put us in relation with particular kinds of substances, or forms of force, are what are termed *sensory organs.*

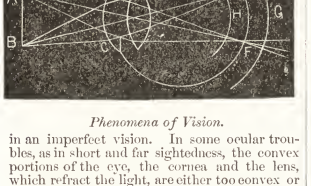


Horizontal Section of the Eyeball.

1, cornea; 1', conjunctiva; 2, sclerotic; 2', sheath of optic nerve; 3, choroid; 3'', rods and cones of the retina; 4, ciliary muscle; 4', circular portion of ciliary muscle; 5, ciliary process; 6, posterior chamber between 7, the iris and the suspensory ligament; 7', anterior chamber; 8, artery of retina in the center of the optic nerve; 8', centre of blind spot; 8'', macula lutea; 9, ora serrata (this is of course not seen in a section such as this, but is introduced to show its position); 10, space behind the suspensory ligament (canal of Petit); 12, crystalline lens; 13, vitreous humor; 14, marks the position of the ciliary ligament; *a*, optic axis (in the actual eye of which this is an exact copy, the yellow spot happened, curiously enough, not to be in the optic axis); *b*, line of equator of the eyeball.

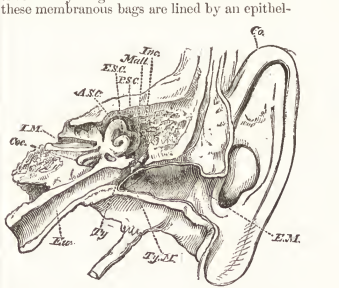
There are two such organs for sight, two for hearing, two for smell, and one, or more strictly speaking, two, for taste. The *eyeball* is composed of a tough, firm, spheroidal case, consisting of fibrous or connective tissue, called the sclerotic; in front of this is a transparent membrane called the cornea; in reality this is a part of the sclerotic. The corneo-sclerotic case of the eye is kept in shape by what are termed the *humors*, watery or semi-fluid substances, one of which, the *aqueous* humor, which is hardly more than water holding a few organic and saline substances in solution, distends the corneal chamber of the eye, while the other, the *vitreous*, which is rather a delicate jelly than a regular fluid, keeps the sclerotic chamber full. The two humors are separated by a very beautiful, transparent, doubly-convex *crystalline* lens, denser, and capable of refracting light more strongly than any of the humors. The crystalline lens is composed of fibres having a somewhat complex arrangement, and is highly elastic. In close contact with the sclerotic externally, and lined, internally, by a layer of small polygonal bodies called pigment cells, is a vascular coat called the choroid coat; the pigment cells give color to the eye. The iris is a curtain with a round hole in the middle, provided with circu-

lar and radiating unstriped muscular fibres; the edges are connected with the capsule of the eye at the junction of the cornea and sclerotic by the ciliary ligament. The phenomena of vision is explained as follows: Rays of light reflected from the points A and B are slightly refracted inwards upon entering the anterior chamber at C C, which contains the aqueous humor. Upon entering the crystalline lens D, they are still further bent, until at length these lines, meeting together at one point, form the focus E F. The highest point becomes lowest, and *vice versa*; or, in other words, the object is inverted. In the normal eye the point of meeting, or focus, of the lines is just on the retina, or inner lining of the eye. Should the posterior wall be too close to the crystalline lens, the lines would not meet; therefore the vision would be confused, as on the line H. Should the retina be at the line G, the rays having come to a focus at E F, will again diverge, and will thus result



Phenomena of Vision.

in an imperfect vision. In some ocular troubles, as in short and far sightedness, the convex portions of the eye, the cornea and the lens, which refract the light, are either too convex or not sufficiently so, and thus the image is imperfectly reproduced on the retina. When an excess of light falls on the retina, and obliquely to the point of vision, the superfluous rays are absorbed by the pigments of the choroid coat. Otherwise an excess of light again falling on the retina would again be reflected, blurring the distinctness of the vision. The *nose* is the organ of smell. It is a delicate mucous membrane which lines a part of the nasal cavities. Each nostril leads into a spacious nasal chamber, separated in the middle by the *septum*. Below, each nasal chamber is separated from the cavity of the mouth by the bony palate. The partition is continued down at the end of this palate to the root of the tongue by a fleshy curtain. The uppermost and front part of the roof of the nasal cavity between the eyes, is formed by a delicate, horizontal plate of bone, perforated like a sieve by a great many small holes, called the *cribriform* plate. This plate (with the membranous structures which line its two surfaces) separates the cavity of the nose from that which contains the brain. The olfactory lobes which are directly connected with, and form indeed a part of, the brain, enlarge at their ends, and their broad extremities rest upon the upper side of the cribriform plate; sending immense numbers of delicate filaments, the olfactory nerves, through it to the olfactory mucous membrane. On each wall of the septum this mucous membrane forms a flat expansion, but on the side walls of each nasal cavity it follows the elevations and depressions of the inner surfaces of what are called the upper and middle turbinal, or spongy bones. The interior of each of these is occupied by air cavities separated from each other by very delicate partitions only, and communicating with the nasal cavities. There is a third light, scroll-like bone, distinct from these two, and attached to the maxillary bone, which is called the *inferior* turbinal, as it lies lower than the other two, and imperfectly separates the air passages from the proper olfactory chamber. It is covered by the ordinary ciliated mucous membrane of the nasal passage, and receives no filaments from the olfactory nerve. The *ear*, or organ of the sense of hearing, is much more complex than either of the sensory organs yet described. The essential parts, on either side of the head, consist, substantially, of two peculiarly formed membranous bags, called, respectively, the *membranous labyrinth* and the *scala media of the cochlea*. Both these bags are lodged in cavities which they do not completely fill, situated in the midst of a dense and solid mass of bone called *petrosal*, which forms a part of the temporal bone, and enters into the base of the skull. Each bag is filled with a fluid, and is also supported in a fluid which fills the cavity in which it is lodged. In the interior of each bag, certain small, mobile, hard bodies are contained; the ultimate filaments of the auditory nerves are so distributed upon the walls of the bags that their terminations must be knocked by the vibrations of the small, hard bodies, should anything set them in motion. Both these membranous bags are lined by an epithel-



Transverse Section showing the Parts of Ear.

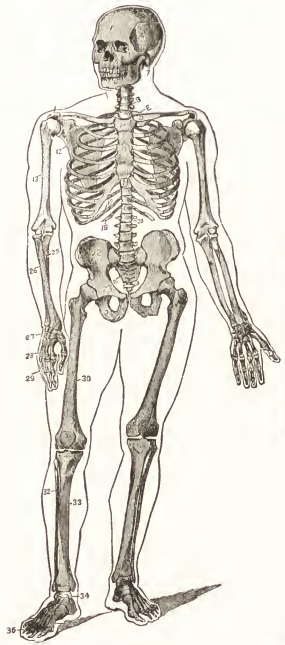
Co., concha or external ear; *E.M.*, external auditory meatus; *Ty.M.*, tympanic membrane; *Inc. Mall.*, incus and malleus; *A.S.C.*, *P.S.C.*, *E.S.C.*, anterior, posterior, and external semicircular canals; *Coc.*, cochlea; *Eu.*, Eustachian tube; *I.M.*, internal auditory meatus, through which the auditory nerve passes to the organ of hearing.

ium. The auditory nerve, after passing through the dense bone of the skull, is distributed to

certain regions of each bag, where its ultimate filaments come into peculiar connection with the epithelial lining. The membranous labyrinth is surrounded by a bony labyrinth, and the scala media is only a part of an intricate structure called the *cochlea*. The bony labyrinth and cochlea with all the parts inside each constitute together what is called the internal ear. The membranous labyrinth has the figure of an oval vestibular sac, consisting of two parts, the one called utriculus, the other *sacculus hemisphericus*. The hoop-like, semicircular canals open into the *utriculus*. They are three in number, and, two being vertical, are called the anterior and posterior vertical semicircular canals; while the third, lying outside and horizontally, is termed the external horizontal semicircular canal. One end of each of these canals is dilated into what is called an *ampulla*. The fluid which fills the cavities of the semicircular canals and utriculus is termed *endolymph*. That which separates these delicate structures from the bony chambers in which they are contained is the *perilymph*. Each of these fluids is so thin as to be little more than water. In the scala media the primitive bag is drawn out into a long tube which is coiled $2\frac{1}{2}$ times on itself into a conical spiral and lies in a much wider chamber of corresponding form, excavated in the petrous bone in such a way as to leave a central column of bony matter called the *modiolus*. The scala media has a triangular transverse section, being bounded above and below by the membranous walls which converge internally and diverge externally. At their convergence, the walls are fastened to the edge of a thin plate of bone, the *lamina spiralis*, which winds round the modiolus. At their divergence they are fixed to the wall of the bony chamber. The two passages thus formed are called scala tympani and scala vestibuli. They are filled with perilymph. In the dry skull there are two wide openings, termed *fenestræ*, or windows, on the side nearest the outside of the skull. Of these fenestræ, one, termed *ovalis* (the oval window), is situated in the wall of the vestibular cavity; the other, *rotunda* (the round window), behind and below this, is the open end of the *scala tympani* at the base of the spire of the cochlea. In the fresh state, each of these windows or fenestræ is closed by a fibrous membrane, continuous with the periosteum of the bone. The *fenestra rotunda* is closed only by membrane; but fastened to the centre of the membrane of the *fenestra ovalis*, so as to leave only a narrow margin, is an oval plate of bone, part of one of the little bones to be described shortly. The outer wall of the internal ear is far away from the exterior of the skull. Between it and the visible opening of the ear, are placed, 1st, the tympanum, and 2d, the long external passage or meatus. The tympanic membrane separates these two, being tightly stretched in an oblique across the passage. 3 small bones, the auditory ossicles, lie in the cavity of the tympanum: 1. *Stapes*, the foot-plate, is fastened to the fenestra ovalis; its hoop projects into the tympanic cavity. 2. *Malleus*, a long process fastened to the inner side of the tympanic membrane. The body of the malleus and a small process is fastened to the wall of the tympanum by ligaments. The rounded surface of the head of the malleus fits into a corresponding pit in the end of a third bone, the *incus* or anvil, which has two processes: 1, horizontal, resting upon the walls of the tympanum; the other, vertical, descends almost parallel with the long process of the malleus, and unites with the *os orbiculare*, which articulates with the stapes. The organ of the sense of taste is the mucous membrane which covers the tongue, especially its back part, and the hinder part of the palate. Like that of the skin, the deep or vascular layer of the mucous membrane of the tongue is raised up into papillæ, but these are large, separate, and have separate coats of epithelium. Towards the tip of the tongue they are for the most part elongated and pointed, and are called *filiform*; over the rest of the surface of the tongue these are mixed with other larger papillæ, with broad ends and narrow bases, called *fungiform*; but towards its root there are a number of large papillæ, arranged in the figure of a V with its point backwards, each of which is like a fungiform papilla surrounded by a wall. These are the circumvallate papillæ. The larger of these papillæ have subordinate small ones upon their surfaces. They are very vascular, and they receive nervous filaments from two sources, the one the nerve called *glossopharyngeal*, the other the *gustatory*, which is a branch of the 5th nerve. The latter chiefly supplies the front of the tongue, the former its back and the adjacent part of the palate.

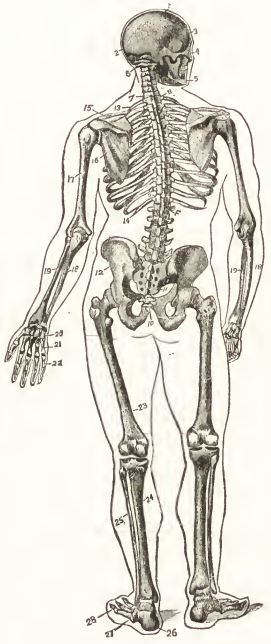
SKELETON.—The different cartilages, composed of a dense, firm substance, known as gristle, make up the skeleton of man. All the bones are fastened together by ligaments, or by cartilages; and where they play freely over one another, a coat of cartilage furnishes the surfaces which come into contact. The cartilages which thus form part of a joint are called *articular* cartilages, and their free surfaces, by which they rub against each other, are lined by a delicate *synovial* membrane, which secretes a lubricating fluid, the *synovia*. The harder tissues are the *bones*, which are masses either of cartilage, or of connective tissue, hardened by being impregnated with *phosphate* and *carbonate of lime*. They are animal tissues which have become, in a manner, naturally petrified; and when the salts of lime are extracted, as they may be, by the action of acids, a model of the bone in soft and flexible animal matter remains. More than 200 separate bones are ordinarily reckoned in the human body, though the actual number of distinct bones, varies at different periods of life, many bones which are separate in youth becoming united together in old age. From their shapes, bones are called long, short, flat, and irregular. Long bones are hollow, and filled with a fatty matter; the others solid. Place a section of bone under the microscope and there will be noticed little canals running in a longitudinal direction. These are named *Haversian* canals, and around these canals the bone is placed in layers in the

form of rings. Branching in all directions from these canals are smaller little tubes called *canaliculi*. These canaliculi end in little pouches named *lacunæ*. All these small canals and pouches are filled with a fluid which nourishes the bone.



Skeleton—Front View.

1, frontal; 2, nasal; 3, malar; 4, temporal; 5, superior maxillary, or upper jaw; 6, inferior maxillary, or lower jaw; 7, mastoid process; 8, last cervical vertebra; 9, first dorsal vertebra; 10, acromion process of the scapula, 12; 11, coracoid process of the scapula; 12, scapula; 13, humerus; 14, manubrium, or first piece of sternum; 15, sternum, or breast-bone; 16, ensiform, or third piece; 17, cartilage of sixth rib; 18, eleventh rib; 19, 12th rib; 20, first lumbar vertebra; 21, sacrum; 22, 23, 24, pelvis; 22, ilium; 23, pubes; 24, ischium; 25, ulna; 26, radius; 27, tarsal; 28, metatarsal; 29, phalanges; 37, internal cuneiform.



Skeleton—Back View.

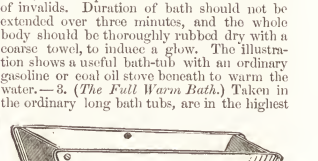
1, parietal; 2, occipital; 3, frontal; 4, malar; 5, inferior maxillary or lower jawbone; 6, atlas or first cervical vertebra; 7, vertebra prominens, or seventh cervical vertebra; 8, first dorsal vertebra; 9, twelfth dorsal, first lumbar vertebra. Of the vertebræ there are originally 33, but the twenty-fifth, twenty-sixth, twenty-seventh, twenty-eighth, and twenty-ninth early unite into one great bone, called the sacrum; the four remaining vertebræ often run into one bony mass called the coccyx; 10, coccyx; 11, sacrum; 12, twenty-four ribs bound the chest laterally, twelve on each side, and most of them are connected by cartilages with the breast-bone. In the girdle which supports the shoulder, two bones are always distinguishable as the scapula and the clavicle. The pelvis, to which the legs are attached, consists of two separate bones called the os innominatum; 13, first rib; 14, twelfth and last rib; 15, clavicle or collar-bone; 16, scapula or shoulder-bone; 17, humerus; 18, ulna; 19, radius; 20, carpal bones; these are the scaphoides, trapezium, semilunare, trapezoides, cuneiforme, magnum, pisiforme, and uneiforme; 21, metacarpal, 5; 22, phalanges, 14; 23, femur; 24, tibia; 25, fibula; 26, tarsus; these are the calcaneum, astragalus, naviculare, cuneiform, and the cuboid; 27, metatarsus, 5; 28, phalanges, 14.

HYGIENE.

REMARKS.—The following are good general rules for the preservation of health: 1. Health requires, in order that we may breathe the same air once only, proper ventilation.—2. Our dwellings and places of business should freely admit solar rays.—3. Decomposing animal and vegetable substances, the gases of which enter the lungs and corrupt and poison the blood, should be kept away from our abodes and every precaution observed to secure a pure atmosphere.—4. An equal bodily temperature should be maintained by physical exercise, by proper clothing or by fire. Physical exercise warms, invigorates and purifies the blood, clothing preserves the warmth the body generates, fire imparts warmth externally; therefore, to obtain and preserve warmth, exercise stands first, then clothing and fire.—5. Fire consumes the oxygen of the air and produces noxious gases; the air is less pure in the presence of candles, gas or coal fire than otherwise, and the deterioration should be repaired by increased ventilation.—6. As the skin imbibes moisture or throws it off, according to the state of the atmosphere and the temperature of the body, it must be repeatedly washed and kept perfectly clean.—7. As late hours and anxious pursuits exhaust the nervous system and produce disease and premature death, 8 hours should be given to rest.—8. The best health is enjoyed upon plain, simple solids and fluids, of which a sufficient but temperate quantity should be taken, and strong drinks, tobacco, snuff, opium, and all mere indulgences should be avoided.—9. Clothing in quantity and quality should be adapted to the alternations of the weather of night and day, and of the seasons, more especially by the young and old. —*Finally*, moderation in eating and drinking; the amount of time and energy spent in labor, business or study; regularity in physical exercise, enough only to keep up a good circulation of the blood; recreation and rest; cleanliness, equanimity of temper and equality of temperature, are the great essentials to that which surpasses all wealth—*health of mind and body*.

AVERAGE WEIGHTS AND MEASURES of the Human Body.—There are a few good points to be remembered, namely: That the average weight of an adult man is 140 lbs., 6 oz.; that the average weight of a skeleton is about 14 lbs.; that the number of bones is 240; that the average weight of the brain of a man is 3½ lbs.; of a woman, 2 lbs. and 11 oz.; that the brain of a man exceeds twice that of any other animal; that the average height of an Englishman is 5 ft., 9 in.; that the average number of teeth is 32; that a man breathes about 20 times in a minute, or 1,200 times in an hour; that a man breathes about 18 pts. of air in a minute, or upwards of 7 hogsheads in a day; that the average of the pulse in infancy is 120 per minute; in manhood, 80; at 60 years, 60; the pulse of females is more frequent than that of males; that the weight of the circulating blood is about 28 lbs.; that the heart beats 75 times in a minute, sends nearly 10 lbs. of blood through the veins and arteries each beat, and makes 4 beats while we breathe once; that 540 lbs., or over 1 hhd. of blood, passes through the heart in an hour; that 12,960 lbs., or 24 hhds., 4 gals., or 10,782½ pts., pass through the heart in 24 hours.

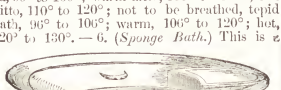
BATHING.—Nothing is of more transcendent importance to the maintenance of health than cleanliness, and this can only be obtained by the free use of water, in washing, sponging or bathing. The modes of bathing are various, and, when rightly used, are most powerful for good.—1. (*The Cold Bath.*) Taken in sea or river, temperature from 35° to 65° Fahr., this has a most powerful, exhilarating and tonic effect on the frame, and imparts a vigorous glow and stimulus to the system, when the body is not debilitated. It should not be continued longer than two or three minutes.—2. (*The Temperate Bath.*) Ranging from 65° to 80° Fahr., is much preferable to the last for the use of invalids. Duration of bath should not be extended over three minutes, and the whole body should be thoroughly rubbed dry with a coarse towel, to induce a glow. The illustration shows a useful bath-tub with an ordinary gasoline or coal oil stove beneath to warm the water.—3. (*The Full Warm Bath.*) Taken in the ordinary long bath tubs, are in the highest



Portable Bath, with Stove.

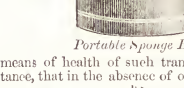
degree promotive of health and comfort. The temperature should range from 90° to 98°; better under that than over it. The benefits will be increased by the use of carbonate of soda, 4 oz. to 30 gals. water. This rids the system of much effete matter, promotes the cure of disease, and thoroughly cleanses the emunctories. After bathing, rub thoroughly dry.—4. (*The Hot Bath.*) Ranging from 98° to 112°, thoroughly stimulates the nervous system, but immersion cannot be prolonged over 2 or 3 minutes without permanent injury. Water scalds at 150°, but heated air at 260° is not painful. It is not safe to tamper with such high temperatures. The sensation in hot vapor resembles that of contact with boiling water.—5. (*Poor Man's Vapor Bath.*) Heat two or three bricks and place them under the patient's chair; sprinkle some water over the bricks, and cover the patient to keep in the steam; or, a large lump of quicklime placed in a pan or old iron pot and sprinkled with water or wrapped up in a wet coarse towel. Neither of these methods,

however, are at all comparable to the efficiency of a properly administered vapor bath, either pure or medicated, in which the temperature of the steam, etc., can be regulated as follows: Temperature of tepid vapor bath, to be breathed, 90° to 100°; warm ditto, 100° to 110°; hot ditto, 110° to 120°; not to be breathed, tepid bath, 96° to 106°; warm, 106° to 120°; hot, 120° to 130°. — 6. (*Sponge Bath.*) This is a

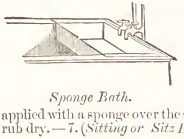


Portable Sponge Bath.

means of health of such transcendent importance, that in the absence of other bathing facilities, it should never be neglected for a single day. Only a small quantity of tepid water is used. The water should be applied with a sponge over the whole body. Then rub dry. — 7. (*Sitting or Sitz Bath.*) It should be arranged to admit of complete immersion of the lower part of the back and abdominal regions, the thighs, etc., with ample room for laving the water and kneading the parts. The cold tonic bath given in this way is excellent for diseases of the kidneys, bladder, urino-genital organs, piles, constipation, etc.—8. (*Head Bath.*) Taken by placing the patient on his back, on a mattress, with his head in a shallow basin, made with a depression in the rim to accommodate the neck, and about 3 inches of water, warm or cold, as may be desired. A most excellent cooling application for affections of the head, brain, etc.— 9. (*Douche Bath.*) Consists of a jet of water used as a stimulant in lethargic states of the system; also a remedy for swellings, sprains, stiff joints, rheumatic affections, etc. Applied directly to the parts. A jet from a hose may be used as a substitute for the douche bath in certain cases. —10. (*Wet Sheet Pack.*) A most powerful remedial agent for invalids. Immerse a cotton or linen sheet in a pail of cold water, remove the bedclothes from the mattress, and on the mattress spread a coverlet; then two or three blankets; next, wring out the wet sheet in the bucket of water and spread it over the blankets. The patient should now warm his feet, divest himself of clothing, and place himself at full length on the cold, wet sheet, with his hands placed over his breast. The sheet, blanket and coverlet should be tucked in closely all around his body by an attendant, the head elevated on pillows and covered with a wet cloth. The first sensation is that of a chill, which gives place almost immediately to a comfortable glow, gradually increasing to a sweat. Remain in the pack from 25 minutes to an hour or more. Some have been known to fall asleep in it. To receive the fullest benefit, it should be followed at once by a plunge bath, or thorough ablution in cold water, and friction by means of a coarse towel.—11. (*Spirit Vapor Bath.*) The patient divested of all clothing excepting a night shirt, seats himself on a wooden-bottomed chair, and covers well before and behind with blankets or coverlets reaching from the shoulders to the floor. Place a saucer containing a few spoonfuls of alcohol, whisky, or any spirit that will burn, on the floor under the chair and ignite. The vapor ascends, and, confined by the blankets, it will soon induce a copious perspiration from every pore of the body subject to its action. The operation is highly beneficial to the system, and may last until a free perspiration is induced. Be careful about the burning spirit.—12. (*Galvanic, Electric and Magnetic Baths.*) The first is taken by placing the patient in a wooden bath tub, filled with water impregnated with any desired drug. The negative pole of the battery is suspended in the water, and a wire connected with the positive pole, with a sponge attached, communicates with the body. The electric current from the positive pole enters the body and escapes through the pores. An electro-positive bath is given while the patient sits on a chair, insulated by placing glass under the feet. While the glass plate of the electric machine is being revolved, the patient holds the prime conductor, and his body becomes charged with positive electricity.—13. (*Acid Bath.*) Highly beneficial in liver and other complaints, and may be compounded with water acidified with vinegar, or with water, 30 gals., muriatic acid, 14 oz. Use the latter in a wooden tub or non-metallic vessel.—14. (*Shower Bath.*) This, with cold water, never fails to produce a shock which weak and nervous patients find it very hard to withstand; but to persons of strong constitution the shock is usually succeeded by a most agreeable reaction. This bath may be rendered agreeable, even to the feeble, by the use of tepid or warm water, applied in the form of a delicate spray, passed through minute perforations in a tin vessel placed overhead, and fitted with a proper apparatus for regulating the descent.— 15. (*Foot Bath.*) This is calculated to produce the most decided benefit in correcting cold feet, also to relieve heat in the head. Use warm or hot water, with the addition of mustard or cayenne pepper. In cases of swollen limbs, ulcers, rheumatic pains, etc., great relief will be obtained by extending the treatment to the legs, knees, limbs, etc., thoroughly washing and laving the parts.—16. (*Mud Bath.*) One of the most powerful remedial agents. On the principle that charcoal purifies foul water, absorbing its impurities, so mud acts on the body, opening the pores, withdrawing effete matter, cooling the skin, and curing disease.—



Sponge Bath.



Sitz Bath.

17. (*Sulphur Bath.*) Produced by allowing sulphuric acid gas to surround the patient's body, being confined there by surrounding him with a blanket or other suitable arrangement for keeping it from his face. A convenient manner of extemporizing a bath of this kind is to place sulphur on a red-hot brick surrounded by a small amount of water, over which the patient is seated, enveloped with a blanket, as recommended for a vapor bath.—18. (*Mercurial Bath.*) May be extemporized in a like manner by placing ten or twenty grains of calomel on the brick.—19. (*Ammoniacal Bath.*) It may be prepared by adding a half to an ounce of the spirits of hartshorn to the gallon of water, according to the strength required. Great caution should always be exercised in using the stronger medicated baths.—20. (*Turkish or Hot Air Bath.*) In ordinary forms of baths the accumulations on the skin are washed off. In this they are literally washed out. The bather, wrapped only in a soft sheet, reclines on a lounge in the sweating-room, where the intense perspiration induced by a dry heat, varying from 120° to 140° Fahr., is continued for a sufficient time to flush every channel of the skin, and expel from the body every particle of obstructed perspiration. The bather is subjected to a process of elaborate shampooing, a kind of kneading of the muscles of the entire body by the hands of the assistant, by which means every particle of impurity is effectually worked out of the body, which is then scraped and washed. The bather is then wrapped in a dry sheet, and conducted to an agreeable divan, where he remains for a sufficient time to recover from fatigue. In obesity, chronic rheumatism, malaria, gout, various skin diseases, and numerous chronic affections, it is a remedy of great value. Persons of deliciate physique are, however, sometimes unfavorably affected by the heroic treatment.

BEDS AND BED-CLOTHES.—A bed, whatever it be made of, should be so flexible that all parts of the body may rest upon it equally. It ought to adapt itself to the outline of the body in whatever position the body may be placed. The very hard mattress which yields nothing, and which makes the body rest on two or three points of corporeal surface, should be excluded from use. On the other hand, the bed that is so soft that the body is enveloped in it, though it may be very luxurious, is too oppressive, hot and enfeebling; it keeps up a regular fever, which cannot fail to exhaust both physical and mental energies. The best bed is one of two kinds: A fairly soft feather bed laid upon a soft horse-hair mattress; or a thin mattress laid upon one of the elastic steel-spring beds. Heavy bed-clothes are a mistake; weight in no true sense means warmth. The light down quilts or coverlets are the best to use. One of these quilts takes well the place of two blankets, and they cause much less fatigue from weight than layer upon layer of blanket covering. It should be the rule to learn so to adapt the clothing that the body is never cold and never hot while under the clothes.

BRAIN. Health of.—Do not overtax the brain. No man should do more work of muscle or of brain in a day than he can perfectly recover from the fatigue of in a good night's rest. Up to that point, exercise is good; beyond, are waste of life, exhaustion and decay. In apoplexy, a blood-vessel of the brain gives way; and the blood accumulates near its base, and pressing on the cranial nerves, on which the action of the vital organs depend, cuts off the flow of nervous force to the latter. A slighter effusion may cause only paralysis, from which the patient may recover, the wound healing and the blood being taken gradually up and carried off by the absorbents. Sometimes the serous portion of the blood escapes through the pores of the vessels sufficiently to occasion a similar result. Free-livers are especially liable to apoplexy. They keep the vessels too full and the current too strong. Distaste for work, except in one constitutionally lazy, is a sign of cerebral fatigue. Brain workers should take just enough exercise to keep up a good circulation. For food they require what can be digested easily.

CHEWING or MASTICATION.—By this act food not only becomes comminuted, but mixed with the saliva, and reduced to a form fit for swallowing. It has been justly regarded by the highest authorities as the first process of digestion, and one without which the powers of the stomach are overtasked, and often performed with difficulty. Hence the prevalence of dyspepsia and bowel complaints among persons with bad teeth, or those who bolt their food without chewing.

CLEANLINESS.—The proper healthfulness of cities and dwellings depends upon personal cleanliness, household cleanliness, and municipal cleanliness. All the legislation conceivable will be of no service in preserving the health of a city unless the first of these is observed, and it is there that the work should commence. Free baths, with whatever of compulsion is necessary to make that class of citizens use them who need them most and which class is most averse to their use, are of the first importance. Bodily cleanliness is the first step toward household neatness, for no clean family will live in a filthy house. For methods see *Bathing*. The cleansing of dwellings does not depend alone upon the use of water. Dry dirt is preferable to moist and moldy cleanliness. Scrubbing is good sanitation only when followed by thorough drying and ventilation. Dry dirt, even on a kitchen floor, is far more tolerable, hygienically, than slops and rotten beams under the floor. Moist and mildewed papers, held to sodden walls by putrid paste, will originate diseases which could have no existence in a dry atmosphere. These evils are often intensified by the addition of sewer gases escaping from defective joints. Tear off sodden paper, carry off from the roofs the rain which permeates the walls, and put down kitchen floors that are impermeable to water. To properly cleanse streets and alleys is to remove the filth, by scraping and sweeping it up and carting it away; by leaving the streets as dry as may be except from the most superficial sprinkling; by removing all the slops and garbage from the al-

leys, and using disinfectants at all offensive localities. A model street is one composed of a smooth, not slippery, hard material, impermeable to moisture, having its dust and accumulations swept or washed away at night.

CLOTHING. — The object of our clothing should be threefold: Warmth in winter, coolness in summer, and health and comfort at all times. Our clothes have no power to manufacture or impart heat. Heat is generated within our bodies, and what is termed warm clothing is that made from materials that are bad conductors of it, and which consequently retain the natural heat of our bodies; and cool clothing is made from materials that are good conductors of heat, and hence convey it away from the body or allow it to escape. Linen is a good conductor of heat, and is hence largely worn in summer and in tropical or warm climates. Cotton is not so good a conductor of heat, and hence is warmer than linen. Silk and wool are bad conductors of heat, and are hence much warmer and consequently better suited for winter clothing and for colder climates. Furs and feathers are very bad conductors of heat, and much used for wraps of various kinds. All kinds of clothing near the skin absorb more or less of insensible perspiration, and should be frequently changed. Clothing worn through the day should be laid off and a night-dress used for sleeping in. India-rubber, when worn continuously, is injurious and unhealthy, on account of interrupting and retaining the insensible perspiration. All wearing apparel of this kind should be laid off upon entering the house. All persons should wear thick or thin flannel next the skin, winter and summer; it absorbs the perspiration, and does not chill the body by coming in contact with it, as cotton and linen garments do. The feet should at all times be kept warm and dry, and the shoes and boots should be made of substantial material, and with thick soles. Clothing should be made to fit the form. We should not attempt to torture the body into some unnatural form to suit the foolish caprice of fashion. The dress of children should favor to the fullest extent the natural and unrestrained development of the body. Many poor infants are cruelly tortured, deformed, or permanently injured for life, by tight and misshaped dresses. The practice of dressing infants in long clothes, is objectionable, when continued too long or beyond severe weather, for, besides being injurious to health, it cramps the action of the limbs, and by so doing prevents their proper development.

COLDS.—Sudden warming when cold is dangerous, as well as the reverse. There is ordinarily little, if any, danger to be apprehended from wet clothes, so long as exercise is kept up, for the "glow" about compensates for the extra cooling by evaporation. Nor is a complete drenching more likely to be injurious than wetting of one part. But never sit still wet, and in changing, rub the body dry. When overheated or drenched with perspiration, put on a warm garment before resting still. Except in localities where malignant miasmata prevail, and that only in warm weather, persons who are out of doors the most take and feel cold least.

COMPLEXION. — Arsenic is a very common ingredient of compounds used for improving the complexion. Not one of them that has been analyzed is fit to rub on the human skin. All complexion fluids are poisonous, and are taken into the system by absorption through the skin. Brisk rubbing, opening the pores of the skin and inducing healthy action, will produce far better effects than any cosmetics.

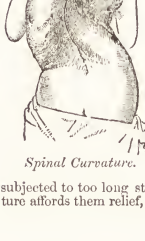
CONTAGION, To Prevent. — Among diseases liable to be spread by the distribution of organic poisons, may be mentioned scarlet fever, typhus fever, typhoid fever, yellow fever, measles, small-pox, diphtheria, infectious ophthalmia, hydrophobia, erysipelas, cholera and glanders. The walls of hospitals should be glass-lined, the better to prevent contamination, and means should be used to destroy the contagious matter by chemical agents. Solar light and great heat, are other powerful disinfectants. (See *Disinfectants.*) Thoroughly disinfect all fecal discharges, and, if in the country, they should be taken at least 200 feet from any well. Under no circumstances should they be disposed of in an open out-house. In the city, in case the drainage is good, it is safe to use the sewer. Contagion is largely propagated by means of clothing. This should be placed in a box or a closet maintained at a temperature of 220°, dry, for perhaps an hour. Carbolic acid will not permanently destroy the effect of vaccine virus. People are far more liable to contract diseases on an empty than on a full stomach.

DIGESTION.—All of the strength of body and mind, of power to move, to work, to think, comes from proper food well digested. A few hours of effort use up certain elements in the muscles, nerves and brain, which can only be replaced by digested food. Tonics and stimulants may temporarily help the dormant or weak digestive organs, enabling them to digest food, but they do not add to the stock of strength. The food in the stomach is moistened and largely liquified by a fluid supplied from the blood, coming through myriads of little openings on the inner coating of the stomach. If there is much food to be worked up, there must be a great flow of blood to supply this digesting fluid, the gastric juice. The blood is then drawn away from other parts of the body. After a heavy meal one feels dull, sluggish, because there is less general circulation of the blood. If violent or strong exertion of body or mind is made soon after eating, it draws the blood from the stomach, and digestion of the food is retarded. If there is more food than the stomach can readily supply gastric juice for, some of it will be imperfectly worked over, and will go into the system in that condition. It will disturb the brain and other organs. It will affect and intensify any local trouble or disease. If one has weak or diseased lungs, this imperfectly digested food will irritate and intensify the trouble. To be well digested by the gastric juice, the food must first be mixed with a good supply of saliva, by thorough chewing. Eat slowly, and keep every portion of food to be swallowed some time in the mouth, to get a full supply of saliva.

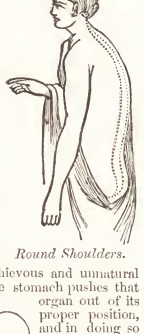
DIPHTHERIA, To Guard against. — Procure from a drug store 1 lb. of sulphate of zinc. Put into an ordinary water pail 8 tablespoonfuls with ½ of common salt, and to this add 1 gal. of boiling water. This disinfecting solution is to be kept in the room, and into it should be placed and kept for one hour every article of soiled clothing, bedding, handkerchiefs, etc. When they are removed from this, they should be put into boiling water before being washed. The dishes and spoons used by the patient should be put into boiling water before they are permitted to leave the room. The remarks under *Contagion* are also appropriate here.

DISINFECTANTS.—The following are some of the principal disinfectants: 1. For privies, use sulphate of iron dissolved in water in the proportion of 1½ lbs. to the gallon; or the same amount of chloride of lime, thoroughly mixed in water.—2. For clothing and bed linen, use sulphate of zinc and common salt; or boil in a solution of permanganate of potassa, 1 oz. to 3 gals. of water; if the articles cannot be boiled, expose them, in a dry room, to a dry heat from 200° to 250° Fahr. Linen is stained by permangante of potassa, but the discoloration may be removed by sulphate of iron.—3. For occupied rooms, use a spray of Ledoyen's solution of nitrate of lead, or solid chloride of lime in shallow vessels, and ventilate the room well; or a tablespoonful of turpentine in a pail of water, is a powerful destroyer of germs and bad odors.—4. For water-closets, bed-pans, etc., use Labarraque's solution of chlorinated soda, 1 fl. oz. to 1 qt. of water.—5. For drinking water, add, after filtration, enough permanganate of potassa to render it just perceptibly pink in a strong light.—6. For dirt piles, cover with charcoal or dry earth, 2 or 3 inches deep.—7. For drains, ditches, and sewers, use sulphate of iron, coal tar, chloride of lime, etc.

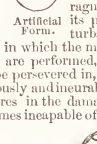
DISTORTIONS.—Spinal curvature arises from a weakened state of the muscles, ligaments, and bones of the backbone. It is most frequently met with in those whose occupation compels them to stand the greater part of the day; as well as in persons who pass many hours at the desk or at needle work. Spinal curvature is also common in young fragile girls acting as nursemaids, and as such unduly subjected to carrying heavy infants on one side. Amongst the children of the poor, those of tender years are much too frequently put to this objectionable form of drudgery. Those subjected to too long standing, because the posture affords them relief, uneonseiously contract the habit of standing on the right leg, and at the same time of bending the left knee a little. One-sided postures cause distortion because the intervertebral substance is compressible to such an extent that an adult man of middle stature loses about an inch of his height after having been in the erect posture during the day, and does not regain it until after some hours of rest. Round shoulders are caused often by incessant desk labor and indolence both as to an erect posture and inflating the chest. By means of corsets, tight stays, and other implements of torture the ribs are pressed inwards to such an extent that all the conditions essential to health are imperilled, and eventually become overthrown. This mischievous and unnatural pressure exerted on the stomach pushes that organ out of its proper position, and in doing so forces the diaphragm also out of its place; a disturbance which so curtails the space in which the movements of the heart and lungs are performed, that if the pernicious custom be persevered in, these latter organs become seriously and ineurably diseased. The liver also shares in the damage inflicted, and frequently becomes incapable of discharging its office. Organic disease of the heart is by no means an uncommon contingency if tight lacing be persevered in; for that organ is not allowed room to beat, nor the blood to circulate. One effect of this is seen in frequent fainting fits. Again, tight lacing not unfrequently stops the growth and arrests the development of a young girl's breasts, thus seriously incapacitating her



Spinal Curvature.

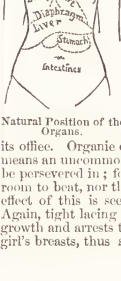


Round Shoulders.

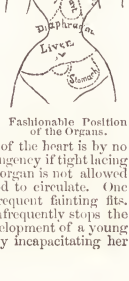


Natural Form of the Waist.

Artificial Form.



Natural Position of the Organs.



Fashionable Position of the Organs.

from suckling her babe when she becomes a mother. Amongst the minor evils wrought by the baleful custom, indigestion, with its accompaniments of flatulence, heartburn, pain in the chest, etc., is the worst. Constipation, bad breath and a red nose are also its attendant ills. Another variety of distortion is that brought about by wearing tight boots and shoes, or those constructed upon false principles; for, a boot or shoe may be productive of considerable inconvenience to the wearer, as well as cause a certain amount of twisting out of place of the bones of the foot, without being too small.

Fig. 1. Natural Position of Bones of the Foot.

Amongst the consequences arising from the adoption of tightly fitting or badly constructed boots or shoes may be mentioned the following: Considerable bodily discomfort, and pain in walking; corns and bunions; growing in of the nails; chronic enlargement of the base of the great toe; caries or ulcerations of the bones of the feet; and flat feet. Fig. 1 represents the skeleton of the foot with the bones which form it in their natural position, and in which they are admirably adapted for executing the various movements required of them. Fig. 2 gives the inner and side view of the foot. It is an arch resting in front on the anterior heads of the five metatarsal bones, *a*, but chiefly on that of the great toe, and on the *calcaneum* or heel, *b*, behind. The astragalus, *c*, forms the keystone of the arch. This arch, which supports the superincumbent weight of the body, retains its curved form by means of strong ligaments or bands, which unite the bones which compose it into a compact, but withal flexible mass. The arch, owing to the pressure thrown upon it from above, becomes flattened when the foot is resting upon the ground; but when this pressure is removed and the foot hangs free, the curvature of the arch increases.

Fig. 2. Side View of a Good Foot.

Fig. 3. Unnatural Position of the Foot.

In front of the metatarsal bones are placed the toes, which are connected with the metatarsal bones by joints. The great toe has one joint; each of the smaller ones has two. Fig. 3 depicts the skeleton of a foot with the bones thrown out of their natural position. The great toe ought to have such a position that the line of its axis, when carried backwards, will emerge at the centre of the heel; this is its position in the healthy foot. The sole of an almost sound foot is given in Fig. 4, and the true position of the great toe is indicated by the dotted line. In a bad foot this line would not touch the great toe at all, but clear it entirely. The smaller toes, however, are by no means without their uses. In standing they rest on the ground and give lateral support to the foot; while in the act of walking they are bent in a peculiar manner, so that they are firmly pressed against the ground; and here, too, they support the foot laterally. The first joint is strongly bent upwards, while the second is hollow above. As boots and shoes are at present constructed, the foot is made to adapt itself to the sole, not the sole to the foot. This pernicious system must be abandoned. A sole is of the proper construction when a line (Fig. 5, *c*, *d*,) drawn at half the breadth of the great toe, distant from, and parallel to, the inner margin of that toe shall, when carried backwards, pass through the center of the heel. In the usual form of a sole this line passes out of the inner margin of the heel. (Fig. 6.) If it be thought desirable to have pointed shoes, the pointing must be effected from the outer side as in the annexed Fig. 7. In a pair of shoes made on these principles, placed side by side with the heels in contact, the inner margins of the front part of the foot are brought close together. (Fig. 8.) The heel-piece ought to be as low and broad as possible. High and small heels are quite unsuitable. Bow legs are caused chiefly by lack of nourishment of the bones. An improvement in the character of the food is necessary. (See *Food, Entire Wheat Flour as*; also WOMEN AND CHILDREN.) Bow legs may also be caused by encouraging children to stand on their feet too early.

Fig. 4. A Good Foot.

Fig. 5. Properly Shaped Sole.

Fig. 6. Usual Form of Sole.

Misshapen Foot caused by high heel.

A Foot with Toe Crowded Under by a bad Shoe.

Fig. 8. A Pair of Properly Constructed Soles.

Fig. 7. Proper Shape for Pointed Toes.

DRAINAGE.—Every house should have a suitable drain for the removal of its liquid wastes. If the house can be brought into connection with a public sewer, it is all right; but in those cases where there is no public outlet, the question of the disposal of liquid wastes becomes extremely serious. For effective drainage, only sufficient inclination of the surface is required to secure a flow in the drains and 1 foot in 100

will be fall enough to accomplish this, especially where the flush-tank system is used. This is as follows: Let the tight drain deliver into a tightly cemented small cistern, say 4x4 ft., discharging through a bent overflow pipe of which the inlet is 12 in. below the point at which it leaves the wall of the cistern, near its top. (Fig. 1.) This will secure room for the deposit of solid matters at the bottom and for the floating of scum at the top. If necessary to clean out the solid accumulation at the bottom, it is always worth the

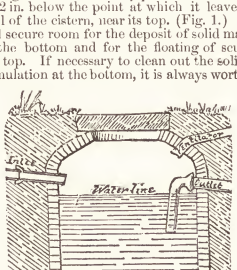


Fig. 1.—Flush Tank.

cost of removal as manure. The outlet should be not more than 12 in. below the surface of the ground, and should be continued through open-jointed land-drain tiles 2 in. in diameter, laid on a foundation of narrow boards or of inverted horse-shoe tiles, also open jointed, and nowhere more than about 12 in. below the surface. This drain may be continuous, or it may be the main for any number of longer or shorter branches. The whole system may act as a means for conveying the foul liquid to all parts of an area, and delivering it at a point within the reach of the roots of plants. When a single long line is not sufficient, lay the lateral drains about four feet apart. If the necessary other means are adopted to prevent the ingress of foul air into houses, then it is very well to use immediately under the outlets of wash-basins, sinks, etc., some form of water-seal trap, which shall be to a certain extent, a barrier against bad smells generated immediately within the waste pipe; but, as a main dependence, these traps are a delusion and a snare. The usual form given to them is shown in the figures 2, 3 and 4. Figure 4 represents the common bell trap so often used over the outlet pipe of the kitchen sink, etc. Its movable part is very easily taken off, and is very apt to be left off, and even when it is in place it offers very slight resistance to the pressure of foul air. The great objections to all water-seal traps are: 1. That the resistance they offer to the pressure of sewer gas is so slight that a trifling change in the temperature of a sewer or cesspool, the sudden filling of the sewer with water, or even the influence of a strong wind blowing against its outlet, will suffice to open them.—2. Water is a very imperfect disinfecting barrier. When water is once itself infected, what is to prevent its giving forth infection? Safety is to be sought, not through a shutting out of the foul gases formed in the sewer and drain, but in the prevention of this formation by the free admission and circulation of air.

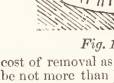


Fig. 2.
Common Water-seal Trap.

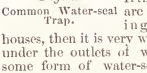


Fig. 3.
Common Water-seal Trap.

Fig. 4.
Common Bell Trap.

DRINK.—Water enters more largely into the composition of our bodies than all other substances combined. Apart from its immediate invigorating influence, it favors the rapid transformation of tissues, and in this manner facilitates the elimination of deleterious substances from the system. A copious draught of water at retiring will sometimes entirely break up a recent cold. A tumbler of fresh water drunk regularly upon rising in the morning will often do more towards overcoming chronic constipation than medicine. In warm weather drink moderately of cold water. Chocolate, from its large proportion of albumen, is a nutritive beverage, but at the same time, from its quantity of fat, the most difficult to digest. Its aromatic substances, however, strengthen the digestion. A cup of chocolate is an excellent restorative, and invigorating even for weak persons, provided their digestive organs are not too delicate. Tea and coffee do not afford this advantage. Albumen in tea leaves, and legumin in coffee berries, are represented in very scanty proportions. Buttermilk nearer satisfies all the conditions of a cheap and wholesome summer drink than anything known at present. It is agreeable to all palates, thirst-subduing and wholesome. Lemonade is one of the best and safest drinks for any person, whether in health or not. It is suitable to all stomach diseases and excellent in sickness. Alcoholic liquors should be avoided. They are heating as well as stimulating; their use tends to excess and sure reaction. (See *Milk.*)

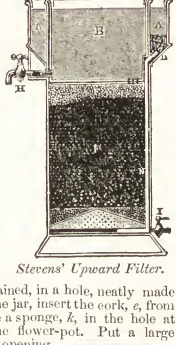
EAR.—Ear troubles begin early. The child is inclined to put small things into it, such as beans, coffee-kernels, pebbles, etc. These irritate and inflame the ear, and may become sources of most serious mischief. Older persons are hardly wiser who pick the ears with the head of a pin. Only the softest material and the gentlest pressure should be used in cleaning the ear. If the ticking of a watch can be heard at the distance of twenty-eight inches, the hearing is good. Each ear should be tested separately. Noises in the head, sometimes ringing, frequently are due to hardening of the wax in the ear. Sudden deafness is sometimes caused by a small mass of

wax, from ill-health or uncleanliness, becoming hard. A continued secretion of wax then blocks up the ear tube still more. A match-end, a pin-head, or a penholder, instead of removing, pushes down the wax and packs it against the tympanum; loss of hearing ensues because the membrane can no longer vibrate. The removal of wax is in some cases, especially those of longer standing, somewhat difficult; but with gentle treatment and patience may be finally accomplished, and the hearing fully restored. The best means for removing wax is by means of water, quite warm, with or without syringe. Never give a child a "box on the ears," for not only is deafness caused, but the inflammation of the internal cavity, which is so frequent a result, may be followed by disease of the bone, giving rise to abscess of the brain, and having a fatal termination.

EXERCISE.—Exercise invigorates the brain, expands the lungs, quickens the circulation, and braces the nerves. All exercise should, as far as possible, be in the open air. It facilitates the full and thorough oxygenation of the blood, the development of the muscles and the nervous system, and promotes sound digestion. Children especially should have the benefit of out-door exercises in all seasons, except in inclement weather; and, when confined within-doors, should have all the benefits of thorough ventilation. Many of the diseases of women are attributable to too close confinement to household drudgery and neglect of proper out-door exercise. Every person should take a daily walk in the open air. Horseback riding calls into activity and develops many of the muscles. Gardening is one of the most healthful exercises; the use of the various tools employed brings into play every muscle in the body; and with the ennobling pleasure to the mind it affords, it imparts a vigor and freshness to the entire system. Of all modes of exercise of children, that of jumping the rope is the most dangerous. It produces continuous concussions of the joints which impinge upon the bone often causing periostitis, and finally resulting in the death of the bone. Children should be encouraged in all their games to take exercise, but rope-jumping should be forbidden.

EYES.—Have sufficient light; never sit facing it; let it come from behind or from one side; have a moderate light, so that surrounding objects may not be too strongly illuminated; a black shade may sometimes be worn with advantage, so large that front and side light may not enter the eyes. With this protection the light may be safely in front; if reading, it is better that it be to one side. Never read in horse or steam cars; never read when lying down; do not read much during convalescence from illness. But while, on the one hand, the eyes should never be strained, or worked to the verge of fatigue, on the other, exercise is just as beneficial to them as to any other part of the body. The habit should be cultivated of studying small objects carefully, keenness of sight depending so much upon the mental attention one is in the habit of paying to visual impressions. Excesses of every kind tend to the injury of the eyesight, and so in a very great degree does the want of good and proper spectacles. In choosing glasses or spectacles the eyes should look through the centres of the lenses; the spectacles with which the print can be seen most distinctly, and, at the same time, with the greatest ease to the eyes, are the proper glasses to be used without regard to strength or number.

FILTRATION.—(See same in APPARATUS, MANIPULATIONS, ETC., in CHEMIST AND DRUGGIST.) Water often needs purification before it is fit to drink. The combined water cooler and filter here shown answers the purpose of rendering water drinkable. The water, before filtration, passes from chamber A, through sponge-box D, and is conveyed to the bottom of the filter, through influent pipe N, and upward through filtering material F, E, into clear water chamber B, from whence it is drawn as required, through faucet H. The filter contains a double bottom, creating a chamber for the deposit of sediment. By reversing the current of water, sediment is removed through faucet I. A good serviceable, cheap filter can be made as follows: Procure a wooden box, *a*, 3 ft. high and 1 ft. square, open on one side, with a shelf, *m*; on this shelf place a common stone jar, *c*, and let a flower-pot, *d*, rest in the mouth of the jar. If a jar or tank with a faucet fitted cannot be obtained, in a hole, neatly made in the bottom of the jar, insert the cork, *e*, from beneath, and place a sponge, *k*, in the hole at the bottom of the flower-pot. Put a large sponge, *f*, over the opening in the jar, and a piece of thin muslin, *g*, over this sponge; then put into the jar, first a layer of 3 or 4 qts. of clean white or river sand, *h*, then the same quantity of pulverized charcoal, *i*, and above that 1 qt. of small pebble stones, *j*. The pitcher, *b*, stands below the shelf, *m*. The filter should be kept constantly at work. During the greater part of the year it should be placed near the hydrant, or pump, so that the waste water may flow off. The flower-pot, *d*, whose sponge prevents coarse materials passing into the jar, should be cleaned once or



Stevens' Upward Filter.

Home-made Filter.

twice a week; but the jar requires attention not more than once or twice a year. Care must be taken to have the hole into which the cork, *e*, is fitted, close to the bottom of the jar, so that when the filter is not at work, no water will remain to become impure.

FOOD. Digestibility of.—

ARTICLE OF FOOD.	Condition.	Hours Required.
Rice	Boiled	1 00
Eggs, whipped	Raw	1 30
Trout, salmon, fresh	Boiled	1 30
Apples, sweet and mellow	Raw	1 30
Venison steak	Broiled	1 35
Tapioca	Boiled	2 00
Barley	"	2 00
Milk	"	2 00
Bullock's liver, fresh	Broiled	2 00
Fresh Eggs	Raw	2 00
Codfish, cured and dry	Boiled	2 00
Milk	Raw	2 15
Wild turkey	Roasted	2 15
Domestic turkey	"	2 30
Goose	"	2 30
Suckling pig	"	2 30
Fresh lamb	Broiled	2 30
Hash, meat and vegetables	Warmed	2 30
Beans and pod	Boiled	2 30
Parsnips	"	2 30
Irish potatoes	Roasted	2 30
Chicken	Fricasseed	2 45
Custard	Baked	2 45
Salt Beef	Boiled	2 45
Sour and hard apples	Raw	2 50
Fresh oysters	"	2 55
Fresh Eggs	Soft boiled	3 00
Beef, fresh, lean and rare	Roasted	3 00
Beef steak	Broiled	3 00
Pork, recently salted	Stewed	3 00
Fresh mutton	Boiled	3 00
Soup beans	"	3 00
Soup, chicken	Boiled	3 00
Apple dumpling	"	3 00
Fresh oysters	Roasted	3 15
Pork steak	Broiled	3 15
Fresh mutton	Roasted	3 15
Corn bread	Baked	3 15
Carrots	Boiled	3 15
Fresh sausage	Broiled	3 20
Fresh flounder	Fried	3 30
Fresh catfish	"	3 30
Fresh oysters	Stewed	3 30
Butter	Melted	3 30
Old strong cheese	Raw	3 30
Mutton soup	Boiled	3 30
Oyster soup	"	3 30
Fresh wheat bread	Baked	3 30
Flat turnips	Boiled	3 30
Irish potatoes	"	3 30
Fresh Eggs	Hard boiled	3 30
"	Fried	3 30
Green corn and beans	Boiled	3 45
Beets	"	3 45
Fresh lean beef	Fried	4 00
Fresh veal	Broiled	4 00
Domestic fowls	Roasted	4 00
Ducks	"	4 00
Beef soup, vegetables and bread	Boiled	4 00
Pork, recently salted	"	4 30
Fresh veal	Fried	4 30
Cabbage with vinegar	Boiled	4 30
Pork, fat and lean	Roasted	5 30

Food should pass into the stomach in a finely divided state. The rapidity with which the digestion is performed depends upon various circumstances. Strong emotion, as anger or grief, will retard it; moderate exercise hastens it, and thus the state both of body and mind influence it. A usual meal is generally digested in a healthy person in from 3 to 5 hours. A mixture of food is not especially objectionable, except as by variety it encourages the appetite, and often leads us to consume more than is needful. Animal food is digested more quickly than vegetable, and solid food more speedily than soups. Oily food is more quickly appropriated by the system than muscular fibre, when agreeing with the stomach. Uncooked oil is more digestible than cooked. Cream and butter are the purest of oils. Boiled meats are most digestible, roasted next, broiled and fried the least so. Bulk is necessary to digestion. The people of cold climates who live much on fats, mix crude matters, sometimes even sawdust, with them, and thus find them more readily digested. Milk is among the most nutritious and digestible of foods. With the same exercise, we need richer food in cold weather than in warm. Never eat between meals, unless extra exertion or exposure require it, and then select hearty and quickly digestible food. The stools from vegetable food are more copious than from meats, because vegetable is less nutritious than animal food, and more of it is therefore rejected. As a rule, ripe fruits or vegetables are more digestible than green, and green fruit stewed more digestible than when eaten in a raw state. Smoked meats are less digestible than fresh, and of smoked or salted meats, the inner portion is more easily digested than the outer part. Dried fruits, as prunes, raisins, apples, etc., are unfit to eat unless well cooked, and all unbroken seeds are indigestible. Alcoholic stimuli, or condiments of any kind, are not necessary in healthy conditions of the stomach.

FOOD, Entire Wheat Flour as.—The bread in common use is 40 per cent. deficient in sustaining qualities. Children fed on white bread are very liable to suffer from rickety bones, consumption and bad teeth, because their food does not nourish them properly. The systems of milling pursued fail to conserve the best food constituents of wheat. White flours are impoverished by being whitened through so much sifting and bolting; and coarse flours, known as Graham, are more or less injured, imperfectly prepared, and so mingled with waste matters as to do serious injury to delicate stomachs and intestines. The true food flour must contain all that the choicest wheat contains of food substance, and must be freed from the outer irritating particles. The grains or kernels of different varieties of wheat vary from each other slightly in form, but are in general irregularly oblong oval, having a deep groove extending from end to end on one side, and at the smaller end of the berry is a brush of vegetable hairs (Fig. 1). At the other end, on the opposite side of the berry, under an irregularly-

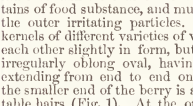


Fig. 1.

curved surface-layer of bran, technically called the *shield*, is the *embryo* or *germ* (Fig. 2). Pass a knife through the berry, midway between the two ends and perpendicularly to the axis, and there will be presented a section, which, under the microscope, will show an exterior envelope of several layers; an interior envelope, consisting of cells and their contents of gluten and phosphates, constituting the most nutritious portion of

Fig. 2.

the berry; and a mass of white, consisting of loose, cellular tissue supporting a vast body of starch granules, with clusters of cells of albuminoid matter extending to the heart of the berry (Fig. 3). Moisten the grains with water, and

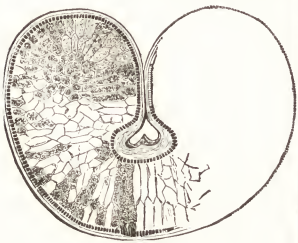


Fig. 3.

rub them between the folds of a rough cloth, and thus detach the outer covering, composed of two layers, constituting about 3.5 per cent. by weight of the plump unbranned berry (Fig. 4). To these layers are attached the vegetable hairs or beard and the shield covering the embryo.

Fig. 4.

The berry, thus hulled, treat with a solution of alum, and then with weak acetic acid; open it with a sharp knife along the curved surface on the side opposite the groove; digest with warm water and subject to gentle pressure; the starch and imbedded albuminoid bodies may thus be wholly separated, leaving a layer of cells containing gluten and phosphates, constituting a

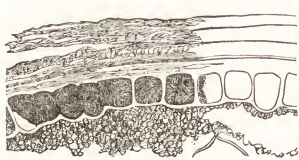


Fig. 5.

Transverse Section of a Scale of Millers' Bran, Magnified to 150 Diameters, part being left in outline only.

part of the inner bran coat. These inner bran coats then free from the gluten by maceration and gentle pressure. They consist of a honeycomb framework of cellular tissue from which the cells of gluten and phosphates have been removed, and the outside layers of envelope not separated with the rough cloth. Ordinarily, millers' bran includes all these coats, and also carries with them the layer of gluten sacs in addition, and traces of adhering white flour (Fig. 5). Fig. 6 gives in one illustration a complete and comprehensive idea of the structure of a grain of wheat, and the relative positions of the various parts comprising it.

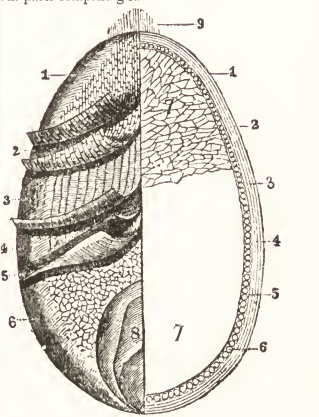


Fig. 6.

1. The *epicarp*, or outer coat of longitudinal cells.—2. The *mesocarp*, or inner coat of longitudinal cells.—3. The *endocarp*, or coat of transfer cells—the cigar coat.—4. *Episperm*, testa, outer seed coat, or color coat.—5. *Tegmen*, inner seed coat, or gluten comb coat, consisting of a layer of obliterated cells.—6. Layer of gluten sacs, or *perisperm*.—7. Interior mass of white, consisting of irregular cells containing starch and albuminoid bodies,—the *endosperm*.—8. *Embryo*, or *germ*.—9. Vegetable *hairs* or *beard*. 1, 2, 3 and 9 constitute the outer husk and fibrous beard. 4, 5, 6 and 8 constitute that portion of the wheat wherein resides nearly all the mineral elements existing in wheat. 7 represents the starch cells, and constitutes nearly seven-tenths of the entire berry.

It will be understood from the above why white flour is the only impoverished food on the diet list. To those who seek a flour possessing the requisites here shown, the "Entire Wheat Flour" of the Franklin Mills, of Appleton, Wis., is recommended.

FOOD, Nutritive Power of. — Physiologists have divided food into two classes: 1. Those containing elements for repairs of the tissue.—2. Those that produce heat. The first class are called nitrogenous, being made up of the elements carbon, nitrogen, hydrogen and oxygen; the second class contains only carbon, hydrogen and oxygen, and are called the non-

nitrogenous. Both of these are present in the animal and vegetable kingdoms. Besides these, phosphates and other salts are present, and assist principally in the maintenance of brain and nervous tissue. Water has no active properties, but only by its presence moistens the tissues, reduces solids to liquids, so that they may be easily carried from one part to another; it also regulates the temperature of the body. The following is a table of the most important articles of diet, in their natural state, showing their comparative usefulness as flesh-repairing or heat-giving (for their digestibility, see *Digestion*):

ARTICLES.	Materials for Muscles.	Heaters or Carbonates.	Fuel for the Nervous System.	Water.	Waste
Wheat	14.6	66.4	1.6	14.0	3.4
Barley	12.8	52.1	4.2	14.0	16.9
Oats	17.0	50.8	3.0	13.6	16.9
Northern corn	13.3	67.5	1.1	14.0	5.1
Southern corn	34.6	39.2	4.1	14.0	8.1
Buckwheat	8.6	53.0	1.8	14.2	22.4
Rye	6.5	75.2	0.5	13.5	4.3
Beans	24.0	40.0	3.5	14.8	17.7
Peas	23.4	41.0	2.5	14.1	19.0
Lentils	26.0	39.0	1.5	14.0	19.5
Rice	5.1	82.0	0.5	9.0	3.4
Potatoes	1.4	15.8	0.9	74.8	7.1
Sweet potatoes	1.5	21.8	2.9	67.5	6.3
Parsnips	2.1	14.5	1.0	79.4	3.0
Turnips	1.2	4.0	0.5	90.4	3.9
Carrots	1.1	12.2	1.0	82.5	3.2
Cabbage	1.2	6.2	0.8	91.3	0.5
Cauliflower	3.6	4.6	1.0	90.0	0.8
Cucumbers	0.1	1.7	0.5	97.1	0.6
Milk of cow	5.0	8.0	1.0	86.0	
Human milk	3.0	7.0	0.5	89.5	
Veal	17.7	14.3	2.3	65.7	
Beef	19.0	14.0	2.0	65.0	
Lamb	19.6	14.3	2.2	63.9	
Mutton	21.0	14.0	2.0	63.0	
Pork	17.5	16.0	2.2	64.3	
Chicken	21.6	1.9	2.8	73.7	
Codfish	16.5	1.0	2.5	80.0	
Trout	16.9	0.8	4.3	78.0	
Smelt	17.0	very little	3 or 6	75.0	
Salmon	20.0	some fat	6 or 7	74.0	
Eels	17.0	some fat	3 or 4	75.0	
Herring	18.0	some fat	4 or 5	75.0	
Halibut	18.0	some fat	3 or 5	74.0	
Oysters	12.6		0.2	87.2	
Clam	12.0	very little	2 or 3		
Lobster	14.0	very little	5 or 7	79.0	
Eggs, white of	13.0		2.8	84.2	
Eggs, yolk of	16.9	29.8	2.0	51.3	
Butter		100.0			
Artichoke	1.9	19.0	1.8	76.6	0.7
Asparagus	0.6	5.4	0.4	93.6	
Bacon	8.4	62.5	0.5	28.6	
Carp	18.0	0.8	2.9	78.3	
Cheese	30.8	28.0	4.7	36.5	
Cherries	0.6	21.0	1.0	76.3	1.1
Chocolate	8.8	88.0	1.8		1.4
Cream	3.5	4.5		92.0	
Currants	0.9	6.8	0.3	81.3	10.7
Dates, fresh		73.7		24.0	2.3
Figs	5.0	57.9	3.4	18.7	15.0
Ham	35.0	32.0	4.4	28.0	
Horseradish	0.1	4.8	1.0	78.2	16.0
Kidney	21.2	0.9	1.4	76.5	
Lard		100.0			
Liver	26.3	3.9	1.2	68.6	
Onions	0.5	5.2	0.2	93.8	
Pearl Barley	0.7	78.0	0.2	9.5	7.6
Pears	0.1	9.6		86.4	3.9
Pigeon	23.0	1.9	2.7	72.4	
Prunes	3.9	75.6	4.5	13.0	
Radishes	1.2	7.4	1.0	89.1	1.3
Suet		100.0			
Venison	20.4	8.0	2.8	68.8	
Vermicelli	47.5	38.0	1.7	12.8	
Whey		4.6	0.7	94.7	

It is easy to see, from the above table, that many of the articles of diet contain an excess of heat-producing elements, and *vice versa*. From these facts it will be plain that a mixed diet is the best.

HEADS. Jaded. — These are caused by overwork and want of exercise. Man has it in every rank of life; but it is chiefly found among persons of sedentary pursuits and among both sexes and almost all ages above fourteen. Generally the first symptom of the malady is discomfort during headwork in the back of the head and in the upper part of the spinal region. Meet this symptom with rest, and seek in sunlight and fresh air some fresh investment for the nervous system, and drop every habit that does not do you positive good. Alcohol and all sleep-producing drugs are dangerous in the highest degree; for they mask the malady, without curing.

HEATED BODY, To Cool. — During very hot weather, keep cool. Just before retiring take a cool bath, after which don the night dress without drying the body, and lie down. The result is much like that produced by sprinkling water on the floor in the evening. The water absorbs the heat, and as it evaporates throws the heat off with it, leaving the body dry and cool. If the bath is not convenient, sprinkle the bed with water. If both can be done, it is better. Avoid heating food. Do not increase the physical temperature, by alcoholic beverages. Sleep regularly; resist the temptation to sit up late because the evening is cool.

HEREDITY. — The great Froebel's motto was: "Let us live for our children." In health of body, as well as of morals and mind, every parent should recognize this as a solemn duty. Alcoholism bequeathes epilepsy and kindred disorders, and these in turn hand down a new apetite for drink. Mothers and fathers should reform, for the sake of their children, who will not reform after them. If the parents are intemperate, their posterity will die either in the insane asylum, of convulsions, of consumption, of intemperance, with St. Vitus' dance, or by suicide. Parents owe it to their children to bequeath to them healthy bodies and minds, and this can only be done by themselves from the first observing the laws of health.

HOMESTEAD, To Keep Healthy. — A healthy house makes healthy people. It should be dry, warm, airy, and free from smoky chimneys. To be dry it must be well drained and should be free from dense, overshading foliage. Do not scour the floors too often, for fear of dampness. It is not necessary to sleep in a cold room to get fresh air. The cold air of the external atmosphere should be made to enter the room in such a manner that it is thoroughly warmed. (See *Ventilation.*) Let plenty of light into the room. Throw open the blinds and draw aside the curtains. Pale cheeks, touched by sunlight, will acquire a deeper hue. Look well to the cellars. In too many cellars will be found rotten apples, cabbages, turnips, onions, etc. In some will be found old brine, with pieces of decayed meat, sending forth an odor, when the cover of the barrel is taken off, which is vile enough to wrench the stomach of a pig. In others there will be musty cider-barrels, possibly vinegar-casks, in which the vinegar has passed on to the putrefactive stage, disseminating the spores of decay and death. Decaying wood generates

one of the most subtle poisons, because the odor is not particularly offensive. Rotten timbers in the cellars and moldy wood or chips in the wood-house fill the air with spores, which, inhaled by one whose blood is low, may generate disease. Under the cider and vinegar barrels, and around potato bins, may often be found old timbers and boards that are full of dry rot, ready to propagate itself wherever the rotten particles may find a lodgment. In the well, also, rotten wood is a subtle poison, more dangerous than a decomposing toad, as the latter makes his presence known, while few tastes are so keen as to detect the presence of decaying wood. Probably the most prolific source of disease around the house is the cesspool into which pass the kitchen and chamber slops. In the cities and large villages these are carried off in the sewers, but seldom does a farm-house have any system of sewerage. The slops are too often thrown out of the kitchen door and left to generate vile odors on the surface of the ground. To keep the air of the cellar and around the house pure and sweet, resort to a free sprinkling, as occasion may demand, of dry, air-slacked lime. (See *Disinfectants.*)

LIGHT. — Daylight exercises considerable influence upon both animal and vegetable life, and also upon a good many inanimate substances. Upon those endowed with life, the effects are of the highest importance. The effect upon animal life may not be so apparent, but it should claim our attention. Its hygienic importance should be more studied than it generally is in the building of our houses. Apartments exposed to the full action of the sun may be less comfortable in hot weather than those from which the sun's rays are excluded, but they are more wholesome. It is the increased intensity of the sunlight in southern climes, independently of their greater warmth, that makes them so beneficial to many invalids. The little sunlight that finds its way into the narrow courts and alleys of great cities is partly the cause of the stunted growth and pale faces of children living there. When the outer skin is tanned, the sympathetic influence is felt also by the connecting mucous membranes lining every part of the body, and stomach and bowel derangements are less liable to occur. The inner as well as the outer skin is toughened. This shows the beneficial influence of light and fresh air in the summer complaints of children.

LONGEVITY.—The following table exhibits recent mortality statistics, showing the average duration of life among persons of various classes.

EMPLOYMENT.	YRS.	EMPLOYMENT.	YRS.
Men unemployed	68	Masons	48
Judges	65	Traders	46
Farmers	64	Tailors	44
Bank Officers	64	Jewellers	44
Coopers	58	Manufacturers	43
Public Officers	57	Bakers	43
Clergymen	56	Painters	43
Shipwrights	55	Shoemakers	43
Hatters	54	Mechanics	43
Lawyers	54	Editors	40
Rope Makers	54	Musicians	39
Blacksmiths	51	Printers	38
Merchants	51	Machinists	36
Calico Printers	51	Teachers	34
Physicians	51	Clerks	34
Butchers	50	Operatives	32
Carpenters	49		

By these figures it will be easily seen how tranquility or a quiet life affect longevity. All other things being equal, the phlegmatic man will live longer than the sanguine, nervous person, who burns out rapidly with borrowed worries. It is also known that women live longer than men. Marriage is favorable to longevity. Married men, from 25 to 30 years of age, die at the rate of 6; unmarried, at the rate of 10; and widowers at the rate of 22, per 1,000 per annum. Maids from 30 to 35 years of age, die at the rate of 11, and married women at the rate of 9, per 1,000, per annum.

MILK is an article of diet which all persons may use, under nearly all conditions. A person who is sick may take milk with the greatest possible advantage, because it contains, in the form of assimilation, all the elements essential for maintaining nutrition. It should be taken slowly in mouthfuls, never in draughts like other fluids. It should not be taken after other food, as it will be almost sure to burden the stomach. The minimum quantity required for the preservation of health, is 5 qts. per diem to a family of ten, and not less than 1 qt. daily to each child. If this, or anything approaching this, were the rule instead of the exception, the disease of rickets, in its manifold phases, would be completely banished from this country, and a much higher standard of health and robustness would unquestionably prevail.

MOUTH, Must be Kept Closed. — The peculiar arrangement of the narrowed and branched and delicately furnished nasal passages are specially suited to strain the air and to warm it before it enters the lungs. The foul air and sickening effluvia which one meets in a day's travel through the crowded city are breathed with greater impunity through the nose than through the mouth. Raw air, inhaled through the mouth, induces hoarseness, coughs, etc. No one who has been snoring through the night feels properly refreshed in the morning. Keep the mouth shut when reading silently, when writing, when listening, when in pain, when walking or riding, when angry, and when asleep.

PLANTS, Healthy Influence of.—House plants may properly be classed as therapeutic agents. They do not give off sufficient carbonic acid at night to become injurious. Every house mother can keep the air of winter rooms moist by having thrifty plants in them, and there is reason to believe that the lives of many persons who die from pulmonary complaints might be preserved by this agency at once so agreeable and so salutary. Certain selections of plants might be made as would exhale healing balsamic particles as odors.

SLEEP.—Rest is not less a luxury after exercise, than exercise is after rest. Both are essential for the continued enjoyment of health and happiness. The cure of sleeplessness requires a clean, good bed, sufficient exercise to produce weariness, pleasant occupation, good air, and not too warm a room, a clear conscience, and avoidance of stimulants, narcotics, and over-eating. We say *over*-eating; for it is a popular mistake that sleep after a full meal is unrefreshing. Every

animal seeks sleep immediately after eating, but man. An after-dinner nap is nature's own prescription. The best possible thing for a man to do when he feels too weak to carry anything through, is to go to bed and sleep as long as he can. Those who think most, who do most brain work, require most sleep. Time saved from necessary sleep is destructive to mind, body and estate. Extremes in sleep and early rising should both be avoided. To prolong the night into the day will bring on physical and mental stupor. It is a mistaken idea that children should lie and steam in bed every morning until disquieted nature forces them out. There is nothing that will so derange the nervous system of a person who is eliminative in nervous force as to lie all night in bed with a person who is absorbent in nervous force. The absorber will go to sleep and rest all night, while the eliminator will be tumbling and tossing, nervous and restless, and wake up in the morning fretful and peevish, fault-finding and discouraged. The feet should be warm and the head cool in order that sound sleep may be secured. A good sleep inducer is to sponge the whole length of the spine for 10 or 15 minutes before retiring.

VACCINATION.—If not well done, it had better be left undone. Good, fresh virus from a sound, healthy cow, only, should be used. The quills should be split; the skin where the virus is applied should be abraded or scratched with the sharp end of the piece of the quill until it barely oozes, not until it bleeds, and then after dampening the virus, or the other end of the quill, apply it. Following these directions does away entirely with the use of a lancet, and, a separate piece of quill being used for each individual, there is no danger of carrying diseased blood from one person to another.

VENTILATION.—Both from our lungs and from the seven millions of pores of the skin, carbonic acid and other impurities are being constantly thrown off; and it is to remove these and supply fresh air that ventilation is necessary. In the absence of other means for ventilation, the upper sash of a window should be kept constantly lowered say ½ to 1 inch in winter, and 4 to 6 inches in summer. In cold weather, in winter, we should rather increase the heat in the room than shut out the fresh air. There is no greater mistake than to suppose that air is pure simply because it is cold. The atmosphere can be tested for the presence of carbonic acid. It feebly reddens litmus paper, extinguishes the flame of a burning taper, and forms a white precipitate in aqueous solutions of lime and baryta, which is soluble in acetic acid. A lighted candle is generally used to test an atmosphere suspected to contain carbonic acid; but it is found that air that will support combustion will contain sufficient of this gas to cause insensibility. The following plan for ventilation is both simple and convenient: Prepare a piece of wood, 1 in. thick and 3 in. high and the exact length of the breadth of the window. Let the sash be now raised, the slip of wood placed on the sill, and the sash drawn closely upon it. If the slip has been well fitted, there will be no draft at that part; but the top of the lower sash will overlap the bottom of the upper one, and between the two bars perpendicular currents of air, not felt as draft, will enter and leave the room. Every closet in daily use in which the night clothes are hung by day and the day clothes by night, should have an airing as well as the bed. If the closet can be large enough to admit of a window—and it is in some cases—an ample provision for sunlight and a circulation of pure air is provided in the window, which should be left open for a short time each day. Another way to ventilate a room is thus: Make a hole through the room to the outer air, in a corner just above the skirting; through the hole put one arm of a tube 3 in. in diameter, and bent at right angles. The arm of the tube reaching to the outer air should be in length equal to the thickness of the wall, and the other arm should be two feet long, standing vertically in the corner of the room; if desired it can be covered with paper of the same pattern as that on the wall. A tube of the diameter given above is sufficient to ventilate a room of moderate size.

Easy Ventilator.

WATER.—Water is valuable to dilute the blood, to cleanse the blood of impurities within and without, and as the most efficient means of applying heat and cold in various forms of baths. Nothing relieves thirst like it. Nothing will regulate the temperature of a fever patient so effectually as water applied in the form of a cool pack. In relieving the coma of narcotic poisoning, apoplexy, sun-stroke, and lightning stroke, cold affusion is more potent than all other remedies combined. Water kept in the room awhile absorbs impurities, becomes unfit for use, and should often be renewed whether it has become warm or not. The water in a pump stock should all be pumped out in the morning before using. That which has stood over night is not fit for cooking. Impure water is quite as injurious to health as impure air. To purify water, see *Cisterns* and *Filters*. Hardness of water is caused by the suspension of lime-salts in it. These salts decompose the soap used in washing, causing it to become flaky and destroying its cleansing properties. An excessive quantity of lime-salts in water renders it decidedly objectionable for drinking as well as other purposes; but recent investigations would appear to show that in moderate quantities it is rather desirable than otherwise.

MEDICINE.

REMARKS ON DIAGNOSIS.—The expression of countenance, discharges from the body, pains, the pulse, breathing, and the tongue, are all indices of what is occurring in distant parts of the body, and afford valuable assistance to the physician in many obscure and complicated cases; features contracted, anxious expression, difficulty of breathing, and rapid dilatation of the nostrils, indicate acute inflammation of the lungs; features pointed, with expression of anxiety, brows knit, countenance pale, lips dry and bluish indicate pain and inflammation of the abdominal viscera; face flushed, wild expression of countenance, eyes red and sparkling, pupils contracted or dilated, great sensibility to light, squinting, twitching of the eyelids and muscles of the face, indicate inflammation of the brain; face flushed and swollen, lips blue, eyes prominent, anxious expression, sudden startings in sleep, indicate organic disease of the heart; cheeks pale and blanched, lips white and puffy, dark circle around the eyelids, languid expression, indicate chlorosis, or green sickness; pale, delicate complexion, puffiness of upper lip, with margins of a carnation tint, indicate scrofula; deep yellow complexion indicates jaundice, or derangement of the liver; squinting, or distorted eyes are ominous of dropsy of the brain; very light, or clay-colored stools evince a lack of bile; very dark evacuations denote an exuberance of bile; green discharges (of infants) denote acidity of the stomach; glairy, dark-green evacuations, like chopped spinach, are characteristic of dropsy of the brain; bloody, mucous stools, accompanied by straining, indicate intestinal inflammation; hard, dry stools indicate a relaxed and torpid state of the mucous membrane of the bowels; a healthy male adult excretes about 2½ pts. of urine in 24 hours; it is of a pale amber or straw color, remaining clear after standing, and precipitating no sediment, but having a peculiar ammoniacal smell; red scanty urine denotes inflammation; urine is clear, limpid, and abundant in nervous affections; urine depositing a sediment indicates biliary derangement; urine turning milky soon after being emitted (especially in children), denotes the presence of worms in the intestines; the pulse of a healthy, adult person beats from 70 to 75 times per minute; but some persons enjoy good health with a pulse at 50, and even lower; others are apparently as well whose pulse is at 90; the pulse varies at different periods of life; in infancy and childhood it ranges from 100 to 120 beats per minute, while in old age it is diminished, and rates at 60 or 70 per minute; a quick, full, bounding pulse indicates inflammation, or fever of an acute, inflammatory character; a sluggish, full pulse evinces a want of nervous energy; a slow pulse, if not habitual, may indicate debility, or tendency of the blood to the head; a changeable pulse indicates nervous derangement, and sometimes organic disease of the heart; a fine, scarcely perceptible pulse denotes great exhaustion and approaching death; sharp, darting pains, ceasing and returning at intervals, indicate neuralgia; tearing, throbbing, and aching pains, aggravated by contact, pressure, or movement, indicate inflammatory action; stitching, or pricking pains, indicate determination of blood to a part; sudden suspension of pain where there is acute inflammation, is ominous of mortification; sudden, rapid, jerking movements of the head and limbs indicate cerebral irritation, *mania à potu*, and some forms of insanity; pain in healthy structures often indicates disease in a remote part; for example, pain in the knee indicates disease of the hip joint, and pain in the right shoulder and arm is often the result of a diseased liver; short, hurried breathing, using principally the abdominal muscles, indicates inflammation of the lungs; using the muscles of the chest alone in breathing indicates abdominal inflammation; irregular breathing, with snoring respiration, indicates compression of the brain, or the effects of poisoning by opium; wheezing, short, panting, anxious respiration, with constriction of the top of the windpipe, indicates asthma; cough, with expectoration of thick, dirty-yellow or greenish sputa, which sinks in water, indicates disorganization of the lungs; cough, with expectoration of tough, white mucus, indicates chronic bronchitis; painful cough, with rust-colored or bloody expectoration, indicates inflammation of the lungs; a thick, dirty-white coating on the tongue indicates gastric derangement; a thick, yellow coating on the tongue, with bitter taste, indicates biliary derangement; a thick, white coating on the tongue, with red papillæ appearing through the fur, indicates scarlet fever; a clean, smooth, bright-red tongue indicates inflammation of the gastric or intestinal mucous membrane; a blackish, dry, furred, and tremulous tongue indicates abdominal or putrid typhus; a sharp, pointed, tremulous tongue indicates irritation and inflammation of the brain, often met with in habitual drunkards; a swollen tongue, coated white, indented or notched on the edges, indicates derangement of the nerves and lining membrane of the stomach; met with in gastric fevers.

ADMINISTRATION OF DOSES.—In measuring doses, it is convenient to have a graduated measuring glass, such as druggists use. Graduated medicine glasses are also sold. In the absence of either, the following guides are useful: 1 tumbler contains about 8 oz.; 1 teacup, 1 gill or 4 oz.; 1 wineglass, 2 oz.; 1 tablespoon, ½ oz.; 1 dessertspoon, 2 dr.; 1 teaspoon, 1 dr.; 1 teaspoon, 60 drops. Physicians' hand-books and some medical treatises give "dose-tables" showing the quantities that may be desirably and safely given of each drug prescribed. But as in this work the dose is nearly always stated with each prescription, besides being particularly stated throughout its department of MATERIA MEDICA and PHARMACEUTICAL CHEMISTRY, such a table would be superfluous here. In administering medicines, the dose must be adapted to

the age, sex, temperament, constitutional vigor

Medicine Spoon.

and peculiarities of the individual. In regard to age, a child 1 year old will generally bear 1-12 of the dose for an adult; afterwards the dose for children should be in proportion to that of the adult as the age of the child to his age increased by 12; thus, for a child 2 years old, it will be 1-7 of an adult dose; for 3 years old, 1-5; for 7 years old, 7-19, or a trifle more than ¼; i. e., the dose is very easily calculated by taking the age for the numerator, and the age plus 12 for the denominator. This rule applies to children under 12; at 12 a person is supposed to bear nearly as much medicine as an adult. A little common sense discretion must of course be used here; and indeed, on this whole subject; for the same rule will not apply to all medicines: calomel, for instance, is better borne by children than by adults, while the contrary is true of opium.

Medicine Glass.

Medicine Dropper.

ACNE.—This eruptive disease of the skin chiefly attacks the face and forehead, having its origin in the sebaceous follicles which secrete the oily matter that lubricates the surface of the skin. Youths at the age of puberty are very subject to it, and it sometimes continues later in life. The retained secretions inflame the skin, giving rise to small, red pimples, in some of which matter forms. The end of a pimple, when blackened by dust and smoke, resembles the head of a worm. When there are many such pimples, it is called spotted acne. *Treatment*: Take sulphur, cream of tartar, of each, 1 oz.; enough syrup or molasses to make a paste; take a dessert spoonful night and morning before eating, until the bowels are affected, and an odor of sulphur is perceived from the skin. A teaspoonful of Epsom salts every morning, or of Husband's magnesia, with like frequency, may have an equally favorable result. Bathe the face frequently with hot saleratus water, 1 dr. of saleratus to the pint of water, and often give it a thorough washing, using only refined soap, with hot water. Cultivate as much as possible the general health; and take three times a day a dessert spoonful of the following tonic: Corrosive sublimate, 1 gr.; iodide of potassium, 2 dr.; water, 3 fl. oz.; mix.

ADDISON'S DISEASE, or BRONZED SKIN DISEASE.—This is a peculiar form of anemia, which Dr. Thomas Addison, of London, in 1855, discovered to be almost always associated with disease of the supra-renal capsules, two flat, triangular bodies, which cover the upper part of the kidneys, and whose physiological use is not known. The skin becomes of a dark, smoky appearance, in some cases causing the patient to very closely resemble a mulatto. It is very fatal, and no successful treatment has been discovered.

ALCOHOLISM.—This term includes, 1. Intoxication; 2. Dipsomania, or the acute alcoholism of delirium tremens; and 3. The state of chronic inebriety. *Treatment*: In a case of intoxication empty the stomach with an emetic of 20 gr. of ipecac, or, if that is not at hand, with a large spoonful of mustard. Apply cold water to the head, but keep the feet and body warm; mustard plasters to the feet and pit of the stomach are useful. As soon as the patient can drink, give strong, hot coffee, without milk or sugar, in tablespoonful doses, every 5 minutes. Give iced milk for nourishment; and as a tonic, 3 times a day, tinct. nux vomica, 10 drops, mixed with 1 dr. each of comp. tinct. of gentian, and comp. tinct. of colombo. In delirium tremens, the first thing is to secure quiet and sleep; and no drug has been more efficient for this object than chloral hydrate, in ½ dr. doses; repeated, if necessary, 2 or 3 times. The bromide of potassium has also succeeded in some cases, 20 gr. every hour, until the nerves are quieted, and the patient rests. The strength must now be supported by nutritious diet of eggs, soups and milk, and by mild stimulants; as 10 drops tinct. of capsicum, or aromatic ammonia in ½ oz. of water every hour. These means, with good nursing, will generally succeed; where they fail, a very rare and moderate allowance of opium and brandy is sometimes permitted. In chronic inebriety most physicians now insist on entire cessation from the use of liquor at the beginning of the treatment; then give 1 fl. dr. tinct. of ginger, or tinct. capsicum, every 3 hours, combined with ½ dr. of bromide of ammonia, or 15 gr. of chloral hydrate as nervines. Sustain also, as much as possible, with generous diet. *Homeopathic*: If the patient lies in a state of stupor, eyes open, stertorous breathing, pupils contracted, give opium; if of a full habit with flushed face, red eyes, dilated pupils, give belladonna; if there is trembling of the limbs and spasmodic twitching of the muscles, give nux vomica. The best remedies for the inclination to drink and the evil effects of habitual drunkenness, are arsenic, nux vomica and sulphur. Administration: Of a solution of 3 drops or 12 globules in 10 teaspoonfuls of water, give 2 teaspoonfuls every 2 or 3 hours in urgent cases; but in milder forms of the disease, a dose 2 or 3 times a day will be sufficient.

ANEMIA, or POVERTY OF BLOOD.—In this disease the patient becomes pale and weak, and the blood watery and more than usually destitute of red globules. *Treatment*: Foster the patient's strength by diet and tonics, and make the blood richer in iron. Take tinct. of chloride of iron, 1 fl. oz.; sulphate of quinia, 20 gr.;

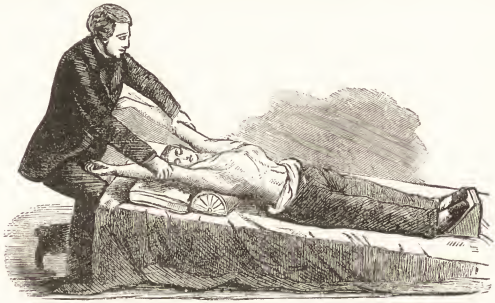
mix, and give 20 drops in sweetened water 3 times a day; sucked through a straw or tube to avoid injury to the teeth. Much also may be accomplished towards recovery by out-of-door gentle exercise and frequent bathing.

ANUS. Fissure of.—A common and very painful affection, especially of middle life, more frequently in females. Neglected constipation and piles are the most frequent causes. The symptoms are, at first, slight smarting or soreness when at stool, which later becomes severe, with intense pain, burning, aching and throbbing, lasting sometimes for hours. The stools are sometimes streaked with blood. *Treatment:* Bathe the part frequently with cold water, or weak lead water; wash thoroughly after every evacuation; anoint with equal parts of benzoated oxide of zinc ointment and belladonna ointment; if the pain is very severe use a suppository of opium and extract of belladonna, ½ gr. of each to 20 gr. of cocoa butter. In obstinate cases it may be necessary to touch the fissure occasionally with nitrate of silver. The bowels should be kept soluble by fruit, dried or mild laxatives, or the daily use of an injection of water or weak soap-suds.

APOPLEXY.—The premonitory symptoms are giddiness, pain and swimming in the head, loss of memory, faltering in speech, diminished sensibility of body or mind, drowsiness, noises in the ears, specks floating before the eyes, frightful dreams, laborious respiration, unrefreshing sleep, sighing without cause, cramp in the legs at night, etc.; then follows sudden suspension or loss of the powers of sense and motion, the heart continuing to beat and the lungs to act, but generally with difficulty; the patient usually lies in a stupor; in some cases there is paralysis of one side of the body, and convulsions of the other; the pulse is hard and full, sometimes feeble, the countenance flushed and bloated, the breathing stertorous, in other cases the skin is cold and the countenance pale. The presence of convulsions is indicative of great danger. The eyelids almost cover the eyes, which are fixed, whilst the pupils scarcely change their dimensions in light or darkness; the lips are usually purple or very dark; the lips and nostrils have generally a slight trembling movement by deep and laborious breathing. *Treatment:* On an attack the patient should be placed in an easy posture, in a well ventilated apartment, and in as erect position as possible; the neckcloth should be removed, and the clothes loosened, and the head and neck laid bare; secure a free exposure to fresh air in every possible way; bleed freely (from 15 to 20 fl. oz. or more) from the arm; if the face be pale, and the pulse feeble, cup at the back of the neck, or leech behind the ears, instead; cold water should be dashed on the head, and ice applied; the legs placed in pretty warm water, and blisters or mustard poultices applied between the shoulders; in the meantime 8 or 10 gr. of calomel may be administered, and its action subsequently promoted by the use of saline purgatives and stimulating clysters; when there is a difficulty of swallowing, a couple of drops of croton oil may be applied to the tongue, or it may be poured on sugar. When the premonitory symptoms are observed, aperient medicines and a light diet should be at once had recourse to; wine, beer, and spirits avoided as the most dangerous poisons. If the symptoms increase or continue, give an active purgative, a still lower diet, and bleed; to calm the circulation and strengthen the system, give one of the following sedatives: 1. Fowler's solution of arsenic, 2 fl. dr.; sulphate of quinia, ½ dr.; aromatic sulphuric acid, 10 drops; anise water, 4 fl. oz.; mix; a teaspoonful every 4 hours.—2. Tinct. of aconite root, 2 fl. dr.; bromide of sodium, 1½ oz.; enough peppermint water to make 4 fl. oz. of the whole; mix; a teaspoonful thrice a day.—3. Acetate of strychnia, 1 gr.; acetic acid, ½ fl. dr.; alcohol, 2 fl. dr.; water, 6 fl. dr.; mix; 10 drops 3 times a day. *Homeopathic:* Head hot, throbbing pulse, and red face, give aconite; eyes red, pupils dilated, tongue palsied and great difficulty in swallowing, give belladonna; sudden falling down with a shriek, loss of consciousness and of speech, foaming at the mouth and constriction of the throat, give hyoscyamus; giddiness, headache, and buzzing in the ears, give nux vomica; decided stupor and insensibility, with slow and laborred breathing, give opium. In administering these doses, dissolve 12 globules or 3 drops of the liquid medicine in ½ tumblerful of water, and give 2 teaspoonfuls every 20 or 30 minutes, in urgent cases. If the patient cannot swallow readily, place 6 or 8 globules on the tongue and allow them to dissolve; as soon as improvement begins, repeat the doses less frequently or discontinue the medicine.

ASPHYXIA.—In the treatment of persons asphyxiated, from whatever cause, the following general rules are to be followed. Treat the patient instantly on the spot in the open air, freely exposing the face, neck and chest to the breeze, except in severe weather, and removing all tight clothing from the neck and chest; clear the throat, by placing the patient gently on the face with one arm under the forehead; all fluids and the tongue itself then fall forward and leave the entrance into the windpipe free; if you place the patient on his back, first draw the tongue forward; keep it projecting beyond the lips by an elastic band over the tongue and under the chin, or a piece of string or tape may be tied around them; or by raising the lower jaw the teeth may be made to retain the tongue in that position; grasp the arms just above the elbows; draw them gently and steadily upward above the head, and keep them stretched upward for two seconds, thus opening the chest; turn down the patient's arms and press them gently and firmly for two seconds against the sides of the chest, thus closing it; repeat the movements alternately, deliberately and perseveringly, until a spontaneous effort to breathe is perceived; immediately on which proceed to rub the limbs upward with firm, grasping pressure and energy, etc.; the friction being continued under a blanket or over dry clothing, which has been substituted, if possible, for the wet; promote the warmth of the body by the application of hot flannels, bottles of hot water, heated bricks, etc., to the pit of the stomach, the

armpits, between the thighs, and to the soles of the feet; from time to time, if necessary to excite inspiration, let the surface of the body be slapped briskly with the hand, and cold water dashed briskly on the surface, previously rubbed dry and warm; if the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room; on the restoration of life a teaspoonful of warm water should be given; then, if the power of swallowing has returned, small quantities of wine, warm brandy and water or coffee should be administered. Avoid the immediate removal of the patient, involving a dangerous loss of time; the use of the bellows or any forcing instrument, and of the warm bath; avoid rough usage, and do not allow the body to remain on the back unless the tongue is secured; under no circumstances hold the body up by the feet or roll it with a barrel; keep off crowds.



Inspiration.

Expiration.

ASTHMA.—A difficulty of breathing, coming by paroxysms, with a wheezing sound, cough and sense of suffocation, and generally terminating with a copious expectoration, usually rather thick and in pellets. The paroxysm may pass in a few minutes, or last for hours. It seems often to be hereditary, and may occur at any age. Men have it more than women. It is brought on by breathing certain vapors, odors, or irritating substances; by powerful emotions; by irritation of the stomach; by indigestible substances, loaded bowels, and irritable conditions of the genital organs; by atmospheric changes, and by certain diseases of the heart and lungs. *Treatment*: First, to relieve the spasm, give ½ to ¾ tea-spoonful each of wine of ipecac and tincture of lobelia, every 15 to 30 minutes, until nausea or expectoration is produced. 20 gr. of chloral with a like amount of bromide of potash or ammonia will often afford prompt re-

lief, as also the hypodermic injection of $\frac{1}{8}$ to $\frac{1}{6}$ gr. of morphia. Smoking tobacco or stramonium sometimes affords immediate ease. Many persons are relieved by breathing the fumes from burning paper that has been soaked in a saturated solution of nitrate of potash. One well-known remedy is to procure the musk-bag of a polecat and prepare an alcoholic tincture. The scent will avert a paroxysm of the disease and ultimately effect a permanent cure. A hot foot-bath, with mustard between the shoulders, may be used to advantage besides. Between the paroxysms avoid all exciting causes. Seek a residence which experience shows to be best adapted to the ease. A light nutritious diet, warm, dry clothing, and regular habits are important. *Homeopathic*: The choice of the remedy must be guided by the patient's constitution and the exciting cause. Ipecacuanha meets the suffocating feeling, and assists expectoration more generally than other drugs; a drop to be taken every hour till improvement sets in; nux vomica when the attack is due to indigestion, and there is furred tongue and constipation; a drop every 2 hours; arsenicum when there is prostration with cold sweats, weak pulse, and if the heart is affected, or the patient is advanced in years; a drop every 2 hours; aconite if the attack has been due to the influence of cold air, or if there is a dry skin and flushed face; antimonium tart. to assist the expectoration when the breathing is less difficult.

ATAXIA.—This affection, the full name of which is *Progressive Locomotor Ataxia*, is a peculiar form of palsy, characterized by diminution of the power of feeling, while the muscular power is retained. The patient can move, but not at will. *Treatment*: It is a very serious disorder, and no method of recovery has yet been discovered; yet the unpleasant symptoms have been greatly relieved by the following: 1. Fl. ext. ergot, 2 fl. oz.; bromide of sodium, 1½ oz.; camphor water, enough to make of the whole 4 fl. oz.; mix; a teaspoonful every 4 hours.—2. Ext. belladonna, 4 gr.; oil of turpentine, 2 fl. dr.; enough cocoa butter to make 12 capsules; mix; 3 capsules daily.—3. Nitrate of silver, 7 gr.; ext. nux vomica, 12 gr.; mix, and make 24 pills; one pill after each meal.

BALDNESS.—It is not uncommon for the hair to fall out during or after severe sickness; but very often between 30 and 40 years of age, without any assignable cause, it commences falling out, and if not arrested, more or less complete, and often permanent baldness results. *Treatment*: 1. As soon as the hair commences to come out, cut it short and bathe the entire scalp regularly in fresh or salt water, or water having in it a small quantity of spirits of ammonia; after rubbing vigorously with the fingers for a few moments, brush well with a moderately stiff brush. If the hair is dry and harsh, rub into it after each bathing a few drops of glycerine, or a mixture of 8 to 10 parts of glycerine with 1 part of tincture of cantharides and a little oil of rosemary, which will be stimulating to the scalp.—2. Muriate of piloearpia in subcutaneous injections, to be administered only by a physician. *Homeopathic*: Where the hair is thin and inclines to fall off, take 2 ounces of bay-rum and 5 drops of tincture of cantharides, mix well, and apply to the roots of the hair with a small sponge every 3 days. If this fails, take 2 drops of oil of bitter almonds and gradually mix with 2 tablespoonsful of melted beef's marrow; of this take a little on the fingers and incorporate into the roots of the hair every 3 days.

BILIOUSNESS.—This disease pertains to the stomach and liver; caused by overeating, which inflicts overwork on the stomach with excessive secretions from the liver; the stomach becomes overwhelmed and indigestion results. *Treatment*: Correct and regulate the diet; give an aloetic, mercurial, or saline aperient; or an emetic followed by a dose of castor oil, Epsom salts, or Seidlitz powder. Take a tumbler of pure cold water on retiring to rest, and another (or even 2) on arising in the morning. *Homeopathic*: Give nux vomica, when there is headach, vomiting of bile, and constipation; mercurius when diarrhea of a scalding character takes the place of the vomiting; aconite when there is feverishness in addition to the above-named symptoms, covered by nux vomica and mercurius; 1-drop doses in a dessertspoonful of water every 3 hours until the symptoms improve, then every four hours.

BOWELS, Bleeding from the.—*Treatment*: Should serious hemorrhage occur, rest and quiet, and cold water poured slowly over the lower portion of the belly, or clothes wet with cold water, or better, with ice water, applied over the belly and thighs, and to the lower end of bowels, will ordinarily arrest it. In some cases it may be necessary to use injections of cold water, or even to put small pieces of ice in the rectum.

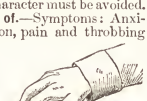
BOWELS, Falling of the.—A protrusion of a portion of bowel, more commonly in children. It sometimes results from violent purgative medicines, or from the straining at stool in diarrhea or dysentery. In children it sometimes results from allowing or encouraging the child to sit long on the chair. *Treatment*: When the bowel is down it should be washed, oiled and gently returned, then bathed freely with cold water. In children a pad and bandage may be necessary to retain it. The bowels should be carefully regulated, and a seat used so high that the feet cannot touch the floor; the hole should be so narrow as not to draw the buttocks apart. Then the bowel cannot be forced down, and a cure will result. In prolapsus, in the adult, a surgeon should be consulted. *Homeopathic*: Ignatia will cure most cases of a recent origin in children, a drop-dose in a spoonful of water 2 or 3 times daily; combined with the replacement of the bowel after evacuation. Calendulated water will relieve irritation of the bowel.

BOWELS, Inflammation of.—This is caused by blows or injuries, neglected constipation, or exposure to wet and cold, and when severe or extensive, is a very serious affection. There are sharp, darting or twisting pains in the bowels, greatly increased by pressure; the muscles of the belly seem drawn tight and the legs drawn up and bent, with fear of moving, lest the pains be increased; the bowels are constipated, with

nausea and vomiting of bile; the pulse quick, sharp and hard, and the urine high colored and scanty. Severe cases require prompt treatment or death may result. *Treatment*: The entire belly must be covered with hot poultices, or hot fomentations (hot hops or camomile infusions), and from ½ to 1 gr. doses of opium, or ½ to ½ gr. of morphia given every hour or two to control the pain. Cathartic medicines must be avoided, perfect quiet enjoined, and nothing but light liquid nourishment allowed. *Homeopathic*: Give aconite in the early stage, when presenting a high inflammatory fever, dry, hot skin, and full, frequent pulse, mouth and tongue dry, with intense thirst, abdomen swollen and tender to touch; (bell. bry.) cutting, burning and tearing pains in the umbilical region, aggravated by the least pressure, great fear and anxiety of mind, with nervous excitability; give arsenicum, usually in the last stage, when there is very rapid and weak pulse, sudden sinking of strength, cold clammy sweat, and great restlessness, intense thirst, drinking often, but little at a time, burning in the abdomen, with cutting and lancinations, worse after eating or drinking, vomiting, especially after eating or drinking, symptoms worse after midnight; give belladonna when there is great heat and tenderness of the abdomen, violent contractive or clutching pains in the bowels. In administration in severe cases, the remedy may be repeated every 1, 2 or 3 hours, according to circumstances; as soon as relief is obtained, give less frequently; 3 drops, or 12 globules in a tumbler ½ full of water, 2 teaspoonfuls at a dose.

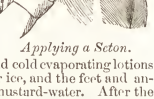
BRAIN, Concussion of.—Caused by blows or falls on the head; by jumping from a height, and sometimes even by slipping off a step. The symptoms are sudden unconsciousness; skin at first pale and cold; pulse small and rapid; later, skin dry and hot; breathing natural or sighing, and pupils contracted, or one may be contracted and the other dilated; when consciousness wholly or partly returns, it is sometimes with vomiting; the pulse becomes stronger; warmth of the body and color of the skin are restored, and, finally, dry, hot skin; intense headache; contracted pupils, and acute inflammation of the brain may result. *Treatment*: If the body is cold, wrap in hot blankets, apply heat to the extremities, and restore warmth and circulation by brisk rubbing; injections of warm brandy and ammonia may be used until reaction is established, when all stimulation must cease, and means be used to control any inflammatory action that may follow. *Homeopathic*: Arnica is the chief remedy to be relied upon, and should be given at the commencement; aconite in high fever, with hot, dry skin, violent thirst, shortness of breath, and great nervous excitability, delirium, especially at night; belladonna, when there is red, sparkling eyes, with furious looks, face red and bloated (also acon.), throbbing headache, great dread of noise or light, they aggravate all his symptoms, sleepy, but cannot sleep; opium, when there is snoring, breathing with eyes half closed, delirious talking, eyes wide open, face purplish and swollen, acuteness of hearing, stools round, hard, black balls. In administration, give 6 or 8 globules dry on the tongue, or dissolve double this quantity in 10 teaspoonfuls of water, and give 1 teaspoonful every 20 or 30 minutes, until relief is obtained; the dose may be repeated every ½ to 2 or 3 hours, until improvement sets in, when it should be given less frequently. The diet should be of the most simple kind; everything of a stimulating character must be avoided.

BRAIN, Inflammation of.—Symptoms: Anxiety, tightness, oppression, pain and throbbing in the head, loss of memory, intolerance of light and sound, a wild, staring expression in the eyes, frightful dreams, great watchfulness, a flushed face, an ungovernable delirium, the skin hot and dry, the tongue, at first red, becomes white and coated, and the pulse hard, sharp and quick, often great irritability of the stomach, and frequent vomiting, while the bowels are obstinately confined, and the urine very scanty and too high colored.

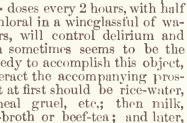


Applying Leeches.

Treatment: Leeches may be applied to the temple, and cut cups to the back of the neck and spine, followed with mustard plasters to the extremities and over the abdomen; in very strong patients, bleed from the arm; the bowels should be moved with a cathartic; the hair should be cut short, and cold evaporating lotions applied to the head, or ice, and the feet and ankles bathed with hot mustard-water. After the intensity of the disease has begun to subside, blister the scalp, and also, as a still more powerful counter-irritant and derivative, a seton of linen or silk, or (the more modern and cleanly one) of rubber, is sometimes inserted in the neck. The bromide of potash in 10 to 20 gr. doses every 2 hours, with half the amount of chloral in a wineglassful of water every 2 hours, will control delirium and mania, but opium sometimes seems to be the only efficient remedy to accomplish this object, and also to counteract the accompanying prostration. The diet at first should be rice-water, toast-water, oatmeal gruel, etc.; then milk, chicken, mutton-broth or beef-tea; and later, more concentrated liquid diet and even alcoholic stimulants may be required.



Applying a Seton.



Seton.

BREAST PANGS (Angina Pectoris).—A sudden pain occurring in the parts covered by the

breast-bone and the throat, accompanied with a feeling of suffocation, and apprehension of death. The pain sometimes extends down the arms and through the back. *Treatment*: Summon a physician without a moment's loss of time; give 1 dr. of ether with ½ gr. of acetate of morphia; apply hot applications to the chest and stomach; likewise friction to the chest, back and sides with spirits; if the relief be only partial, the dose of ether may be repeated after twenty minutes. *Homeopathic*: Give aconite, in case of sharp pain in the region of the heart, going down the left arm (also bryo.); suffocative constriction of the chest, so distressing that the patient sweats from agony, pulse full, strong, throbbing, intense anxiety, with fear of death (also ars.); especially suited to persons of full habit; give arsenicum in great mental anxiety and fear of death, indescribable, agonizing pain in the region of the heart, extending up to the neck and top of the head, oppression and stitches in the heart, with fainting and anguish, when can breathe only when the chest is bent forward (also lach.); the attack is renewed or aggravated by the least motion (also bryo.). In administration, dissolve 12 globules or 3 drops of the liquid in 6 dessert-spoonfuls of water, and give a spoonful at a dose; or 8 globules dry on the tongue; in urgent cases, it may be repeated every 20 or 30 minutes until relief; then less frequently.

BREATH, Fetid.—Scarcely anything is more disgusting. *Treatment*: Various means depend principally on aromatics, which by their odor smother it for a time; but these require continual repetition, and are liable to interfere with digestion. The real cause of stinking breath may generally be traced to a diseased stomach, or to decayed teeth. When the former is the case, mild aperients should be administered; if these do not succeed, an emetic may be given. When rotten teeth are the cause, they should be thoroughly cleansed and then filled; or, if this is impracticable, they should be removed. (See *Dyspepsia*.)

BRONCHITIS.—An inflammation of the mucus lining of the bronchia, or smaller ramifications of the windpipe. In the mild form, it is called a cold on the chest. The symptoms are hoarseness, dry cough and fever, followed by expectoration of mucus, at first thin and afterwards thick; in the severe forms there is oppression at the chest, with more or less wheezing and rattling, and in the outset a sensation of rawness in the upper chest and windpipe; towards night, generally, the symptoms increase, sometimes giving rise to great distress. *Treatment*: A hot mustard foot-bath, with 10 gr. of Dover's powder, or a hot lemonade at bed-time will very often, during the first 24 hours, cut short the attack; a wet towel folded upon the chest and covered with a dry flannel, or a piece of oiled silk, to prevent evaporation and keep the clothing dry, will generally assist much in breaking up the cold; should these means fail or have been neglected, a brisk saline cathartic (a tablespoonful of Epsom salts or citrate of magnesia), should be given, with a few doses of spirits of nitre, 20 to 30 drops, with 3 drops of tinct. aconite in each, if there is much fever, and flax-seed tea or other demulcents, with frequent doses of some simple cough mixture to ease and loosen the cough; in many cases, ¼ to ½ tea-spoonful of syrup of ipecac, with half as much paregoric every 3 hours will be sufficient; or, a tea-spoonful of a mixture of equal parts of syrup of ipecac, syrup of tolu, and mucilage of gum Arabic, with 5 to 8 gr. of bi-carbonate of potash, and ¼ to ½ gr. of morphia to each oz.; should the pain in the chest be very severe, a mustard-plaster or friction with turpentine and sweet oil, with or without a little spirits of hartshorn, will be useful; with children especially, the chest may be covered with a hot poultice. *Homeopathic*: Give aconite at first, in the dry, irritative state, a dose every 2 hours; also during the inflammatory stage either singly or alternately with the aconite; give antimonium tart. when there is much wheezing in the chest, with difficulty of expectoration; a dose every 2 hours; an occasional dose of sulphur at night is of value.

CEREBRO-SPINAL MENINGITIS.—(See *Spotted Fever*.)

CHILBLAINS. — First, insist on the patient wearing large shoes which do not compress the feet; touch the toes with nitrate of silver; liniment of aconite is recommended; an ointment of lard and dry mustard rubbed in before the fire for 20 minutes will cure the trouble after a few applications; paint the affected parts with flexible collodion to protect them from the air; bathing in very hot water is efficacious; a strong solution of acetate of lead, 20 gr. to 1 oz. of water, is highly recommended; sulphurous acid is useful in mild cases; a local application of a thick paste composed of slacked lime, moistened with a very little water and common oil, is recommended as a good remedy; laudanum, taken internally in very small doses, of from 2 drops for young children, night and morning, up to 6 or 8 for adults, will also cure chilblains; anoint the affected part with either of the following formulæ: 1. Tincture of iodine, 1 oz.; Labarraque's solution of chlorinated soda, 2 oz.; mix; dry the foot before the fire.—2. Alcohol, 4 oz.; glycerine, 1 oz.; carbolic acid, 1 sc.; mix and make an ointment; anoint the chilblains thoroughly 2 or 3 times a day. *Homeopathic*: 1 part of mother-tincture of arnica to 8 of soap liniment, tamus communis, cantharides (1 part to 6 parts of camphor liniment), sulphurous acid, agaricus muscarius, may severally be tried before the skin has broken; but when that occurs, calendula lotion or ointment should be applied, using an occasional bread poultice when the irritation is very great; rubbing the feet with snow or ice water, and with a warm towel after, will promote a glow when the skin is unbroken, but is not of universal application.

CHOLERA, Malignant Asiatic.—The attack usually begins with sickness and purging; this discharge, however, is not bilious, as in ordinary cholera, but a thin, colorless fluid, like rice water; at the same time there is great prostration of strength, and cold, clammy sweats. In a short time dreadful cramps assail the extremities and afterwards the abdomen; the

body becomes bent, the limbs twisted, the countenance cadaverous, the pulse almost imperceptible and the eyes sunken; the patient sinks into a state of apathy, and unless a favorable change speedily takes place, soon expires from exhaustion. When there is reaction, the pulse gradually returns, the natural warmth of the body is restored, and the spasms and difficulty of breathing give way. Frequently, however, the reaction is accompanied by fever closely resembling typhus, which often terminates fatally in from 4 to 8 days. *Treatment*: 1. Equal parts of maple sugar and fresh-burnt, powdered charcoal, made into a stiff paste with lard, and divided into pieces the size of a filbert; take one, occasionally, swallowing whole.—2. Sulphuric acid, 3 dr.; nitric acid, 2 dr.; simple syrup, 6 dr.; water enough to make the whole weigh exactly 10 oz.; a single drop of essential oil of lemon may be added; take 1 tablespoonful in water, on the first appearance of the premonitory symptoms; follow by the free use of very cold water; in half an hour a second dose is to be taken.—3. Tincture of camphor, tincture of opium, tincture of rhubarb, compound, of each 1 oz.; mix the tinctures of camphor and opium first, to avoid precipitation, then add the tincture of rhubarb; the adult dose is 20 drops every hour till the patient is relieved. *Homeopathic Preventive*: Camphor, 1 dr.; rectified spirit, 6 dr.; dissolve, and preserve it in a well corked bottle; take 2 drops on a lump of sugar, sucked as a lozenge, 2 or 3 times a day. *Homeopathic Remedy*: As the last, repeating the dose every 10 or 15 minutes, followed by draughts of ice-cold water, until the symptoms abate.

CHOLERA-MORBUS.—The attack generally comes on suddenly and at night. It is characterized by vomiting and purging, spasmodic pain in the bowels, and sometimes cramps in the legs, rapid prostration of strength and coldness of the skin; the matter ejected from the stomach is at first the contents of it, but afterwards mucus and bile; the discharges from the bowels are thin fecal matter, very offensive. It mostly occurs in the heat of summer, and is incited by overloading the stomach, eating inordinately of certain fruits and vegetables, drinking sour, fermented liquors, sudden change of temperature, and checked perspiration. *Treatment*: Until the overloading of the stomach has been relieved by vomiting, give large and repeated draughts of warm water; then check, quiet, and support with opium and brandy; 30 drops of laudanum in a tablespoonful of brandy for an adult every hour until relief is obtained; or a more speedy relief from pain may follow a hypodermic injection of $\frac{1}{4}$ to $\frac{1}{2}$ gr. of sulphate of morphia in solution. *Homeopathic*: Give antimonium when there is violent vomiting and diarrhea, vomiting slime and bile, cramp-like pains in the stomach, tongue coated white, especially suitable after overloading the stomach, or after drinking sour wine; give arsenicum, if the symptoms are severe from the beginning, and attended with rapid prostration of strength, burning in the region of the stomach, (also nux v.), violent thirst, drinking little and often; give ipecacuanha, if nausea and vomiting predominate, stools having the appearance of being fermented, griping, pinching pain in the bowels; give veratrum alb. when there is violent vomiting with severe diarrhea, excessive weakness and cramps in the legs, cold sweat on the forehead, violent pain in the region of the navel, eyes sunken, countenance pale and expressive of acute suffering, pulse small and thread-like. In administration, dissolve 3 drops or 12 globules in a tumbler one-third full of water, and give 2 teaspoonfuls at a dose, or 8 globules may be taken dry on the tongue.

COLDS, To Prevent.—1. Watch for the first symptoms, and when convinced of their presence, exclude the external air from the mucous membrane of the nose by loosely plugging each nostril with a pellet of dry cotton; this will check the cold, and immediately check all irritation and sneezing.—2. As soon as there is an unpleasant sensation of chilliness, keep the room at such a temperature as will prevent this feeling, even if it requires 100° Fahr.; in addition, put the feet in water, half-leg deep, as hot as can be borne, adding hot water from time to time for a quarter of an hour, so that the water shall be hotter when the feet are taken out than when put in; dry them thoroughly and put on warm, thick, woolen stockings, even if it be in summer; for 24 hours eat no food, but drink any kind of warm teas, and at the end of that time, if not sooner, the cold will be effectually broken without any medicine whatever.—3. Sniff the fumes of ammonia or spirits of camphor every few minutes, as strong as can be borne; if the cold continue, take the following mixture: Glycerine, 4 oz.; whisky, 4 oz.; morphine, 1 gr.; 1 or 2 teaspoonfuls every hour till cured.—4. Syrup of squill, 2 oz.; tartarized antimony, 8 gr.; sulphate of morphine, 5 gr.; pulverized gum Arabic, $\frac{1}{4}$ oz.; honey, 1 oz.; water, 1 oz.; mix; for an adult, 1 small teaspoonful; repeat in half an hour, if it does not relieve; child in proportion.—5. The Turkish bath is recommended as a sure cure. (See *Turkish Bath* in HYGIENE.)—6. Peel a few onions, and cut them in very thin slices; place some sugar in the bottom of a bowl, then a layer of onions, cover thickly with sugar, and so on, until the onions are all used; cover the top well with sugar; place a plate over the bowl, and set away until the syrup is formed; take a teaspoonful or two every time the cough is troublesome, and on retiring.—7. Salicin, 20 gr. every 2 hours, has proved a very efficient remedy for colds in some cases.—8. Oxalate of cerium, 10 gr., 3 times a day, is highly recommended.—9. 4 tablespoonfuls of flaxseed, whole; 1 qt. boiling water; sweeten to taste; steep 3 hours in a covered pitcher; if too thick, put in cold water with juice of 2 lemons. *Homeopathic*: Give aconite for the first stage of irritation, in drop doses, repeated every 2 hours, and this may cut short any further symptoms; the same medicine will be called for when feverishness has set in; phosphorus when the windpipe is tender, and the voice hoarse and deep, a drop dose, every 2 or 3 hours; spongia, when the breathing is difficult, with wheezing, and also with tenderness of the windpipe, a drop dose every 2 or 3 hours; give

hepar sulphuris when there is loose and irritative cough, and when the uvula also is relaxed and the cough worse on lying down, a drop dose every 3 or 4 hours; for the chilly stage give camphorated spirits, 1 drop on a piece of sugar, repeated every ½ hour for 4 or 5 doses; for the dry, irritative stage, give aconite in drop doses every 2 hours, especially if the patient has been exposed to the action of cold wind; for the sneezing stage, with watering at the eyes and running at the nose, give mercurius, a drop every 2 hours, when there is no headache or depression; nux vomica when headache and pain over the brows and nose; arsenicum when there is much weakness, and if relaxation of the bowels is also present (a not uncommon accessory of cold in the head), a drop every 2 hours; putting the feet in hot water, drinking warm drinks without alcohol in them, an extra blanket on the bed, will help to drive away a cold. When there is the slightest suspicion of having taken cold, leave off cold bathing and use tepid water instead.

COLIC. — Violent shooting, griping pains, with a sense of twisting around the lower part of the belly; the skin of the belly drawn into knots, obstinate constipation; sometimes nausea and vomiting. *Treatment:* If there is evidence that the pain arises from anything eaten, empty the stomach with an emetic of a large teaspoonful of mustard or common salt, or 30 gr. of ipecac in a bowl of warm water, and to relieve the horrible pain give ½ teaspoonful of laudanum or chloroform in some peppermint water or ginger tea; or give ¼ gr. of sulphate of morphia in the arm by hypodermic injection; apply a large mustard poultice over the entire belly; repeat the laudanum or morphia every hour, till the pain is subdued.

COLIC, Bilious.—The paroxysms are sometimes caused by the passage of stones through the gall duct, and relief is only obtained when these reach the intestines; sometimes they appear to be the result of the irritant action of acrid, unhealthy bile. *Treatment:* The continued use of chloroform or opium, or both, is necessary, with hot fomentations, to relieve the pain; 5 gr. of bicarbonate of soda with ½ gr. of calomel, once in 4 hours, and a large blister over the right abdominal region, may be beneficial where symptoms of inflammation of the bowels set in.

COLIC, Painters'. — Caused by exposure to the poisonous influences of lead; the belly is shrunken and hard, and sometimes the intestines may be felt contracted into knots; the pain is lessened by pressure; there is obstinate constipation; and the suffering is most intense. *Treatment:* The pain should be relieved by full doses of chloroform, or some forms of opium, and mustard poultices and hot fomentations. When an attack comes on suddenly, give a full dose of laudanum, ½ to 1 teaspoonful, with 2 or 3 tablespoonfuls of Epsom salts, in a large tumbler of water, with ½ teaspoonful of dilute sulphuric acid, or of the aromatic acid (elixir of vitriol) added, with large, warm injections and hot fomentations repeated as may be necessary. The iodide of potash will eliminate the lead from the system, and may be used in doses of 5 to 10 gr., 3 or 4 times daily, for this purpose. The regular use of weak sulphuric acid lemonade, ½ to ½ teaspoonful of the acid to 1 pt. of sweetened water, is a preventive; the bowels being kept open by an occasional laxative. *Homœopathic:* If the colic is inflammatory, involving the bladder, give aconite; if there is great sensitiveness and cutting pains, give belladonna; if there is much trouble from wind, give chamomilla; if much nausea, give ipecac; if the nausea is accompanied with drowsiness, give opium. Administration: In violent cases repeat the medicine every 20 or 30 minutes, until relief is obtained; then extend the time to 1, 2 or 3 hours; dissolve 3 drops, or 12 globules in 8 dessertspoonfuls of water, and take 1 spoonful at a dose.

CONSTIPATION applies to that condition of the body in which the bowels act tardily, and in which the discharges are hardened. *Treatment:* When the affection is merely accidental or occasional, a dose of some aperient or cathartic, such as ½ oz. of Epsom salts, or a tablespoonful of castor oil or of the fl. ext. of rhubarb and senna, or 10 gr. of calomel with 2 gr. of podophyllin, is the only treatment necessary; but when it is habitual adopt a diet free from astringents, and consisting of a large portion of green vegetables and ripe fruit; particularly avoid the use of over-cooked, salted, or dried animal food; brown bread may be eaten, as it acts as a gentle laxative, from the bran it contains; the occasional use of aperient and emollient enemata may be had recourse to; the best remedy in habitual constipation is ½ dr. Epsom salts, dissolved in ½ pt. of water, adding 10 drops of elixir of vitriol; take 1 hour before breakfast; the smaller the dose the better it will operate. take until a cure is effected. In the treatment of the constipation of infants, castor oil, ½ teaspoonful occasionally, or manna, ½ to ½ oz., sucked at will, may be given. The introduction into the rectum (very gently), of a little slip of writing paper, parsley stalk, or suet, is a method sometimes adopted successfully by nurses. Friction on the stomach and bowels with a warm hand or a piece of soft flannel, should also be employed. *Homeopathic:* Nux vomica should be taken by those of a dark bilious temperament, who lead a sedentary life and indulge in rich living, when there is headache and nausea, and a sensation as if the bowels were going to act, but refuse to do so; a drop-dose twice or thrice daily; bryonia is adapted for those of a rheumatic habit, when the evacuations are too large, and when there is no inclination for a stool. dose as for nux; sulphur will assist the action of both nux and bryonia, especially when the piles exist; 3 gr. at bed-time, dry on the tongue.

CONSUMPTION.—A leading symptom in the first stage is cough, at first very slight, and only in the morning upon rising, but after a time occurring at times during the day, particularly on taking more than ordinary exercise, but for a considerable time with but little or no expectoration; later, there is pain in the breast, frequent and severe cough, shortness of breath, some increase in the circulation, and occasional spitting

of blood. There may be also hectic fever, chills and fever, with hot, dry hands and flushed cheeks. The paroxysms of coughing become more frequent, the amount of expectoration increases and becomes purulent and often mixed with blood, showing that abcesses have formed, the appetite varies, the flesh becomes softer, the cheeks grow pale and sunken, the eyes brilliant, night sweats become profuse, prostration and diarrhea follow, then death by exhaustion, or sometimes by suffocation or sudden hemorrhage. *Treatment*: Hygienic measures are of chief importance. Consumptives should avoid indoor and sedentary life; they should engage in active, outdoor business, and select a high and dry place of residence; their food should be generous, varied and nutritious, embracing a full allowance of meats; they should clothe warmly and secure abundant and regular rest and sleep; and so far as possible live in the open air and sunlight. Mix cod-liver oil and whisky, of each, 8 oz.; give it 3 times a day to sustain and strengthen the system. To check night sweats, promote the appetite and strengthen the system, give elixir of vitriol, 10 to 30 drops, with 1 or 2 gr. of quinine, 2 or 3 times a day, in some aromatic or sweetened water. Brandy in ½ oz. doses, or 30 drops of laudanum every 2 hours, will relieve the diarrhea. To relieve the pains of the chest, warm it or apply plasters. *Homeopathic*: The hygienic measures are the same as those adopted by the advocates of allopathy. The homeopathic medicines are as follows: Where there is a bright redness of checks, give aconite; if there is a scrofulous habit, with cough at night, short breath, and mucous rattling, give belladonna; if there is short, dry cough, with tickling in the chest, made worse by exercise, give phosphorus; if the cough is only during the recumbent position, going off when sitting up, give pulsatilla; if there is much hoarseness and dryness in the throat, give sulphur. In administration, where the cough and other symptoms are troublesome, repeat the medicine 3 or 4 times a day; but in general once or twice a day will be sufficient; take 8 globules dry on the tongue, or dissolve 12 globules or 3 drops of the liquid in 8 dessert-spoonfuls of water, and take a spoonful as a dose; the food should be of the most wholesome and nutritious quality; rare roast beef, mutton chops, good bread made for the most part of unbolted flour, vegetables and good, ripe fruits; milk is one of the very best articles of diet for a consumptive.

CONSUMPTION, Of the Bowels.—A tubercular disease of the mesenteric glands and of the follicles of the intestines; the belly becomes swollen and hard, the skin dry and harsh, the eyes red, the tongue strawberry colored, the breath foul, the stools clay colored and offensive, sometimes costive, sometimes extremely relaxed. *Treatment*: Animal food and other nutriment should be given in small quantities at short intervals; mild mercurials to amend the intestinal secretions, especially the combination of corrosive sublimate with tincture of bark, as, corrosive sublimate or bichloride of mercury, 1 gr.; tinct. cinchona, 2 fl. oz.; mix; take 1 teaspoonful after each meal; bathe in tepid salt water.

DANDRUFF (Furfura, or Pityriosis Capitis).—Scurf is a natural and healthy formation, and though it may be kept from accumulating, it cannot be entirely prevented. It is produced on every part of the body where hair is found, although, from the more active growth of hair on the scalp, the facilities for collecting, and the contrast of color, it strikes the eye most disagreeably in that situation. It may be removed, and should be removed, every day with the hair-brush; but occasionally an unusual quantity of scurf is produced; the daily use of some mild stimulating or detergent wash, with due attention to the stomach and bowels, will generally abate this annoyance. *Treatment*: 1. Corrosive sublimate, 5 gr.; water, 1 pt.; oil of bergamot, 10 drops; alcohol, 1 oz.; mix; use once a day as a hair-dressing.—2. Sulphur, 1 oz.; water, 1 qt.; mix, and shake every few hours for 1 day; the next morning carefully pour off and bottle the clear liquid, with which saturate the hair every morning for 2 or 3 weeks.—3. A simple but very effective remedy, when systematically adopted, is to rub the scalp briskly and thoroughly every night and morning with the balls of the fingers, loosening all scurf and stimulating the surface to healthy action. But if this (or any other) remedy is neglected or irregularly applied, the dandruff may return. *Homeopathic*: This consists in extreme cleanliness, the frequent use of warm water and soap, attention to diet and keeping the head cool; take every night one of the following: Cal., graph., lyc., sep., or sulph.

DELIRIUM.—A disordered state of mind in connection with fevers, diseases of the brain, etc.; indicated by sleepless mutterings, with a hot, flushed face; unusual brightness and sometimes bloodshot condition of the eyes, and a quick, jerking pulse; there is frequently a meaningless expression of face, picking at the bedclothes, etc. *Treatment*: This must be in harmony with the treatment of the disease with which it occurs. Usually cold applications to the head, and warmth to the extremities, are indicated. If persistent the hair may be cut short, and a mustard plaster or a blister applied to the back of the neck. Should these measures fail, 5 to 10 gr. of bromide of potash, with as much hydrate of chloral, and ½ to ½ gr. of morphia, or 10 drops of laudanum, may be given every 2 hours in sweetened water. In connection with this a teaspoonful of Epsom salts, or a Seidlitz powder should be given to keep the bowels open, and a drop or two of tincture of veratrum or of aconite root, every hour, in a spoonful of water, to relieve any feverishness.

DIABETES, Insipidus, or Polyuria.—In this complaint there is a morbid abundance of urine, the amount passed being largely in excess, when compared with the normal amount in a state of health. *Treatment*: Little can be done by way of treatment beyond an assiduous promotion of the general health; although belladonna has sometimes seemed in a marked degree beneficial; 1. Fl. ext. belladonna, 5 drops 3 times a day.—2. This disease may be much relieved by

a sponge-bath and brisk rubbing of the skin every morning. The increased action of the skin relieves the kidneys so much as to promptly check the secretion of urine.

DIABETES. Saccharine. —The symptoms observed in this generally fatal ailment are the passing of an excessive quantity of pale, straw-colored urine of high specific gravity, containing grape sugar; great thirst and hunger, obstinate dyspepsia, constipation, an unpleasant odor from the body, debility and emaciation; these symptoms vary in intensity according to the course and duration of the disease, which is frequently accompanied with fever, cough, and sometimes carbuncles, and generally ends in consumption or some organic disease. The flow of urine sometimes reaches as much as 8 gals. in 24 hours; the average quantity is 2 gals. *Treatment:* Great attention should be paid to diet, which should consist principally of digestible, broiled or roasted meat, gluten, bran bread, beef or mutton broth; if the thirst is extreme, it is best assuaged by drinking water acidulated with phosphoric acid; spirituous liquors as well as saline aperients should be eschewed; claret is, however, a suitable beverage; give small doses of laudanum, 3 or 4 times a day; the bowels must be regulated by means of mild aperients; warm baths are also of use, as they augment the secretion of the skin. The disease may be kept under by administering from 20 to 40 minims of tincture of perchloride of iron, 3 times a day.

DIARRHEA.—A purging or looseness of the bowels. Among the most common causes are the presence of irritating matter, worms or acidity of the stomach or bowels, and exposure to cold, especially to the feet, or sudden changes of climate or temperature. *Treatment:* In general, administer a mild aperient, rhubarb or castor oil. The dose of the first may be from 20 to 30 gr. in sugar, or made into a bolus; that of the second, from ½ oz. to ½ oz., with a little peppermint water. After the due operation of this medicine, opium, astringents, and absorbents may be taken with advantage, but not in excessive doses; the first and second are indicated when great irritability exists, and the third in cases of acidity. Chalk mixture, to which a few drops of laudanum have been added, or the compound powder of chalk and opium, are excellent medicines, and will generally quiet the bowels. In bilious diarrhea, characterized by the bright, yellowish-brown color of the dejections, 10 gr. of blue pill or calomel, assisted by mild diluents and demulcents and warmth, generally proves efficacious; ½ to 1 gr. opium is also useful in some cases. The diet should be light and non-irritating. Glutinous broths, beef tea and arrow root are among the best articles. To these may be added a little dry toast. Arrow root (genuine), either with or without a spoonful of brandy, will of itself cure ordinary cases, if accompanied with repose. Among external remedies, warm and stimulating fomentations, liniments, etc., to the epigastrium and abdomen, will be found useful. 1 or 2 spoonfuls of laudanum, used as a friction, will allay pain, and in many cases settle the bowels when other remedies have failed. Diarrhea has been very successfully treated by ice-water injections; after each stool inject from 1 pt. to 2 qts. of ice-water, which is allowed to run out again by slight pressure on the abdomen; then inject 1 gill to be retained. Flannel over the region of the bowels, and indeed good thick under-flannels, worn night and day, summer and winter, will assist very greatly in both the prevention and cure of chronic cases. *Homeopathic:* Arsenicum will relieve when there is much griping, very watery stools, and vomiting; china, if there is little pain, great weakness, and no vomiting, and the food passes almost undigested; mercurius when the griping pain is low down in the bowels, the stools green, and the patient strains after an evacuation; drop doses of the medicine chosen every 2 or 3 hours; camphorated spirit is very useful at the outset, when there is coldness of the body, prostration and crampy pains; unless it speedily relieves, it should be discontinued after 3 or 4 doses.

DIPHTHERIA. Precautions with.—Cleanliness in and around the dwelling, and pure air in living and sleeping rooms, are of the utmost importance where any contagious disease is prevailing, as cleanliness tends both to prevent and mitigate it; all filth from cellar to garret, and around the house, should be removed; drains should be put in perfect repair; dirty walls and ceilings should be lime-washed, and every occupied room should be thoroughly ventilated. Apartments which have been occupied by a person sick with the diphtheria should be cleansed with disinfectants, ceilings lime-washed, and woodwork painted; the carpets, bed clothing, upholstered furniture, etc., exposed many days to fresh air and sunlight. Many articles should be exposed to a high artificial temperature, to kill all germs of infection. When diphtheria is prevailing, no child should be allowed to kiss strange children, nor those suffering from sore throat; nor should it sleep with or be confined to rooms occupied by or use toys, handkerchiefs, etc., belonging to children having sore throat, croup or catarrh. If the weather is cold, the child should be warmly clad with flannels. The well children should be scrupulously kept apart from the sick in dry, well-aired rooms, and every possible source of infection rigidly guarded. Every attack of sore throat, cough, and catarrh should be at once attended to; the feeble should have invigorating food and treatment; the sick should be rigidly isolated in well-aired, sunlighted rooms; all discharges from the mouth and nose should be received into vessels containing disinfectants, as solutions of carbolic acid or sulphate of zinc. (See *Diphtheria* in HYGIENE.)

DIPHTHERIA.—A sudden and very dangerous disease of the throat, having in many respects a strong resemblance to croup. It commences with the general symptoms of an ordinary sore throat, and swelling of the glands behind the jaw; there soon appears on the red and swollen palate or tonsils a yellowish-white substance in form of a membrane, which in some cases, like croup, extends into the larynx or upper portion of the windpipe, and may cause death by suffocation. In others (the ulcerative form, or put-

rid sore throat), the parts attacked are rapidly destroyed by a gangrenous ulceration; in others (the malignant form), there is intense headache, vomiting and bleeding from the nose, mouth, stomach and bowels; the fauces seem covered with a thick, leathery deposit, at first yellowish, and afterwards ash-colored or brown, and unless death occurs speedily, apparently from an overpowering of the system from the violence of the disease, extensive sloughing occurs, with foul discharges, and a clammy coldness and insensibility often precede death. *Treatment*: No specific remedy has been discovered. 1. Open the bowels with a mild saline laxative, ½ oz. of citrate of magnesia or Rochelle salts.—2. Chlorate of potash should be used as a gargle, putting 2 teaspoonfuls in a tumbler of water, and using freely every hour; and a tablespoonful of this should be swallowed every two hours.—3. The great discovery of Behring, "antitoxine," is now the grand specific for diphtheria. Reports from hospitals and private practice all prove it one of the greatest achievements in science, reducing the mortality three-fourths. This treatment is derived from the injection in the veins of another animal of a culture of diphtheria bacilli, finally attenuated to such a degree that it becomes harmless when again applied to man, yet rendering his system "immune," or proof against the virus. It can be given safely only by physicians, who alone are capable of its administration.—5. Inhalation of the vapor or steam of a strong infusion of hops or salt will afford comfort, and the steam of lime-water is worthy of a trial.—6. Small pieces of ice may be swallowed freely during the earlier stages, and, later, iced wine or brandy, if it can be swallowed. Chlorine water should be given, prepared as follows: Chlorate of potassium, 20 gr.; hydrochloric acid, ½ dr.; water, 4 oz.; pulverize the potash and put in a dry vial; add the acid, corking the vial, to retain the chlorine set free by the reaction; after that has ceased, add 1 or 2 oz. of the water; agitate until all the chlorine is dissolved in the water; add water to make it the desired strength; give teaspoonful every 2 hours, as required. It ought to be of a green color, and it will lose that if not kept in a dark colored bottle, wrapped in colored paper, or kept in a dark place. The medicine ought to be freshly prepared every second or third day. *Homeopathic*: When there are ulcers in the mouth and throat, putrid breath, and swelled glands on the neck, give nitric acid; if a false membrane has formed on the tonsils and palate, and great dryness and thirst prevail, give bryonia; if, in addition to the dryness, the tonsils are bright red and swollen, and there is great difficulty in swallowing, give belladonna. Gargle the throat with dilute alcohol, carbolic acid, chlorate potassa, or hot water; inhale the vapor of aqua ammonia, or tincture of iodine, especially in croupal diphtheria; regulate the diet to suit the inclinations of the patient; beef tea, mutton or chicken broth may be taken liberally; good fresh milk is excellent. Administration: Of a solution of 12 globules to 6 dessertspoonfuls of water, give a spoonful every 2 or 3 hours until a change is apparent, then less frequently.

Inhalers.

DROPSY, Of the Abdomen.—This occurs more frequently in women and aged persons, in married than in unmarried females; it is often the consequence of the distension or pressure attending pregnancy, of difficult and instrumental labors, and of suppression of the puerperal secretions. It generally assumes an acute or inflammatory form. The pulse is hard, thirst increased, and the urine scanty; the skin warm, hot, colored, and resists the pressure of the finger; a dull sound is emitted by percussion, on examining the abdomen. *Treatment*: This depends upon the extent and nature of the disease; give mercurials and antimonials, at first, to act on the bowels, and subsequently as alteratives, or with opium, and push it so far as to affect the mouth; 10 gr. jalap and 2 dr. cream of tartar should be taken every other day to act on the bowels; the kidneys at the same time by an infusion of juniper berries; ½ dr. of fl. ext. of jaborandi at night will produce a copious perspiration, which will assist in diminishing the accumulation of fluid; warm vapor baths should be given, followed by brisk rubbing with a coarse towel to restore perspiration; also give a gentle tonic. *Homeopathic*: Give arsenicum, apis mellifica, dulcamara, sulphur, or china; either of which should be administered once in 4 hours.

DROPSY, Of the Chest.—The effusion of water in the chest, which so often takes place in pneumonia, may be greatly lessened by promoting the free action of the kidneys. *Treatment*: 1 oz. of bruised juniper berries, steeped for 2 hours in 1 pt. of hot water, which may then be poured off, and a tablespoonful or two of cream tartar added and drank through the day will be useful for this. When there is much effusion, and absorption of it does not take place, a puncture is sometimes made through the walls of the chest and the water drawn off. This operation is called *paracentesis thoracis*, and is generally, in uncomplicated cases, entirely successful. The chest also may be painted freely with tincture of iodine, and the iodide of potash given in 5 to 10 gr. doses 3 or 4 times daily, in a tablespoonful of the compound syrup of sarsaparilla. *Homeopathic*: If there is oppression of the chest, anxiety, and tendency to seek relief by leaning forward, give colchicum; difficulty of breathing after exertion, sensation of danger of suffocation on lying down, and constant inclination to sit up, bending forward a little, give arsenicum; sore and bruised feeling, with urine scanty and cloudy, give apis mel.; oppressed breathing, waking from sleep and throwing the arms about, give lachesis. In acute and urgent cases, repeat the remedy every 2 or 3 hours, until relief is obtained; then extend the time to 4 or 6 hours, as may be necessary; dissolve 12 globules or 3 drops in 10 teaspoonfuls of water, and give 2 teaspoonfuls as a dose.

DROPSY (Wind Dropsy). — Signifies a puffy swelling, caused by the introduction of air into the cellular, fatty tissue. This may occur after

wounds of the larynx, windpipe or lungs. Frequently it is exhibited as a result of fracture of the ribs; when the sharp ends of the broken ribs penetrate the chest, the air escaping from the lungs insinuates itself into the fatty tissue surrounding the wound, and may spread to all parts of the body, rendering the whole surface swelled and puffy, and oppressing the internal organs, especially the lungs. *Treatment*: Keep the patient, especially his ribs, as quiet as possible, as the motions of the ribs tend to increase the swelling and aggravate the complaint, and prevent inflammation of the chest by relieving any existing cough or pain, so that the breathing may be as easy as possible; by bleeding, if necessary; also, by purgatives, as follows: Calomel and rhubarb, in powder, of each, 10 gr.; podophyllin, 2 gr.; mix; to be taken in syrup or sauce, and followed by 1 tablespoonful of castor oil, if it does not operate in 4 hours; after the operation, 10 gr. of Dover's powder, or 1 gr. of opium should be taken that entire quiet may be insured.

DROWNING, Restoration from. — (See *Asphyxia.*)

DYSENTERY.—A disease arising from inflammation of the mucous membrane of the large intestines, and characterized by stools consisting chiefly of blood and mucus, or other morbid matter, accompanied with griping of the bowels, followed by straining at stool. There is generally more or less fever, and the natural faeces are either retained or discharged in small hard balls. The common causes are marsh miasms, improper diet, excessive exhaustion and fatigue, and, above all, exposure to the cold and damp air of night after a hot day. *Treatment*: Give gentle aperients, ½ oz. of castor oil or the same quantity of Epsom salts to cleanse the bowels; then dilute muriatic acid, 2 fl. dr.; sulphate of morphia, 2 gr.; water, 3 fl. oz.; mix; 1 teaspoonful 3 times a day. The symptoms, which frequently hang about for some time, are best combated by mild tonics and vegetable bitters; comp. tinct. of cinchona, comp. tinct. of gentian, of each, 1 oz.; mix; take 1 teaspoonful 3 times a day, before meals. *Homeopathie*: Mercurius corrosivus should be given for the acute symptoms, a drop dose in a dessertspoonful of water every 2 or 3 hours; an occasional dose of aconite will reduce any feverish symptoms and moisten the skin; arsenicum is of value in the chronic form, a drop dose 3 times a day.

DYSPEPSIA. — The common symptoms of dyspepsia are, want of appetite, sudden and transient distensions of the stomach, frequent eructations, heartburn, stomachic pains, occasional vomiting, and frequently costiveness or diarrhœa; sometimes the head is affected, and dimness of sight, double vision, floating specks and slight vertigo, are experienced, along with a multitude of other symptoms, depending on derangement of the functions of the nervous system. In the higher ranks of society it is caused by over indulgence in the luxuries of the table, late hours, or the want of proper exercise both of body and mind. In the studious, and those who lead a sedentary life, it is caused by excessive mental exertion or anxiety, or by the fatigues of business, and the want of sufficient bodily exertion and of pure air. In the lower orders of society it results from indebtedness, or a deficiency of proper food and clothing, bad ventilation, etc. *Treatment*: This depends less on medicine than on the adoption of regular habits of life. Moderation in eating and drinking, and in the indulgence of the passions; early rising, due exercise, and retiring to rest at an early hour, will do much to restore the tone both of the stomach and nerves; excessive study and mental exertion should be avoided, and recourse should be had to society and amusements; if the bowels are confined, mild aperients should be taken, and if diarrhœa is present, antacids and absorbents may be had recourse to; the stomach may be strengthened by mild bitters, tonics and stimulants, and baths may be taken, when convenient, to strengthen the nervous system. Among the aperient medicines most suitable to dyspepsia, are Epsom salts and phosphate of soda, each in the dose of ½ oz., dissolved in 1 oz. of water; give 1 or 2 Seidlitz powders in a state of effervescence, every day, until the costiveness is removed; among the antacids are the bicarbonates and carbonates of potassa and soda; either of which may be taken in doses of ½ teaspoonful dissolved in water; if the spirits are depressed, 1 or 2 teaspoonfuls of spirit of sal volatile will be more appropriate; and in cases accompanied by diarrhœa, a little prepared chalk; as bitters, the compound infusion of orange-peel or of gentian are excellent; comp. tinct. of gentian and water, of each, 8 fl. oz.; 3 fl. dr. of muriatic acid; mix; 1 teaspoonful every 4 hours. As tonics, small doses of bark or of sulphate of quinine, to which chalybeates may be added, as sulphate of quinine, 40 gr.; sulphate of iron, 20 gr.; aromatic sulphuric acid, 10 drops; mix; and with gum Arabic mucilage make 20 pills; take 1 pill before each meal, if there is pallor of countenance, or a low pulse, with no disposition to fever or headache. When dyspepsia depends on constipation or a deficiency of bile, inspissated ox-gall acts with almost specific certainty; when the liver begins to assume its healthy form, its employment should be discontinued. From its well known power in causing muscular contraction, strychnia affords the most powerful means of restoring the gastric functions. Use the following formula: Acetate of strychnia, 1 gr.; comp. tinct. of cardamoms, 3½ fl. dr.; alcohol and water, of each 2½ fl. dr.; enough syrup to make the whole 4 fl. oz.; mix; 1 teaspoonful 3 times daily. *Homeopathie*: Nux vomica is suitable for persons of a bilious temperament; it relieves nausea, flatulence and pain, constipation, headache, and sleepiness, with wakefulness early in the morning; it suits those who are confined indoors, who use their brain too much, and their bodies not enough; a drop dose in a dessertspoonful of water, 3 times daily; bryonia meets many of the nux symptoms, but there is more of a weight at the stomach after food than pain; there is less flatulence, and the constipation is characterized by the large size of the evacuations; a drop dose in a dessertspoonful of water 3 times daily; china relieves pain after food, with flatulence,

in subjects weakened by loss of humors, as of blood, or milk, or matter; and when there is a tendency to diarrhea and coldness of the abdomen and extremities; pulsatilla is more useful when there is an aversion to rich or fatty food, a very foul taste in the mouth and a white fur on the tongue, when the patients are women, and of fair complexion, especially if the monthly flow is irregular or suppressed; arsenicum is suitable when there is burning pain at the stomach after the smallest quantity of food or stimulant, when the tongue is dry, and rather of a clean glazed red than furred, when there is thirst and relaxation of the bowels, when stimulants or highly spiced food have been freely indulged in, and if the stomach and bowels (not the liver) are especially at fault.

ECZEMA.—This is an eruption of minute vesicles, closely crowded, often running into each other, so as to form on being ruptured a moist sore, which becomes more or less covered with scabs, attended, usually, with feverishness and restlessness. *Treatment*: Light, nutritious diet, cooling drinks, and saline laxatives, as Rochelle salts, cream of tartar, etc., and warm or tepid baths of bran-water, elm-bark or flax-seed infusions, with 20 gr. of bicarbonate of soda to 4 oz. of the wash. If there is inflammation and burning, lime-water and linseed oil in equal parts, with the addition of 2 or 3 gr. of carbolic acid to 1 oz. of the mixture is an excellent application; later, use benzoated oxide of zinc ointment. In chronic cases cover the inflamed surface with oiled silk or rubber cloth, these being removed several times daily and the surface washed with a lotion of equal parts of glycerine and water. If the system is debilitated, use tonics in some form. Another good application is citrine ointment, 2 dr.; olive oil, 1 oz.; sulphate of morphia, 2 gr.; mix, and make an ointment; rub this ointment faithfully into the parts affected with eczema 2 or 3 times a day.

ELEPHANTIASIS.—The legs and feet are affected, becoming rough, scaly, and swollen to great size by serous infiltration, the skin growing thick and insensible. Compression is found to give but slight relief; nor do surgical processes, as ligature of the principal artery of the limb, appear to be successful. Electricity, by using both induced and continuous currents, will sometimes entirely remove the infirmity. The continuous currents appear to have the effect of softening, and to a certain extent liquifying, the indurated tissues, while the intermittent currents cause a reabsorption of the tissues thus prepared.

ERYSIPELAS, or ST. ANTHONY'S FIRE.—The symptoms are fever, delirium, vomiting, pulse strong or weak as the fever inclines to the inflammatory or typhus kind. By or before the fourth day the skin in some one part becomes red and inflamed, which is soon extended to others, the parts affected being swollen and bright scarlet. If the face is attacked, it spreads to the scalp, and the eyelids sometimes swell so as to prevent the patient from seeing; after a longer or shorter period the eruption ends in watery vesicles, or branny scales. *Treatment*: Tincture of iron, when there is debility (and this is very frequently the case), has quite a reputation both as a local application to arrest the spread of the inflammation, and, internally, in doses of 10 to 30 drops, every 2 hours, as a tonic and for constitutional effect. Quinine is also an excellent remedy, given internally in the dose of 4 to 5 gr., twice a day; and also made into paste as an external application. Diluted alcohol and tincture of iodine are also good external applications. A milk diet, or this with beef-tea where there is much prostration, is the most suitable. The patient must be kept clean, and the room should be large and fully ventilated. If a case of labor occur near by at the time, the patient should be sent away or carefully kept from the woman, as the latter is then particularly liable to take it, or to be attacked with puerperal fever. *Homeopathic*: Belladonna for the simple cases when there is great redness and irritation, and especially when the head and face are attacked, and delirium present; a drop dose every 2 or 3 hours; rhus is indicated when the vesicles appear and the inflammation wanders from part to part; drop dose every 3 or 4 hours; arsenicum will be required when matter forms and there is great prostration; a drop dose every 3 hours; dusting flour or whiting over the affected part is a simple and good application; in some cases hot fomentations will give great comfort.

ERYTHEMA, or INFLAMMATORY BLUSH.—This appears in slight, superficial, irregular red patches, most frequently on the face, chest and extremities, often with well-defined raised borders, not very sore, usually disappearing on pressure, but quickly returning again. *Treatment*: 1. The stomach and bowels may need attention, antacids and laxatives being required, as rhubarb and magnesia, 1 dr. of each, or ½ oz. of Rochelle salts, or citrate of magnesia, with light, unstimulating diet; bathe with bran-water and bicarbonate of soda, 1 dr. to the pt., or sponge frequently with sweet milk and water, and after entire drying, dust thoroughly with finely powdered starch or equal parts of starch and oxide of zinc, or apply cold cream, or lime-water and oil, or the benzoated ointment. When associated with a rheumatic constitution or other vice of system, the necessary constitutional remedies should be used. For the "chafing" of children, frequent bathing, careful drying, and then dusting with equal parts finely powdered starch and lycopodium, is usually sufficient.—2. 1 gr. of sulphate of atropia rubbed up with 1 oz. of glycerine forms an excellent application.

FAINTING.—This results from excessive grief, joy, anger, fright, any sudden or violent emotion, loss of blood, or other exhaustive discharges, diseases of the heart, etc.; with some persons odors of different kinds, and the sight of unpleasant objects will occasion it. *Treatment*: Lay a person who has fainted down in a current of air, or where the air from an open window or door will play upon his face; prevent a crowd closing around; the clothes also may be opened, cold water sprinkled upon the face, hands and chest, and some pungent substance, as smelling salts, camphor, aromatic vinegar,

etc., applied to the nostrils; as soon as able to swallow, give a little fresh water, or spirits and water. Persons who faint easily should avoid crowded rooms and places where the air is close.

FAT.—There are three modes by which fat can be reduced: Diet, exercise and specific medicines. The patient may eat lean mutton, beef, veal, lamb, tongue, sweetbread, soups, not thickened, beef tea and broths, poultry, game, fish, cheese, eggs, bread, in moderation; also greens, spinach, watercress, mustard and cress, lettuce, asparagus, celery, radishes, French beans, green peas, Brussels sprouts, cabbage, cauliflower, onions, broccoli, sea-kale, jellies, flavored, but not sweetened, fresh fruit in moderation, without sugar or cream, and pickles. He may not eat fat bacon and ham, fat of meat, butter, cream, sugar, potatoes, carrots, parsnips, beet root, rice, arrowroot, sago, tapioca, macaroni, vermicelli, semolina, custard, pastry and pudding of all kinds and sweet cakes. He may drink tea, coffee, cocoa from nibs, with milk, but without cream or sugar, dry wines of any kind, in moderation, brandy, whisky, or gin, in moderation, without sugar, light bitter beer, Apollinaris water, soda water and seltzer water. He may not drink milk, except sparingly, porter and stout, sweet ales, sweet wines; as a rule, alcoholic liquors should be taken very sparingly, and never without food. Among specific medicines, certain natural mineral waters are the best. Sea water is the best of all, as taken internally it acts as a diuretic and purgative, particularly the latter. A small glassful of it should be taken three times a day in a little fresh water or milk. Sea-water baths are also to be resorted to, free exercise should be practiced. 5 drops of Fowler's solution 3 times a day, will sometimes restore the patient to health in 2 months. Turkish baths have a reputation for reducing obesity.

FEET. Cold.—Sometimes cold feet come from over-action of the brain. In such a case use the brain less and the feet more. Many persons suffer from cold feet simply from a neglect to keep them clean. Warmth may be brought by washing and rubbing the feet in warm water every day. After the skin has become soft, a good washing with warm water twice a week during cold weather will greatly contribute to a healthful condition of the feet as well as to the personal comfort. Warm stockings or shoes, which compress the feet and render the separate action of each toe impossible, will not keep the feet warm.

FEVER AND AGUE, or INTERMITTENT FEVER.—There are several varieties, differing from each other in the length of time that elapses between the attacks. There is one called *quotidian*, occurring every 24 hours; another named *tertian*, every 48 hours; and the third, *quartan*, the interval lasting 72 hours. There is a very severe form of it called *congestive*, which is quite fatal and requires energetic treatment. The symptoms commence with yawning, stretching and uneasiness; this is succeeded by slight shiverings, that end in a violent shaking of the whole body; this is the cold fit, and is immediately followed by the fever; the pulse rises, the skin becomes hot, with pain in the head, tongue white, and all the marks of fever, terminating in a profuse sweat, which leaves the patient in his natural state, though somewhat weakened. *Treatment*: In the cold stage give hot, stimulating drinks; use the hot foot bath, and put the patient to bed, with hot bricks or bottles of hot water to the feet, sides and back; administer a teaspoonful of chloroform or a half teaspoonful of laudanum to cut short the paroxysm. In the hot stage give 20 or 30 drops of spirits of nitre, or a tablespoonful of the spirits mindererus every hour until the fever subsides; bathe the head and hands occasionally, and even the whole body, if agreeable to the patient, with water; when the sweating sets in, rub the patient with dry towels; in the outset of the paroxysm, if the bowels are constipated, give an active cathartic, as the infusion of senna and salts, or 3 or 4 cathartic pills; as soon as the fever has subsided, give quinine in 3 gr. doses every 4 hours, until some ringing in the ears is produced or the time for the next paroxysm past; the quinine may be taken in pills or in powder packed in capsules, 4 to 6 gr. twice a day. Iodine may be substituted for quinine, in doses of 12 to 15 minims for adults, 3 times a day; for children 5 to 10 minims, 3 times a day. The best form in which to take it, is as follows: Comp. tinct. of iodine, 6 dr.; syrup of acacia, 18 dr. *Homeopathic*: China in those cases where the complexion is jaundiced, the liver affected, or bilious diarrhea present; a dose every 3 hours; arsenicum, when the ague is accompanied by burning pain in the stomach, sickness, neuralgia, pains of the face and head, and if quinine should have failed or been given in excess, if dropsy is present; a dose every 4 hours; ipecacuanha, having a periodic action, will also be curative, especially when nausea and vomiting, oppressed breathing, and watery diarrhea are characteristic of the paroxysm; a dose every 3 or 4 hours; sulphur will remove the tendency to any recurrence of slight attacks, after the use of the first mentioned medicines; a dose 3 times daily. The medicine should be given in the intervals between the attacks, and not during.

FEVER, Ague Cake from.—A common name for an enlarged spleen, showing the cause of the complaint, as it results from ill-treated or obstinate intermittents. *Treatment*: If the bowels are constipated, give a dose of compound rhubarb pills, or a blue pill at bed-time, and a seidlitz powder, or dose of salts in the morning, and follow with 3 to 5 gr. of quinine in 20 drops of aromatic sulphuric acid in a wineglass of sweetened water 3 times daily, for a few days. If there is pain, apply a blister or repeated mustard plasters. If the case prove obstinate, give Fowler's solution of arsenic in 3 drop doses, 3 times daily, which may be persisted in for weeks.

FEVER, Bilious or Remittent.—A fever which occasionally abates, but does not entirely cease before a fresh attack comes on, so that the patient is never entirely free. For several days there is a feeling of debility, headache, lack of appetite, furred tongue, bitter taste in the mouth

in the morning, with pains in the joints and general uneasiness; nearly always a distinct chill or rigor, sometimes slight and brief, at other times severe and prolonged; there is generally but one well-marked chill, the returns of the fever not being preceded by a cold stage; at certain periods of the day there is a regular increase in the febrile symptoms, after which the fever moderates but does not subside. *Treatment*: First, give an emetic, 20 gr. of ipecac, or a large teaspoonful of mustard, in ½ gill of tepid water; its operation may be greatly aided by large and frequent draughts of warm water or boneset tea. Through the course of the fever, when the skin is hot and dry, sponge the whole body several times a day with tepid saleratus water; apply to the head cold water; iced drinks and iced lotion to the head, are frequently beneficial. Give 2 drops tinct. of aconite every 3 hours till the fever subsides. As a cooling febrifuge, administer 3 half Seidlitz powders during the day, if the bowels are at all constipated; but if they are sufficiently free, use the effervescing powders in the same manner. If there is headache or vomiting, apply mustard to the back of the neck or over the stomach. If the Seidlitz powders are not sufficient to keep the bowels open, use 2 or 3 comp. cathartic pills, or a tablespoonful of Epsom salts occasionally; and during the remissions give quinine as directed for ague. *Homeopathic*: Pale, yellow, earthy color of the face, yellow fur on the tongue, fetid breath, sore lips, gums and teeth, give mercurius; chill, followed by fever, hot skin, great thirst, red face, short breath, and very nervous, give aconite; low-spirited, out of humor, dizzy, putrid taste, no appetite, sour belchings, and loose bowels, give sulphur.

FEVER, Breakbone.—This fever, also called *Dengue* and *Rheumatic Scarlatina*, is characterized by great pain in the limbs, much general distress and watchfulness. *Treatment*: The expectorant plan, relieving urgent symptoms, and promoting as much as possible the patient's comfort and strength, is best adapted to secure a favorable result. It is indeed treated on general principles, like other fevers, and needs no special directions.

FEVER, Relapsing.—On from the fifth to the eighth day of this fever there occurs a copious sweating, with which all the symptoms cease, and the patient may feel well enough to get up and walk about; on the fourteenth day a sudden relapse occurs, which runs a similar course to the first attack; 3, 4, or more relapses may occur, and the patient may die from sudden prostration or exhaustion. It prevails generally as an epidemic, and recoveries from it are slow. *Treatment*: A Seidlitz powder, or rhubarb and magnesia at the beginning, and, if the headache is severe, mustard to the back of the neck and spine, cooling draughts, citrate of potash in 30 gr. doses in a glass of water, or the effervescing draught, 20 gr. bicarbonate of soda with 15 gr. tartaric acid, or a tablespoonful of lemon juice in a glass of water, may be freely used, until sweating occurs, when quinine, in 2 gr. doses, every 4 hours, with beef-tea, wine-whey, etc., should be given; bathe with salt and water, or spirits and water, with fresh air, and a good diet, with the continued use of tonics.

FEVER, Spotted, or Cerebro-Spinal Meningitis.—This disease sets in suddenly, commences with chill, followed with fever, violent headache, restlessness, and great prostration; as the disease progresses, irregular, purplish spots, varying in size from a pin's head to large patches, appear on different parts of the body. *Treatment*: On account of the sudden and great prostration, great attention must be paid to supporting measures. 1. If there is costiveness, clear the bowels with calomel, 10 gr.; aloes and rhubarb, of each, 5 gr.; mix, and give in syrup or sauce; bathe the head frequently with warm water; if there is nervous irritation, give ⅛ gr. of morphia, 2 or 3 times in the 24 hours; if the fever is high, give 5 gr. of quinia at bedtime, and 5 gr. at 11 A. M. — 2. The Calabar bean has been highly recommended in this complaint, and also the spurred rye or ergot, given in the following form: Tinct. of Calabar bean, 1 fl. oz.; fl. ext. of ergot, 1½ fl. oz.; mix; ½ teaspoonful every 2 hours; give wine freely to support the patient. *Homeopathic*: Frontal headache, double vision, muscular weakness, give gelseminum; chill, fever, restlessness and thirst, give aconite; stupor, slow breathing and slow pulse, give opium. Either of the above remedies, dissolve 10 globules in a tumbler ½ full of water, and give 2 teaspoonfuls every 2 or 3 hours, until improvement sets in, then lengthen the intervals between the doses. Diet the same as advised under inflammation of the brain.

FEVER, Typhoid.—The first symptoms are like those of other fevers, but more gradual in their development. For several days before its actual beginning the patient droops, loses his appetite, and his sleep is unrefreshing at night; a chill then ushers in the attack, with pulse ranging from 80 to 120; furred tongue; headache and pain in the back; sometimes diarrhea and swelling of the belly; and sometimes nausea and vomiting. *Treatment*: Give the patient good air and frequent spongings with water; if there is much constipation, give a teaspoonful of castor oil, after which no laxatives will generally be required; if the fever is high, give 30 drops of spirits of nitre every 2 hours, and apply cloths wrung out of vinegar and water, or ice water, to the head; should there be excessive action of the bowels, control with chalk mixture, or teaspoonful doses of spiced syrup of rhubarb with a few drops of laudanum or paregoric; give none but liquid nourishment, as toast-water and rice-water, for the first few days; then milk, light porridge, and, later, beef-tea, mutton or chicken broth; if there be much prostration or debility, wine-whey, milk-punch and egg-nog; sleep must be secured by opium or Dovers powders at bed-time; if necessary, by chloral or bromide of potash, 10 grains of each, given at bed-time in a wineglass of camphor-water, and repeated every 2 hours, until the desired effect is produced; if there is great soreness and tenderness of the bowels, especially in the right side, low down, apply hot fomenta-

tions, or light, hot poultices of hops and bran; the mouth must be frequently gargled, or, when the patient is too weak for this, washed with a solution of chlorate of potash, 1 dr. to a tumblerful of water; and quinine in 2 gr. doses, 2 or 3 times a day, should be given as a tonic, especially in the latter stages. Should there be symptoms of perforation of the bowels on account of too deep ulceration of Peyer's glands, give oil of turpentine, 5 drops, mixed with laudanum, 10 drops, 3 times a day; and keep the patient perfectly quiet. *Homeopathic*: As soon as the disease becomes clearly defined, give opium; repeat this once or twice, and if no change be effected, give arnica; if still there is no improvement, give veratrum, particularly when there is clammy sweat on the forehead, with coldness of the extremeties, great weakness, and unequal, laborious, rattling respiration; if these symptoms increase, the pulse become irregular and the tongue dark brown or black, give arsenicum; alternate the administration of the last two medicines every half hour; if temporary blindness is complained of, give belladonna; bryonia, rhus, and senega will be found useful, and in severe cases sulphur, followed by lycop., lachesis, phosph., ammon. c.

FEVER, Typhus.—The symptoms are languor, alternate flushes of heat and chills, pain in the head, difficulty of breathing, frequent weak and sometimes intermitting pulse, the tongue dry and covered with a brown fur, the forehead covered with sweat, while the hands are dry and glow with heat, the patient talking wildly. *Treatment*: In regard to principles and methods of treatment see *Typhoid Fever*; for there is no material difference in this respect between the two fevers. *Homeopathic*: When there is headache, giddiness, nausea, vomiting, watery, yellow greenish, slimy evacuations, give ipecacuanha, or 3 globules in a teaspoonful of water, every 3 or 4 hours; when frequent shivering, bitter taste, whitish tongue, loss of appetite, nausea, vomiting of mucus, slimy evacuations, give 2 globules of the 6th potency of pulsatilla in a little water every 3 to 6 hours; if the spasms are confined to the stomach, and there is painful pressure and tension in the epigastrium, a sensation as if the limbs were bruised, and nervous excitability with slight delirium, give nux vomica, 2 globules of the 6th potency every 12 hours; when there is a pale or yellowish appearance of the face, severe headache, a thickly coated tongue, bitter or foul taste, little thirst, dry burning skin followed by profuse sweats, extreme restlessness and anxiety, give mercurius, 3 globules of the 6th potency, in a little water, every 2 hours; cinchona is useful in the 1st stage, and china in the advanced stage of the disease; give globules of the 3rd potency every 6 hours; when inflammatory symptoms declare themselves, aconite, belladonna, bryonia and rhus will generally be found useful.

FEVER, Yellow.—A disease of warm climates. The symptoms are, first, the headache, weakness, and lassitude common to all fevers; the mouth is clammy, the tongue furred, and the skin hot, dry and hard to the touch; the eyes and skin yellow; then bilious vomiting; a great determination of blood to the head; the pupils are dilated; as delirium sets in, dark spots break out on the body; in fatal cases this is followed by the black vomit or dark-colored bile, and the tongue, gums and teeth are covered with a black, thick fur; blood bursts from the mouth, ears, nostrils and bowels. *Treatment*: Move the bowels with some mild cathartic, as ½ oz. salts, of rhubarb and magnesia, or of the citrate of magnesia. Some physicians precede this with 10 gr. calomel. If there is a chill, put the feet in a hot mustard bath, give warm cordial baths, and apply hot bricks, bottles of water, etc. Apply hot mustard fomentations over the abdomen, and give ice, iced champagne, lime water, or charcoal water, to relieve the vomiting. During the hot stage sponge freely with cold or tepid water. In the collapse, give stimulants, wine, brandy or whisky, with concentrated liquid food and quinine in 5 gr. doses twice a day. *Homeopathic*: In the first stage, when there is fever and thirst, red face, rapid pulse and dry skin, give aconite; headache, red eyes, coated tongue and cracked lips, give bryonia and belladonna; yellow face, pointed nose, sunken eyes and dull, throbbing headache, give arsenic; eyes sensitive to light, palsied limbs, pain, dizziness and drowsiness in the head, give mercurius. In urgent cases repeat the remedy every ½ hour or hour, but generally give a dose once in 2 or 3 hours; dissolve 3 drops or 12 globules in a tumbler ½ full of water, and give 2 teaspoonfuls at a dose, or 8 globules may be taken dry on the tongue; the diet must be mild and unirritating; a little thin gruel, made of rice or wheat flour, may be taken if the stomach will retain it; as a drink give pure, fresh water, toast-water, barley-water, or a little weak black tea; all alcoholic stimulants must be discarded; as the disease abates and the appetite returns, use the utmost care in changing to a more substantial or stimulating diet; the room should be well ventilated, and the sunlight freely admitted; the utmost care in regard to cleanliness should be observed, and the patient's entire body frequently sponged with tepid water.

FITS, Epileptic.—There is temporary loss of consciousness, strong spasms, and intervals between the fits; the patient falls down, senseless and convulsed, struggles violently, has a turgid and livid face, foams at the mouth, bites his tongue, and appears to be at the point of death; in from five minutes to a half hour, by degrees, these symptoms diminish; and then the patient falls into an apparent sleep. In a short time more he recovers, and is apparently well. *Treatment*: Little can be done during the attack, other than to prevent injury from the violence of the convulsions. To prevent the tongue being bitten, place a piece of soft wood, cork or leather, between the back teeth. Unbutton the clothing, and give, during the intervals, bromide of potash in doses of 25 gr., or ½ that amount of bromide of ammonia 3 times a day, in a glass of sweetened water. To build up the system, give the following: Citrate of iron and quinia, 1 dr.; sherry wine, 2 fl. oz.; mix; give 1 teaspoonful 3 times a day. *Homeopathic*: Medi-

eal treatment should be chiefly applied during the interval between the fits; and consists of the use of such medicines as belladonna, calcarea, cuprum, ignatia, nux vomica, opium, cina, sulphur, arsenicum, and phosphorus; the choice of the medicine will depend upon the peculiar character of each individual case, and this choice should always be made by the medical attendant.

GALL-STONES.—Generally found in the gall bladder, but occasionally in the larger biliary ducts. They vary in size from a grain of wheat to a large hazel-nut; and some have been found as large as a hen's egg, roundish or angular in form, and having the feel and consistence of soapstone. The pain is felt about three inches to the right, and a little below the point of, the breast-bone; is of a continuous, dull, aching character, at times becoming most excruciating. The paroxysms cause nausea and vomiting, cold sweat, small, frequent pulse, pallid face, and great exhaustion; the attacks usually come on without warning, continue from 1 to 3 hours, and stop suddenly, as the stone escapes through the duct. Attacks having once occurred are liable to be repeated. *Treatment*: 1. Sulphate of morphia, ¼ to ½ gr.; dissolve in ½ dr. of warm water and inject under the skin of the arm with hypodermic syringe; keep the patient under the influence of this narcotic by repeating the injection 2 or 3 times in 24 hours until the obstruction has passed the gall-duct.—2. The prolonged hot bath is often of signal benefit.—3. To promote the solution of the gall-stone, give muriate of ammonia, ext. of dandelion, of each, ½ oz.; water, 6 fl. oz.; mix; a dessertspoonful 3 times a day.—4. oil of turpentine, 3 fl. dr.; sulphuric ether, 2 fl. dr.; mix; ½ teaspoonful night and morning. *Homeopathic*: Give 4 oz. of warm olive oil as soon as the pain appears; apply cloths wrung out of hot water, or a bag of heated salt, to the locality of the pain, and give a warm bath. At the same time give either aconite, belladonna, china, nux vomica, sulphur, or camomilla. Of the appropriate remedy dissolve 3 drops or 12 globules in 10 teaspoonfuls of water and take 2 teaspoonfuls every 20 minutes, until relief is obtained.

GIDDINESS, or VERTIGO.—All objects, or the individual himself, seem to be turning round; the difficulty usually depends upon derangement of the stomach, but sometimes from congestion of the brain; it often announces an attack of apoplexy, or some other disease. *Treatment*: 1. Sulphate of quinia, 1 dr.; divide into 12 equal powders; 1 powder to be taken at 11 A. M., and another at bedtime, every day, until the symptoms are relieved. The other bitters have also proved useful, especially strychnia.—2. Acetate of strychnia, 1 gr.; comp. tinct. cardamom, ½ fl. dr.; alcohol, water, of each, 2½ fl. dr.; enough syrup to make 4 fl. oz.; mix; a teaspoonful twice a day. In the vertigo of the aged, the following formula is excellent: Corrosive sublimate, 1 gr.; glycerine, 1 oz.; comp. tinct. cinchona, 3 fl. oz.; oil of peppermint, 25 drops; mix; a teaspoonful in a wineglass of water 3 times a day. *Homeopathic*: If caused by close study, and there is dimness of sight, and whizzing in the ears, and constipated bowels, give nux vomica; if caused by a fall, blow, or mechanical injury, give arnica; when it arises from a disordered stomach, and there is nausea and repugnance to food, give pulsatilla; when from suppression of cutaneous disease, or old ulcers, give sulphur. If the attack is sudden and severe, dissolve 12 globules in 10 teaspoonfuls of water, and give 2 teaspoonfuls every ½ hour or hour until improvement sets in, then less frequent. In less urgent cases, 6 or 8 globules may be taken dry on the tongue 3 or 4 times a day. Persons of full habit, who are subject to attacks of vertigo, or rush of blood to the head, should abstain from all stimulants, even tea and coffee, be moderate in their eating, rise early, bathe frequently, and take plenty of exercise in the open air.

GOUT.—The symptoms are pain in the small joints, generally in the ball of the great toe, the parts swollen and red, the attack coming on in the night; in the advanced stages, chalky lumps are formed in the joints. *Treatment*: If the patient be young and vigorous, having the disease for the first time, bleed and purge him; confine him to a low diet, and treat it exactly as an inflammation arising from any other cause. To procure sweating, 10 gr. of Dover's powder may be taken on going to bed. The use of the wine of colchicum, of the pharmacopœa, a teaspoonful 3 times a day, will frequently carry off the paroxysm, and mitigate the symptoms. If the disease leaves the extremities and flies to the stomach, apply mustard poultices and blisters to the soles of the feet and ankles, give large doses of ether and laudanum, hot wine, brandy, etc., and endeavor by all such means, (including the hot bath), to send it back again; if transferred to the head, and apoplexy produced, take away 15 or 20 oz. of blood immediately, and give active purgatives, as 10 or 15 gr. of calomel, followed by senna tea or Epsom salts. *Homeopathic*: Give aconite to mitigate the feverish symptoms and pain consequent on an acute attack of gout; a drop dose every 2 or 3 hours; following it up with nux vomica, when the patient is of a bilious temperament, with confined bowels and a headache, a drop dose every 3 or 4 hours; or pulsatilla when the pains wander about much, and the foot is red and swollen, with relaxation of the bowels, and a bitter taste in the mouth; a drop dose every 3 or 4 hours.

HANGING, Apparent Death from.—The cause of death by hanging, results from the pressure of the rope or ligature employed on the jugular veins returning with their impure blood from the head to the heart; this pressure causes a rapid collection of blood in the veins of the head, face, and on and in the brain; the arterial supply of blood to these parts causes a rapid distension of the veins, which goes on for a few seconds, till their coats burst, their contents effuse into the cavities of the brain, press on the vital nerves and produce death; at the same time, the blood, checked at the points of external pressure, forms a clot in the jugular veins, presenting a barrier to the return of blood should the ligature be removed. *Treatment*: Immediately cut down the body, or hold

it up while another cuts the cord, and remove the stricture from the throat; lay the body on its back, then inflate the lungs. (See *Asphyxia.*) While the lungs are being inflated, as soon as possible, by hot bricks or flannels, bring heat to the spine, feet and thighs, continuing at short intervals the artificial respiration, the frictions, and cold affusions on the face.

HAY FEVER.—Emanations from new-mown hay, blossoming roses, and perhaps other vegetable growth, seem to produce in some persons sniffles and bronchial irritation. *Treatment:* Hot baths in some cases and quinia in others, have given marked relief. Sulphate of quinia, 4 gr.; concent. tinct. of gelseminum, 6 drops; mix; take this amount in a little water or sweetened milk every 4 hours. But this affliction is so difficult to control, that many yearly victims go regularly to high altitudes or summer resorts among the mountains, which affords them relief.

HEADACHE.—When headaches are habitual, and proceed from a torpid liver, first endeavor to excite the biliary function to a more healthy action by taking 3 or 4 3 gr. blue pills at intervals of as many hours, and follow with a Seidlitz powder, the citrate of magnesia, or 2 gr. of calomel and ½ to ½ gr. of morphia, in 20 gr. of bicarbonate of soda, with 2 gr. of powdered ginger as a corrective; take this at bed-time; if necessary, its action may be favored by a Seidlitz powder or ½ oz. of Rochelle or Epsom salts. When the consequence of some indigestible food, a mild emetic of 15 gr. of ipecacuanha, dissolved in some warm water, and the vomiting encouraged by draughts of tepid water, should be taken before the pain has extended over the whole head. Whatever may be the cause of the headache, the new remedy, guarana, will give relief, in doses of ½ oz. of the fl. extract, or 15 gr. of the powder, mixed with hot water, cream and sugar. Nervous headaches are relieved by nervous tonics and stimulants, as bark, cascarilla, calumba and gentian, camphor, ammonia, ether and wine, the latter in a state of considerable dilution. A cup of strong coffee or strong green tea often acts like a charm. Small doses of tincture of henbane have often a like effect. 20 or 30 drops of laudanum, or, preferably, half that number of black drop, or acet. tinct. of opium, may be taken with advantage as an anodyne, and to induce sleep. Soaking the feet in very warm water, in which a spoonful of mustard has been stirred, is also beneficial in drawing the blood from the head. 2 teaspoonfuls of powdered charcoal, well stirred in ½ glass of water, and drank at once, is a valuable remedy in sick headache from sour stomach, flatulence, etc.; but rest is the best cure. *Homeopathic:* Nux vomica relieves the nausea as well as the headache; a dose or two will often greatly assist the cure by relieving the congestion of the liver, as well as acting on the brain; mercurius will give relief when the complexion is sallow, and there is a tendency to diarrhea; aconite will relieve when there is much throbbing, and the skin is hot and dry, the patient thirsty, the pulse frequent, and there is much restlessness of the whole system; take a drop dose every 2 or 3 hours; give belladonna where the head seems full, the cheeks and forehead brightly red, the eyes suffused and intolerant of light, the patient feeling that if the headache were relieved the whole system would be restored to health; dose as for aconite; nux vomica will give relief when stimulants have been used too freely, or the brain over-worked.

HEARTBURN.—Heartburn is a pain or burning sensation in the stomach, and a symptom of dyspepsia; frequently accompanied by anxiety, faintness, inclination to vomit, gnawing in the stomach, sour eructations, or gulping up a watery, tasteless fluid. It often arises from the irritation of worms or the use of acrid or pungent food and drink. *Treatment:* 1. Charcoal biscuits, or charcoal in capsules, 2 or 3 dr. to be taken every day.—2. Powdered rhubarb, 1 dr.; bicarbonate of soda, 1½ dr.; oil of spearmint, 4 drops; water, 4 oz.; mix; a tablespoonful before each meal. *Homeopathic:* Gulping up a sour bitter fluid at night, nausea after meals, and constipation, give nux vomica; eructations of what has just been eaten, and gnawing in stomach, give pulsatilla; rancid gulpings, sour belchings, and after dinner sleepiness, give phosphorus; water in the mouth with empty retching and pressure in the stomach, and great fullness after meals, give china. Take 6 or 8 globules dry on the tongue ½ hour before each meal, for 3 days; omit the medicine for a few days; if no better, select another remedy, and take it in the same way.

HEART, Fatty Degeneration of the.—A term used to denote a change of the substance of the heart from muscle to fat. Another disease, sometimes called ossification of the valves of the heart, or of the arteries, consists in a similar change into a limy substance, and is properly denominated *calcareous* degeneration of the heart. In these cases, there is much weakness in the heart itself, as well as in the circulation, and in the whole general physical system. *Treatment:* The following tonics are deemed appropriate, and may retard and alleviate, although complete recovery may be impossible: 1. Tinct. of chloride of iron, tinct. of digitalis, sweet spirits of nitre, of each 10 drops; mix, and take in 1 fl. oz. of infusion of quassia, 3 times a day.—2. Tinct. of digitalis, tinct. of valerian, of each, 1½ fl. oz.; tinct. of chloride of iron, 1 fl. oz.; mix; take 25 drops 3 times a day.

HEART, Inflammation of, or Carditis.—This inflammation is frequently associated with acute rheumatism; the heart, being itself a muscular structure, sympathizes with the rheumatic inflammation of the other muscles. In carditis, the inside of the heart is chiefly affected, or, rather, its valves, which, being roughened and thickened by the inflammation, communicate to the ear of the listener a peculiar bellows sound by which this disease may be recognized; for the other symptoms of pain and discomfort are not so severe as when the outside of the heart, or its investing membrane, the pericardium, is inflamed. In inflammation of this membrane, or *pericarditis*, the patient's deportment

seems strange, there is a distressed aspect generally, palpitation, pain at the pit of the stomach, difficulty of breathing, stiffness and pain in left shoulder and arm, and sometimes delirium; and when the ear is laid over the region of the heart, in auscultation, a rubbing sound, called the "to and fro" sound, is distinctly heard. *Treatment*: The same as of acute rheumatism, modified to meet the emergency. Bleeding must be employed, if the general state of strength and excitement show it to be demanded, and that it can be borne; cupping between the shoulders is advisable in all cases; full doses of opium should be given at bedtime, to insure sleep; and calomel, with smaller doses of opium, in such quantities as the severity of the disease may demand during the day; purgatives given so as to clear out the abdominal viscera. Blood or cup the instant any abnormal sound is heard in the region of the heart; when the acute state has subsided, blisters will hasten the absorption of effusion or deposit of lymph.

HEART, Palpitation of.—Usually the result of some functional derangement rather than an organic disease. Women are more subject to it than men, and those of a nervous temperament and relaxed habit much more so than those of robust constitution. *Treatment*: to be governed by the cause of the trouble. If dyspepsia, hypochondria, hysterics, etc., these diseases require their usual treatment; when cured the palpitation will stop. When caused by an impoverished condition of the blood, some form of iron in one of the following formulæ: 1. Tinct. of chloride of iron, 2 fl. dr.; dilute phosphoric acid, 3 fl. dr.; essence of lemon, 1 fl. dr.; simple syrup, 2½ fl. oz.; enough water to make of the whole 6 fl. oz.; mix; take 1 tablespoonful after each meal.—2. Sulphate of quinia, reduced iron, of each, 1 dr.; acetate of strychnia, 1 gr.; enough ext. of gentian to make 60 pills; 1 pill before each meal, and also 1 pill at bedtime; these may be continued for weeks. The diet should be nourishing, roast and broiled meats, with regular, moderate exercise in the open air. Bathing and friction with a coarse towel or the flesh-brush, and regular habits of life will materially aid in effecting a cure. *Homeopathic*: If excited by motion or talking, and there are stitches over the region of the heart, give digitalis; if there is intermitting pulse, a feeling of anguish about the heart, and of fullness with throbbing headache, give belladonna; if the beating is very violent, with great agitation, upright position for the sake of breathing more easily, *orthopnea*, anxious expression of the countenance, give aconite. Dissolve 12 globules or 3 drops of the liquid in a tumbler of pint full of water, and take a dessertspoonful every ½ hour or hour in urgent cases; in chronic cases 2 or 3 times a day will suffice.

HICCOUGH.—A convulsive movement of the diaphragm and parts adjacent. The common causes are flatulency, indigestion, acidity and worms. *Treatment*: It may generally be removed by the exhibition of warm carminatives, cordials, cold water, weak spirits, camphor julep, or spirits of sal-volatile. A sudden fright or surprise will often produce the like effect. A pinch of snuff, a glass of iced soda water, or an ice cream, will also frequently remove this affection. Where other means fail, 20 or 30 gr. of chloral may be tried in a glass of ice-water. Temporary hiccough may be checked by holding the breath a few moments.

HOARSENESS.—1. Slowly dissolve and swallow a lump of borax the size of a garden pea, or hold about 3 or 4 gr. in the mouth for 10 minutes before speaking or singing.—2. Horseradish will afford instantaneous relief in most obstinate cases of hoarseness. The root possesses the most virtue, though the leaves are good till they dry. The root is best when it is green. —3. Bake a lemon or sour orange for 20 minutes in a moderate oven, open it at one end, dig out the inside, sweeten it with sugar or molasses, and eat.

HYPO, or HYPOCHONDRIASIS.— This is the depression of spirits or "blue devils." It chiefly affects persons of the melancholic temperament, and is commonly induced by hard study, irregular habits, want of proper social intercourse, living in close apartments, and insufficient out-of-door exercise. *Treatment*: Similar to that recommended for dyspepsia, observing, however, that success depends more on engaging and amusing the mind, than in administration of medicine.

INSANITY. — The studious, very nervous, and those who are engaged in sedentary or in-door occupations, or who indulge in irregular or vicious habits, as well as fast livers, are the most liable to this affection. It also frequently arises from disordered physical health. It is sometimes inherited. *Treatment*: Change of scene, out-door exercise, agreeable company, pleasing mental occupation, and due attention to diet, clothing, ventilation, etc., with the judicious use of some mild aperient medicine and tepid bathing, will generally alleviate, and frequently effect a cure. *Homeopathic*: If uneasy, with desire to change from place to place, and there is a suicidal tendency, give nux vomica; if fearful, and inclined to start, and stupid with spasmodic movements and trembling, and a slow pulse, give opium; face flushed and hot, eyes brilliant, pupils dilated, give belladonna; febrile symptoms, with full pulse and hot and dry skin, give aconite. Give 8 globules, or 1 drop of the liquid medicine, on a little sugar, once or twice a day, according to the violence of the symptoms; the diet should be plain and simple; all stimulating food and drinks of every kind should be avoided; frequent ablutions and change of clothing are essential.

ITCH.—This arises from a little insect called the *acarus*, or *sarcoptes hominis*, which burrows and deposits its eggs in the skin. The itching, always severe when approaching the fire or getting warm in bed, often becomes intolerable; this irritation induces papillæ, which soon pass into vesicles, and finally into pustules, which break under the patient's scratching, and the poisonous lymph still further propagates the eruption, the face being the only part of the body free from attack. *Treatment*: After thoroughly washing the entire body with soap

and water, strong sulphur ointment, or one composed of 2 dr. of sulphur, 1 of carbonate of potash, and ½ dr. oil of bergamot, to 1 oz. of lard, should be well rubbed in. The ointment should remain on over night, and be removed in the morning by a warm bath and plenty of soap. 2 or 3 repetitions of this is generally sufficient.

ITCH, Barber's, or Sycosis.—Little pimples on the hairy parts of the face and nape of the neck, with matter at the top, and have the shaft of a hair passing through them; are of a pale yellowish color, and in a few days burst; the matter forms into hard, brownish crusts, which fall off in 1 or 2 weeks, leaving purplish, sluggish pimples behind, which disappear very slowly. *Treatment:* Shaving had better be discontinued and the beard merely cropped off with scissors; all intemperance in eating and drinking and exposure of the face to heat, must be avoided; a light, cool diet will do much toward curing the disease. The nitrate of mercury ointment, or the iodide of lead ointment, or carbolized oil (1 part carbolic acid to 10 of olive or linseed oil), with frequent sponging with carbolic acid soap suds, are useful applications.

ITCHING, or PRURITUS.—Caused by a morbid sensibility of the nervous system, similar to what exists in hysteria. No local disorder is perceptible; the skin retains its wonted appearance, yet its nervous excitability occasions unspeakable torment. *Treatment:* Tonics and anodynes are required; give 10 drops of Fowler's solution of arsenic, in ½ oz. of water, 3 times a day, after meals; and ½ dr. of McMunn's elixir of opium, in a little sweetened water, once in 3 days. Apply locally lemon juice or vinegar mixed with an equal quantity of water; or chloral hydrate, ½ dr.; water, 4 oz.; mix. *Homeopathic:* The free use of the flesh-brush over the body will often greatly relieve the suffering, or the warm bath and soap will be found beneficial. Bathing with dilute alcohol will often allay the irritation. A dry state of skin, with burning heat, give arsenic; if the itching begins and spreads while undressing, give nux vomica; worse at night and when warm in bed, give mercurius; a biting sensation, like ants creeping over the skin, give pulsatilla.

ITCH, Seven Years', or Prurigo.—Small pimples, almost the natural color of the skin, attended with great itching, at times so intense that those suffering from it scratch and tear themselves until the blood flows; usually worse towards evening. *Treatment:* Hot salt water and sulphur baths, or, when it can be had, the Turkish bath, with tonics and good, plain nourishing diet, with saline laxatives or cream of tartar and sulphur, to keep the bowels open. The itching can be much relieved by bathing with bran water, carbolic acid, soap-suds, etc. One of the following formulæ makes a good wash: 1. Glycerine, 4 oz.; carbolic acid, 1 dr.; ext. belladonna, 20 gr.; water, ½ oz.; mix. — 2. Camphor and chloral hydrate, of each, 1 dr.; rub together till it becomes liquid; then add cold cream, 2 oz., and make into an ointment.

JAUNDICE.—The most prominent symptoms are yellowness of the skin and whites of the eyes, saffron colored urine, and whitish or clay-colored stools, impaired appetite, a loathing of food, a bad condition of the stomach, sickness and vomiting, a bitter taste in the mouth, some stupor and a dull pain in the right side. *Treatment:* An emetic in the early stage will often break it up by restoring the functions of the liver, from the shock caused to it by vomiting; also, if the result of obstruction by a gall-stone, the relaxing effect on the duct may enable the stone to pass. 2 gr. of calomel with 20 gr. of carbonate of soda at bed-time, have the effect of promoting an increased secretion of bile, and are useful in this affection. In cases of slow recovery, 3 or 4 drops of nitro-muriatic acid will hasten recovery. The warm bath is excellent, and the acid bath, made by mixing 3 parts of muriatic acid with 2 of nitric acid, and adding as much of this mixture to water as will make it like weak vinegar, is valuable in obstinate cases. Only a quart of water need be used, and the solution applied with a sponge. *Homeopathic:* Pain in region of liver, skin very yellow, tongue thickly coated, clay colored feces, give mercurius; obstructed duct, as in gall-stone, nausea, and fullness and soreness of liver, give podophyllum; sour and bitter taste in the mouth, swelled belly, weak, faint spells and flashes of heat, give sulphur; high fever, scanty urine, with acute stitches in side, give aconite; Of a solution of 12 globules or three drops in 10 teaspoonfuls of water, give 2 teaspoonfuls every three hours; or 8 globules may be given dry on the tongue at a dose; in chronic cases, repeating the medicine night and morning will be sufficient; the diet advised under *Inflammation of the Liver*, will be found suitable in this disease.

KIDNEYS, Bright's Disease of.—So named from Dr. Bright, the first to draw attention to this singular affection, the chief characteristic of which is the presence in the urine voided from the bladder of a greater or less amount of albumen, separated from the blood. The symptoms are pain in the back and loins, at first slight and occasional, but becoming heavy, dull and settled, accompanied with restlessness and fever, loss of appetite, hectic flushes and general disturbance; these are succeeded by enlargement of the loins, swellings, and finally a state of general dropsy. Heat applied to the urine will at once indicate its character; for the albumen will become coagulated, and, according to the amount present, will be seen floating in the water. *Treatment:* A warm bath, followed by friction over the loins with weak mercurial ointment, containing 1 dr. of camphor to 1 oz. of ointment. The bowels also should be regulated by some gentle laxative, as ½ oz. cream of tartar dissolved in flaxseed tea, or the same amount of Rochelle or Epsom salts. When there is considerable debility, give 5 gr. of quinia every forenoon at 11 o'clock, and the same dose at bedtime; or, give from 10 to 20 drops of the muriated tinct. of iron 3 times a day, before meals. *Homeopathic:* During the febrile symptoms, give aconite; if complicated with pneumonia or bronchial symptoms, give phosphorus; burning pain in kidneys, running along in the ureters to the bladder, scanty, dark urine,

with constant desire to urinate, and burning pain in the bladder, give cantharides; dropsical swelling in rheumatic and gouty subjects, and white sediment in urine, give rhus toxicodendron. In acute cases it may be necessary to repeat the remedy every 3 hours, but in the chronic form it will be sufficient to give it night and morning. Dissolve 3 drops or 12 globules in $\frac{1}{2}$ of a tumbler water, and take 2 teaspoonfuls at a dose. In the inflammatory stage, the diet should be plain and simple; in the chronic form, the patient should be supported by a nourishing diet; well cooked tender beef, mutton chops, fowl, and fresh cooked vegetables, puddings, bread and milk, etc.; all alcoholic liquors should be strictly avoided; daily ablutions and frequent out-door exercise are highly commendable, but excesses of every kind should be avoided.

KIDNEYS, Inflammation of.—The acute form begins with cold chills and rigors, followed by fever and pain. The pain frequently extends to the bladder, the loins and the thighs. The urine is scanty, high-colored, sometimes bloody, and can only be passed drop by drop. In the loins is a sense of heat, gnawing and constriction; the bowels are either constipated, or relaxed by diarrhea. A numbness of the thigh, and drawing up of the testicle on the affected side, are marked and peculiar symptoms. In some cases there is further derangement of the stomach and bowels. The skin is hot and dry, pulse hard and frequent. In the chronic form there is a dull, heavy pain in the kidneys, with a sensation of weakness of the back; the water is passed often, and in small quantities; is sometimes white and milky, and, upon standing, deposits sediment. *Treatment:* Put the feet in a hot mustard bath, or mustard drafts upon them; apply a large mustard poultice upon the small of the back, and follow it up with hot fomentations of stramonium leaves and hops, or stramonium and wormwood or tansy; let perspiration be induced as soon as possible by 2 drops of tinct. of aconite root, repeated every hour; the bowels, if costive, must be opened by $\frac{1}{2}$ oz. of Epsom salts or cream of tartar, or by copious injections of warm water, containing 1 tablespoonful of salt to the quart. The drinks must be mucilaginous and diuretic. The marshmallow-root, slippery-elm bark, flaxseed, mullein, elder blows, are all valuable. If the disease is caused by gravel, 20 drops of liquor potassa largely diluted with flaxseed or juniper berry tea, will be serviceable. In the chronic form, infusions of buchu, uva ursi, or pepsissewa, may be freely used, and an alkaline sponge bath every day; over the kidneys apply frequent mustard plasters, or rub on a few drops of croton oil every few days. The food should be at first very light and farinaceous, then plain and nutritious, and exercise in the open air be taken; but avoid exposure to cold and dampness. *Homeopathic:* At first, when there is hot skin, quick pulse and intense thirst, give aconite; where there is throbbing sensation over kidneys, heavy feeling in loins, with chilliness, heat and perspiration alternating with each other, give mercurius; pains shooting from kidneys to bladder, appearing and disappearing suddenly, urine scanty and of a bright yellow color, give belladonna. In the acute stage, the remedy may be repeated every 2 hours until improvement sets in; then extend the time to 4 hours; dissolve 3 drops of the liquid or 12 globules in $\frac{1}{2}$ of a tumbler of water, and give 2 teaspoonfuls at a dose.

LEPROSY.—This terrible disease appears in circular, red, scaly patches, of various sizes, on the arms and legs, and sometimes on the breast and shoulders. The margin of the patch is generally the highest, reddest, and most scaly. The scales are sometimes of silvery whiteness. *Treatment:* This is very difficult to cure. Internally, arsenic in form of Fowler's or Donovan's solution, 8 to 15 drops thrice daily, should be continued until some constitutional effect is noticed. Bathing and friction with the hand should be practiced, and tar ointment, citrine ointment and a lotion of glycerine and carbolic acid, 1 dr. carb. acid to 2 oz. glycerine, should be applied, and the parts protected by covering them with rubber or gutta percha cloth.

LICHEN. — An affection of various forms. Small, round or pointed pimples, reddish or purplish, appear on the face, neck, etc., distinct or in clusters, accompanied with itching and tingling, followed by a slight scaly formation as they subside. In the form called "prickly heat" the eruption is not generally so prominent, but is usually of a bright red color, and very irritable. *Treatment:* In the first mentioned form, tonics and alteratives are frequently required. Fowler's solution of arsenic may be tried in 3 drop doses 3 times daily, omitting it occasionally if headache, nausea, diarrhea or puffiness of the face occur. The diet must be regulated; greasy food must be avoided, and $\frac{1}{2}$ oz. Epsom salts, or cream of tartar and sulphur, used if the bowels are constipated. For "prickly heat" use tepid salt-water baths, and sponge frequently with bran water, with a teaspoonful of bicarbonate of soda or borax to the pint, and 15 to 20 gr. of carbolic acid, when the irritation is severe.

LIGHTNING STROKE.—Never, during a storm of thunder and lightning, fly to the dangerous cover of a tree, pillar, hay-rick, wall or hedge. Also avoid the vicinity of metal objects; when in the house do not sit or stand near the windows, doors or walls, but place yourself in the middle of the room, unless there should be a lamp or chandelier hanging there; keep away from the neighborhood of fireplaces. *Treatment:* If a person is struck, immediately strip the body and throw bucketfuls of cold water over it for ten or fifteen minutes; continued frictions and inhalations of the lungs must also be employed.

LIVER, Inflammation of, or Hepatitis.—In the acute form, there is a dull pain in the right side below the rib, an inability to lie on the left side, pain in the right shoulder, and a sallow complexion. In the chronic form, its approaches are so gradual that it is difficult to determine its nature. It commences with all the symptoms of indigestion and ends with jaundice or dropsy. *Treatment:* Hot fomentations should be applied freely over the liver and a brisk saline cathartic, a tablespoonful of salts, or a salts and senna

draught, should be given, after which the bowels should be kept open daily by teaspoonful doses of Rochelle salts or rhubarb and soda, or magnesia, with cooling drinks, to allay feverishness and promote free action of the kidneys. Repeated blisters or mustard plasters may be used, with mineral acids and bitter tonics, during convalescence. The diet should be light, gradually improving as convalescence progresses. Should abcesses form, use warm poultices. In chronic cases, for the tenderness over the liver, apply mustard poultices and dry cups, and to move the bowels, give 2 gr. podophyllin in 1 oz. fl. extract of rhubarb and senna, of which give a teaspoonful, 3 times daily. Frictions over the stomach and liver with nitromuriatic acid, diluted to the strength of strong vinegar, and a foot bath of the same may be used. *Homeopathic*: A feeling of fullness and pain, with nausea and bilious vomiting, and bitter taste in the mouth, give podophyllum; violent fever, with stitches in the side, restlessness, anxiety, giddiness and headache, give aconite; tenderness over the liver, yellow skin, and inability to lie on the right side, give mercurius. In urgent cases, the remedy may be repeated every 2 hours, until improvement begins; then extend the time to 4 hours; dissolve 12 globules or 3 drops of the liquid in 8 dessert-spoonfuls of water, and take a spoonful at a dose; all greasy food should be avoided; rice, oatmeal, tapioca, plain puddings, simple toast, vegetables and fruits, should constitute the diet.

LOCKJAW, or TETANUS.—There are two varieties of this disease, the *traumatic* and *idiopathic*. Traumatic lockjaw is a very dangerous malady, and is usually caused by wounds, the irritation of splintered bones, and sometimes follows amputations. Idiopathic lockjaw proceeds from constitutional causes, and is far less dangerous than the former. It may arise from debility of the nervous system, and from affections of the brain. The disease commences with stiffness and pain in the neck and jaws as if from a cold; the voice is husky; there is difficulty in protruding the tongue, and in articulating; the muscles of the jaws and throat become rigid, with great difficulty in swallowing; a pain at the pit of the stomach succeeds these, shooting to the back, with difficulty of breathing; as the disease advances, the paroxysms become more frequent, the jaws locked, the breathing obstructed, and the patient dies from exhaustion or suffocation. *Treatment*: All wounds made by nails and other sharp instruments, especially in the bottom of the foot or in the palm of the hand, should not be allowed to heal up too quickly; such wounds should be thoroughly cleansed with a solution of chlorinated soda, 1 teaspoonful to 6 of water, and compresses, wet with the same, bound to the parts. When there is a foreign body in the wound, as dirt, rust, a splinter, or a piece of bone, it should at once be cut out.

LUNGS, Bleeding from, or Hemorrhage.—Let the patient at once go to bed, and keep perfectly quiet, avoiding movement of any kind as much as possible; the attendants should endeavor by their manner and conversation to cheer and encourage the patient; cloths wet with cold or ice water should be applied to the chest and throat, and small quantities of cold or iced water, or ice lemonade, or small bits of ice may be given; or he may swallow a little salt or vinegar; but under no circumstances must he have any warm drink, or be taken into a warm room. *Homeopathic*: During the attack, and for some time after, keep the patient perfectly quiet. And when the case is violent, tie a handkerchief around the upper part of the left arm as tightly as it can be borne, and another around the upper part of the right thigh; and if this does not arrest the bleeding, ligate the right arm and left thigh in the same way. So soon as the hemorrhage stops, loosen the bandages gradually. If there is much fullness of chest with palpitation of heart, restlessness, anxiety, and nervous excitability, give aconite; red flushed face, difficult breathing, pain between the shoulders, give ferrum; dry cough, especially at night, disturbed sleep, awaking with a wild, staring look, give hyoscyamus; congestion of the head and face, tickling in the throat with cough and bloody sputa, giddiness while stooping down or rising up, taking cold easily, give belladonna.

MERCURIAL DISEASE, or HYDRARGISM.—This results from the injudicious or excessive use of mercury, or exposure to the fumes of this metal. The common and leading symptoms are a disagreeable coppery taste; excessive salivation; sponginess, tumefaction, and ulceration of the gums; swollen tongue; loosening of the teeth; exfoliation of the jaws; remarkably offensive breath; debility; emaciation; ending, when not arrested, in death from exhaustion. *Treatment*: The principal remedy is iodide of potassium, 10 to 15 gr., 3 times a day; the following tonics are useful helps: 1. Iodide of potash, 4 dr.; comp. syrup of sarsaparilla, comp. tinct. of gentian, of each, 1 fl. oz.; mix; a teaspoonful before each meal.—2. Sulphate of quinia, reduced iron, of each 1 dr.; acetate of strychnia, 1 gr.; sufficient extract of gentian to make 60 pills; mix; 1 pill to be taken before each meal, and 1 at bedtime.

MORTIFICATION.—The part affected feels cold, moist, and inelastic; the skin becomes marked with dull purple spots; small blisters next rise, which eventually become black, and emit a fetid odor; a line of demarcation now appears; there is a rapid prostration of strength; the spirits are greatly depressed; the face looks care-worn; the pulse is small, quick and feeble; the body is covered with a cold perspiration; and an attack of hiccough, more or less loud, will proclaim approaching death; if the mortification is trifling in extent, constitutional disturbances are only slightly indicated. The mortification of old age, dry or senile gangrene, usually attacks the feet or the hands. A small black spot is first seen, which spreads over the entire part. *Treatment*: If the cause be inflammation, it must be treated as such; then tonics, bitters and a nourishing diet must be used; 3 gr. of quinine in 20 drops of the tincture of iron, or when quinine cannot be taken, the tincture of nux vomica should be given in 10

drop doses, with beef-tea, porter, ale, etc. Opium in grain doses, repeated as required; or chloral in 10 gr. doses, in like manner, may be necessary to relieve pain and quiet nervousness. To remove the stench, a charcoal and flaxseed poultice may be applied, with frequent cleansing by pouring over the part a weak solution of carbolic acid, 1 dr. to a pint of water. Keep the patient surrounded with an abundance of fresh air.

MOUTH. Inflammation of, or Stomatitis.—It begins with small red elevations, with minute, white, pearly points or vesicles on them, which soon break and allow serum to escape, leaving little rounded ulcers of grayish color, with more or less thickened edges, and surrounded with redness; they appear first on the inner surface of the lips and gums, and then on the cheeks, edges of the tongue, and soft palate; in severe cases, there is often fever, thirst, nausea, and vomiting, offensive breath, and high-colored urine, with constipated bowels or diarrhœa; in the milder attacks, some, or all, of these may exist in a mild degree; it may last but a few days or continue for weeks. *Treatment:* In mild attacks, all that may be required is to regulate the diet, and gargle or wash the mouth with infusions of elm-bark, flaxseed, marshmallow, or quince seeds, to which 1 dr. to the pt. of chlorate of potash solution is added, and touching the ulcers occasionally with a mixture of one part borax to two of honey; or prepared chalk rubbed up in glycerine to the consistence of a thin paste. If the bowels are costive, ½ oz. of Epsom or Rochelle salts may be given, or 10 gr. of rhubarb, with twice as much magnesia. In severe cases, or where the ulcers prove obstinate, a gargle may be used of 2 dr. of chlorate of potash in 4 oz. of water, and 1 teaspoonful of it given internally, 4 to 5 times daily; the ulcers may be touched occasionally with the solid nitrate of silver (lunar caustic), or with alum in substance, and quinine, 3 gr. in 10 drops tincture of iron, given 3 times daily, and even stimulants, as wine-whey, milk-punch, brandy and eggs.

NERVOUSNESS.—The derangement of health, and the complication of disagreeable sensations which are popularly described under this name, are indicative of the vital system being out of order, that its energies are failing or overtasked, and that the functions of some of its organs are languidly or imperfectly performed. *Treatment:* This consists mainly in restoring the healthy action of the stomach and bowels, and in the use of proper exercise. The stomach should not be overloaded with indigestible food, and the bowels should be occasionally relieved by the use of a mild aperient, in the following form: Bicarbonate of soda, 1 dr.; powdered rhubarb, ½ oz.; essence of peppermint, 2 fl. dr.; enough water to make 4 fl. oz.; a tablespoonful every 4 hours, until the bowels are free. Milk with lime water should be the food 3 times a day, till cured; celery is another good cure, taken as much as desired, green or cooked.

NETTLE-RASH.—An eruption of round red or white elevated patches, attended with intense burning, itching and tingling; sometimes it continues in one place for hours, but more frequently it disappears in a few minutes, and again makes its appearance in some other place. *Treatment:* If caused by anything eaten, give an emetic, or a brisk saline cathartic, ½ oz. of Epsom salts or citrate of magnesia, preceded, if there be torpid condition of the liver, with 3 gr. of blue-mass, or 1 gr. of calomel and 10 gr. of bicarbonate of soda; or in children, 2 or 3 gr. of mercury with chalk, followed with 1 dr. each of rhubarb and magnesia, or of magnesia and charcoal. A warm salt-water bath, or sponging with vinegar and water, glycerine and rose-water, 1 part to 6, or bran-water and bicarbonate of soda, or strong carbolic acid soap-suds, will relieve the itching. The diet must be regulated, and the tonic effect of quinine, 2 gr. repeated 3 times a day, may be used to prevent a return of it. *Homeopathic:* Aconite will give relief when the rash is due to a chill; a drop dose every 2 or 3 hours; pulsatilla when either digestion or menstruation are at fault; dose as for aconite; rhus when the itching is excessive, worse in bed and the patient rheumatic; dose as for aconite; Sponge the skin with hot water, or take a warm bath, if it is not too soon after a meal; after the attack, all exciting causes must be inquired into and removed; Turkish baths will prevent the recurrence of attacks; the chronic form of nettle-rash should be treated by a medical practitioner, as there is sometimes a history of gout traceable.

NEURALGIA. — Acute, shooting or darting pains. The pain can always be distinguished from any other by being neither augmented by motion nor relieved by rest, and by being unaffected by pressure, unless, as sometimes occurs, inflammation should exist at the same time. It may affect any of the sensitive nerves, and has received different names according to the seat of it. Thus, tic doulloureux is facial neuralgia; hemicrania, that affecting the side of the head; sciatica, that of the hip; pleurodynia, of the pleura; and gastrodynia, of the stomach. *Treatment:* When from a local cause, as in tic doulloureux, sometimes upon decay of the teeth, the cause must be removed. Laudanum, tincture of arnica, or tincture of aconite root, may be applied by saturating a cloth with them, and applying over the seat of pain, covered with oiled silk to prevent evaporation; chloroform may be in like manner applied. Mustard plasters, and flannels steeped in hot water, will often give prompt relief. In obstinate cases a blister may be applied, and the blistered surface sprinkled with 1 gr. acetate of morphia; or ¼ gr. morphia in solution may be injected hypodermically. The inhalation of ether and chloroform may also be resorted to. Of internal anodynes none are superior to belladonna. Opium and belladonna may be given conjointly in doses of ½ to 1 gr. of opium and ½ to ¼ gr. of belladonna every hour, until some effect is produced, when the time may be lengthened. Quinine, iron and strychnine are a most efficient tonic combination taken in the following form: Sulphate of quinia, reduced iron, of each 1 dr.; sulphate of strychnia, 1 gr.; enough ext. of gentian to make 60 pills; take 1 pill before each meal, and also at bed time. Generous diet, change of air, and sea bathing,

etc., will assist in curing this; great benefit is at times derived from covering the part with carded cotton, and then enveloping in flannel bandages; also, by cutting a thick slice of bread, soaking one side for a minute in boiling water, and rapidly sprinkling cayenne pepper over the hot side; apply, while still smoking hot, to the painful surface. The operation of acupuncture is very efficacious in some cases of neuralgia; this is done by running in 5 or 6 needles with a rotatory motion. *Homeopathic:* Cutting and tearing pains, worse in the afternoon, with convulsive jerkings and intolerance of noise and light, give belladonna; if the part is hot and red, with febrile symptoms, anxiety, giddiness and restlessness, give aconite; nervous symptoms, intolerable pain with despairing feelings, twitching of muscles, delirious, continually talking, with eyes wide open, give stramonium. In acute cases and where the suffering is great, repeat the medicine every hour until relief is obtained; then extend the time to 3 hours, or as the case may require; of a solution of 12 globules or 3 drops in 12 teaspoonfuls of water.

NIGHTMARE.—The symptoms are generally well understood, and they are caused by the effects of too hearty or indigestible suppers eaten too short a while before going to bed. *Treatment:* This must be mainly preventive. The diet should be simple and well regulated, and the supper light, and the evening spent in some pleasant recreation or amusement; avoid sleeping on the back or in constrained, uneasy positions; the bowels should be kept regular by mild laxatives when required, and as much outdoor exercise as possible taken.

NOSTRILS, Diseases of.—1. (*Imperforate Nostrils.*) The nostrils are sometimes imperforate, owing to congenital malformation. *Treatment:* The passage may be restored by a cautious incision, and must be kept open with bougies. If, however, the obstruction be seated far back, it ought not to be meddled with.—2. (*Rhinorrhœa or Ozæna.*) A purulent or sanious discharge from one or both nostrils; it is but a symptom, and it will be necessary to consider the diseased conditions on which it may depend. *Treatment:* Remove to a dry, bracing atmosphere; take aperients, bark with mineral acid, and inhalation every evening of the steam of boiling water, to which 20 or 30 drops of creosote have been added.—3. (*Scrofulous Rhinorrhœa.*) Generally begins in early life, and depends on inflammation or ulceration of the mucous membrane. *Treatment:* Use a large syringe daily to wash out all clots and collections of matter with a copious stream of warm water, to which a little chloride of zinc may be added; a leech or two should be applied to the inside of the nostril if the bridge of the nose is tender, or if there are any marks of obstruction about the lachrymal duct; the citrine ointment, 1 dr. mixed with 1 fl. oz. of warm liquid lard, may be applied by a camel's hair brush, and bark, iodide of potassium, cod-liver oil, and other anti-scrofulous remedies administered in tedious cases.—4. (*Syphilitic Ozæna.*) The presence of foreign bodies should always be inquired into in any case of discharge from the nostrils; the examination may be facilitated by chloroform, and by the ear speculum, or dilating the nostrils with forceps.

ONANISM, or MASTURBATION.—A habit generally formed in early life, about the age of puberty, and taught by the older to the younger, by the guilty to the innocent. Youth know not the evil consequences of this vice, and must be watched and taught to shun the practice; it must be prevented, or broken up in its incipiency, by timely instruction and proper management; if it is once firmly established, it will be extremely difficult to eradicate. The practice is often produced by uncleanliness, or irritating eruptions. *Treatment:* Abandon at once the practice that has induced the emissions; the patient should restrain his thoughts from all lascivious subjects, and avoid the reading of all books that tend in any way whatever to excite this passion; he should make use of frequent ablutions, and take regular active exercise in the open air, sleep on a hard bed or mattress in a well-ventilated room, and rise early in the morning; the diet should be plain but nutritious; very little animal food should be taken, and no stimulating condiments used; the suppers should be light and early; all stimulating drinks of whatever kind, even tea and coffee, should be strictly avoided, as well as tobacco in all its forms.

OPIUM HABIT.—Opium holds its victims with a power well-nigh resistless. No other drug can compare with it in this respect; and no other has yet been discovered to take its place. *Treatment:* Where this habit has existed for a comparatively brief period and patients are young and strong, the best plan is to stop it at once, and sustain the strength with food and tonics until recovery; where the habit has been existing several years, and the patients are old and weak, such a course would be highly dangerous, and might prove fatal. These should adopt a gradual and systematic reduction of the opiate dose, supplying its place as much as possible, with a tonic in one of the following forms: 1. Take sulphate of strychnia, 1 gr.; water, 2 fl. oz.; simple syrup, 6 fl. oz.; mix, and take 1 teaspoonful 3 times a day.—2. Sulphate of quinia, 30 gr.; dilute sulphuric acid, 10 drops; water, 2 fl. oz.; tinct. of chloride of iron, 2 fl. dr.; mix, and take 1 teaspoonful 3 times a day. Chloral hydrate in ½ dr. doses, or bromide of potassium, with the same dose, or tinct. of hyoscyamus in the dose of 1 fl. dr., are used occasionally to quiet the nerves and produce sleep. The chief curative agent is a determined will. "They that endure to the end, shall be saved."

PARALYSIS, or PALSY.—This may involve the power of motion or feeling, or of both, in the whole body, or may be partial or local, affecting certain portions only. The following are among the most frequent varieties: *Hemiplegia:* Palsy affecting one entire side of the body; *Paraplegia:* Palsy of the lower half of the body, chiefly affecting the legs and leaving the rest of the body free; *Palsy of the Face:* In which there is loss of motion or sensation in certain muscles, according to the nerves affected, and giving rise sometimes to muscular twitchings, especially during eating and speaking; strabismus or

squinting, in which one or both eyes may be drawn from their proper line of vision, is sometimes present, as a symptom in this complaint. The most severe paralytic strokes occur without the slightest appreciable warning or suspicion as to their approach. A non-professional could form an opinion as to a probable fit of palsy only by constant headache, confusion of ideas, loss of memory, impaired vision, deafness, constant drowsiness, and a pricking sensation in that part about to be attacked. *Treatment:* A sudden and severe attack of palsy requires the same treatment as apoplexy (see *Apoplexy*). When the bowels are obstinately constipated, the compound cathartic, or compound colocynth pill, or even croton oil, with stimulating injections, may be necessary; when the bladder is affected, there is often a painful retention of the urine; in such cases use the catheter twice a day; when there is suppression of the secretion, draughts of linseed tea, with 5 gr. of nitre and 10 drops of tincture of cantharides should be given 3 times a day. When the inflammatory symptoms have subsided, and in cases of marked debility from the beginning, strychnia, cautiously used, may be tried; strychnia 2 gr.; extract belladonna 8 gr., with extract of gentian and conserve of roses enough to make into 50 pills, may be used in doses of 1 pill 4 times daily. In some cases, electricity is useful. In local paralysis, use the following formula: Sulphate of strychnia, 2 gr.; chloroform, 1 oz.; mix; apply half, night and morning, by brisk friction to the part. *Homeopathic:* Partial palsy of face and limbs, giddiness, weak eyesight and memory, and noise in the ears, give nux vomica; head congested with blood, spasm on one side of the body, palsy of face, give belladonna; loss of motion, but not of sensation, palsy of throat and eyelids, give gelseminum. In administration, in acute cases, dissolve 12 globules or 3 drops of the dilution in 10 teaspoonfuls of water, and give 2 teaspoonfuls every 3 hours; in the chronic form, 8 globules may be given once a day for a week, then omit for a few days.

PEMPHIGUS, or POMPHOLIX.—Large blisters, from the size of a pea to an inch or more in diameter, form on almost any part of the body, and break in a day or two, leaving a raw surface, which soon becomes covered with a thin crust; the eruption is generally preceded with feverishness for a day or two, and itching of the skin. *Treatment:* Good diet and tonics, with frequent bathings; the blisters should be punctured to allow escape of the water they contain, without removing the skin, and water dressings, or weak lead water and laudanum, and, later, the ointment of oxide of zinc should be applied.

PLAGUE.—The symptoms are of two orders, local and general; in severe cases, the general symptoms precede the local; the patient is suddenly seized with high fever, which, in some instances, is ushered in by a prolonged shivering fit; the pulse beats 130, or even more, and the temperature of the body rises to above 107.6° F. The nervous agitation which sometimes ushers in the attack is a very remarkable symptom; it is a prolonged, regular shake, lasting from six hours to three days. In the usual course of plague, however, the local precede the general symptoms; the patient first complains of pain in the groin, the armpit, or the neck, and a swelling is found there, which rapidly increases and usually suppurates by the seventh or eighth day; at the same time carbuncles may show themselves, and in bad cases petechiæ, purple spots. *Treatment:* Support the patient's strength as much as possible and sometimes nature will conquer.

PLEURISY.—The symptoms are most frequently shiverings, succeeded by high fever, with a peculiarly hard, resisting pulse, sharp, stabbing pain in the side, generally just below the nipple, but sometimes extending back, hurried and interrupted breathing, short, dry cough; the pain is considerably aggravated by motion, coughing, or an attempt to take a long breath; the patient lies upon his back or well side, his countenance full of anxiety, fearing motion, often crying out from the torture; later, he will prefer to lie on the diseased side, as this leaves the healthy one more free for breathing. *Treatment:* The entire affected side should be covered with a fomentation of a sufficiently large flannel wrung out of hot mustard water. After a brisk cathartic, as 3 or 4 compound cathartic pills, or senna and salts, a hypodermic injection of ¼ gr. of sulphate of morphia in ½ dr. of hot water should be administered under the skin of the arm, and tartar emetic given in 1-10 gr. doses every 3 hours. To procure sleep, and at the same time promote sweating, Dover's powders may be given in 8 gr. doses twice a day. As soon as the heat of the skin has subsided, if the pain continues, a large blister may be applied, and if necessary, may be repeated with excellent effect. *Homeopathic:* Give aconite for the chills, a drop dose every 2 hours, followed by bryonia for the catching pain in the side; they can be alternated, especially during the feverish symptoms. Hot fomentations to the side are absolutely necessary; the patient should be kept in bed, on a light diet, without stimulants; when there is effusion of fluid in the chest cavity (which is indicated by greater distress of breathing, bulging of the affected side, and a dull sound, if on the left side, when tapping the chest walls), such a condition requires medical advice.

PNEUMONIA, or LUNG FEVER.—The symptoms are pain in the chest and difficulty of breathing, cold chills, headache, thirst, and all the general indications of fever, attended with heat of the surface of the chest, great debility, anxiety, and a dry, hard cough; the tongue is furred, and the pulse quick and small; about the third or fourth day a reddish, or rusty colored expectoration takes place, when the cough loses its hard, dry sound, and becomes loose. *Treatment:* A full dose of Epsom salts or citrate of magnesia should be given to unload the bowels. Tartar emetic, in ½ gr. doses, may be given every 2 hours, until the pulse is brought down and the fever abated, and then ½ dr. doses of wine of ipecac substituted; mustard plasters may be applied over the chest, and repeated, or alternated with some stimulating liniment; or, the chest may be covered with a hot poultice. If the cough is troublesome, some simple cough mix-

ture may be used, as paregoric, syrup of squill, mucilage of gum Arabic, of each 1 oz.; mix; take a teaspoonful 3 or 4 times a day; the diet during the earlier or febrile state should be light and unstimulating, consisting mainly of weak broths and gruels; as the disease progresses and the strength of the patient indicates, it should be increased; later, when the expectoration is free, tonics and even stimulants may be required; when in the progress of the ease, the inflammation assumes a typhoid form, a sustaining treatment and stimulants may be required. *Homeopathic:* Give aconite at the outset, a drop dose every 2 hours, when there are chills and dry cough, also when the chills give place to the feverish symptoms; then it can be alternated with phosphorus, indicated by difficulty of breathing, pain in the chest, and rusty or plum-colored expectoration; a drop dose every 2 hours; bryonia may be given when there is much pain in the side, and if the complexion looks yellow, a drop dose every 3 hours; antimonium tart., when the cough is looser, but the phlegm causes a suffocating feeling; a drop every 3 hours.

POISONING.—When a person is discovered to have swallowed poison, unless vomiting has already occurred, empty the stomach by an emetic that can be most readily and quickly obtained, and is prompt and energetic, but safe in its action; for this purpose, there is, perhaps, nothing better than a large teaspoonful of ground mustard in a tumblerful of warm water. If the mustard is not at hand give 2 or 3 teaspoonfuls of powdered alum in syrup or molasses, and give freely of warm water to drink; or give 20 gr. of sulphate of zinc (white vitriol), or of ipecac, in a large cup of warm water and tickle the throat with the finger, or with the feather end of a quill; copious draughts of warm water or mucilaginous fluids should be given to keep vomiting up until the poisonous substances have been thoroughly evacuated, and then suitable antidotes should be given. If vomiting cannot be produced, the stomach pump should be used; if a stomach pump cannot be procured, the following means may sometimes be advantageously resorted to: Pass into the stomach one end of a piece of rubber gas tubing, 2½ to 3 feet long, and holding the other end above the level of the mouth, pour in water until the stomach and the tube are filled with it, when by suddenly lowering the end of the tube below the level of the stomach the water will flow out, and empty the stomach; repeat as often as may be required; then treat the case according to the following directions (*look the list through, if not instantly found*):

Acids.—The symptoms of poisoning by acids are intense, burning pain in throat, mouth and stomach, vomitings of highly acid fluids, mixed with blood, purging, sinking, and, if not relieved, stupor and death. For poisoning by such acids as *acetic, citric, muriatic, nitric, oxalic, sulphuric, tartaric*, etc., give either of the following to neutralize: 1. Warm soapsuds. — 2. Magnesia in water.—3. Powdered chalk, mixed in warm water. — 4. Wood-ashes, soda, potash, gruel, linseed tea, or rice-water. Carbolic acid is neutralized by saccharate of lime.

Acid, Prussic or Hydrocyanic, Laurel Water, Cyanide of Potassium, Bitter Almond Oil, etc.—One of the results of poisoning by these fatal drugs, is a peculiar odor of the breath. Weak solution of chloride of lime or soda, or spirits of hartshorn largely diluted, may be given and the vapor of the latter cautiously inhaled; give a cold affusion, and chloroform in ½ to teaspoonful doses in glycerine or mucilage, repeated every few minutes until the symptoms are ameliorated. Artificial respiration may aid recovery.

Aconite.—For poisoning by this and other *Acronarcotics*, such as *Arnica, Colchicum, Conium, Digitalis, Ergot, Gelseminum, Helleborus, Hyoscyamus, Veratrum*, etc., evacuate the stomach at once; give strong *coffee*, or dilute *vinegar;* large injections of soup and water, or of salt and gruel, should be given to clear the bowels and assist in getting rid of the poison.

Alcohol, Brandy, and other Spirituous Liquors.—After emptying the stomach, pour cold water on the head and back of the neck, rub or slap the wrists and palm, and the ankles and soles of the feet, and give strong, hot coffee, or aromatic spirits of hartshorn, in teaspoonful doses in water. The warmth of the body must be sustained.

Alkalies and Their Salts, such as Concentrated Lye, Wood Ash Lye, Caustic Potash, Ammonia and Hartshorn.—The symptoms of poisoning by these are a caustic, acrid taste, excessive heat in the throat, stomach and intestines, vomiting of bloody matter, cold sweats, hiccough, purging of bloody stools. Use, 1. Dilute vinegar. — 2. Lemonade. — 3. Sour milk. — 4. Mucilaginous drinks. — 5. Sweet-oil.

Amylene.—The same as for chloroform.

Antimony and its Preparations, such as Tartar Emetic, Antimonial Wine, and Kerme's Mineral.—Astringent infusions, such as of gall, oak-bark, Peruvian bark, etc., act as antidotes and should be given promptly; or very strong green tea; to stop the vomiting, apply mustard to the pit of the stomach and give by the mouth or hypodermic injection, ¼ gr. of morphia.

Arnica.—(See *Aconite.*)

Arsenic and its Preparations, such as Ratsbane, Fowler's Solution, etc.— Tincture of chloride of iron, 1 dr.; bicarbonate of soda or potash, the same; tepid water, a teacupful; mix. The mixture may be given almost *ad libitum.*

Belladonna, or Deadly Nightshade.—There is no known antidote; give a prompt emetic, and brandy, opium, and strong coffee to sustain the strength.

Bismuth.—Albumen, milk, sugar and mucilaginous drinks.

Bites and Stings.—(See this head in *Surgery.*)

Brucia.—(See *Strychnine and Nux Vomica.*)

Calabar Bean.—Give emetics and hypodermic doses of atropia, 1-60 gr. in ¼ dr. of warm water.

Camphor. — Emetics, stimulants, wine and opium.

Cantharides.—Emetics, white of eggs, castor oil, gruel, demulcent drinks, and full doses of camphor,

Chloral Hydrate.—Keep the body and extremities warm; use artificial respiration, if necessary; give strychnia hypodermically, 1-30 to 1-20 gr. every hour; try electricity to neck and pit of stomach; also strong coffee.

Chloroform.—Invert the body (standing the patient on his head), keep the mouth open and the tongue out; use artificial respiration; also galvanism and stimulants to spine.

Chromium.—Carbonate of magnesia or chalk in milk, albumen, or water.

Cobalt, or Fly Powder.—Give an emetic, followed by the free administration of milk, eggs, wheat-flour and water, and mucilaginous drinks.

Cocculus Indicus.—Give emetics, mucilaginous drinks and stimulants.

Colchicum.—(See *Aconite.*)

Copper or Blue Vitriol, Verdigris or Pickles, or Food Cooked in Foul Copper Vessels.—Give large doses of simple syrup as warm as can be swallowed, until the stomach rejects the amount it contains; also the whites of eggs and large quantities of milk.

Croton Oil.—Give opium, stimulants, demulcent drinks, and external counter-irritation.

Digitalis or Foxglove.—(See *Aconite.*)

Ergot.—(See *Aconite.*)

Ether.—Expose the patient to a current of air; give a cold affusion; use artificial respiration.

Gelseminum or Yellow Jessamine.—(See *Aconite.*)

Gold and its Preparations.—Give sulphate of iron and mucilaginous drinks.

Hellebore, Indian Poke, or Veratrum.—(See *Aconite.*)

Hemlock.—(See *Aconite.*)

Henbane, or Hyoscyamus.—(See *Aconite.*)

Indigo, Sulphate of.—Give magnesia and milk.

Iodine.—Free emetic, prompt administration of starch, wheat flour, or arrow-root, beat up in water.

Iron, Chloride and Sulphate of.—Give magnesia and copious diluent drinks.

Lead Preparations, such as Acetate of Lead, Sugar of Lead, Dry White Lead, Red Lead, Litharge or Pickles, Wine or Vinegar sweetened by Lead.—Give alum in water, 1½ oz. to a qt.; or Epsom salts or glauber salts, 1 oz. of either in a qt. of water; or dilute sulphuric acid, a teaspoonful to a qt. of water; if a large quantity of sugar of lead has been recently taken, empty the stomach by an emetic of sulphate of zinc.

Lobelia.—Give emetics, purgatives, stimulants, and anodynes.

Mercury Preparations, such as Corrosive Sublimate (frequently found in Bug Poisons), Red Precipitate, and Chinese or English Vermilion.—If vomiting does not already exist, an emetic must be given immediately, the whites of eggs in continuous large doses, and infusion of catechu afterwards, sweet milk, mixtures of flour and water in successive cupfuls, and, to check excessive salivation, put ½ oz. of chlorate of potash in a tumbler of water, and use freely as a gargle, and swallow a tablespoonful every hour or two.

Methylene, Bichloride of.—(See *Chloroform.*)

Mushrooms.—Give emetics and ½ dr. doses of chloroform every hour till relief.

Opium and its Preparations, such as Morphine, Laudanum, Paregoric, together with Soothing Syrups, and Godfrey's Cordial.—Empty the stomach; give very strong coffee without milk; put mustard plasters on the wrists and ankles; use the cold douche to the head and chest; if the patient is cold and sinking, give brandy, or whisky, and ammonia; belladonna may be given in doses of ½ to 1 teaspoonful of the tincture, or 2 grains of the extract, every 20 minutes, until some effect is observed in causing the pupils to expand; use warmth and friction, and if possible prevent sleep for some hours by walking the patient about, and if necessary switches may be freely used; as a last resort use artificial respiration. Galvanism may also be tried.

Phosphorus.—An emetic should be promptly given; also copious draughts containing magnesia in suspension, and mucilaginous drinks; follow the general treatment for inflammatory symptoms.

Poison Oak.—Bruise slightly a handful of white ash leaves; add new milk enough to cover; simmer 10 minutes, and apply as hot as can be borne 3 times a day. Use Labarraque's solution of chloride of soda; when the skin is unbroken it may be used clear 3 or 4 times a day; in other cases dilute with 3 to 6 parts of water.

Shell Fish.—(See *Mushrooms.*)

Silver, Nitrate of, or Lunar Caustic.—Give freely of a solution of common salt in water, which decomposes the poison, and afterwards flaxseed or elm-bark tea, and after a while, a dose of castor oil.

Stramonium.—1. Coffee.—2. Vinegar.—3. Lemonade. Give in large quantities.

Strychnine and Nux Vomica.—Give, if obtainable, 1 oz. or more of bone charcoal mixed with water, and follow with an active emetic; then give chloroform in teaspoonful doses, in flour and water or glycerine, every few minutes while the spasms last, and afterwards brandy and stimulants, and warm the extremities if necessary; freely and promptly administer oil, melted butter or lard.

Tin Preparations, such as Chloride of Tin, Solution of Tin and Oxide of Tin or Putty Powder.—Empty the stomach, and give whites of eggs in water, milk in large quantities, or flour beaten up in water, with magnesia or chalk.

Tobacco.—After the stomach is empty apply mustard to the abdomen and to the extremities, and give strong coffee with brandy and other stimulants, with warmth to the extremities.

Woorara, or Curara.—Suck the wound immediately, or cut it out and tie a cord around the limb, between the wound and the heart; apply iodine, or iodide of potassium, and give it internally, and try artificial respiration.

Zinc Preparations, such as Oxide of Zinc, Sulphate of Zinc, White Vitriol, Acetate of Zinc, etc.—The vomiting may be relieved by copious draughts of warm water; carbonate of

soda, administered in solution, will decompose the sulphate of zinc; milk and albumen also act as antidotes.

POX, Chicken.—An eruptive disease, consisting of smooth, semi-transparent vesicles, of various sizes, which become white and straw colored, and about the fourth day break and scale off, without leaving any permanent mark behind them; in hot weather the discharge sometimes becomes purulent, and at others the eruption is attended with considerable fever. *Treatment*: Adopt a light, vegetable diet, and administer mild saline aperients and cooling drinks.

POX, Cow.—This is the usually mild form of disease that follows vaccination. (See *Vaccination* in HYGIENE.) In case the inflammation of the part becomes excessive, or very painful, it should be kept down by alcoholic lotions.

POX, Small.—This comes on with the usual symptoms of inflammatory fever; about the third day red spots, resembling flea-bites, make their appearance on the face and head, and gradually extend over the whole body; about the fifth day small circular vesicles, depressed in the centre, surrounded by an areola, and containing a colorless fluid, begin to form, when the feverish symptoms abate; about the sixth day the throat becomes sore; about the eighth day the face is swollen, and about the eleventh day the pustules acquire the size of a pea, and cease to enlarge, the matter which they contain becomes opaque and yellow, a dark central spot forms on each, the swelling of the face subsides, and secondary symptoms of fever come on; the pustules become rough, break and scab over, and a dark spot remains for some days, often followed by permanent indentations. At the end of the sixteenth or eighteenth day the symptoms usually disappear. In the confluent small-pox, a severer form of the disease, the pustules coalesce, the eruption is irregular in its progress, and the inflammatory symptoms more severe. *Treatment*: As soon as the febrile symptoms become marked the patient should take ½ oz. of Epsom salts, and after their operation ½ dr. of sweet spirits of nitre 3 times a day; place the patient on a mattress, in a cool and well-ventilated apartment, and antiseptic cooling drinks should be freely administered; when the convulsions occur, or great irritability exists, small doses of morphine, opium, or camphor may be administered, and obstinate vomiting arrested by effervescing saline draughts; when the skin is pale and cold, the pulse weak, and the eruption languidly developed, the warm or tepid bath is often serviceable; paint over the face a solution of India rubber in chloroform; the latter quickly evaporates, and an elastic film of India rubber remains, which almost entirely removes the itchiness of the pustules and prevents pitting. Warm sea-bathing tends to remove the marks, whether recent or old. *Homœopathic*: begin with aconite during the primary fever; if this drug does not lower the pulse, or cause the skin to act, at once resort to veratrum viride in the first decimal dilution; drop doses every hour until perspiration breaks out; antimonium tart. will be required when the eruption comes out, alternated with veratrum viride when the pulse rises during the pustular stage; a dose every 3 hours; belladonna controls brain symptoms and inflammation of the eyes; a dose every 2 or 3 hours; mercurius should be used if the throat is much inflamed, the glands of the neck enlarged, or dysenteric diarrhœa comes on; a dose every 3 hours; sulphur will close the treatment when the pustules dry up and scabs form; a dose every 4 hours.

PURPURA (Purpura Hemorrhagica). — This affection is characterized by a spotted eruption. The spots are owing to extravasations of blood under the skin or membranes of the body. There may be bleeding also into its different cavities, and through its outlets. This disease is very similar to, but not identical with scurvy. Similar spots exist in both these diseases; also in spotted fever, or cerebro-spinal meningitis; and indeed in low states of typhus and typhoid fevers, and in many other diseases. *Treatment*: Doses of lemon-juice, or dilute sulphuric acid, 10 drops 4 times a day, with nourishing diet, including a liberal allowance of fruit and vegetables, comprise the principal means of cure. Ergot internally, in ½ dr. doses of the fl. ext. every hour, and the local application of persulphate of iron are valuable remedies for the bleeding.

RHEUMATISM, Acute. — The symptoms are high fever, sometimes preceded by shiverings, with a full bounding pulse, furred tongue, profuse sweat, which has a sour smell; scanty and high-colored urine, with brick-dust sediment; and swelling of the joints, with slight redness, great tenderness and pain, which is particularly agonizing when the patient attempts to move; it often changes suddenly from one part of the body to another, and sometimes attacks different portions at the same time, sometimes the heart, causing serious and even fatal consequences. *Treatment*: Open the bowels freely with calomel, aloes, and rhubarb, 10 gr. of each; keep them open by repeated small doses of Rochelle or Epsom salts; give 15 gr. each of the nitrate and bicarbonate of potash every 3 or 4 hours, with 20 drops of laudanum, to ease the pain; bathe the swollen joints with some active, penetrating liniment, as 3 parts volatile liniment and 1 part each of chloroform, tincture of arnica and of aconite root, and then cover with raw or carded cotton and surround with a woolen roller bandage; lemon juice in tablespoonful doses 3 or 4 times daily has been found highly useful in some cases; also salicine or salicylate of soda, 15 gr. 3 times a day, or quinine, 5 gr. twice a day. Flannel should be worn next the skin, the feet kept warm and dry, and all exposure to wet and cold avoided. Kerosene oil is a good local application, 1 pt. to 2 oz. of aqua ammonia. Another good local application is made as follows: Take a pint of the spirits of turpentine, to which add ½ oz. of camphor; let it stand till the camphor is dissolved; then rub it on the part affected. *Homeopathic*: Aconite should commence the treatment, a drop dose every 2 or 3 hours, followed by bryonia, given in alternate doses every 2 hours, abandoning the aconite occasionally when the fever does not run so high.

RHEUMATISM, Chronic. — More common in

persons of advanced age. There is little or no fever, but it usually lasts a long time, and causes much suffering. There are stiffness and lameness, after being at rest, and inability to move, at first, without pain, but usually this disappears as soon as the patient grows warm with exercise. There is not generally as much swelling in the joints as in the acute form. *Treatment*: Surround the part with a large, hot bran poultice, made with a strong decoction of hops, or of arnica, or laudanum may be liberally added before applying; occasionally benefit is derived from sprinkling it freely with mustard, or the poultice may be preceded by the liberal application of an embrocation of equal parts of camphorated oil, hartshorn, chloroform and laudanum; or equal parts of opodeldoc, arnica, laudanum and chloroform, well rubbed in; renew this 3 times a day; regulate the bowels with ½ oz. of Epsom salts or take a compound rhubarb or a compound colocynth pill and 2 tablespoonfuls of the following mixture, every 4 hours: 1 dr. of powdered guaiacum; 6 dr. ammoniated tincture of guaiacum; 1 dr. of powdered gum Arabic; 5 oz. of camphor mixture; mix the gum Arabic and guaiacum in a mortar, and make into an emulsion with a little of the camphor water; add the tincture; shake well together, and finally mix the rest of the camphor water to make a 6 oz. mixture. Or iodide of potash in doses of 10 gr. 3 or 4 times daily, in a tablespoonful of syrup of sarsaparilla, or a wineglassful of the compound decoction, to which 20 drops of the wine of colchicum has been added. Another remedy is electro-magnetism or galvanism; and still another is the Turkish bath. Wrapping rheumatic joints in carded cotton, and surrounding this with flannel bandages, is often beneficial in obstinate and long-continued cases. Celery cut into bits, boiled in water until soft, and the water drank by the patient, is a good remedy. Another: Put new milk, with a little flour and nutmeg, into a saucepan with the boiled celery; serve it warm with pieces of toast; eat it with potatoes, and the ailment may soon yield. *Homeopathic*: Bryonia will suit cases that are improved by warmth, increased by movement, accompanied by gastric derangement; a drop dose every 4 hours; rhus is indicated when the pain is worse during rest or on first moving the affected part, and generally aggravated by the warmth of the bed, but not always; a drop dose 3 times daily; pulsatilla should be taken when the pains wander about much, and when the feet, hands and hip joints are chiefly affected; a drop dose 3 times daily; sulphur should be taken at bed-time when the pains are worse at night, when the skin is dry and harsh, and if perspiration or eruptions of skin have been suppressed; 2 gr. dry on tongue night and morning.

RHEUMATISM. Of the Loins. or Lumbago.—It is distinguished from inflammation of the kidneys, by the pain being aggravated on stooping. *Treatment*: This consists of strong stimulant embrocations or liniments, or of blisters over the parts affected, with active aperients, warmth, and diaphoretics at bedtime; the hot or vapor bath often gives almost immediate relief.

RHEUMATISM, Of the Thigh, or Sciatica.—Regulate the bowels; apply a hot external application; give a tonic, with anodyne internal remedies. Give ¼ to ½ gr. of morphia, internally or by hypodermic injection, or 1-60 gr. of atropia in solution. A good, hot application is made as follows: Boil a small handful of lobelia in ½ pint of water till the strength is out of the herb, then strain it off and add a teaspoonful of fine salt; wring cloths out of the liquid as hot as possible, and spread over the part affected.

RINGWORM (Favus, or Tinea Favosa).—This appears in circular patches of little pustules, which form scabs, leaving a red pimply surface, and destroying the bulbs of the hair; it spreads rapidly, and is very infectious. It chiefly affects the neck, forehead, and scalp of weakly children, and may sometimes be traced to uncleanness, or contact with the disease. *Treatment*: Shave the part, and keep it clean with soap and water, at the same time that an occasional mild saline aperient is administered, and a light nutritious diet, of which rare beef and ripe fruits should form a portion, should be rigorously adhered to. When the scabbing commences, use dressings of tar ointment, or of the ointment of nitrate or red oxide of mercury. *Homeopathic*: If the eruption cause burning and itching, and its vesicles are small and watery, like those of ivy, give rhus tox.; if it comes out on the arms, has a raw, sore feeling, tending to form ulcers, give mercurius; 8 globules, or 1 drop in a teaspoonful of water may be taken at a dose.

ROSEOLA (Rose Rash).—Bright, but generally dark or deep-red spots, irregular in shape and size, appear over any part of the body, with, generally, but little fever. Sometimes mistaken for erysipelas, or scarlet fever, or measles, but may be distinguished by the absence of the fever of the two former, and sore throat and inflamed eyes of the latter. *Treatment*: A dose of rhubarb, 10 gr., and magnesia, 20 gr.; or a small dose of Rochelle or Epsom salts, and attention to the diet, is all that is usually required. It is generally of short duration.

RUPIA.—With some fever, watery blisters form, followed with dirt-colored scabs; upon the removal of which, unhealthy, eating sores are left, which, upon drying, form crusts. *Treatment*: Local cleanliness must be observed; astringent dressings, as white vitriol or nitrate of silver, 1 dr. to 3 oz. of soft water with 10 gr. of carbolic acid, should be applied to the sores; tonics, as quinine and iron, 1 gr. or 2 of each, 3 times a day, must be given; or doses of sulphocarbolate of soda in an infusion of gentian will do.

SALIVATION (Mercurial Sore Mouth).—Those who take calomel as a medicine sometimes have a sore mouth, and frequently attribute their salivation to their eating butter or grease, or drinking cold water; but the only thing that needs to be forbidden to a patient who has taken calomel, is salt; for salt is a *chloride* of sodium, and there is danger that, by adding another portion of chlorine, it may change calomel, which is a *protochloride* of mercury, into the *bichloride*,

or corrosive sublimate, a virulent poison, and one which often salivates. Its approach may be known by the "coppery" taste in the mouth; the gums become red, swollen and sore; the teeth tender; the flow of saliva greatly increased; the tongue may swell, the cheeks and throat may grow sore and painful; the breath becomes offensive, and in severe cases the teeth become loose and fall out; there also may be fever and constitutional disturbances. *Treatment*: Slight cases will get well in a few days without any treatment. As a mouth wash use saturated solution of chlorate of potash; put ½ ounce in a tumbler of water and use freely as a gargle, and swallow a mouthful every 3 hours; a portion only of the potash will dissolve; and water can be added to it regularly after using from it, until it does all dissolve; if the bowels are constipated, take frequent small doses of Epsom salts, or of a mixture of equal parts of sulphur, cream of tartar, and simple syrup.

SCURVY.—The symptoms are languor, weakness and depression of mind; the face and skin are pale and bloated, and the breath is fetid; the gums are swelled, soft, red and spongy, and bleed; the teeth get loose and often fall out; the skin becomes covered with purple spots, and these sometimes spread and run into each other; ulcerous sores break out on the body, which discharge thin, offensive matter; the pulse is weak and soft, and all the secretions have an offensive smell; in bad cases blood is discharged from the bladder, bowels, womb, nose and mouth, and exertion may be followed by fainting and sudden death. *Treatment*: This consists mainly of a diet consisting of an abundance of fresh meat and vegetables, with acid fruits, and where the debility is great acid wines and malt liquors; the utmost attention must be paid to cleanliness, and the bowels kept regular by tamarinds and prunes stewed together, or lenitive electuary, and by ½ oz. of Epsom salts, where stronger remedies are required; the mouth is to be treated with a solution of chlorate of potash and tannin in diluted glycerine, 1 part to 4 of water, followed by a gargle of infusion of sage, with a little alum and tincture of myrrh; for contractions of the limbs, bathing freely with hot vinegar and soap liniment, and active rubbing should be made use of; for the breath, use chlorate of potash in 10 gr. doses every 4 hours, and for pain at the heart and oppression of breathing, tablespoon doses, as often, of a mixture of ½ oz. spirits of nitre and 2 fl. dr. each of sulphuric ether and aromatic spirits of ammonia in 3 fl. oz. of camphor water; in addition to these, change of air and a frequent bath will prove very beneficial. *Homeopathic*: Aconite, arnica, or phosphorus are the chief internal remedies, a dose of which may be given every ½ hour or hour until relieved; where these fail, a solution of persulphate of iron, tannin, sugar of lead, or creosote will usually succeed; saturate a little compress of lint with the medicine, and introduce it into the cavity of the gum; in some cases it may be necessary to plug the cavity; first remove all coagulated blood, pack the cavity with dry wheat flour, and allow it to remain.

SEA-SICKNESS.—1. To prevent this observe the following rules: Do not go on the steamer in a nervous or exhausted condition; have every preparation made at least 24 hours before starting; eat a good hearty meal 3 hours before sailing, of wholesome food; select a berth as near the centre of the vessel as possible; in going to Europe be on the starboard side, and in returning on the port side, which will be the sunny side; go on board sufficiently early to arrange such things as may be wanted for the first day or two, so that they may be easy of access; then undress and go to bed before the vessel gets under way; if subject to nausea, retain the horizontal position the entire passage if necessary; eat regularly and heartily, without raising the head for at least 1 or 2 days; on the first night out take some mild laxative medicine, and be careful to keep the bowels open for the remainder of the voyage; after having become so far habituated to the sea as to be able to take meals at the table and go on deck, never think of rising in the morning until something has been eaten; if subsequently during the voyage the sea should become unusually rough, go to bed before getting sick; do not try to keep on deck.—2. Dissolve 1 oz. of bromide of sodium in 4 oz. water; take 1 teaspoonful 3 times a day before eating; begin taking this 3 days before embarking.

SHOCK.—Prostration, or collapse, which signifies depression of the powers of life, which follows any severe injury. The usual symptoms are, that the patient lies cold, and half unconscious, with a feeble pulse and imperfect sighing respiration; nausea and vomiting, hiccup, suppression of urine, and in children convulsions are also very frequent symptoms. The duration of these symptoms is various. Sometimes these symptoms pass off quickly; but they remain even for 48 hours before reaction is established. *Treatment*: Give stimulants, of which hot brandy and water is the best; and nourishment, such as beef-tea; put blankets, heated bricks, or bottles of hot water under the armpits and between the thighs. Vomiting may be allayed by soda water with brandy, by sucking ice, by a full dose of opium, by an opiate enema, or by a mustard poultice to the epigastrium. Hiccup may be relieved by small doses of Hoffman's anodyne. Convulsions, delirium and coma are to be treated according to the state of the circulation; by ammonia and stimulants while it is depressed; but by a very cautious purging and cold to the head, after the circulation is restored, and the pulse is firm.

SPERMATORRHEA (Involuntary Nocturnal Emissions).—Much needless anxiety has been created in regard to this affection by quack books and quack lecturers. Persons of pure minds, correct habits and excellent health, occasionally have nocturnal emissions; yet by these empirical instructors and their publications they have been assailed with terrific descriptions of broken down constitutions, ruined health, and premature dissolution; and exhorted to take care of themselves in season. Now, if these emissions occur only a few times in a month, or even once or twice a week, they do

not imply any danger. But when they occur every night, or oftener, they need attention. *Treatment:* Cultivate strict chastity in thought, word and deed. For medicines, the following, in their appropriate doses, have been highly recommended: Bromide of potassium has the most recent, and the highest reputation, taken 3 times a day in from 15 to 30 gr. doses; next the tinct. of hops, 2 fl. dr. 3 times a day; then come conium and belladonna, 15 drops of the fl. ext. of either, 3 times a day; and camphor water, 1 dr. of tinct. of camphor mixed with 2 dr. of sugar and 8 oz. of water, may be drank so as to use 2 or 3 dr. in 24 hours. Frequent bathing in lukewarm water, a bland, cooling diet, avoiding spirit, and taking meat sparingly, and tonics, if the patient is much debilitated, will be in order. (See *Onanism.*)

STAMMERING (Blæsitas).—This may depend on some organic affection, or slight malformation of the parts immediately connected with the utterance of vocal sounds; but, much more frequently, it is a mere habit. *Treatment:* When the latter is the case, it may be removed by perseveringly adopting the plan of never speaking without having the chest moderately filled with air, and then slowly and deliberately. Rapid speaking must not be attempted until the stammering is completely subdued. Nervous excitement must be avoided, and the general health attended to, as circumstances may direct. Another plan is to go into a quiet room; take up an interesting but not excitable book; read aloud for 2 hours, keeping the teeth together. Stammering depending on elongation of the uvula, and other like causes, may be removed by a simple surgical operation.

STARVATION, Apparent Death from.—Where the functions of life have been suspended from want of sustenance, food must be given very cautiously at first; give, repeatedly, small injections of warm milk, and after a little add to the injections chicken broth or beef tea; as the patient begins to revive, give him a few drops of warm milk every 2 or 3 minutes, and gradually increase the quantity as improvement takes place; soon a little broth, thin gruel, or rice-water may be taken; be careful not to give too much food under the circumstances, as it endangers life.

STOMACH-ACHE (Gastralgia).—A painful affection of the stomach, having a neuralgic character. It is characterized by spasmodic pains occurring in paroxysms and varying in intensity; usually commences with a feeling of pressure in the stomach, frequent yawning, coldness of the extremities, and general discomfort; sometimes, however, without previous warning the patient is seized with violent pain in the region of the stomach, of a cramp-like character; sometimes the pain is relieved by pressure against the stomach, while in other cases pressure increases it; the attacks usually last from 1 to 6 hours, and end in belching large quantities of wind and sometimes by vomiting sour, watery fluids. *Treatment:* If the stomach is too full, by reason of the patient's having eaten too heartily, or of some indigestible substances, give the following: Ipecac, 20 gr.; water, 1 oz.; mix, and make a draught; let it be followed by copious draughts of warm water every 15 minutes till the stomach has been cleared; if pain continues after the operation, take sulphate of morphia, ½ gr.; warm water, ½ dr.; dissolve the morphia in the water and give internally or by hypodermic injection in the arm. The following combinations have also been recommended: 1. Tinct. of opium, tinct. of capsicum, tinct. camphor and sulphuric ether, of each, 3 dr.; chloroform, 1 dr.; mix; 1 teaspoonful every ½ hour, until the pain is relieved. — 2. Ext. of belladonna, 5 gr.; sulph. of quinia, 30 gr.; with ext. of valerian make 15 pills; 1 pill 3 times a day. *Homeopathics:* If there is much cramp in the stomach, give belladonna; if constipation and sour belchings, give nux vomica; if the pain is spasmodic and relieved by bending double, and by hard pressure, give colocynth. Administration: Dissolve 3 drops or 12 globules in 6 dessert-spoonfuls of water, and give a spoonful every ½ hour in urgent cases, until relief is obtained; then repeat less frequently or discontinue the medicine.

STOMACH, Belching of Wind from.—Its most common cause is indigestion. *Treatment:* Select proper articles of food; rich vegetables, peas, beans, under-cooked potatoes, and indigestible fruits should be especially avoided, as well as large quantities of weak and warm liquids; the diet should consist principally of animal food, carefully but not over-cooked, with a sufficient quantity of mealy mashed potatoes, and Graham bread, moderately seasoned with common salt and spices; the most suitable beverages are toast-and-water, and a little good coffee. Take charcoal in ½ dr. doses, in capsules or mixed with syrup or water. (See *Dyspepsia.*)

STOMACH, Inflammation of.—In the acute form, which results from irritating substances taken into the stomach, there is burning pain, thirst, restlessness, constant vomiting, prostration, a quick, and usually small pulse, incessant retching, a sunken countenance, hiccough, cold hands and feet, and a damp skin; in the more common chronic form, there is generally pain and uneasiness, increased by food or pressure, and frequent belchings; the meals are frequently vomited, and the appetite irregular; the urine scanty and high-colored, and the tongue red and coated with whitish fur in the center. *Treatment:* In the acute form, having gotten rid of the irritating substance, apply mustard poultices over the stomach, along the spine, and to the extremities; also hot fomentations and poultices of hops or stramonium; give ice in small pieces, or iced water, in ½ to teaspoonful doses, or lime-water and sweet milk in equal quantities; also 3 drop doses of tincture of aconite root, to control the fever; when the acute inflammation has subsided, and in the chronic form, apply blisters or counter-irritation with croton oil externally, with subnitrate of bismuth, in doses of 5 to 10 gr., and cold compresses over the stomach every night; while there is tenderness, the nourishment must be simple, consisting of little more than bland nutritive drinks, in small quantities at a time; in 2 or 3

weeks, a more nourishing diet may gradually be resumed. *Homeopathic*: For fever, give aconite; nausea and vomiting, give ipecac; sensitiveness and burning, cutting pains, give belladonna; red and swelled face, tongue red, clean, and tremulous, give nux vomica; eyes sunken and glazed, lips bluish and dry, great thirst, and stomach very sore, give verat. alb. Administration: In urgent cases repeat the medicine every hour at first and extend the time as the patient improves; dissolve 3 drops or 12 globules in 10 teaspoonfuls of water, and give a teaspoonful at a dose.

STOMACH, Sickness at the, or Vomiting.—Generally induced by acidity or irritability of the stomach, by distress of mind or injury of the brain, and by any organic disease of the stomach. *Treatment*: Treat the disease which induces it. If from acidity, lime water and sweet milk, in tablespoonful doses, is a simple and efficient remedy. If from irritating substances, they should be got rid of by an emetic. Some aromatic, as ginger, spearmint, peppermint or spice tea will do; some cordial or stimulant, as brandy, champagne, tincture of ginger, paregoric, etc., will answer well; also strong coffee, without sugar or milk. When it persists obstinately, without any appreciable cause, and in spite of all ordinary measures, a mustard plaster, or spice poultice, should be placed over the stomach, and if this does not relieve, a blister should be applied, and the blistered surface, after the skin is removed, should be sprinkled with $\frac{1}{4}$ gr. of morphia, or $\frac{1}{8}$ gr. of morphia in solution, may be injected hypodermically. The vomiting of children may sometimes be stopped by wetting a cloth with equal parts of spiced vinegar and laudanum, and applying over the stomach. *Homeopathic*: Give petroleum and oculus; place a broad flannel bandage around the abdomen, keep the horizontal position, the stomach neither too empty nor too full; ipecacuanha, when the stomach chiefly is at fault, and the nausea continues after the vomiting has ceased; arsenicum, if the vomiting is accompanied by pain in the stomach and diarrhea; nux vomica, when the vomiting is connected with derangement of the liver; give of the medicine selected, a drop dose in a dessert-spoonful of water every hour until the vomiting and nausea ceases, then every 2 or 3 hours.

STOMACH, Vomiting of Blood from.—Usually preceded by a sense of weight, fullness, pain and uneasiness in the region of the stomach; saltish taste in the mouth; nausea, faintness, debility, giddiness and confused feeling about the head; when the blood is not thrown up, but carried off through the bowels, the stools will be black. *Treatment*: Ice, internally by swallowing small pieces; and externally, by applying a light ice poultice over the pit of the stomach. If the vomiting continues, change to a mustard poultice over the stomach, and give $\frac{1}{4}$ gr. of sulphate of morphia by hypodermic injection or by the mouth. The following astringents are excellent auxiliaries for checking this hemorrhage: 1. Sugar of lead, 2 gr.; acetate of morphia, $\frac{1}{4}$ gr.; mix, and take 2 or 3 times a day, if necessary.—2. Alum in powder, 8 gr.; powdered opium, 1 gr.; mix, and take every 3 hours.—3. Ipecac, 2 gr.; stir this amount into $\frac{1}{2}$ oz. of water and take every $\frac{1}{2}$ hour until nausea is produced.—4. Fl. ext. of ergot, 1 dr.; take every hour.—5. Gallic acid in 15 gr. doses 3 times a day, or tannic acid in 5 gr. doses, as often. *Homeopathic*: For febrile symptoms, give aconite; great paleness, and faintness, with nausea, give ipecac; dark looking blood, the patient quiet, free from pain, but pale and weak, give ergot. Administration: If the bleeding is active, repeat the medicine every hour until checked; then every 4 hours. Of a solution of 3 drops or 12 globules in 8 dessert-spoonfuls of water, give a spoonful at a dose; or 8 globules may be taken dry on the tongue; for several hours after an attack no food should be eaten; then a little thin gruel, corn-starch, tapioca or fresh milk may be taken; all food and drink should be taken cool; in urgent cases, dry cups placed below the ribs, or cloths wrung out of cold water and applied to the lower part of the abdomen, will be found of benefit.

STRICTURE OF URETHRA.—Generally occurs in persons with some permanent obstruction; exposure to cold, and indulgence in drink, favor an attack. The symptoms are sudden retention of urine; great straining and desire to urinate; the bladder becomes distended, the countenance anxious, the pulse quick, the skin hot; at last the bladder may burst. *Treatment*: A catheter should be introduced at once, as large an instrument as the parts will admit. Relaxation of the spasm may also be produced by bleeding, warm bath, Dover's powder, laudanum enemata, and cold water upon the genitals; should these means fail, and life be endangered, the bladder must be punctured from the rectum by a surgeon.

ST. VITUS' DANCE (Chorea).—The symptoms are constant involuntary and irregular twitchings and movements, most frequently of some portion of the muscles, and often confined to one side, but sometimes affecting almost the entire body; sometimes apparently produced by fright, nervous debility or fatigue. *Treatment*: Good diet, salt water bathing, and regular and systematic exercise will often effect a cure; occasionally iron, 5 to 20 drops of the muriated tincture, or 3 to 5 gr. of the citrate, or phosphate, or the citrate of iron and quinine, 3 to 4 times daily, is beneficial; in obstinate cases, Fowler's solution of arsenic, 3 drops, 3 times daily, has effected cures; if these means fail, 3 to 10 gr. of chloral, with as much bromide of ammonium, 3 times daily, should be tried, with the cold douche, or dashing cold water against the body, especially against the spine. *Homeopathic*: Belladonna, if the face is implicated, the patient stammers and has headache, trembling of the limbs, which scarcely allows her to walk; suitable to girls; give stramonium, if the convulsive motions are often crosswise or violent all over, there is an extreme degree of nervousness, the patient moves about rapidly, wants to go fast, loss of memory. The application of electricity will be found to have a salutary effect in this disease when judiciously adminis-

tered. Administration: 1 drop or 6 globules in a teaspoonful of water, every evening, for a week; then omit the medicine for a few days, and if no improvement takes place, select another remedy, and give it in the same way.

SUFFOCATION.—Remove to fresh air, and dash cold water over the head, neck and chest; carefully apply hartshorn or smelling salts to the nostrils, and when the breathing is feeble or has ceased, resort immediately to artificial respiration. (See *Asphyxia.*) Keep up the warmth of the body, and as soon as the patient can swallow, give stimulants in small quantities.

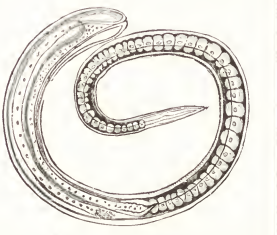
SUN-STROKE.—The treatment is similar to that required in apoplexy. Cold ablutions should be poured over the whole person and ice applied to the head, in the case of a robust person; otherwise hot applications, or alternate hot and cold are better; if hot water cannot be obtained at first, bathe the head with tepid water, and, with the hands moistened, rub the extremities, the neck, and the whole length of the spine, rubbing in a downward direction to draw blood from the head; as soon as boiling water can be obtained, put a dry blanket around the body; wring flannels from the hot water and apply them quickly to the region of the stomach, liver, bowels, and spine over the blanket; immerse the feet in hot water, or wrap them in hot flannels as far as the body; re-wring the flannels once every 5 minutes for ½ hour or more; then remove them and apply cool water in the same way; dry well and rub the surface lightly and briskly with the hand until a glow is produced; use 1 teaspoonful of salt to every quart of hot water; have the feet made bare and rubbed or slapped, and in extreme cases apply mustard poultices; give internally whisky in hot water, or use a little ammonia or hartshorn in hot water; as the patient convalesces, give at first lime water and milk, ½ lime water to ¾ milk. *Homeopathic:* Great thirst, headache, red face, and nervous excitement, give aconite; headache, aggravated by motion, peevishness, faintness, nausea, and costiveness, give bryonia; fullness, splitting headache, giddiness, and sore eyes, give belladonna. Administration: In sudden and severe cases, give 8 globules in a little water every 20 minutes until relief is obtained, then less frequent, say once every 3 hours. The patient may be allowed cold water to drink, but it should be taken in small quantities at first; cloths wrung out of cold or ice water may be applied to the head as directed under inflammation of the brain.

TETTER, or HERPES.—This is characterized by an outbreak of small vesicles appearing in groups; as the vesicles increase in size, the fluid which they contain dries into scabs and scales off; the eruption is accompanied by a burning, crawling or smarting sensation, which is often very annoying to the patient. It is not contagious. Another form appears in patches on the face or neck, on the hands and wrists, and in the joints. The patches are rough, incline to crack, and have a raw appearance; the fluid from the surface dries and is thrown off in bran-like scales; its duration is often protracted. It is caused by immoderate use of rich and indigestible food, and a morbid condition of the cutaneous excretions. *Treatment:* Commence with a bilious cathartic and alterative, as calomel, 10 gr.; podophyllin, 2 gr.; aloes, rhubarb, of each, 5 gr.; mix, and take in syrup or sauce. After the operation use the following tonic: Arsenious acid (white arsenic), sulphate of strychnia, of each, 1 gr.; sulphate of quinia, tartrate of iron and potash, of each, 1 dr.; mix, and make 40 pills; 2 pills to be taken every day, 1 at bedtime, and 1 at 11 A. M. Take special care of the skin by bathing the whole body in a warm room every morning in tepid water, to which has been added bicarbonate of soda, 1 dr. to the pint. If there is much smarting, apply carbolic acid water in the following form: Carbolic acid, in crystals, 1 dr.; water, 1 qt.; mix. *Homeopathic:* Much burning at evening, the parts very dry and rough, like parchment, or fish scales, give arsenicum; appearance like the eruption produced by ivy, skin thick and hard, with stinging and tingling, give rhus tox.; scabby and scurfy, and cracking open after washing, give sulphur. In acute cases, give 8 globules or 1 drop in a spoonful of water 3 times a day; in the chronic form, a dose every evening will be sufficient.

THROAT, Inflamed.—Sore throat is one of the commonest affections, and is met with in every grade, from a simple dryness, and slight heat, or sensation of rawness and hoarseness, to a total loss of voice from ulceration of the vocal cords and constant soreness, with expectoration of a puriform secretion, sometimes with difficulty got rid of. From the frequency of the affection among clergymen and public speakers, it received the name of "clergyman's sore throat." *Treatment:* Use gargles of alum and sage tea, flaxseed and slippery-elm infusions, mild liquid diet, and a mild cathartic, as calomel, aloes, rhubarb, of each 5 grs.; mix and take in syrup or capsule at bedtime; if it does not operate by morning, take ½ oz. of Epsom salts or of castor oil. Pour a few drops of spirits of camphor on a lump of sugar, and allow it to dissolve in the mouth every hour. Wet compresses to the throat are the best remedies known; double a towel 2 or 3 times, so as to make a pad that will fit snugly under the chin and over the throat, and let it extend around from ear to ear; bind a thickly-folded towel over the wet pad, having the towel wide enough to overlap the edges of the pad; it may be put on cold or warm; when cold, it soon becomes warm from the heat of the skin, and is really a warm vapor bath; when the pad is taken off, the throat should be washed in cold water to close the pores, and then well dried with a towel. *Homeopathic:* Phosphorus is suited for the weakness and loss of voice, especially if the patient has been weakened, and there is any tendency to consumption; a drop dose every 4 hours; carbo vegetabilis, for hoarseness of voice, with dry spasmodic cough, and raw feeling in the windpipe; a drop dose every 4 hours; hepar sulphuris, for weakness of voice and loose cough with much expectoration; a drop dose every 4 hours.

TRICHINÆ.—Trichina is the term applied to

a minute, slender, and transparent worm, scarcely 1-20th of an inch in length, which exists in the muscles of swine. The young worms



Sexually Mature Female Trichina Spiralis (*Magnified*).

at first range freely through the stomach and intestines, remaining for a short time within the lining membrane of the intestines, causing irritation, diarrhœa, and sometimes death, if present in sufficient numbers. As they become stronger they penetrate the walls of the intestines to effect a lodgement in the muscles, causing intense pain and severe cramps, and sometimes tetanic symptoms. After 4 weeks' migration they eneyst themselves permanently on the

The Trichina in its Cyst (*Magnified*).

muscular fibre, and begin to secrete a delicate sac which gradually becomes calcareous. In this torpid state they remain during the person's lifetime. *Treatment:* Nothing has ever been discovered which will counteract the effect of trichinæ or kill them after they have once found their way into the muscles of a person. The only thing is to take quinine, if at all feverish, and seek strength.

VOICE, Loss of, or Aphonia. — *Treatment:* When caused by catarrh or excessive hoarseness, give one of the following: 1. Sulphate of zinc, 4 gr.; water, 1 fl. oz.; mix, and use as an inhalation.—2. Chloride of ammonium, ½ oz.; syrup of wild cherry, 3 fl. oz.; mix; 1 teaspoonful, 3 times a day.—3. Sulphate of strychnia, ½ gr.; water, 2 fl. oz.; syrup of tolu, 1 fl. oz.; mix; a teaspoonful, 3 times a day.—4. Dip a piece of thick paper in a solution of saltpeter, and dry it, then cover it over with comp. tinct. of benzoin; cut it up into pieces 3½ by 1½ in., and make into cigarettes. *Homeopathic*; Accompanied by feelings of suffocation, as if there was not air enough, irritation of the larynx and heat on the top of the head, give sulphur; great hoarseness, burning and tickling in throat, dry cough, but moist skin, give mercurius; a sensation of great weakness in the throat, palsied glottis, difficulty of swallowing and soreness, give gelseminum. Administration: In acute cases the remedy may be taken once or twice a day; but in chronic cases it should not be repeated oftener than once a day, or once in 2 days; give the medicine dry, 8 globules at a dose.

URINE, Bloody, or Hæmaturia. — The seat of the hemorrhage may be either the kidneys, or the prostate or bladder. That from the kidney may be caused by the irritation of stone, or by blows on the loins, by scarlet fever, and by other diseased states of the system. Hemorrhage from the prostate or bladder may be caused by the rude introduction of instruments, or by the irritation of stone; or by the existence of an ulcer or tumor, of which it is often the earliest sign. When the blood is derived from the bladder, the pain in the back and other signs of irritation that accompany the bleeding from the kidney, will not be present. *Treatment:* When hemorrhage from the kidneys is attended with inflammatory symptoms, cupping, purging, and the acetate of lead are indicated; when with symptoms of debility, the dilute sulphuric acid, alum, or gallic acid. Cold may be applied to the loins and hips by means of bladders of ice. In hemorrhage from the bladder a catheter should be passed and retained there. If the hemorrhage is obstinate, the bladder may be injected with cold water containing 1 sc. of alum to each pt.; and if much blood has coagulated there, it may be necessary to repeat injections of water. Small doses of turpentine will sometimes check a hemorrhage from the bladder which resists all other means.

URINE, Incontinence of (Enuresis). — Pregnant women, and children with worms, are the most frequent sufferers. It also occurs in old people from debility of the neck of the bladder, and is a common symptom of stone. *Treatment:* When resulting from gravel or inflammation, the cause must be relieved. Children should be allowed to drink but little in the evening, and required to empty the bladder before going to bed, and again after 2 or 3 hours' sleep. Chloral in 3 to 5 gr. doses, at bed-time, and tincture of belladonna in 1 to 3 drop doses, with 3 to 5 drops of tincture of iron, 2 or 3 times daily, are sometimes useful. If troubled with worms, see *Worms*. In debility or paralysis of the neck of the bladder, 5 drops tinct. of cantharides, and 12 drops of tinct. of iron, 2 or 3 times daily, will sometimes be beneficial. Pregnant women should use mild laxatives, and lie down as much as possible.

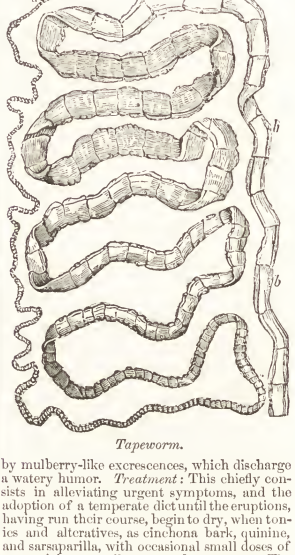
URINE, Retention of (Dysuria).—Give a warm bath, or apply hot fomentations over the lower part of the belly and to the parts. Relief is also afforded by large anodyne injections, if caused by inflammation of the neck of the bladder. In addition, leeches may be applied to the perineum. If from paralysis of the bladder, and during the low stages of typhoid fever, etc., the catheter must be used.

URINE, Suppression of (Ischuria).—The symp-

toms are restlessness, with a slight pain in the loins and bowels perhaps. No water is made and none is in the bladder. After a time, nausea and vomiting may come, and drowsiness, wanderings of mind, hiccough, stupefaction and death. Before death the perspiration has a strong smell of urine. *Treatment:* Let the patient be placed in a hot bath, and afterwards apply hot fomentations over the lower portion of the belly, and cups or mustard plasters over the kidneys. Let the bowels be opened by saline laxatives, and warm diluent drinks, as flaxseed or watermelon-seed, or juniper-berry tea be freely given, with 15 to 30 drops spirits of nitre, or 20 to 30 gr. of the acetate or citrate of potash, or 15 of the nitrate of potash, every 2 hours, with occasional doses of 6 to 10 gr. Dover's powder. If drowsiness or convulsions set in, cups to the spine, mustard to the extremities, leeches to the head, and even free bleeding from the arm must be resorted to.

WORMS.—These parasites are generated and nourished in the human intestinal canal. They cause griping pains, especially about the navel, acid eructations, slimy stools, occasional nausea and vomiting without any manifest cause, heat and itching about the anus, tenesmus, emaciation, disturbed dreams, grinding of the teeth during sleep, pallor of countenance, discoloration round the eyes, feverishness, headache, vertigo, etc. *Treatment:* In ordinary cases, 10 gr. of calomel over night, followed by ½ oz. of castor oil the next morning, is good. Oil of turpentine is useful against nearly every variety of worms, taken in the following form: Oil of turpentine, castor oil, and mucilage of gum Arabic, of each ½ oz.; mix and take fasting. For tapeworm, take a decoction of ½ lb. of pomegranate root bark, yielding 12 fl. oz. of liquid; take 1 tablespoonful of castor oil in the evening, and the following morning, after coffee, a third of the contents of the bottle, another third half an hour later, and the remainder in yet another half hour. If there is no operation, take 1 drop of croton oil in a teaspoonful of sweet oil, repeated every ½ hour until movement. If the head (see *a* in the engraving) of the worm does not come away, the process must be entirely repeated, after a few days.

YAWS.—A peculiar contagious disease of the skin, occurring but once in life, characterized



Tapeworm.

by mulberry-like excrescences, which discharge a watery humor. *Treatment:* This chiefly consists in alleviating urgent symptoms, and the adoption of a temperate diet until the eruptions, having run their course, begin to dry, when tonics and alteratives, as cinchona bark, quinine, and sarsuparilla, with occasional small doses of mercurials, generally prove advantageous. The master yaw, which frequently remains troublesome after the others have disappeared, may be dressed with the ointment of red oxide of mercury, or of nitrate of mercury, diluted with an equal weight of lard.

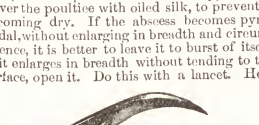
—o—

SURGERY.

The descriptions of surgical operations herein are not intended to include all that a skilled surgeon would perform, but only such as an amateur might possibly undertake in some great emergency, distant from professional help, when in many cases a life might be saved or distress alleviated, by assistance guided by right principles. The more serious the operation the more danger of failure by the unskilled.

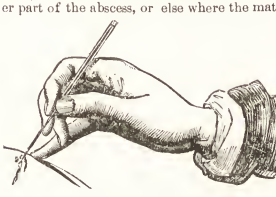
ABSCESS.—A collection of purulent matter in some tissue or organ, the result of diseased action. Abscesses may be either superficial or deep-seated. When of rapid formation, and with considerable inflammation and a throbbing sensation, they are called acute; when of slow formation, and of doubtful origin, they are called chronic. Suppuration is indicated by abatement of the fever and pain. The tumor becomes softer and paler and projects in a pyramidal form. *Treatment:* Remove, if possible, the morbid state of constitution on which the abscess depends, by purgatives, and hasten suppuration by warm poultices. In abscesses from local injury, all thorns, splinters, etc., should be removed. The poultices should be large, soft and light, and may be made of bread and water, or linseed meal, or of bran sewed up in a flannel bag, which may be dipped in boiling water at

often as they become cold. When required very light, use the powdered bark of slippery elm. Cover the poultice with oiled silk, to prevent it becoming dry. If the abscess becomes pyramidal, without enlarging in breadth and circumference, it is better to leave it to burst of itself. If it enlarges in breadth without tending to the surface, open it. Do this with a lancet. Held



Abscess Lancet.

like a pen, it should be gently plunged in at a right angle to the surface, till it has entered the cavity, and the aperture may be enlarged sufficiently as the instrument is being withdrawn. The puncture should be made either at the lowest part of the abscess, or else where the matter



Opening an Abscess.

points most decidedly and the skin is the thinnest. No rude attempts should be made to squeeze out the matter.

ACCIDENTS.—The chief requisite, in case of accidents, is presence of mind. Find out from the injured person, if sensible and able to speak, or from bystanders, the cause and such other particulars of the injury as can be learned without delaying any help that may be required. If the person is insensible, remove as quickly as possible the neck-tie, collar, etc.; open all clothing pressing tightly upon the neck, chest or abdomen, and lay him on the side, rather inclined forward than back, with the head slightly raised. In this position he can breathe more easily than if placed on the back. As a restorative, dash a little cold water on the face and chest, and try camphor or smelling salts. If able to swallow, give him cold water to drink, and if much prostrated, a very small quantity of spirits. Do not allow stimulants to be poured down him. If there is bleeding, ascertain its source, and use prompt measures to arrest it. (*See Bleeding.*) Allow no one seriously injured to be bled, at least until reaction has been established. Examine carefully if there are any serious bruises or sprains, or any bones dislocated or broken, and, if so, see that the position is made as comfortable as possible, using only cold water until suitable dressings can be applied.

ANÆSTHETICS.—Agents which diminish or destroy sensibility, or relieve pain. Among the most useful, safe and powerful are chloroform, ether, nitrous oxide, and intense cold. The mode of administration is by causing the patient to inhale their vapor mixed with air. Sometimes they are poured on a sponge or handkerchief, or a piece of lint, either of which is then applied to the mouth and nostrils of the patient in such a manner that the air which passes into his lungs is saturated with the vapor. The use of nitrous oxide gas is almost wholly confined to operations in dental surgery. To prevent accidents in the administration of chloroform, add 1 part of rectified oil of turpentine to 5 parts of chloroform, or give a full dose of whisky before the anæsthetic. (See chloroform in *Poisoning.*) Freezing may be accomplished by applying a spray of ether, by means of an atomizer, or by a freezing mixture composed of equal parts of pounded ice and salt, or two parts of snow to one of salt; mix quickly, put into a gauze bag and apply to the part to be frozen; in 3 to 6 minutes the skin will become white and glistening, when the bag should be removed and the operation performed. Freezing should not be continued more than 6 minutes at a time, as the tissues may be hardened, though usually no harm results from repeated freezing, if proper care is used in thawing the frozen part by frequent wetting with cold water, until the natural feeling is restored. Rapid breathing has been successfully employed as an anæsthetic. The patient should commence to breathe as rapidly as possible. As soon as his face begins to get red, the surgeon can cut. It is alleged that although the knife is heard to rip through the flesh, no pain is felt.

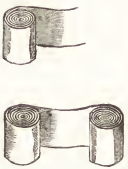
BLACK EYE.—There is nothing to compare with a tincture or strong infusion of capsicum annuum, mixed with an equal bulk of mucilage or gum Arabic, and with the addition of a few drops of glycerine. This should be painted all over the bruised surface with a camel's hair pencil, and allowed to dry on, a second or third coating being applied as soon as the first is dry. If done as soon as the injury is inflicted, the treatment will invariably prevent the blackening of the abused tissue. The same remedy has no equal in rheumatic, sore or stiff neck.

NOSE BLEEDING.—The only reliable remedy for bleeding at the nose is to move the jaws rapidly. This has been known for years, but a modern fad has made it much more easy to adhere to the prescription. If a person who is suffering from severe hemorrhage of this character will chew gum viciously for a minute or two, the bleeding will entirely cease, and it is important for him to keep some gum in his pocket, so that when the feeling of fullness which proceeds the renewal of attack comes on he can avert the danger in a few minutes.

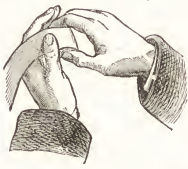
STYE IN EYE.—Poultices, warm water, etc., no doubt do good in the end, but such applications have the great disadvantage of prolonging the career of these unsightly sores, and encouraging the production of fresh ones. The local application of tincture of iodine exerts a well-marked influence in checking the growth.

To apply it, the lids should be held apart by the thumb and index finger of the left hand, while the iodine is painted over the inflamed spot with a fine camel's hair pencil. Care must be taken that the iodine does not touch the eye itself. The lids should not be allowed to come in contact until the part touched is dry. A few such applications in twenty-four hours are sufficient.

ly necessary. 1. Wounds and broken bones come without warning. The occasions for the use of bandages are therefore often very sudden and peremptory. For this reason a moderate supply should be kept on hand in every house. They should be made of cambric, and wound snugly in cylindrical rolls, 6 or 8 yds. long by 2 in. wide. The other sizes, narrow ones for the fingers, and broad ones for the trunk, may be



Single and Double Rolls.



Rolling the Bandage.

Bandaging the Forearm.

Wrist and Thumb Bandage.

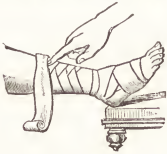
Bandaging the Forearm.

Bandage for the Knee and Ankle.

Finger Bandage.

Applying a Bandage to the Leg.

Bandaging the Leg.



Bandaging the Leg.

Bandage for Head.

Bandaging.

BANDAGING.—The art of bandaging has been made too difficult. Its teachers have given very minute directions for an exact application of this covering to every part of the human body; whereas, with ordinary mechanical skill, but little more than a few brief general rules are real-

left to extempore preparation. To roll, a bandage is held loosely in the left hand, with a slight pressure of the left thumb to insure snugness, while it is turned by the thumb and finger of the right hand (as seen in the illustration). The double roll is convenient to make a reverse. — 2.

In applying a bandage, keep both edges smoothly down upon the part. — 3. If it tends to go off one side, so as not to cover completely, place your finger on it (see illustration), and turn it back, or make a reverse, as it is termed. In this way you can oblige it to go where you want it, and at the same time to lie smoothly.—4. When you come to a joint, let your bandage describe the figure of 8. (See illustration, Knee and Ankle.) In other parts than the extremities, pins or stitches may be used to keep the bandage in place, or confine it when you wish to turn it in a different direction.

BITES AND STINGS, Of Insects. — Those of bees, wasps, hornets, etc., although generally painful, and causing much outery and disturbance, are rarely attended with fatal results. *Treatment*: The pain and swelling may generally be promptly arrested by bathing freely with a strong solution of equal parts of common salt and baking soda, in warm water; or by the application of spirits of hartshorn; or, the instant any one is stung, wet some eut tobacco and lay it at once on the spot. Hold it there a few minutes and the eure is complete. Camphor is a good remedy to use in a case of a bite by the tarantula.

BITES AND STINGS, Of Reptiles. — Of these the rattlesnake, the cobra di capello, the whipcord snake, and the viper of our own country are among the most dangerous. The infliction of the wound is followed by instant and acute pain, discoloration and swelling of the part, sickness, fainting, pain in the back, difficulty of breathing, spasms, extreme drowsiness, coma, and, in fatal cases, death, within two hours. *Treatment*: Hitherto no antidote has been discovered, but the precautionary measures consist in, 1st, preventing absorption of the virus into the blood; 2d, in removing as much of the poison as possible from the wound; and 3d, by counteracting the symptoms with anti-spasmodics and stimulants. Although there is a natural repugnance to suck a venomed wound, the most deadly animal poison is perfectly innocuous unless brought into contact with a cracked or abraded surface in the mouth. Directly after receiving the injury a tourniquet must be put round the limb, above the wound, the part washed well and quickly with warm water, at the same time forcing out with the fingers any blood or exudation that may appear; then cup the surface; if proper cupping glasses are not ready, apply the lips and suck the wound with steady exhaustion, spitting and washing the mouth before again repeating the process, which should be continued for ten minutes. The punctures are then to be treated with lunar caustic and a hot poultice applied. Fainting, difficulty of breathing and symptoms of collapse are to be met by doses of ether, brandy and ammonia, or valerian, lavender and musk, repeated every ten or fifteen minutes. Electricity may be applied to the spine, or, if not at hand, friction with mustard along the spinal column. For drowsiness and coma, the patient must be kept constantly walking, and cold water occasionally dashed in the face. Should much constitutional disturbance manifest itself subsequently, adopt a course of sarsaparilla, compound decoction, alternated with 5 drops of Fowler's solution of arsenic every 6 hours; at the same time a liberal diet, such as wines and tonics, as the case may demand. A good remedy is to apply externally to the wound by saturating lint or batting, 30 gr. iodide potassium, 30 gr. iodine and 1 oz. water. Carbolic acid, diluted and administered internally every few minutes, is said to be a good remedy; or ammonia, diluted and injected into the circulation. A decoction made from the powdered root or green leaves of the common male fern, is also recommended.

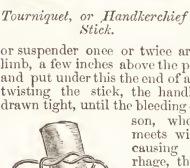
BLADDER, Inflammation of.—This may result from blows or other injuries, the presence of stone or gravel, irritating diuretics, or from decomposing urine retained by stricture. There is pain, frequent desire to pass water, with burning pain and great straining, to pass but a very small stream; fever and chills, and frequently nausea and vomiting; in bad cases the urine may be mixed with matter and blood. *Treatment*: The pain may be so severe as to need opium, or some other narcotic, for its relief. 25 drops of laudanum, or ¼ gr. of morphia, or a teaspoonful of tincture of hyoscyamus, may be given every 2 hours, or a suppository containing ¼ gr. of morphia and ½ gr. of extract of belladonna, may be similarly repeated. Cloths wrung out of hot water, or hot poultices of bran and hops, should be applied freely over the region of the bladder and to the perineum. Warm hip baths will also be soothing. Flaxseed tea should be given freely, with occasionally 15 drops spirits of nitre. The bowels should be kept open with castor oil or other mild laxative. In chronic cases injections into the bladder may be necessary. Sulphates of quinia and cinchonidia, in affections of the bladder, have proved eminently useful. The following are also frequently employed: 1. Powdered opium, 12 gr.; powdered camphor, 30 gr.; ext. belladonna, 3 gr.; cocoa butter, enough to make 6 suppositories; use one each night before retiring.—2. Balsam copaiba, 4 dr.; benzoic acid, 4 sc.; gum Arabic; sugar, of each, 2 dr.; oil of checkerberry, 20 drops; camphor water, enough to make of the whole 8 oz.; mix; a tablespoonful every 4 hours.

BLEEDING. — An escape of blood from any part of the system is termed a hemorrhage. Hemorrhages may be arterial or venous. Bleeding from the veins may be recognized by the dark-red color and steady flow, and is less dangerous than that from an artery, which spirts and is light-colored, and requires prompt action to save life. The bleeding from wounds, if extensive, should be arrested by tying the ruptured blood-vessels; where this cannot be done, and in less important cases, by the application of styptics, as creosote, infusion of galls, compound tincture of benzoin, etc. But the most efficient application in all such cases, is the persulphate of iron, either in powder or solution. A pledget of lint or cotton or several thicknesses of soft cloth wet with the solution, and applied to the bleeding surface, or the powder applied to it and covered with a soft compress, will often arrest

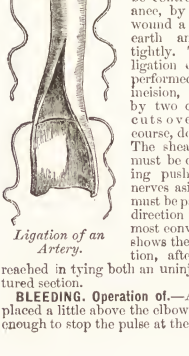
bleeding from vessels even of considerable size.

BLEEDING. From the Arteries. — This must first be controlled by pressure, torsion (twisting the ends of the vessel), or tying it. Pressure may be made in the wound where the bleeding occurs, or between the wound and the heart, either with the finger, or with a tourniquet. The finger may be pressed firmly upon the spot from which the blood spirts, or upon some point a few inches nearer to the heart, where the beating of the vessel can be felt. Any article may be used to make pressure over the vessel. Sometimes the bleeding can be controlled, until a surgeon comes, by plugging and binding the wound with lint, cotton, or a bit of sponge, or soft cloth suitably folded or twisted; or this and pressure on the vessel may be combined. If the bleeding is from any point below the middle of the thigh, or from the arm, pass a handkerchief or suspender once or twice around the injured limb, a few inches above the place of bleeding, and put under this the end of a stick; when, by twisting the stick, the handkerchief may be drawn tight, until the bleeding ceases. If a person, when by himself, meets with an accident causing serious hemorrhage, the bleeding may be controlled until assistance, by placing on the wound a handful of dry earth and grasping it tightly. The operation of ligation of an artery is performed by making an incision, 3 in. in length, by two or three cautious cuts over the artery's course, down to the artery. The sheath of the artery must be opened after having pushed all veins or nerves aside. The needle must be passed in whatever direction the operator finds most convenient. The cut shows the method of ligation, after the artery is reached in tying both an uninjured and a ruptured section.

Finger Pressure.

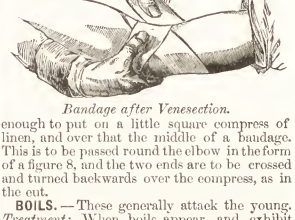


Tourniquet, or Handkerchief Stick.



Ligation of an Artery.

BLEEDING. Operation of.—A ligature being placed a little above the elbow, but not tightly enough to stop the pulse at the wrist, the operator places his thumb on the vein a little below the intended puncture, and then pushes the lancet obliquely into the vein, making it cut directly outwards. When sufficient blood has been taken, the surgeon unties the ligature and places his thumb on the bleeding aperture. Next he puts a little bit of lint on the wound, and secures with a strip of plaster, only removing his thumb sufficiently. Then he removes his thumb



Bandage after Venesection.

enough to put on a little square compress of linen, and over that the middle of a bandage. This is to be passed round the elbow in the form of a figure 8, and the two ends are to be crossed and turned backwards over the compress, as in the cut.

BOILS. — These generally attack the young. *Treatment*: When boils appear, and exhibit persistency by daily enlargement and increasing pain, suppuration should be promoted by warm poultices of bread and linseed meal, to which a little fat or oil may be added; or warm and stimulating embrocations, or exposure to the vapor of hot water, or the application of stimulating plasters, may be adopted. When the tumor is ripe, the matter should be evacuated by gentle pressure, and the boil dressed with a little simple ointment spread on a piece of clean linen. The diet may be full and liberal till the discharge of the matter, when it should be lessened, and the bowels kept gently open by saline purgatives, as Epsom salts or cream of tartar. When there is a disposition in the constitution to boils, the bowels should be kept regular, and tonics had recourse to.

BRUISES.—To prevent inflammation, cold lotions may be applied. The best of these are lead water and vinegar, or spirits and water; or better, when at hand, a lotion of arnica (tincture of arnica, 1 part, water, 6 parts). If severe inflammation sets in, low diet and cooling purgatives may be required. If suppuration occurs, warm fomentations or poultices should be applied. A good wash is carbolic acid in solution, 10 gr. acid to the oz. of water.

BUBO.—A tumor resulting from the enlargement of the gland, usually in the groin, and very painful. It may be caused by injury or over-exertion; or from the specific virus of gonorrhœa or syphilis. *Treatment*: Non-specific bubo will ordinarily require nothing more than rest and cooling lotions. If the bowels are constipated, saline laxatives should be used. If the tumor is highly inflamed and very tender, leeches may be applied. Hot fomentations and poultices may be applied, and the tumor lanced if matter forms.

BURNS.—Apply a solution of soda to the burnt surface, to relieve the pain. The part burned must be immediately covered with a double fold of wadding, the woolly side next the skin. Should pieces of the dress adhere to the cuticle, cut all the loose edges off, and lay wadding over what remains. If there is much prostration of strength, every ½ hour give draughts of a tablespoonful of brandy, ½ teaspoonful of sal volatile, 20 drops of ether, in a wineglassful of water; at the same time, to counteract the shivering and sense of cold that follow such accidents, apply heated bricks, or bottles of hot water, to the feet, thighs, and armpits. Should the pain continue an hour after encasing the part in wadding, give 40 drops of laudanum in one of the above draughts, and repeat, if necessary, in an hour. This dose applies to adults; to a child of from 5 to 12 years, from 5 to 10 drops. When the wadding becomes moist, on no account remove it, but put on another layer. The burnt surface must be kept constantly covered till the new cuticle has formed and the dressings fall off. When neither wadding or cotton can be procured, cover the part with handfuls of flour, or any harmless, impalpable powder, adding more whenever moisture appears. When the healing state of the burn warrants, apply a poultice. When softened and removed, the part is to be again dusted lightly, or treated with the wadding. The blister of a burn should on no account be broken. A cloth dipped in a solution of alum, 4 oz. to a qt. of hot water, and applied immediately to the burn, will also relieve the pain. As soon as it becomes hot or dry, replace by another, and repeat as often as the cloth dries, which at first will be every few minutes; even 24 hours will show the advantage of this treatment.

CANCER.—This is a malignant and nearly incurable disease, which may attack almost any portion of the body, but with women the glandular structures, and of these the breasts and womb, and in men the lower lip, are the most common seats of it. *Treatment*: The diseased part must be cut out. Where a cancerous tumor cannot be cut away, it may sometimes be removed by caustics; but this method is slower and more painful, and generally not so successful. Chloride of zinc, in some form, is the caustic most relied upon. Cut a hole in a piece of sticking plaster as large as the tumor to be removed, and over this the caustic may be applied. By this means the tumor gradually becomes separated, but the danger is that although removed from its present place, it may appear again elsewhere.

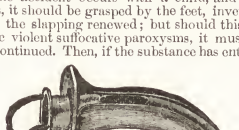
CARBUNCLE.—An exaggerated boil or collection of boils. *Treatment*:; Similar to erysipelas. To produce a full discharge of bile and urine, take the following: Calomel, 40 gr.; comp. ext. colocynth, 60 gr.; mix, and make 10 pills; take 2 pills once every 12 hours, till they operate. Opiates may then be given to allay pain, and bark with nitric acid to recruit the strength. Fomentations and poultices should be used to hasten suppuration. It is usually better to defer cutting till suppuration; then thoroughly cut through; after this apply warm poultices. Carbolic acid passed through the skin over the carbuncle by a hypodermic syringe, and allowed to saturate the sore thoroughly, is recommended. The skin becomes white, hard and dead, in a few days sloughs off, the interior mass becomes loose, and is easily removed.

CARIES.—An inflammation of the bone with softening, leading to ulceration. It is attended with pain and swelling, and after ulceration there is a fœtid discharge with portions of the bone. *Treatment*: Fresh air, tonics and alteratives; then remove those portions incapable of repair, and endeavor to establish healthy granulations. It may be necessary to remove portions of bone which are disintegrated, and apply escharotics to the surface.

Caries of Bone.

CHANCRE.—A venereal ulcer, mostly on or near the sexual organs, with well defined edges, looking as though the skin had been punched out. They are frequently attended with suppuration of the glands of the groin. *Treatment*: The thorough application of solid nitrate of silver or nitric acid, which last may be applied a single drop at a time, with the uncovered end of a match to every part of the sore, or deliquesced carbolic acid in like manner, to destroy the virus, and the subsequent use of gently stimulant and astringent washes; 3 gr. of alum or sulphate of zinc, with as much carbolic acid to 1 oz. of water, is usually all that is needed, sufficient care being had to prevent the contact of other parts, by the use of small pledgets of lint wet with the lotion. If the ulcer spreads, the use of quinine and iron tonics will be of service.

CHOKING.—A violent slap with the open hand between the shoulders, if given immediately, will frequently dislodge any foreign body. If the accident occurs with a child, and this fails, it should be grasped by the feet, inverted, and the slapping renewed; but should this induce violent suffocative paroxysms, it must be discontinued. Then, if the substance has entered



Double Tube for Insertion into the Windpipe.

the windpipe, nothing but cutting into the windpipe (called the operation of *Tracheotomy*) by a surgeon will do. If food has stuck at the entrance of the gullet, the substance may be reached and extracted with the forefinger, or

seized with a pair of pincers. Should this fail, excite vomiting by passing the finger to the root of the tongue or tickling the throat with a feather. By suddenly dashing in the face a basin of cold water, the shock and the involuntary gasp may move the substance up or down. If this cannot be done, seize a fork, a spoon, a penholder, pencil or quill, and push the article, if not too large, down the throat. If it be low down in the gullet, give an emetic of sulphate of zinc, 20 gr., in a couple of tablespoonfuls of warm water.

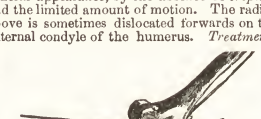
Securing Tube in Trachea.

CORNS.—These horny indurations of the skin have a nucleus, very sensitive at the base, and occur on the exposed portions of the joints of the toes. The common cause of corns is pressure or pinching from wearing tight, stiff or ill-fitting shoes. Frequently they are aggravated by some constitutional taint. *Treatment:* Soak the corns for some minutes in warm water; then pare closely with a sharp penknife, and bathe with dilute arnica tincture. If this does not do, bind cotton on the corn at night, and saturate it with spirits of turpentine. If this is not sufficient, paint, the corn with tincture of iodine, 2 or 3 times a day. If this fails, after paring the corn, place upon it a small, circular piece of leather or buckskin, spread with some emollient plaster, and have a hole in the center corresponding to the size of the corn; now touch it with nitric acid, by means of a small glass rod or wood toothpick, due care being taken not to allow the liquid to come in contact with the neighboring parts. Repeat this daily until it be sufficiently softened to admit of removal. If these all fail, any one of the following is recommended.—2. Apply, morning and evening, a drop of perchloride of iron by means of a bit of straw, for 15 days.—3. Take a lemon and roll it until soft; cut a thick slice and bind it on the corn on retiring at night. In the morning, if the corn is white and disintegrated, pull it out with your finger-nails. Sometimes several applications will be necessary.—4. Soak the feet, and bind on baking soda, dampened, and in the morning you will be surprised to find the soreness all out of your corns.—5. (*Pomades for Corns.*) Savine ointment, 1½ oz.; verdigris (in fine powder), ½ oz.; mix.—6. Dried carbonate of soda, ½ oz.; lard, 1 oz.; smalts (to color), q. s.; mix. The above are applied on a piece of rag, and renewed night and morning. Sold under various names.—7. (*Liquid Solvents.*) A saturated solution of salt of tartar or pearlash. It is commonly obtained by exposing the article, contained in a jar or wide-mouthed bottle, in a damp place, until it forms an oil-like liquid.—8. Caustic potassa, 1 dr.; alcohol, 1 fl. oz.; mix, in a stoppered phial, and agitate until solution is complete. The corns are either moistened with the above, or a small piece of lint, or rag, of the size of the corn, is moistened with them and bound on, care being taken, particularly with the last one, that the liquid does not touch the surrounding parts.

CRAMPS.—These may result from various causes, and may affect the muscles of a part only, or of the entire body. *Treatment:* Brisk friction, whether the cramps be general or local. For general cramps, put the patient in a hot bath, and use friction while in the water. For local cramps, use an embrocation of camphorated oil, spirits of turpentine and spirits of hartshorn; or the volatile liniment, 1 part spirits of hartshorn and 2 of sweet oil; or liquid opodeldoc and tincture of arnica, rubbing in the direction of the muscles, and apply to the extremeties. For cramps in the stomach and bowels, use hot friction, apply hot mustard or fomentations, and 25 drops of laudanum, with a teaspoonful of aromatic spirits of hartshorn, and ½ teaspoonful of essence of peppermint in sweetened water; or ½ teaspoonful of chloroform with as much spirits of lavender; or, in the absence of these, 1 oz. of brandy in some warm water.

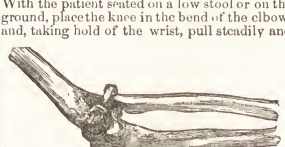
DISLOCATIONS.—Dislocations, like amputations, are of such importance that they usually require a surgeon to attend to them. The methods would be so innumerable, and the directions so extended, that it will only be attempted to give a faint idea of what might be done. Therefore, only a few cases of resetting will be considered; such as the elbow, the fingers, etc.

1. (*The Elbow.*) The common form is the dislocation of both the bones of the forearm backwards. It may be distinguished from fracture of the upper bone, which it resembles in general appearance, by the absence of *crepitus* and the limited amount of motion. The radius above is sometimes dislocated forwards on the external condyle of the humerus. *Treatment:*



Dislocation Backwards of the Elbow.

Simple extension, the elbow being kept straight. With the patient seated on a low stool or on the ground, place the knee in the bend of the elbow, and, taking hold of the wrist, pull steadily and



Dislocation Forwards of Head of Radius.

firmly, at the same time bending the arm gently, and the bones will in most cases return to their places without difficulty.—2. (*The Fingers.*)

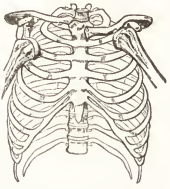
These are difficult to manage, but the general principles of simple extension are all that are usually employed.—3. (*The Jaw.*) Is caused by wide yawning, laughing, etc., and may be recognized by an inability to close the mouth, and by an unusual projection of the chin. *Treatment:* Protect the thumbs with a napkin or heavy gloves; place them within the mouth, in a line with and on the back teeth of the lower jaw, and press forcibly downwards and backwards, at the same time raising the chin with the other fingers, and the jaw will slip into place with a snap.—4. (*The Shoulder.*) May usually be detected by the deformity produced. The patient being seated in a chair, the surgeon places one of his knees in the axilla, resting the foot on the chair. He then puts his hand on the shoulder to fix the scapula, and with the other depresses the elbow over his knee. The arm should then be carried for some days in a sling, and if there is much inflammation, cold water dressings, or a lotion of lead water and tincture of arnica (sugar of lead, 1 dr., and tincture of arnica, 2 oz., to water; 1 pt.) may be applied. This joint may also sometimes be successfully reduced by the following maneuver: Have the patient lie down, and sit directly behind him; place one hand upon the shoulder to fix it;

Dislocation of the Jaw.

Dislocated Thumb.

Dislocation of the Thumb.

Reducing Dislocation of the Finger.



Dislocation of the Right Shoulder into Armpit.

Self-Reduction of Shoulder.

The common form is into the armpit. The shoulder is flattened, the head of the bone may be felt with the fingers, and the arm cannot easily be raised even with the shoulder. *Treatment:* Lay the person on a bed, on the side of the injured joint; seat yourself on the edge of the bed, and, having placed your heel in the patient's armpit, grasp the wrist or arm in some way with both hands and pull steadily downwards. After pulling a few moments, divert the patient's attention, by asking him to slightly change position, and while he is trying to do so pull suddenly with increased force, and the bone will probably be felt to slip into its place. Another method is by the knee in the axilla, then raise the arm from the side, and draw it straight up by the patient's head, till the bone is thus elevated into its socket. Another method is shown by the engraving of the man and gate.—5. (*The Wrist, Knee, or Ankle.*) These are most always accompanied with a fracture of one or both bones of the involved joint, and the services of a good surgeon are very indispensable.

DROPSY OF TESTICLES.—A collection of serum in the tunica vaginalis. It forms a pear-shaped swelling, smooth on its surface, fluctuating if pressed, free from pain and tenderness, and causing merely a little uneasiness by its weight. *Treatment:* The remedies are three-

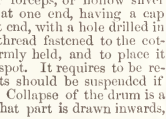
fold: 1. Strong discutient lotions, which sometimes assist the cure in children, but cannot be depended on for adults.—2. Evacuation of the serum, or the *palliative cure*, by a puncture with a lancet, or by making a number of punctures with a grooved needle, so that the fluid may escape into the cellular tissue of the scrotum, whence it is readily absorbed. This is sufficient for children, but rarely so for adults. —3. By injecting stimulating fluids, or introducing setons into the tunica vaginalis, to excite inflammation sufficient to destroy its secreting faculty. The surgeon grasps the tumor behind, and plunges a trocar and canula into the sac, pointing the instrument upwards, so that it may not wound the testicle. He next withdraws the trocar, at the same time pushing the canula well into the sac. About ½ oz. of tinct. iodine is then injected.

DROPSY, Operation of Paracentesis in.—For the general treatment of dropsy, see the same in MEDICINE. When medicines fail to afford relief, an operation must be resorted to. In dropsy of the abdomen, let the patient be placed on the side of a bed and the part affected surrounded with a broad bandage, having in it a slit corresponding with the place of puncture on a line with the umbilicus or navel, and a couple of inches below it. After seeing that the patient's bladder has been emptied, let the skin at that point be divided with a lancet or sharp knife, and a trocar and canula be thrust through, when the trocar is withdrawn and the water flows through the canula. While the water is flowing, an assistant draws steadily upon the two ends of the bandage, thus making gentle compression, without which a sensation of faintness is generally experienced, and afterwards, when the operation is completed, the bandage should be securely pinned.

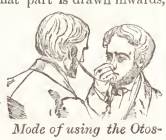
EAR-ACHE.—An affection that depends more on sympathy with the neighboring gums than any other cause. The irritation caused by cutting the permanent teeth in youth, and the wisdom teeth in adults, is the most frequent cause. *Treatment*: When caused from the irritation of teething, it can be relieved by scarifying the gum above the tooth, or by inserting a little wool in the ear, wetted with laudanum, and covering the ear with a large hot bran poultice. If from decayed or rotten teeth, these should be removed. When the ear-ache proceeds from cold, or some nervous affection of the head, the wool, with laudanum in the ear, and fomentation of chamomiles, will in general subdue the pain; but a better remedy is to drop into the ear a few drops of a solution of 2 gr. of atropia (the active principle of belladonna or deadly nightshade) in ½ *oz.* of water.

EAR, Diseases of.—Perforation of the "drum" of the ear very often accompanies fracture of the petrous bone; but may be caused by blows on the head, boxes on the ear, violent blowing of the nose, forcibly syringing, by disease, as after scarlet fever, by descent in the diving bell, by the introduction of foreign substances, and by loud noises. The symptoms which indicate an aperture in the membrane are, that the patient is conscious of air passing from the ear during swallowing; or that he can taste or perceive in his throat substances applied by syringing the ear. Diseased conditions are examined with a speculum and the otoscope. Purulent discharges from the ear can often be cured by patient daily syringing with pure warm soft water. After a few weeks, the addition of a little salt exerts a tonic effect. Obstinate cases require an aurist's treatment with nitrate of silver, etc. The closing of a perforation depends on the youth and strength of the patient and the healing of any diseased condition. A little bit of cotton wool, moistened with water, if passed down the meatus, and applied against the orifice, will act as a support to an injured membrane, and to the relaxed chain of small bones in the ear, and often produces a remarkable increase of hearing. Borated, or other medicated cotton, such as is sold at the druggists, should be used. On no account should any of the quack appliances now advertised take the place of this soft cotton, or the irritation will set up or increase a purulent discharge, ultimately destroying the ear. Not even the cotton should be used until a persevering effort has been made, for many months, to heal any ulcer in the ear, as even so innocent a foreign body as this soft cotton, antiseptically medicated, will militate against healing. The patient can usually be taught to introduce and withdraw this cotton with great nicety, by means of a slender forceps, or hollow silver tube, slightly bent at one end, having a cup soldered on the bent end, with a hole drilled in it, through which a thread fastened to the cotton is pulled and firmly held, and to place it exactly in the right spot. It requires to be renewed daily. Efforts should be suspended if irritation is caused. Collapse of the drum is a condition in which that part is drawn inwards, so as to be concave externally and leave the handle of the malleus unnaturally prominent. This requires the attention of an aurist. There are many diseases of the internal ear, only recognized by the skillful aural surgeon, who, with the otoscope, speculum and catheter, as shown in our engravings, and sometimes with the tuning fork and other scientific appliances, is able to diagnose the case, as no patient can for himself. Astringent gargles

Ear Speculum.



Mode of using the Otoscope.



Mode of using the Eustachian Catheter and the Explorer.

for the mouth are useful in improving the condition of the entrance of the Eustachian tube, on whose healthful state good hearing largely depends. It is often closed by bad colds. Prolonged bathing in cold water is a prolific source of deafness. A plug of cotton in each ear before swimming, is a sensible precaution.

EAR, Foreign Bodies in the. — Most foreign bodies, especially of small size, may be readily removed by syringing with warm water. Should instruments be used, great care should be observed, and very little force exerted. When foreign bodies cannot be removed by syringing the ear, introduce a very small brush or swab of frayed linen or muslin cloth, or a bit of sponge, moistened with a solution of glue, and keep it in contact with the foreign body until the glue adheres, when the body may be easily removed. Insects in the ear may be readily killed by pouring oil into the ear, after which they may be removed by syringing. Hardened ear wax may be softened by dropping into the ear some oil or glycerine, and then washed out with a syringe and warm water.

EYE, Cataract of the.—The blindness caused by obscuration of the crystalline lens. *Treatment*: This is by a well-known surgical operation, which none but a surgeon would undertake. There are two kinds of operation, extraction of the lens, and depressing it; the former secures the best result.

EYE, Closure of Tear-Passage of.—In health there is a tear-passage between the eye and nostril; this is sometimes closed up, causing a constant overflow of tears. *Treatment*: By a surgical operation this passage must be opened again, and a silver style introduced to keep it open for a period.

EYE, Inflammation of Tear-Gland of. — This gland sometimes inflames, and frequently suppurates, forming a small abscess. *Treatment*: Poultice the swelling while there is pain, and open it when it becomes mature.

EYELID, Eversion of.—After long-continued inflammation, the mucous lining of the eyelid becomes thickened, and the lid is turned out; the same effect is sometimes produced by the puckering of the scar of a healed burn or abscess in the vicinity of the under eyelid. *Treatment*: When caused by inflammation, try a wash of nitrate of silver, 2 gr. to 1 oz. of water; if this does not succeed, a portion of the thickened lining must be cut out, so that the lid may be braced up by the contraction of the scar that follows the healing of the cut. But when the eversion is caused by a scar after a burn or abscess, this scar itself must sometimes be excised, and a new under eyelid formed from the neighboring skin of the cheek.

EYELID, Falling of.—In the aged and feeble, owing to the paralysis of the muscle that raises it, the upper lid falls down. The patient is unable to see unless he lifts the lid. No efficient treatment is known. The lid may recover its power by using stimulating lotions or electricity.

EYELID, Inflammation of the.—The glands of the lids secrete a sticky mucus, which, during sleep, glues the lids together, so that, on awaking in the morning, the patient cannot get his eyes open. The complaint is generally chronic and obstinate, lasting a long time. Weakly persons, with disordered digestion, are most subject to it. In bad cases the lids ulcerate, and the lashes fall out. *Treatment*: The lids should be bathed with a solution of 10 gr. of sulphate of zinc, or 20 gr. of sugar of lead, and 1½ dr. of laudanum in ½ pt. of water, and the bowels opened daily with a small dose of Epsom or Rochelle salts, or the citrate of magnesia, and the edges of the lids, as soon as the active inflammation is subdued, touched once or twice daily with a solution of 5 gr. of tannin, or 2 of sulphate of zinc, in 1 oz. of water; a small amount of citrine ointment should be rubbed along the borders of the lids, with a small brush, at night.

EYELIDS, Insects on the. — In rare instances lice infest the eyelashes; they lodge about the roots of the hairs, and cause an obstinate itching. *Treatment*: Anoint the eyelashes with a small quantity of mercurial ointment.

EYELID, Inversion of the.—When the eyelid is turned in, there exists, either on account of previous inflammation, or some cause not clearly understood, a redundancy of the skin of the eyelid, and a contraction of its cartilage. *Treatment*: By operation a portion of the skin of the eyelid is removed, and the edges of the wound brought together by suture.

EYES, Dryness of the.—Sometimes a morbid dryness affects the eyes. *Treatment*: Keep the eyes constantly moist with glycerine.

EYES, Excessive Moisture of the.—In this case there is an over-secretion of tears, such that the cheeks are kept constantly wet. *Treatment*: As this complaint is owing to general irritability and weakness, the treatment is directed to regulating the bowels by occasional dram doses of Epsom salts, and promoting the strength by a dessertspoonful of comp. tinct. of gentian twice a day, before breakfast and supper.

EYES, Foreign Bodies in the. — They should be removed as soon as possible. Do not rub the parts, as this only increases the inflammation. If the injury is caused by caustic, strong acids, or salt, drop sweet-oil into the eye. When lime, ashes, dye-stuffs, or tobacco is the offending object, cream or sour milk is the best application. When sharp minerals, paint, sand, dirt and the like get into the eye, apply white of egg. When small particles cannot be removed by the above means, the upper lid should be turned inside out by taking the eyelashes between the finger and thumb and turning the lid upwards over a probe or knitting needle; the foreign substance may then be wiped off with the corner of a linen handkerchief. To remove cinders, take a small camel's hair brush dipped in water and pass it over the ball of the eye after raising the lid.

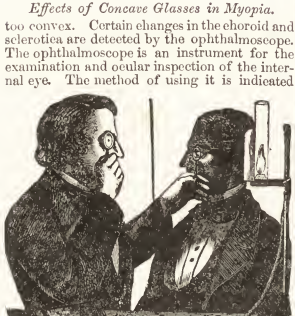
EYES, Gonorrhœal Ophthalmia of the.—Confined mostly to adults, though it may occur in children. Great precaution is always necessary to prevent the spread of the disease through a family. Any one with this kind of sore eyes should always have his own basin and towel, and nobody else should use them. *Treatment*: If possible, an oculist should be

consulted immediately. The eye should be kept clean with warm water and a soft rag; hard rubbing should be avoided; the best remedy is then a solution of alum, 10 gr. to 1 oz. of water, dropped into the eye every hour.

EYES, Myopia of, or Short Sight.—This affection may depend either on an increase in the refractive power of the eye, or else on an elongation of its axis, so that in either case the rays of light are brought to a focus before they reach the retina. The cornea is often exceedingly convex, and the secretion of aqueous humor abundant; and the crystalline lens is also

Effects of Concave Glasses in Myopia.

too convex. Certain changes in the choroid and sclerotica are detected by the ophthalmoscope. The ophthalmoscope is an instrument for the examination and ocular inspection of the internal eye. The method of using it is indicated



An Opthalmoscopic Examination.

by the illustration. By it the condition of the eye is readily seen. *Treatment:* The eyes should be accustomed to look at distant objects. When children display any tendency to short sight, their studies should be abridged, and they should have plenty of exercise in the open air. Shooting, archery, ball, and field sports in general, are highly beneficial. If the myopia is very decided, or if the eyes feel fatigued after any ordinary use of them, it will be better to wear glasses continually. Spectacles should always be used in preference to a single glass. The patient should choose a pair that enables him to see objects within 40 feet as distinctly as other people, but not so concave as to make objects appear dazzling, or smaller than usual.

EYES, Presbyopia, or Long-sight.—This depends apparently on a diminished quantity and density of the humors of the eyeball, through which it becomes flatter, and its refractive powers are diminished. *Treatment:* Use convex glasses immediately on discovering that it is impossible to read at the usual distance without fatigue to the eye; taking care that the lenses

Effects of Convex Glasses in Presbyopia.

chosen are of the lowest power, that will assist vision and restore the faculty of reading at the distance of from 12 to 16 inches. The sight should be spared by artificial light as much as possible. The glasses should cause minute objects near the eye to appear bright and distinct, but not larger than natural.

EYES, Strabismus, or Squinting of the.—The ordinary form of squint in young persons is the *convergent*, in which the eye is turned inwards; the *divergent*, that in which the eye is turned outwards, is chiefly met with in elderly persons. *Treatment:* If the affection be of not more than a few weeks' duration, it may perhaps be removed or mitigated by judicious medical treatment, especially by purgatives; as, 3 improved comp. cath. pills, taken at bedtime and followed by ½ oz. castor oil the next morning, if they do not operate previously; by antacids, as a teaspoonful of Husband's magnesia, followed by 2 teaspoonfuls of vinegar; by tonics, as iodide of potassium, 1 dr.; syrup of sarsaparilla, 4 fl. oz.; mix; take 1 teaspoonful before each meal. In settled cases, an operation by a skillful oculist will often cure.

EYES, Styes of the.—Stye is a small painful boil at the edge of the eyelid, having its seat probably in the hair follicle of an eyelash. *Treatment:* Poultices or fomentations; afterwards the citrine ointment to remove remaining hardness. Give one 3 gr. blue mass pill twice a week at bedtime, and follow it with a Seidlitz powder the next morning; and take every morning before breakfast a dessertspoonful of wine in which the tartrate of iron and potash has been dissolved in the proportion of 1 dr. to 1 pint.

EYES, Ulceration of the Cornea.—A common disease and always painful, sometimes excessively so. There is usually great dread of the light and hot water runs constantly from the eye. A white spot will be visible somewhere in the clear part of the eye, which is the seat of the ulcer. *Treatment:* A solution of atropine, 4 gr. to 1 oz. of water for adults, should be dropped into the eye 4 times a day, according to the amount of pain.

FELON (Whitlow, or Run-Around).—An abscess in the extremities of the fingers, or between the joints, and sometimes on the toes. It usually commences with a pricking pain in the finger. Soon the part begins to swell, becomes hard, hot, and exceedingly painful. The patient gets no rest night or day, and the matter burrows around the bone, causing caries of the joint. *Treatment:* 1. On the first approach, let it be painted with pure deliquescent, undiluted carbolic acid, and apply a coating of collodion over this.—2. Take equal parts of lard, soap, salt, and spirits of turpentine. Shave the soap and mix with the other ingredients, and apply as a

plaster; use kerosene where turpentine is not at hand. If the skin is thick, soak it in hot lye before applying the plaster.

FREEZING.—A person apparently dead from being frozen should never be taken into a warm house; on the contrary, always place the body in a cold room, and cover it with snow; or bathe and rub with ice-cold water, until the limbs become soft and flexible; then place it in a dry bed and rub briskly with flannel. So with any individual part that is frozen, caution being used not to raise the temperature too suddenly, or mortification may follow. Teaspoonfuls of weak brandy and cold water can be given occasionally.

GANGLION.—A movable, elastic swelling, with little or no pain, or change of color of the skin, situated under or between the tendons or sinews, and generally near a joint. *Treatment:*—1. By sudden pressure or a smart blow, the sack may be ruptured; where this cannot be done, puncture and let out the contents. Pressure may then, sometimes, cause the sides of the sack to adhere, and a cure be effected. — 2. Puncture it with a hypodermic syringe, draw out any fluid that will come through the hypodermic needle, and then inject into it carbolic acid or tincture of iodine

Ganglion in a Finger.

GLANDERS.—This disease is chiefly manifested by an unhealthy suppuration from the nasal cavities, pustular eruptions on the skin, and unhealthy abscesses. When seated in the lymphatic system, it is called *farcy*—when in the nasal cavities, *glanders*. It may be either acute or chronic. Acute glanders begins with the symptoms of a putrid poison. There are feelings of indisposition, followed by fever; then abscesses appear in red swellings about the joints; the fever is of a low, malignant character; in about a fortnight a dusky, shining swelling appears on the face, extending over the scalp and closing the eyes; then an offensive, yellowish discharge issues from the nostrils. *Treatment:* The chief points are to open all abscesses as soon as possible, to syringe the nasal cavities with solutions of creosote, and to support the strength and abate the thirst with wine or brandy, soda water, beef tea, etc. The effluvia must be counteracted by fumigations of chlorine and aromatics. Creosote injections, the administration of iodide of potassium with iodine, and mercurial salivation, in different cases respectively, have effected cures.

MOLES.—Croton oil, under the form of pomade or ointment, and potassio-tartrate of antimony, under the form of paste or plaster, have each recently been successfully employed, on the Continent for the removal of ordinary moles and nævi. The following is the mode of using the latter adopted by an eminent French surgeon: Tartar emetic, in impalpable powder, 15 gr.; soap plaster, emplastrum saponis, 1 dr.; beat them to a paste. Apply this paste to nearly a line in thickness (not more), and cover the whole with strips of gummed paper. In four or five days eruption or suppuration will set in, and, in a few days after, leave in the place of the nævus only a very slight scar. Croton oil ointment effects the same, but less completely unless repeated, by producing a pustular eruption, which, however, does not permanently mark the skin.

WARTS.—A wart belongs to the skin proper, the *vera cutis*, and consists of an abnormal growth of one or more papillæ, in which the nerves or blood vessels terminate. *Treatment:* Touch them repeatedly with nitrate of silver, or apply nitric acid to their extremities. Do not touch the adjacent skin. A safer remedy is to get a piece of sal ammoniac, about the size of a walnut; moisten the warts, and rub the sal ammoniac well on them every night and morning. If these prove ineffectual, try any one of the following:—1. Dissolve 1 oz. of white vitriol in 5 tablespoonfuls of water; put into a vial, and rub the warts as often as convenient.—2. Dissolve as much common washing soda as the water will take up; wash the warts with this for a minute or two, and allow them to dry without being wiped.—3. Pass a pin through the wart; apply one end of the pin to the flame of a lamp; hold it there until the wart frics under the action of the heat.—4. In cases of multiple warts of the face, apply the following paste: sublimed sulphur, 5 dr.; pure concentrated acetic acid, 2½ dr.; glycerine, 2 oz.; mix; for external use. The paste is applied to the warts either with a brush or spread over small pieces of linen. This is done at night, the paste being washed off the next morning. The application is repeated for several days in succession. Under the influence of this treatment the warts shrivel up, become blue, and ultimately drop off spontaneously.—5. Another very simple method employed with success in the treatment of facial warts, consists in covering the affected parts with pieces of flannel, smeared with soft soap. These are left in position for 24 to 48 hours, according to the degree of sensitiveness displayed by the patient, until the skin becomes red and shrivels up. After removing the flannel the warts should not be washed, nor even wiped; they become spontaneously detached in about a week.—6. Electrolysis is the most efficacious means of treating nevi molluscifórmes. A needle connected with the negative pole of a battery is introduced into the tumor, while the patient holds the positive electrode in his hand. A current of from one to two milliampercs should be used, and the application should last about thirty seconds. It is repeated at the end of a week or a fortnight. Large nevi require application of the galvano-cautery or some other caustic.—7. The common wart, which is so unsightly on the hands and face, can be easily removed by small doses of sulphate of magnesia, taken internally. — 8. Several children, treated with 3 gr. of Epsom salts, morning and evening, were promptly cured.

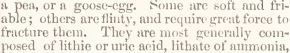
GOITRE. — A tumor on the forepart of the neck. It is an endemic disease: that is, one extremely prevalent in certain localities; among which may be mentioned Derbyshire, Nottingham, and the chalky parts of England generally; and various Alpine and mountainous districts, especially the Tyrol and valley of the Rhone. The use of melted snow, or of water impregnated with calcareous or earthy particles, to which the inhabitants of those places are more or less habituated, although not perhaps the invariable cause, is the most probable that can be assigned. *Treatment:* Take 20 drops of the comp. tinct. of iodine in a tablespoonful of wine, 3 times a day before meals, and paint the tumor twice a day with the tincture of iodine. It may be necessary, under the threatening of suffocation, to perform an operation; but this is extremely dangerous on account of hemorrhage, and does not always produce a cure.

GONORRHŒA (Clap).—A tingling or itching sensation at the end of the penis, which becomes inflamed and swollen, a discharge of matter, at first thin and whitish, and, later, thick greenish-yellow, attended with intense scalding in passing water; pain and soreness along the entire under-surface of the organ, and involuntary, painful erections. The glands of the groin may become enlarged and inflamed, forming "buboes," which, if neglected, may suppurate. After the inflammatory symptoms have abated, a muco-purulent discharge is left, which, when obstinate and thin, is called a *gleet*. *Treatment:* First give ½ oz. of Epsom salts to operate as a cooling aperient; then take 3 times a day 1 dr. of a mixture of balsam copaiba, mucilage of gum Arabic, and sweet spirits of nitre, of each 1 fl. oz.; when the disease is obstinate, inject the urethra every four hours with a solution of 2 gr. of nitrate of silver in 8 fl. oz. of water. The patient should be kept very quiet and if there is much pain and fever should continue the Epsom salts in dram doses every morning, and take 8 gr. of Dover's powder at bedtime.

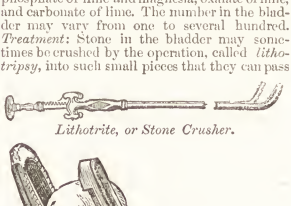
GRAFTING. Skin.— When a large surface of the body needs a covering of skin, and it is impossible for nature to supply the want, the operation of skin-grafting is resorted to to aid nature. Frightfully contracted cicatrices which follow burns, etc., are excised and their places filled with skin removed from another body or part of the same body, and engrafted on the required place. The skin adheres, and with surprising rapidity sends out prolongations of delicate skin in all directions, covering the surface with a new skin, comparatively free from contraction.

GRAVEL.— Small stony deposits, or *calculi*, are generally formed in the kidneys by a precipitation of earthy substances, and when they pass freely and frequently the disease is termed *gravel*. The passage of these gritty particles through the waterpipe frequently causes excruciating pain. *Treatment:* The pain being one of the most prominent, as well as serious symptoms, the treatment should be first directed to its relief; and this can be accomplished in no quicker or better way than by a hypodermic injection of from ½ to ¾ gr. of sulphate of morphia, dissolved in ½ dr. of warm water. This may be repeated every ½ hour till the pain subsides. We may be obliged to resort to bleeding, warm bath, soothing injections, diluent and diuretic drinks, spirits of turpentine; also mucilaginous drinks, like flaxseed tea, slippery elm, or gum Arabic water, are useful throughout the disease. The ordinary result is the passage of the calculus; but sometimes it is retained in the kidney, increasing in size, and branching into the pelvis or renal cavity. Then it is called *stone*. The symptoms are then pain in the loins, irritation and retraction of the testicle, bloody urine, and inflammation of the kidney. The passage of the stone through the ureter causes most acute and severe pain, faintness and sickness, which may last for several days, and is only relieved by the stone entering the bladder. The symptoms of stone in the bladder are frequent, sudden, irresistible desire to make water; pain in the glans penis, and elongation of the prepuce; sudden stoppage of the stream in urination, and its re-establishment by change of position—the urine being mixed with mucus and sometimes with blood. Stones vary in their form, size, color, consistence, and chemical composition; the size may be that of a pea, or a goose-egg. Some are soft and friable; others are flinty, and require great force to fracture them. They are most generally composed of lithic or uric acid, lithate of ammonia, phosphate of lime and magnesia, oxalate of lime, and carbonate of lime. The number in the bladder may vary from one to several hundred. *Treatment:* Stone in the bladder may sometimes be crushed by the operation, called *lithotripsy*, into such small pieces that they can pass away through the waterpipe. The instrument

Urinary Deposits.

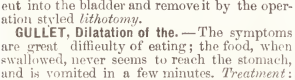


Lithotrite, or Stone Crusher.



Its Crushing End, Magnified.

used consists of two blades, which slide one upon the other, the extremities being slightly bent. It is introduced into the bladder as a sound or catheter, and afterwards the blades are separated, to grasp the stone. The crushing power is a screw, variously adapted. The extremities of the instrument have teeth, so as to retain the stone when grasped, and also apertures to allow of the escape of sand or powdered stone. The patient must be previously prepared for the operation, by regulation of the general health, dilatation of the urethra, and distension of the bladder by introduction through a catheter of warm water. The patient lies on a convenient table or bed. After encountering the stone and fairly grasping it, the stone is crushed by slowly and gradually turning the screw. Then the instrument should be slowly



Male Catheter, in two Parts.

withdrawn, and when the irritation has subsided, subsequently introduced to crush the fragments. When the stone cannot be crushed and removed in this way, the surgeon is obliged to cut into the bladder and remove it by the operation styled *lithotomy*.

GULLET, Dilatation of the.—The symptoms are great difficulty of eating; the food, when swallowed, never seems to reach the stomach, and is vomited in a few minutes. *Treatment*: The patient should be fed as in palsy. Sometimes a blind pouch is connected with the gullet, and occasions great distress by intercepting the food. The only remedy is to feed the patient constantly with the stomach-pump, so that the pouch may close.

GULLET, or FOOD-PIPE, Cancer of the.—Causes burning pain between the shoulder blades, and difficulty of swallowing. *Treatment*: Support with ice-cream, eggs, meat beat to a pulp, etc.; and give nourishing injections; for pain apply belladonna plasters to the back, and give opium, if necessary.

GULLET, Palsy of the.—This occasions inability of swallowing, but without pain, and a bougie, when passed, meets with no obstruction. *Treatment*: It generally depends on organic disease of the brain or spinal cord, which must be examined into and cured, if possible. The patient should be fed by the stomach pump, by nutrient enemata, and by pushing soft food occasionally down the gullet with a probang.

GULLET, Polypus of the.—Cases are recorded of polypous tumors projecting into the pharynx or gullet. *Treatment*: They must be removed by a surgical operation, in the same way they are removed from the nostrils and other localities.

GULLET, Spasm of the.—This disease is known by its generally occurring in sudden fits—the patient at a meal finding himself altogether incapable of swallowing, and the attempt to do so producing spasmodic pain and a sense of choking. *Treatment*: This affection always depends on a weakened or hysterical state of the system. Tonics, antispasmodics, and alteratives, especially iron with aloes and galbanum at bed-time; as, reduced iron, ½ dr.; aloes, galbanum, of each, 1½ dr.; sufficient syrup to make 60 pills; take 2 pills at bedtime and 2 at 11 A. M.; exercise in the open air and warm and cold bathing; great attention to the diet, care not to swallow anything imperfectly mastieated or too hot, and the occasional passage of a bougie, are the remedies.

GULLET, Stricture of the.—This causes difficulty of swallowing, gradually increasing, never absent, and occasionally aggravated by fits of spasm. Swallowing frequently produces pain in the chest, which shoots between the shoulders, and up to the head. *Treatment*: A mild course of mercury, so as just to affect the gums; occasional leeching, to relieve paroxysms of pain; hyoscyamus or conium, if there be much irritability; a seton between the shoulder blades; and the occasional passage of a bougie, or of a *ball probang*, or of a piece of sponge moistened with a weak solution of nitrate of silver.

GULLET, Tumors of the.—Tumors sometimes press on the gullet, producing ulceration and all the symptoms of stricture. *Treatment*: This disease demands the same management as that recommended for polypus, stricture, etc.

GULLET, Ulceration of the.—A disease almost uniformly fatal, producing exhaustion, irritation and inability to swallow. *Treatment*: The same as for tumors, stricture, etc.

GUM-BOIL.—A small abscess commencing in the socket of a tooth, and bursting through the gum, or sometimes through the cheek. It is usually caused by the irritation of a dead or carious tooth. *Treatment*: Fomentations; removal of the tooth, if much decayed; and an incision as soon as matter can be detected. If the tooth is extracted soon, the sac of the abscess very often comes away with it.

GUMS, Epulis of the.—A fibrous tumor of the gum. It generally commences between two teeth, which it gradually separates, then loosens, and finally displaces, and may spread so as to involve several of them. Or it may begin on the free surface of the gum. It is indolent, painless, and of slow growth. *Treatment*: It must be extirpated without delay. If possible, it must be cleanly shaven from the periosteum; but, if necessary, the tooth on either side must be extracted, and the tumor entirely cut out.

GUMS, Inflammatory Softening of the.—This generally affects elderly people, and may be a consequence of tartar, but more frequently depends on a congested state of the liver and bowels. The gums are swollen, spongy, exceedingly tender, and subject to constant pain, and bleed on the slightest touch. If the disease proceeds, they separate from the teeth; the teeth loosen and fall out. *Treatment*: Deep and free scarifications and repeated leechings; the bowels cleared by purgatives; and gargles should be employed. Whilst there is much pain and soreness, the soothing gargle, as, creosote, 20 drops; gum Arabic mucilage, ½ fl. oz.,

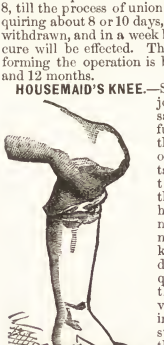
rub together and add water, 8 fl. oz.; afterwards the following: Alum, 1 dr.; dilute sulphuric acid, 40 drops; tinct. myrrh, 2 fl. dr.; decoction of cinchona, 6 fl. oz.; mix. Or, tannin, 20 gr.; brandy, ½ fl. oz.; camphor mixture, 6 fl. oz.; mix.

HARE-LIP.—A malformation that is born with a child. Hare-lip is more frequently found in the upper than in the under lip; in the latter case, the child is unable to articulate, or retain the saliva in the mouth, creating a source of ceaseless discomfort and pain. The disease is a fissure of one or both lips, having a space between, wider at the bottom and narrower to an apex at the gum, resembling the letter V reversed, Λ. This condition is called simple hare lip; but sometimes the fissure is double, having a pendant piece of the lip in the centre of both fissures. Compound harelip is that where the cleft extends along the bones of the palate, over the whole arch of the mouth, while in some cases the bones are entirely wanting. *Treatment:* This is very simple. The operation consists in making the two edges of the fissure even, bringing them together by two short silver needles, and keeping them in that position by silk thread passed over their ends like the figure 8, till the process of union has taken place, requiring about 8 or 10 days, when the needles are withdrawn, and in a week longer the permanent cure will be effected. The best period for performing the operation is between the age of 6 and 12 months.

Operation for Hare-Lip.

Button Suture.

HOUSEMAID'S KNEE.—Situated near the large joints are certain little sacs, or bags, whose function is to lubricate the tendons with the oily fluid they contain. Inflammation of the one between the knee-pan and skin has received the above name, because housemaids, from often kneeling on hard, damp stones, have frequently been subject to this affliction. It causes very great pain, swelling and fever. The swelling is in front of the knee-pan, and entirely unconnected with the joint. *Treatment:* Rest, leeches, fomentations and purgatives. If not speedily relieved by these means, it should be freely opened. When inflammation has abated, the absorption and consequent disappearance of the tumor, have sometimes been hastened by injecting into its substance the tincture of iodine with a hypodermic syringe.



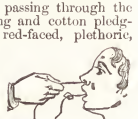
Housemaid's Knee.

HYDROPHOBIA.—It is best, when it can be safely done, to cut immediately around the entire track of the animal's teeth. If a finger be bitten, it would be best to chop the finger off, or amputate at the next joint. If the cutting cannot be safely done, warm water should be applied freely to wash away the virus, and promote free bleeding. A large cupping glass should then be applied; or, the bitten part should be strongly sucked for some minutes, by the person himself, or by any one else having no sores on the lips or in the mouth. A red-hot iron, or caustic potash, or pure deliquescent carbolic acid should then be thoroughly applied to every part of the wound, after which dress with lint, moistened with warm spirits and water with a little carbolic acid added, or with a warm poultice.

LIP, Epithelial Cancer of the.—A disease of middle life, and affects the lower rather than the higher classes, men much more than women, and the left more often than the right side. The disease begins as a crack or excoriation, thick epidermis, or as a wart, or as a superficial hardness of the skin. *Treatment:* Extirpation, free, entire, and early. The wound must be brought together vertically by pins and the twisted suture. In cases not fit for the knife, the palliative treatment of eaneer must be adopted. (See *Cancer.*)

MALIGNANT PUSTULE.—A contagious and very fatal disease, commencing as a little dark red spot, with a stinging pain, on which there soon appears a pustule on a hard inflamed base. When this is opened, it is found to contain a slough, black as charcoal, which rapidly spreads. *Treatment:* Same as for ulcers.

NOSE, Bleeding from the.—Let the arms be raised above the head; bathe the face, neck, and head with cold or ice-water, and lay a towel wet with it on the forehead; when this is not sufficient, let some salt water or alum water, or a pinch of powdered alum, be snuffed up the nose, or thrown up with a syringe, or blown through a quill, or better, if it can be had, some of the powder or solution of the persulphate of iron. If these means fail, the nostrils must be plugged, by a surgeon's passing through the nostril and mouth a string and cotton pledget. If the patient be red-faced, plethoric, and subject to headache and giddiness, a moderate hemorrhage may be regarded as a salutary effort of nature; a good purgative can be administered, as calomel, 5 gr.; podophyllin, aloes, rhubarb, of each, 2 gr.; mix, and make a powder, to be taken in a syrup or sauce; if the bleeding continues, give the following: Dilute sulphuric acid, 1 oz.; syrup of orange peel water, of each, 4 oz.; mix; take 1 tablespoonful 3 times a day.



Plugging the Nostrils.

NOSE, Enlargement of, or Hypertrophy.—This happens principally to those addicted to high eating. *Treatment*: The tumor may be removed with the knife; but the surgeon must first examine the patient's general health, and put him on a regular diet.

NOSE, Foreign Bodies in.—These may be removed from the nose by a small, bent probe. If they cannot be brought through the nostrils, they may be pushed back into the throat. The removal should be effected as early as possible.

NOSE, Polypus of.—A tumor of the consistence of jelly, pear-shaped, yellowish, slightly streaked with blood-vessels, attached by a narrow neck to the mucous membrane, causing a constant feeling of stuffing and cold in the head. *Treatment*: A probe should be introduced to feel for the neck of the polypus, which should then be seized with forceps, and gently twisted off. If it projects backwards into the pharynx, it must be extracted through the mouth.

NOSE, Rhinoplastic Operations on.—When a portion or the whole of the nose has been destroyed by disease or accident, the deficiency may be restored by a transplantation of skin from an adjoining part; the operation being varied according to the extent of the deformity. When the whole or greater part of the nose has perished, a triangular piece of leather should be cut into the shape which the nose formerly presented, and spread out flat on the forehead, with its base uppermost, and its boundaries marked out on the skin. Then the remains of the old nose (if any) are to be pared, and the margins of the nasal aperture cut into deep, narrow grooves. When the bleeding from these wounds has ceased, the flap of skin marked out on the forehead is to be dissected up, and all the cellular tissue down to the periosteum with it, so that it may hang attached merely by a narrow strip of skin between the eyebrows. When all bleeding has ceased, the flap is to be twisted on itself, its edges fitted into the grooves made for their reception, and fastened with sutures.

PALATE, Fissure of.—In some cases the uvula merely is fissured; in others the cleft extends forward, and may be combined with a hare-lip. *Treatment*: When the fissure is combined with hare-lip, and the gap extends from back to front entirely through the hard and soft palate and lip, the lip should be operated upon soon after birth in the manner described for hare-lip; and the observations then made should be attended to, as to the saving and pushing together any projecting bone. During childhood trusses should be worn to bring the edges of the bony fissure nearer together. If the fissure at birth should be discovered to be in the soft parts only, cauterize the angle of the fissure and allow it to cicatrize.

Fissure of the Palate.

PILES are external or internal. The predisposing causes are whatever tends to determine the blood to the rectum, such as constipation, pregnancy, sedentary habits; and the exciting causes may be purging, diarrhea, etc. *Treatment*: The palliative treatment of external piles consists in the application of astringent and anodyne ointments, made of galls, opium, etc., and the regulation of the bowels with laxatives, such as sulphur, rye mush with molasses, etc. The radical treatment is removal by scissors or bistoury; arresting the hemorrhage, and producing a healthy ulcer. A recent tense, single pile, may be successfully cured sometimes by letting out its contents by a lancet. With internal piles, in the first place, the stomach and bowels must be regulated by laxatives; disorder of the liver must be corrected, since any obstruction of the portal circulation in that organ predisposes to bleedings, or congestion of all the bile-making viscera. Great benefit will result from the use of astringent injections, such as solutions of zinc, oak bark, etc.; 6 or 8 drops of Fowler's solution of arsenic, three times daily, in ½ glass of water, has sometimes a wonderful effect in any case of piles; but the radical cure consists in their removal by a surgeon.

Suture for Fissure of the Palate.

PROUD FLESH.—Large granulations which sometimes give to healing ulcers, etc., an uneven, flabby and florid appearance. They are generally indicative of a weakened system, but frequently result from wounds and sores being kept too warm. Some mild astringent, as 1 gr. sulphate of zinc, or sulphate of copper, in 1 oz. of water; or 1 gr. of tannin, rubbed up with twice the quantity of powdered gum Arabic; or a few gr. of burnt alum, will usually be sufficient to arrest them. In addition, when the system is weak, or the diseased surface large, wine, tonics and good diet should be used. Dry calomel, dusted over exuberant granulations, will usually check them.

RUPTURE, or HERNIA.—A protrusion of the abdominal viscera. The exciting causes are over-exertion of some kind. Hernia is divided into *reducible*, *irreducible* and *strangulated*; and if the contents of the sac be intestine, it is called *enterocele*; if it contains omentum, it is called *epiplocele*. The sac is formed of peritoneum, and the different parts are called mouth, neck, and fundus. 1. *Reducible Hernia*. A painful swelling suddenly forms at some part of the abdominal walls, which is compressible and soft; can be made to disappear by pressure in the proper direction, and which often disappears spontaneously. An *enterocele* is smooth, elastic, and globular, retires suddenly, and with a gurgling noise. An *epiplocele* is more irregular in its form, has a doughy feel, and retires slowly without noise. *Treatment*: The treatment consists of reduction and retention. Reduction is effected by a manipulation termed *taxis*, the patient being placed in a recumbent position, and the muscles of the abdomen relaxed; gentle and steady pressure is made by the

hand in the direction of the descent. Retention is effected by continued and suitable pressure over the site of the protrusion, by means of a truss. The points of a good truss are, a well made elastic spring and a pad, that can be accurately fitted. The spring is to be applied 2 inches below the crest of the hip bone, and not above it, as is frequently done, Care must be taken to prevent excoriation, and also that every portion of intestine or omentum is removed from the sac previous to its application. By constant and careful use of a truss, a radical cure may be effected in a child, but rarely, if ever, in an adult.—2. *Irreducible Hernia.* When the contents of the sac cannot be restored to the abdomen, the hernia is called irreducible. It may arise from adhesions between the sac and the intestine contained, or from membranous bands stretching across the sac; from great enlargement of the omentum or intestine, or contraction of the cavity of the abdomen. The patient usually suffers from flatulence, indigestion and constipation, owing to the movements of the bowels being partially interrupted. *Treatment:* Consists in carefully regulating the bowels, avoiding any great exertions, and the wearing of a bag truss for support and to prevent further protrusion.—3. *Strangulated Hernia.* This is an incarceration of the contents of the sac with inflammation, and an interruption to the passage of feces, and of the circulation in the part. The inflammation is caused by the constriction, which may be the result of spasm, or sudden enlargement of the intestine by feces or gas. The symptoms are flatulence, constipation, pain in the part and abdomen, nausea and vomiting; and unless reduction can soon be effected there is danger that the imprisoned intestine will mortify. *Treatment:* First apply a quart of pounded ice to the hernial tumor to drive out the blood, and thus make it smaller; then let one or two assistants hold the patient in an inverted position for a few seconds at a time while the taxis is faithfully tried. If this does not succeed, the bowel will have to be cut down upon and its constriction relieved by operation.

SCROFULA, or WHITE SWELLING. — White swelling generally appears in the knee-joint, but sometimes attacks other joints. The disease commences with slight pains, perhaps affecting several joints, but at length settling decidedly in one. The pain increases in severity, and is felt as a small spot deep in the joint. The parts become swollen and hard, but do not turn red; the skin retains its natural color or assumes a shining whiteness. If not checked, matter forms in the joint, and may escape from several openings. *Treatment:* Dietetic and hygienic measures, abundance of exercise and nourishing diet, tonics of infusions of quassia, gentian or chamomile, with the bicarbonate of potash in the proportion of 3 dr. to every 6 oz. of bitter infusion, should be taken 3 times a day, and, if necessary, a grain or two of quinine, in the form of a pill, night and morning, or the citrate of iron and quinine, given in mint water or infusion of calumba, may be substituted in delicate constitutions. For the glandular form of the disease the iodide of potash and of iron; a mixture of 1 or 2 dr. of the iodide of potash and 4 to 6 dr. of the syrup of the iodide of iron in 3 oz. each of cinnamon or peppermint water, and as much compound syrup of sarsaparilla, may be given in tablespoonful doses 3 or 4 times daily. Excision of the affected bone has also been practiced, with the beneficial result of *shortening* the disease probably by months, and perhaps by years.

SPRAINS. — Warm applications are in most cases the best for 3 or 4 days, and may be applied in the following manner: Dip a good-sized piece of flannel into a pail or basinful of hot water or hot poppy fomentation, 6 poppyheads boiled in 1 qt. of water for about ½ hour; wring it almost dry and apply over the sprained part. Then place another piece of flannel (quite dry) over it, that the steam and warmth may not escape. This process should be repeated as often as the patient feels that the flannel next to his skin is getting cold, the oftener the better. If, however, the patient finds cold or tepid water more comfortable, it should be used. If the swelling be great, cold water should be applied. The diet should be nourishing, and not tend to constipate the bowels. When the knee is the joint affected, the greatest pain is felt at the inside, and therefore the fomentation should be applied to that part. When the shoulder is sprained, the arm should be kept close to the body by means of a linen roller, which is to be wrapped 4 or 5 times around the whole of the chest. It should also be brought 2 or 3 times underneath the elbow, in order to raise the shoulder. Gentle friction with the hands, after the swelling and pain have subsided, will help towards recovery.

TEETH, Caries of. — A successive softening and decay, gradually spreading till it reaches the central cavity of the tooth, which from that time is subject to fits of toothache. It may be promoted by any circumstances which lower the general health. It is very frequently a consequence of pregnancy and of nursing; it may follow any serious illness, or loss of strength, or the abuse of mercury. *Treatment:* If the caries be slight and recent, the whole of the decayed portion should be removed, and the cavity filled with gold, or an amalgam. But if the decay has advanced far towards the pulp cavity, or has laid that open, it may be necessary first to employ aperients and tonics, and use some applications to deaden the sensibility of the tooth, so as to enable it to bear the filling, and to protect it by a temporary filling of cotton or gutta percha. Avoid exposure to cold, errors in diet, and drinking very hot, cold, sweet, or acid fluids.

TEETH, Fracture of. — If a portion of a tooth is broken off, without exposing the pulp cavity, the exposed surface should be filed smooth, and no inconvenience will probably follow. If it is snapped off at the neck, and the pulp cavity is exposed and very painful, it should be touched with lunar caustic, and the mouth frequently bathed with strong poppy decoction; when pain and tenderness have ceased, an artificial tooth may be fastened to the stump. If a tooth is loosened by a blow, it should be fastened by silk to its neighbors. If a tooth is entirely driven

out, it should be replaced as soon as bleeding has ceased, and be fastened in by silk; no food should be allowed that requires mastication, and inflammation should be combated by bleeding over the gums.

TEETH, Irregularity of.—Usually a consequence of contracted and ill-formed jaw-bones. If either of the canine teeth or of the incisors of either jaw project much, persistently endeavor to push it back into its proper position with the fingers. But if at the age of fourteen or fifteen this method has not succeeded, and the teeth are crowded, the projecting tooth may be removed, although in many cases it is better to sacrifice one of the bicuspides to make room for it. If a growing child is underhung, so that the under incisors come in front of the upper ones when the mouth is shut, or so that the teeth meet at the cutting edges, instead of the lower teeth being received within the upper, the child should be encouraged daily to push the upper teeth forwards with its tongue and fingers; and should frequently put the end of a spoon-handle behind the upper incisors, and then close the mouth, using the spoon as a lever to press the upper teeth forwards and the lower ones backwards. But if these simple means do not succeed, recourse should be had to the appliances used by dentists. The wisdom teeth, especially in the lower jaw, are extremely liable to be misplaced, growing directly outwards or inwards, and producing ulceration of the cheek or tongue; or projecting forwards against the neighboring molar, or backwards into the coronoid process, or even being contained within a tumor in the substance of that process. In such cases a dentist's services will be necessary.

TESTICLE, Inflammation of.—Bleeding, purgatives, tartar emetic, opium, cold or warm lotions, should be resorted to, according to the patient's feelings. Low diet, and the recumbent position are essential. The weight must be sustained by a handkerchief. After the acute symptoms have subsided, friction with mercurial ointment, astringent lotions, and compression, will be useful. In the hardness and swelling which generally remain, iodide of potash has the best effect.

TOE, Great, Exostosis of. — The great toe is subject to a disease caused by a fibrous tumor at first; but it soon ossifies, pressing against the front half of the nail. *Treatment*: The only useful treatment is excision of it, and of that part of the nail adjacent.

Exostosis of Great Toe.

TOE-NAIL, Ingrowing. — Soak well in warm water until the soreness is relieved; then introduce under the edge of the nail pledgets of lint, to force it up out of the flesh. At the same time, with a sharp-pointed knife, scrape a groove lengthwise through the center of the nail, from the root to the point. Repeat the scraping daily until it nearly penetrates the quick, and keep in this condition. When proud flesh springs up in the ulcer, and it is very tender, take a little perchloride of iron in powder and insinuate it as deeply as possible between the free edges of the nail and the ulcer. This may be repeated in 24 hours or 36 hours, if necessary. Another good remedy is to put a small piece of tallow in a spoon, heat it quite hot, and pour it on the granulations.

Ingrowing Toe-Nail.

TONGUE, Inflammation of. — Great swelling, tenderness, and difficulty of speaking and swallowing; generally accompanies severe salivation; but it may occur in an acute form independently of this cause. *Treatment*: Purgatives and gargles; by bleeding, incisions, and antiphlogistic regimen generally. If abscess form, the fluctuating part should be opened.

TONGUE, Swelling Under, or Frog. — A soft, elastic, fluctuating and transparent tumor which forms under the tongue, and contains a pale-yellowish fluid. *Treatment*: A good plan is to empty the cyst by means of a trocar, wash it out thoroughly, and then throw in a solution of iodine.

TONGUE-TIE. — A prolongation of the frænum linguæ, confining the apex of the organ to the lower jaw. It is usually detected by the difficulty which the infant has in sucking. *Treatment*: Divide the frænum with a blunt-pointed pair of scissors, taking care to direct their points downwards, and keep as close to the lower jaw as possible, so as to avoid the lingual artery.

TONGUE, Ulceration of. — Endeavor to remove the cause and use aperients and an astringent gargle, as of alum. When this fails, free and early extirpation should be performed.

TONSIL, Chronic Enlargement of. — A frequent sequel of inflammation, especially of catarrh in scrofulous children. The parts are liable to attacks of acute inflammation, swallowing is impeded, the voice is hoarse, and breathing laborious, especially during sleep. *Treatment*: The system must be strengthened, and the secretions kept up by tonics and alteratives. Iron, especially the iodide, bark, and cod-liver oil, may be administered in either of the following forms: 1. Iodine, 2 gr.; iodide of potassium, 4 gr.; water, 1½ pt.; mix; take ½ wineglassful 3 times a day.—2. Corrosive sublimate, 1 gr.; tinct. of cinchona, 2 fl. oz.; mix; take 1 teaspoonful 3 times a day. Contraction must be promoted by astringent gargles, by swabbing the throat once a day with a lotion of nitrate of silver, 20 gr. to the oz. of water; use a piece of sponge the size of a walnut, over the end of a stick, firmly fastened on. Another remedy is to inhale boiling water, to which 20

drops of creosote or the same of tincture of iodine has been added. If these measures fail, part of the gland should be removed with the knife.

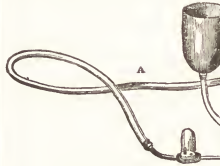
TONSIL, Inflammation of, or Tonsilitis. — Known by rapid swelling of the part, throbbing pain, swallowing difficult, perhaps impossible; headache, foul tongue and fever. *Treatment*: It must be treated by poultices, a dose of calomel followed by purgatives, inhalation of the steam of boiling water, and, to promote the secretion of saliva; use the following as a gargle: Solution of chlorinated lime, 4 fl. dr.; honey, 1 oz.; water, 3 fl. oz.; mix and add 1 tablespoonful to a glass of warm brandy. If the gland continues to swell, or if it occasion any embarrassment to the breathing, an incision should be made into it to unload the vessels, and give exit to matter.

TOOTHACHE.—Let the patient have a dose of calomel and colocynth; confine him to liquid diet; wash out the mouth with a solution of carbonate of soda in water; let the gum around the tooth, and between it and its neighbors, if tumid or tender, be scarified with a fine lancet; then let the cavity be filled loosely with a little bit of cotton dipped into a solution of tannin and mastic, 1 dr. of each to 1½ oz. of cologne water. If the pain is very violent, ½ gr. of powdered acetate of morphia may be taken up with the cotton imbued with the tannin; warmed before it is put into the cavity. In some cases, a whiff of chloroform will lull the pain. The following are also occasionally of service: Warm poultices to the cheek; a little piece of pellitory chewed; warm poppy decoction held in the mouth; or a full opiate at bedtime, if the bowels have been well cleared; stimulant, escharotic and astringent substances introduced into the cavity of the tooth, such as a drop of strong solution of nitrate of silver, or solution of alum or of tannin, or creosote, and of such aperients as Epsom salts, ½ oz.; syrup of ginger, comp. tinct. of cardamoms, of each, 1 fl. oz.; comp. infusion of rose, 10 fl. dr.; mix and take at one draught.

TOOTHACHE, Neuralgic. — Take quinine in large doses, together with aperients and alteratives.

TOOTH, Hemorrhage of, After Extraction. — The cavity must first be cleared of all coagulum; then a piece of matico leaf, or a little strip of lint loaded with powdered matico, or a bit of nitrate of silver, may be put into the socket; but if neither of these succeeds, the cavity must be plugged; one end of a long thin strip of lint is to be firmly pressed into it, so as to come into contact with its very bottom, and the remainder in successive portions forced in till the socket is filled up to the level of the gum. A compress should then be placed on the part, thick enough to be pressed upon by the opposite teeth, and the mouth kept firmly closed by a bandage.

TRANSFUSION OF BLOOD.—This consists in conveying blood from a healthy person to a weaker one. The basilic vein in the right arm of the patient is opened. From the median cephalic vein of the right arm of the healthy person blood is allowed to flow into the cup of a very ingenious apparatus here depicted. It consists of a cup of glass or of plated metal, a flexible tube and a metal tube, which



Apparatus for Transfusion.

last is to be inserted into the vein. This last has an air-trap, so constructed that any bubbles of air would be detained in it, and be rendered visible to the operator. The blood is received into the cup, and allowed to fill the flexible tube and air-trap (which is emptied of air by being turned upside down), then the nozzle can be inserted into the vein. By raising the cup the force of the stream may be increased, and it can be stopped in a moment by the finger and thumb of the operator.

TREPHINING. — An important operation performed by surgeons when a part of the skull has been forced down upon the brain by some accident, causing unconsciousness and endangering the brain and life of the person. The skull is pierced by the instrument near the injury, a small section is removed, and an *elevator* introduced to relieve the pressure. The aperture will then heal up.

Application of the Trephine.

ULCERS.—For simple ulcers, lint soaked in water, or water and laudanum, is all that is required. For indolent ulcers, the application may be made more stimulating by the addition of 2 gr. sulphate of zinc, or a few drops of nitric acid; or the surface of the ulcer may be touched with lunar caustic, followed by a warm poultice until free suppuration is established, after which the water dressing will be sufficient. For irritable ulcers, soothing applications, as warm anodyne fomentations or poultices are required, and dressings of extract of opium in glycerine and water, with rest of the part in an elevated position, are required. For both these forms and indolent ulcers, tonics, as quinine and iron, open air exercise, and good nutritious diet are useful; and in all forms of ulcers, especially when there is much formation of matter, cleanliness and frequent changes of dressings. Specific ulcers require constitutional treatment,

Bandaging an Ulcer.

in accordance with the nature of the case giving rise to them. A small amount of carbolic acid, 2 to 10 gr. to the oz., is at times a valuable addition to dressings. For weak ulcers, the application of strips of adhesive plaster as a bandage is sometimes of great advantage by supporting the edges, drawing them together, and thus assisting nature in her efforts to repair.

UVULA, Relaxed.—The uvula is the projection seen at the back part of the mouth, at the entrance to the throat. From the middle of the soft palate, the uvula hangs down into the throat, acting as a valve. It is liable to be inflamed and relaxed, occasionally a troublesome cough, by its length, irritating the upper part of the windpipe. *Treatment:* The usual mode is by astringents.—1. Take of powdered kino, 6 dr.; powdered alum and powdered cinnamon, of each, 2 dr.; syrup, a sufficient quantity to form an electuary; mix, and take a dessert-spoonful occasionally.—2. Bruised oak bark, 1 oz.; water, 1½ pt.; boil down to 1 pt.; strain, and add powdered alum, ½ dr.; brandy, 2 oz.; mix, and use as a gargle.

VEINS, Tumors in, or Phlebolites.—These little tumors, which sometimes so greatly disfigure the face and neck, are calcareous concretions, or limy growths, formed by the degeneration of blood-clots in dilated veins. The knife is the only remedy, in the hands of a surgeon.

Elastic Stocking for Varicose Veins.

VEINS, Varicose. — Varicose or dilated veins are generally found on the lower extremities. They are more common in women than in men, and are often the origin of troublesome ulcerations that frequently occur in later life. *Treatment:* Excision, and even a ligature around the trunk veins supporting the varix, have been adopted; but the best treatment is a steady and equal pressure by means of a laced stocking, as much rest in the horizontal posture as possible, and care taken to keep the bowels always open.

VENEREAL DISEASE.—The treatment must be a combination of alterative and tonic measures; a mild course of mercury should be resorted to, by rubbing 1 dr. of mercurial ointment on the inner portion of the thighs every second night; or by a blue pill, 2½ gr. blue mass and 1 gr. of extract of henbane, hyoscyamus, or of hemlock; or, should it cause pain in the bowels or purging, ½ to ½ gr. of opium may be given night and morning, until a slight constitutional effect is produced; then iodide of potash may be given in doses of from 10 to 30 gr. 3 times daily. Iodide of potash, in doses of 4 gr., 3 times daily, in 1 oz. of comp. syrup of sarsaparilla, is an effective remedy. A mixture of 2 gr. of quinine, dissolved in 4 drops of dilute nitric acid, in infusion of gentian, 3 times daily before meals; or 15 drops of the tinct. of iron, 3 times daily, will often prove highly efficacious.

WINDPIPE, Inflammation of.—Great constitutional disturbance shows itself, with difficulty of breathing and swallowing; a dry, harsh cough, with wheezing at every inspiration; the voice sinks to a whisper, the countenance becomes livid, and respiration is carried on with extreme difficulty, death by suffocation terminating the sufferings unless relieved. *Treatment:* Hot fomentations, blisters, cupping, hot bath, and an active employment of calomel and opium, 1 gr. of each, every 3 hours. Inhalation is valuable in this disease; for this purpose the following combination has been found useful: Comp. tinct. of benzoin, 3 fl. oz.; chloroform, 40 drops; mix; a teaspoonful in a pint of water at 140° F. for each inhalation.

WOUNDS, Applications for.—1. Wash twice a day with 1 dr. of carbolic acid in 8 oz. of water; then take 5 parts of glycerine and 4 parts of the yelk of egg; mix well; the mixture forms a varnish, with which wash the wound.—2. balsam fir, true Venice turpentine, oil of sweet almonds, of each, 2 oz.; add carbolic acid, ½ dr., previously dissolved in 2 dr. warm glycerine; mix; apply with a flat camel's hair brush, and inject into the interstices of the wound with a glass syringe, having previously cleansed the wound with very warm water and a bulb syringe.

WRYNECK.—A peculiar distortion, in which the head is bent down toward one shoulder (generally the right), and the face is turned to the opposite. *Treatment:* This will vary with the causes producing it. If it result from spasm, purgatives, leeches, and fomentations should be used; if from paralysis of the opposite side, general tonic treatment and stimulating friction will be useful. If the contraction be permanent, the muscle must be divided. In the latter extremity, the services of a surgeon are necessary.

Women and Children.

REMARKS.—A baby should not sleep in the same bed with another person more than absolutely necessary, and should have a plenty of fresh air, day and night. Give an ailing child a warm bath, and the effect will be soothing and grateful. It should not remain in the water more than a few minutes, and when taken out be wrapped in a blanket and quickly dried with warm towels. Bathing the hands and face frequently is very refreshing, and will sometimes induce sleep. Every mother should make some general preparations for accidents. For a cut there is nothing better than isinglass plaster and powdered rosin. Get a few cents worth of rosin, pound it until it is fine and put it into an empty, clean pepper or spice box, with perforated

top; it can then be easily sifted out on the cut; put a soft cloth around the injured member, and wet it with cold water once in a while. It will prevent inflammation and soreness. In doing up a burn, the main point is to keep the air from it. If sweet oil and cotton are not at hand, take a cloth and spread dry flour over it and wrap the burned part in it. Some simple remedies should always be on hand. Among them a little bottle of peppermint, in case of colic; chlorate of potash, for a sore throat; pepsin, for indigestion; a bottle of brandy, of alcohol and of tinct. of camphor. Have them where they are handy, but never touch them without being sure of what is taken.

ANÆSTHETIC, For Children.—Chloral, in sufficiently large doses, always produces in children a profound sleep approaching to anæsthesia. In incomplete anæsthesia from chloroform, the patient feels the pain, and manifests his sensations by cries, as in anæsthesia from chloral; but, while in the first case memory is preserved, in the latter all recollection of what was done is lost. The necessary doses for anæsthesia are: From 2 to 4 years, 2 graines; from 4 to 8, 3 graines; from 8 to 12, 4 graines. It should be given in one dose, while fasting. Sleep comes on very quickly. The operation should be performed about 1 hour or 1½ hours after the child has fallen to sleep. 5 hours is the usual duration of the sleep, during which the respiration and the circulation preserve very nearly the normal type.

BOWELS, Bands for Weak.—If the bowel complaint should become troublesome, keep a flannel band bound snugly around through all the hot weather. It supports the bowels, keeps them warm, and will often cure the trouble when medicine and diet have been of no avail.

BOW-LEGS.—If the child is healthy, and has good, nourishing food and pure air, it will probably outgrow its bow-legs as its strength increases. Rubbing the legs with the hand in the morning may help to strengthen and straighten them, holding them straight at the same time. If the case is pretty bad, the two legs may be bound together with comfortable bandages during sleep, rubbing them well before and after binding them. If the child is still quite young, it may be kept from standing on its feet for a few months, giving time for the crookedness to straighten while the limbs are growing stronger. A healthy child, with wholesome food, and pure air to breathe, if kept from standing and walking while too young and weak, will not have bow-legs. Scrofulous children are more likely to suffer in this way, and those that are very fleshy.

BRANDY, For Children.—When brandy is used, or ordered by a physician, a few drops, according to the age, should be given in water or some sweet milk. Generally keep it in reserve for the time of the day when the sufferer appears to exhibit signs of being weaker than usual, and then give only enough to restore it to its average condition in health. Usually it is most frequently needed in the latter part of the day, or quite early in the morning.

BREAST, Acute Inflammation of.—Known by great swelling, tenderness and pain, and fever. These symptoms are generally soon succeeded by formation of matter. *Treatment:* At first purgatives, leeches, and fomentations, or poultices after them; the milk should be drawn off, if it can be done without very much pain, and Dover's powder given to allay restlessness. The arm should be kept quiet in a sling. So soon as suppuration is evident, a puncture should be made. Efficient support should be given by bandages, to take up the weight of the organ, compress the distended vessels, and prevent bagging of matter. If, after leeches and purgatives, the tenderness and pain diminish, so that there seems a chance of resolution without suppuration, similar support is most useful.

Support for Inflamed Breast.

BREAST, Sore Nipples of.—Excoriations and cracks of the nipples not only cause great pain and inconvenience in suckling, but are a frequent cause of acute inflammation of the breast. The tannin lotion, made of ½ dr. of tannin, 1 fl. dr. of alcohol, and 4 fl. oz. of water, mixed together, should be used. The nipple may be defended from the clothes and the child's mouth by a metallic shield, or rubber band. Women who are subject to this affection should frequently wash the parts with salt and water, or solution of alum, during pregnancy; or should apply every night a liniment composed of equal parts of rectified spirit and olive oil.

BREAST, Swelling of.—The swelling of the breasts to an enormous size is very common during the earlier months of pregnancy in plethoric women. Boys and girls about the age of puberty are subject to slight swelling and tenderness, which soon disappears of itself if not interfered with. The breasts of new-born infants also are sometimes found to be swollen and hard. *Treatment:* When the breasts are found to be hard and swollen, they should be gently bathed with warm hog's lard, and a piece of folded linen saturated with it laid over them. If this means does not cause the swelling to subside, apply a warm poultice, changing it every 3 hours, till the abscess breaks and discharges its matter, when it will speedily heal.

CANKER.—A serious disease, consisting of ulceration, commencing in the gums, and thence extending to the lips and cheek. Apthæ affects children during the first weeks and months of life; but canker rarely attacks a child under 1½ years of age or over 7 years, choosing for its advent by preference the periods of the first and second dentition; and, at the latter period seem-

ing often to be aggravated, if not caused by decayed teeth. *Treatment*: Tonics and generous nourishment are of prime importance, as canker generally indicates a low state of the system. Give 1 gr. doses of quinia in a little milk twice a day to a child 2 years old; also 2 or 3 teaspoonfuls of whisky in the 24 hours. Use chlorate of potash, 1 dr. to the pt. of water, as a mouth-wash, in mild cases; but if the ulceration becomes very severe and destructive, resort at once to the muriatic acid, 1 part acid to 2 or 3 parts honey; this preparation should be applied by means of a sponge pressed over the foul ulcers; one or two applications will probably be sufficient to thoroughly cleanse the diseased surface, and change it to a more healthy action. *Homeopathic*: Carbo veg., mercurius and nux vomici, will be found the best remedies with which to correct this condition; when the ulcers are consequent upon a derangement of the stomach or liver, the remedies must be chosen with a view to correct these functional derangements.

CHAFING.—(See *Erythema* in MEDICINE.)

CHILD-BED FEVER (Puerperal Peritonitis).—When this occurs, it is on the third or fourth day, usually after confinement; the woman is seized with rigors, pains in the head, acute and constant pain over the abdomen, increased by pressure or any motion. All the secretions are suddenly stopped, the milk and womb discharges especially, the abdomen is tense and distended, the skin hot, the pulse quick, small and wiry, yet sometimes full and bounding, with a white-coated tongue; the face is flushed and anxious, there is occasionally sickness at the stomach, and the respiration is brief and quick; the pulse becomes more rapid, the skin clammy, the tongue, gums and teeth covered by a dark brown fur, and a low, muttering delirium indicates the approaching end, when the fever progresses thus far. *Treatment*: Give 1 gr. opium every hour, combined with 2 gr. of calomel, and cover the entire abdomen with hot poultices of hops and bran, or of scalded corn-meal, or with hot fomentations, or cloths wrung out of hot turpentine. Later, give quinine in 2 or 3 gr. doses, 4 or 3 times daily, with beef tea. Warm vaginal injections of a solution of carbolic acid, 1 dr. to 6 oz. of water, and ½ oz. alcohol, are of great value.

CHILD-BED FITS (Puerperal Convulsions).—During labor, women are frequently attacked by convulsions, especially if of a nervous or epileptic condition. The patient is suddenly deprived of consciousness; the face and all parts of the body are distorted by spasms; the eyes are agitated and roll frightfully; the tongue projects and is bitten, causing it to bleed; bloody froth issues from the mouth; the paroxysms last from 5 to 20 minutes, when the convulsive movements gradually subside, and consciousness returns. In unfavorable cases, the patient remains in a state of total insensibility. *Treatment*: Keep up action of the bowels by mild saline cathartics, as the Rochelle salts; free action of the kidneys should be promoted by the tartrate or the citrate of potash, or use small repeated doses of cream of tartar, a teaspoonful in a tumbler of water, as often as required, to act both on the kidneys and bowels. Use chloroform inhalation to control the convulsions until labor is completed with the forceps, or by turning, when the passages are sufficiently dilated. Stimulating injections, ice to the head, mustard plasters to the extremities and over the abdomen, and cups to the back of the neck and along the spine, with full doses, 20 gr. each, of chloral and bromide of potash in a wineglassful of sweetened camphor water, and repeated when necessary, usually give relief; use until all convulsions subside.

CHLOROSIS, or GREEN SICKNESS.— A disease or condition almost peculiar to young women at the age of puberty, consequent upon, or accompanied with, suppressed or vitiated menstruation. It is characterized by derangement of the stomach and bowels, manifest by a pale, bloated appearance of the tongue, foul breath, loss of appetite, or morbid craving for certain indigestible articles, as chalk, coal, clay, paper, etc. The bowels are torpid, the stools imperfectly digested, and of an unnatural color. The skin is extremely pale, sometimes clear, sometimes yellowish, greenish, or waxy. *Treatment*: Good diet, iron in some form, with bitter tonics, salt water bathing, change of air, cheerful companionship, and regular, moderate exercise. A pill of iron, quinine and strychnine, in the following form, is recommended: Sulphate of quinia, reduced iron, of each, 1 dr.; acetate of strychnia, 1 gr.; enough ext. of gentian to make 60 pills; take 1 pill before each meal. The elixir of iron, calisaya bark and strychnia is an excellent preparation, as sulph. strychnia, 1 gr.; sulph. cinchona, 1 dr.; tinct. of chloride of iron 2 fl. dr.; enough syrup of tolu to make of the whole 4 fl. oz.; mix; take 1 teaspoonful before each meal.

CHOLERA INFANTUM. — The symptoms are diarrhea, vomiting, refusal of food, and weakness; at first the head may be hot and the stomach swollen; and later coldness and wasting; death may result in a few days, with head symptoms; in other cases the child seems merely to waste away from the combined effect of diarrhea and want of food. *Treatment*: Stop the vomiting and purging as soon as possible by opiates and astringents, as spearmint tea, cinnamon water, of each, 1 oz.; tinct. catechu, 2 dr.; aromatic ammonia, 1 dr.; laudanum, 12 drops; syrup of orange-peel, 2 dr.; mix, and give 1 teaspoonful every hour, till the diarrhea and vomiting are checked, or sleep is induced. 2 or 3 teaspoonfuls of brandy during the 24 hours, diluted by 3 or 4 times as much hot water, with a little sugar, may be useful in preventing exhaustion. Warm applications, ginger or cayenne plaster, externally over the abdomen, with gentle friction, are frequently beneficial.

CLEFT-SPINE TUMOR. — A congenital affection in which the spinous processes and lamine of some of the vertebræ are cleft or deficient. The spinal membranes, deprived of their ordinary support, yield to the pressure of the fluid which they contain (which also is secreted in unusual quantity), and bulge out, forming a tumor in the middle line of the back. *Treatment*:

Apply moderate support by means of a hollow truss, or some such contrivance, so as to counteract that tendency to effusion which there always is when a natural support is taken away.

COLIC OF INFANTS. — 1. Hot catnip tea, or spearmint tea, or aniseed tea, or any of the hot carminatives by the mouth are useful in this complaint; but a simple injection of hot water, or hot saleratus water, will often prove to be the most complete remedy. Either of the following are valuable: — 2. Powd. rhubarb, fennel seed, of each, 2 dr.; water, 1 pt.; boil until $\frac{1}{2}$ is dissipated; dose, $\frac{1}{2}$ teaspoonful to $\frac{1}{2}$ tablespoonful, 2 or 3 times a day. It is useful in those cases attended by constipation. — 3. Laudanum, 80 drops; anise oil, 18 drops; alcohol, 1 oz.; mix; put in $\frac{1}{2}$ pt. of boiling water, after sweetening to taste give $\frac{1}{2}$ teaspoon or more, according to age.

COUGH, Whooping. — This has 3 stages, the catarrhal, convulsive, and declining. The first stage has the symptoms of catarrh, as sneezing, dry cough, languor, restless nights and fever; the cough is intermittent and is more frequent by night than day; this stage lasts from 1 to 3 weeks. The 2nd stage exhibits the paroxysmal cough; it is a peculiar *whoop*, from the spasmodic closure of the glottis; the paroxysms last from 1 to 3 minutes and frequently terminate by vomiting of mucus and the contents of the stomach; the face becomes swollen and livid, and blood often exudes from the mouth, nose and ears; this lasts from 3 to 6 weeks. In the 3rd stage the symptoms become milder and less urgent; when after 3 or 4 weeks the child may get well. *Treatment:* No complete remedy for this disorder has been discovered; but belladonna, either alone or in combination with quinia, has given relief. 1. Sulphate of atropia, 1 gr.; distilled water, 1 fl. oz.; mix; 2 to 4 drops every 2 hours, unless the peculiar effect of belladonna in dilating the pupils is observed; when this appears, stop the medicine for a few hours, and afterwards let the intervals be 3 or 4 hours. — 2. Ext. belladonna, 1 gr.; powdered alum, $\frac{1}{2}$ dr.; syrup of ginger, syrup of gum Arabic, water, of each, 1 oz.; mix; a teaspoonful 3 times daily, also once at night, if cough occurs. *Homeopathic:* If the patient is feverish, and the cough dry and whistling with some soreness of the throat, give aconite; if the cough is suffocative, with scanty urine and great exhaustion, give arsenic; if the paroxysms are frequent, worse in the night, and the child gets very red in the face, give belladonna. Administration: During the first stage, the remedy may be repeated 3 or 4 times a day; in the second stage, every 2 or 3 hours in bad cases; during the stage of decline, a dose 2 or 3 times a day will be sufficient; dissolve 12 globules or 3 drops of the liquid in a tumbler $\frac{1}{2}$ full of water, and give teaspoonful doses.

CROUP.—An inflammatory disease affecting the larynx and trachea. The symptoms are a laborious and suffocative breathing, with wheezing, a cough, a peculiar shrillness of voice, and more or less expectoration of purulent matter as the disease progresses. It attacks suddenly, often in the night. A false membrane forms in the most dangerous cases, and croup is considered to be divided into 2 kinds: the spasmodic, and the membraneous or malignant. In the former, the symptoms are very violent, but are often relieved completely by a prompt emetic. The latter, or malignant kind, comes on more insidiously, and seems like a peculiarly hoarse cold. *Treatment:* The treatment of malignant croup may also be commenced by an emetic; tartar emetic, $\frac{1}{2}$ gr., for a child 4 years old, and 5 gr. of ipecac, mixed with a little warm water. If this does not relieve by bringing away the false membrane, the child should then be treated in the same manner as for diphtheria; the strength should be supported by nourishment and stimulants, if necessary, frequent inhalations of the steam of warm water, and his bowels kept in proper order. It is well to have a couple of grains of calomel in this first cathartic, as the influence of that is to diminish inflammation and regulate the secretions of the liver and glandular system. After that, the bowels should simply be regulated by rhubarb, salts, or oil, as may be convenient. The following are also quite efficient methods of treatment: 1. Give 2 teaspoonfuls of Epsom salts, and put the child to bed; apply mustard to its feet; wring out a flannel cloth in hot water, and wrap it around the neck as warm as it can be borne, protecting the bed with dry cloths; if the breathing is not easier, and the skin not getting moist in 3 or 4 hours, mix $\frac{1}{2}$ teaspoonful each of powdered alum and ipecac in $\frac{1}{4}$ glass of tepid water, and give it; if it does not vomit in 10 minutes, repeat the dose with a teacupful of warm water every 5 minutes until there is free vomiting. If this should fail to afford relief in 12 hours, give 10 gr. of calomel, mixed with 1 dr. of saltpeter, called nitrate of potash; divide into 12 powders, and give 1 every 2 hours. — 2. Bind a napkin wet with cold water, and a dry one over it, around the throat, and give a teaspoonful of syrup of ipecac; the cloths must be changed every few minutes till the choking is over; if necessary, give the ipecac or hive-syrup till the child begins to vomit. *Homeopathic:* Give spongia as soon as the hard cough is heard, and repeat every hour, $\frac{1}{2}$ hour, or 15 minutes, a drop for a dose; aconite, when the pulse rises and there are feverish symptoms; this medicine can be alternated with spongia when the symptoms are very acute, and then given every 10 minutes with spongia; give hepar sulphuris, when the cough is looser and the feverishness has disappeared; a drop every 2 hours.

DIARRHEA. Of Infants. — To check infantile diarrhea: 1. Cinnamon water, 1 fl. oz.; spearmint tea, $\frac{1}{2}$ fl. oz.; bi-carbonate of soda, 10 gr.; syrup of orange-peel, 2 fl. dr.; laudanum, 6 drops; mix; take 1 teaspoonful every hour. — 2. Infusion of simaruba, $1\frac{1}{2}$ oz.; dilute nitric acid, 4 drops; syrup of clove, $\frac{1}{2}$ oz.; laudanum, 6 drops; mix; take 1 teaspoonful every 3 hours. (See *Diarrhea* in MEDICINE.)

DRINKS, For Children.—Fresh rice water, barley water, oatmeal water, with lemons and sugar, are valuable in every house where children are. These are surely better than cold tea, which is often given, or even milk when not fresh. Give the baby all the water it wants.

DROPSY, Of the Brain.—This disease appears most frequently during the periods of infancy and childhood. Among its precursory head symptoms, none is more marked or impressive than the sudden scream, or piercing shriek, with which the little patient sometimes wakens from its sleep; and the ominous import of which the experienced parent learns to dread. The other symptoms are too familiar to need particular notice. *Treatment*: Purgatives are the main dependence; commence with a full dose of calomel, from 2 to 4 gr., mixed with a little wet sugar, for a child a year old; and follow it up with small doses of Epsom salts every 4 hours; as Epsom salts, 1 dr.; nitre, 10 gr.; syrup of lemon, 3 fl. dr.; water, 9 fl. dr.; mix; a dessertspoonful every 4 hours. Then, apply externally, glycerine, 1 oz.; tinct. of iodine, ½ oz.; mix, and apply to the head twice a day, either on a cloth or by painting with a little brush. As an internal tonic, use iodide of potassium, 20 gr.; syrup of tolu, ½ fl. oz.; water, 2 fl. oz.; mix; a teaspoonful morning and evening after food. In extreme cases, blisters, and even issues on the occiput or nape of the neck have been advised. One of the new remedies, pilocarpine, or extract of Jaborandi, on account of its great power to drain the head by profuse salivation of the mouth, bids fair to be eminently useful in this disease; but future experience must decide this matter. *Homeopathic*: When there is a flushed, purplish, swollen face, with red eyes and dilated pupils, give belladonna; much intolerance of light, irritation, or feverishness, give aconite; great stupor, drowsiness, and stertorous breathing, give opium; manifest signs of effusion, dark flushed face, and dry lips, give bryonia. Administration: Of either of the above remedies, dissolve 10 globules in a tumbler ½ full of water, and give 2 teaspoonfuls every 3 hours.

EVOLUTION AND INVOLUTION.—These terms are now employed, the former to describe the gradual dilatation of the womb during the months of pregnancy, and the latter its more rapid, but still gradual contraction to very nearly its virgin dimensions. These are great and wonderful changes; and it is not strange that it takes much time, and much of the undiverted energies of nature for their accomplishment. The virgin womb weighs 1 oz.; and the just emptied womb, immediately after childbirth, 24 oz. There are diseases and dangers, incident to evolution, which are well-known, and which the intelligent mother will endeavor to avoid. The work of making a human being is a great one, and it is easy to comprehend that she, to whom such an important trust is committed, should not allow her energies to be too much absorbed by other labors. But it seems more difficult for the woman to understand why, when she feels so well, she need be kept quiet so long after the birth of the child. Involution furnishes the reason; this also is a great work; 24 oz. are to be contracted to nearly 1 oz., and if the woman would retain her handsome form, free from that abdominal protuberance frequent among child-bearing women, and if she would also recover her youthful vigor, she will be careful of her strength during six weeks after labor.

FEVER, Scarlet, or Canker Rash.—Somewhere between the second and tenth day after exposure it begins with languor, pains in the head, back and limbs, with drowsiness, nausea and chills; these are followed by heat, thirst, etc. When the redness appears the pulse is quick, and the patient is anxious, restless, and sometimes delirious; the eyes are red, the face swollen, the tongue is covered in the middle with white mucus, and is studded with elevated points of extreme redness; the tonsils are swollen and the throat red. The greatest degree of redness is reached on the evening of the third or fourth day from its beginning, when a gentle moisture appears, the disease begins to decline, with itching, and the scarf-skin falls off in branny scales; as the disease advances the tongue often becomes suddenly clean, and presents a glossy, fiery-red surface, which is sometimes, with the whole lining of the mouth, raw and tender. On pressing down the tongue, the throat is swollen and of a deep, florid red; on the tonsils may be seen white or gray ulcers; the great amount of mucus in these parts causes also a continual rattling in the throat; the glands under the ear and jaw inflame and occasionally break; the inflammation of the throat almost always runs into ulceration, and abscesses sometimes form in the ear and cause deafness that may be difficult or impossible to cure. *Treatment*: In ordinary cases, the treatment should be very simple. The apartment should be kept cool, and the bed-covering light; the whole body should be sponged with cool water as often as it is hot and dry, and the patient be permitted to take cooling drinks; when the fever is very high, the wet sheet pack should be thoroughly tried. (See *Bathing* in HYGIENE.) Give 10 drops of the tincture of belladonna, night and morning; the feet and hands should be soaked 2 or 3 times a day in hot water, with a little ground mustard or cayenne pepper stirred in; if the bowels are costive, they should be kept open by gentle laxatives, 1 dr., each, of rhubarb and magnesia or Rochelle salts, or by injections; the diet should, as a rule, be liquid, but need not necessarily be low; milk, milk-porridge, chicken or mutton-broth, or beef-tea, will be suitable; in many cases tonics, as quinine in 2 gr. doses, 5 drops of mineral acids in sweetened water, or 10 drops of muriated tincture of iron, may be required. A useful external application is fat salt bacon, which should be rubbed over the whole surface from neck to heels, 2 or 3 times a day; internally nothing is better than equal parts of muriatic acid and honey, applied with a small brush or swab, or diluted with water and used as a gargle. During convalescence great care must be used to prevent catching cold; warm clothing should be worn; quinine in 2 gr. doses 3 times daily may be used as a tonic, and lemonade or cream of tartar water drank freely to excite the free action of the kidneys. *Homeopathic*: Febrile symptoms before the eruption, dry, hot skin, frequent pulse, great thirst, anxiety, restlessness, and nervous excitement, give aconite; eruption smooth, and scarlet red, burning sensation of skin, tongue coated with prominent red papillæ,

throat inflamed and dark-red with stinging pain, give belladonna; eruption delays or grows suddenly pale, rapid prostration, putrid throat, internal heat and external coldness, fetid diarrhea, give arsenicum; profuse discharge from nostrils, bad smelling breath, foul ulcers in mouth, swelled glands in neck, give nitric acid; extreme drowsiness, stertorous breathing, delirious, give opium. When scarlet fever is prevalent, a dose of belladonna taken occasionally will usually ward off an attack, or at least so modify the disease as to render it comparatively harmless; dissolve 12 globules or 3 drops in a tumbler half full of water, and give a teaspoonful twice a day for a week, after which it will be sufficient to repeat the dose once in 2 days; for the troublesome itching that often disturbs the patient so much, anoint the skin with cocoa-butter, or rub with rusty bacon; the tenacious phlegm that accumulates in the throat will be loosened and removed by taking teaspoonful doses of glycerine in a little water; the patient should be sponged off 2 or 3 times a day with tepid water, and his linen and the bed-clothing frequently changed. The temperature of the room should be maintained at about 70° Fahr., and amply supplied with pure, fresh air. Administration: In severe cases the remedy may be repeated every 2 or 3 hours; but when the symptoms are less urgent, a dose every 3 or 4 hours will be sufficient; dissolve 12 globules or 3 drops in a tumbler ½ full of water, and give a teaspoonful at a dose; a little milk or thin gruel is all the patient should be allowed during the violence of the attack; even after the fever abates, and there is a craving for food, great care must be exercised in the giving of nourishment; milk is one of the very best articles of diet, and may be used in any stage of the disease; as soon as digestion is being performed regularly, a little mutton or chicken-broth, cream toast, light puddings, etc., may be taken; fresh water or bits of ice will be found very grateful to the patient, and may be taken at pleasure.

FITS, or SPASMS. — During the period of childhood the nervous system is so easily excited or irritated that these are of frequent occurrence. During the first four years of its life the child is especially liable. *Treatment*: When a child is attacked, place the lower extremities up to the knees in water, hot as can be borne, for 10 or 15 minutes; when taken out, rub them thoroughly dry and wrap in a warm flannel, at the same time enveloping the whole head in a cold cloth and changing it often. If the spasm is caused by indigestion, or constipation, give an injection of warm slippery-elm or flaxseed tea. An enetic, a teaspoonful of mustard in a tumbler of warm water, may be given. Mustard poultices or chloroform liniment to the spine may also be used, if necessary. If the gums are swollen and tender, lance them.

HYMEN, Imperforate.—Sometimes this membrane completely obstructs the vagina, and causes the menstrual fluid to accumulate and distend the uterus. The impediment is easily got rid of by an incision. Then the fluid that has accumulated should be syringed out with warm water; otherwise it might putrefy, and cause typhoid fever and death. The abdomen should be bandaged, and the patient confined to bed until the uterus has resumed its healthy size.

HYSTERICS. — An attack is generally preceded by depression of spirits, restlessness and a frequent desire to pass water. It is sometimes marked by convulsions, or fits. At times the attacks are local, manifested by spasms in the throat, the patient feels a ball rise there, her heart beats violently, and she laughs and cries by turns. In the worst cases, the limbs are thrown into spasms; the patient struggles violently, rising up in a sitting posture, and throwing herself back, twisting the body from side to side, clenching the hands, and throwing the arms about, so that she is with difficulty held. After the paroxysms, the patient generally passes a large quantity of very pale urine. *Treatment*: Cutting the stays and lacing, laying the patient on her back and dashing cold water suddenly in the face, and holding some hartshorn to the nose, will generally effect a recovery. If not, give ½ teaspoonful each of Hoffman's anodyne and aromatic spirits of hartshorn, or the ammoniated tincture of valerian in a wineglass of camphor water, and again dash water over the face and neck. If these fail, give an enctic, as a teaspoonful of mustard, 15 gr. sulphate of zinc, or 20 gr. of ipecac, in a tumbler of water. After the subsidence of the attack, 3 or 4 comp. cath. pills should be given. Quinine will be found the best tonic, 1 gr. 3 times a day, in the form of pill, or in a little sweetened milk.

JAUNDICE, Of Infants.—New-born infants are subject to a form of jaundice which usually makes its appearance 3 or 4 days after birth. The skin assumes a yellow color, which may last only a few days and then pass away. But sometimes, in addition to the yellowness of the skin, the whites of the eyes, the secretions of tears and urine become yellow, and the evacuations from the bowels have a clay-colored appearance; the abdomen swells; the child becomes fretful, and all the ordinary symptoms of jaundice are developed. *Treatment*: Give 1 gr. of calomel with a little wet sugar at bedtime, and 5 gr. of Husband's magnesia in a little milk the next morning; repeat this medicine once a week, until the jaundice disappears.

LABIA, Inflammation of. — The labia may be the seat of acute inflammation and of encysted tumors, which perhaps may be connected with the round ligament; of hernia and of fibrous or fatty tumors. *Treatment*: The treatment of these cases requires no distinct comments. The clitoris and nymphæ, if they grow to an inconvenient size, should be partly excised.

LABOR.—When labor is about to commence the woman usually experiences some general agitation of the nervous system, the womb settles down lower, the genital organs become relaxed and moist, a temporary diarrhea comes on, and there are frequent calls to make water; thus providentially emptying those viscera adjoining the child's pathway, and making more room for his head. Labor has 3 stages; the first commences with the beginning of labor, and ends when the child's head has cleared the mouth of the womb; the second stage, commencing with

the termination of the first, continues till the child is born; the third stage comprises the period between the delivery of the child and that of the afterbirth; thus, at the end of the first stage, the inside door is wide open, and the largest part of the child, his head, has passed through; at the end of the second stage, the outside door has been fully opened, and the child has passed through; the third stage delivers what has been left behind, and thus completes the process. There are two kinds of labor pains—the wringing and twisting pains, and the bearing-down pains. The first seem peculiarly trying to the nervous system; they exist during the first stage, and seem to be in the neck of the womb while it is being dilated. The bearing down pains occupy the second stage, and, though very severe, are better borne than the wringing pains of the first stage. These pains may be relieved by anæsthetics; and although there has been much prejudice against them on the part of the ignorant, intelligent physicians have recommended them highly. They seem to be even more appropriate at this time than during surgical operations; for they not only save the sufferer from much of her pain, but they also promote muscular relaxation, and thus help the labor to a more rapid termination. And they seem less dangerous at this time also; for even chloroform, which has not always been found safe for the dentist and the surgeon, has never been known to do injury to a woman in childbirth. Chloroform then may be recommended for these terrible pains, and with a 2 oz. bottle and napkin may be left very much to the management of the patient herself; she may pour about ½ teaspoonful on the napkin, and begin to snuff it earnestly when she feels a pain coming on, and come back to consciousness between the pains. Two other symptoms are often present during the first stage; nausea, and a sudden shivering without feeling cold; these are both favorable indications, being occasioned by the rapid dilatation of the neck and mouth of the womb. The bed should first be prepared. If there is a feather bed, it should be removed or turned back; the mattress should be protected by a rubber or oil cloth, if convenient, or by folded sheets, or any cloths that will be sufficient to guard the bed against the discharges. The woman should have on the clothes she expects to wear after labor; and when she lies down these should be tucked up under her arms, ready to be brought down after she gets through, thus saving her the trouble of changing her clothes at a time when she may be exhausted after so much pain and flowing. The lower part of her body may be covered by a sheet pinned around, and such other wraps as may be necessary for her comfort; these, after they have been soiled by the discharges, can easily be removed and the clean clothes brought down at the same time. But, although it is well to have the bed in readiness, and prepare the woman's clothing, she need not lie down at the beginning of labor, unless she chooses, but may sit, walk, or stand, as she feels most inclined. When a person takes charge of a case of labor, he (or she) should first inquire about the state of the bowels and bladder; unless the bowels are more open than usual, he should have an injection of a solution of 1 tablespoonful of salt in a pint of tepid water administered; or, if there is time, he may give by mouth ½ oz. of castor oil, or of Epsom salts. He should next inquire as to the frequency of the pains, and whether the waters have been discharged; his first examination should be made as early, at least, as the first discharge of the waters, so that, if it should be necessary to alter the position of the child, he may be able to do it before the womb has contracted tightly around the child's body. The membranes furnish a soft cushion wedge to press against and at length press open the mouth of the womb. Should they remain unbroken after this has been accomplished; that is, after the first stage is completed, they are not only useless, but, by presenting too much bulk for the successful action of the womb and abdominal muscles, they really retard the progress of the labor, and should be ruptured by the attendant; he can easily do this by sharpening the nail of his index finger to a point, and, during a pain, when they are tense, by scratching a small opening. In an ordinary labor, besides cheering and encouraging the patient, there will be nothing further for him to do until the head presses against the perineum, or space between the openings of the vagina and of the bowel. This becomes very thin during the last severe pains; and, to prevent a rupture, the attendant's hand, guarded by a napkin, should be kept pressing firmly and evenly against it during the passage of the child's head and shoulders. The child usually announces its advent by a loud cry, which gives a favorable impression as to life and lungs. But sometimes he makes no noise, and does not even appear to breathe. In such cases dash cold water on his face, and on the pit of the stomach; and slap his back briskly; if this does not succeed, resort at once to artificial respiration. (See *Asphyxia*, in MEDICINE.) After breathing has been established, the cord should be tied about two inches from the child's body, and, for the sake of neatness, it is well to tie a second cord two inches from the first, and then cut the cord between. This two inches of navel-string, attached to the child, soon becomes dead flesh and drops off in a few days; lest this dead flesh should come in contact with and irritate the living flesh, it is well, when the child is dressed, to cover the cord so that it may not touch and lie against the child's skin. For this purpose nothing is better than a piece of cotton batting two inches square, twisted around the navel-string, and confined by winding around it several turns of thread or small twine. During the third stage, by gentle friction of the attendant's hand over the mother's abdomen, contraction of the womb is excited, and the afterbirth is expelled, generally with the very first pain or pains that succeed the birth of the child; this is grasped by the attendant and rotated several times so as to unite its membranes into a strong cord, and thus secure their being withdrawn entire. After the womb has thus been emptied of its contents a swathe should be immediately applied to the mother; it should reach from the ribs to 6 or 8 inches below the hips, and should be so snugly

pinned around her as to afford a firm and even support to the abdomen and its contents. The soiled clothing should now be removed, a soft napkin applied to the external parts, the clean clothing brought down and the woman comfortably fixed in bed; she may now be permitted to rest 2 or 3 hours, after which the child should be promptly put to the breast; this should be repeated for a brief period every 3 or 4 hours for the benefit of both mother and child; in the case of the mother, nursing the breast has an influence to promote a thorough and desirable contraction of the womb, and to excite the gradual secretion of milk; and as to the child, it not only procures a little nourishment, but also puts into practice that innate knowledge of imbibing, so necessary for its future support. The *first* milk that comes also has a necessary aperient effect in starting the child's digestion. There are very rarely any after-pains after the birth of the first child, but in subsequent labors the woman is quite often troubled by them. She can first try a drink of camphor mixture, tinct. of camphor, 1 dr.; sugar, 2 dr.; water, ½ pint; mix the tinct. of camphor with sugar first, then add the water, and use freely as a drink. If this should fail, then try ½ gr. of sulphate of morphia, or 30 drops of laudanum. The diet of the mother should be bland and cooling, until after the milk has come; as there is apt to be some fever, while the breasts are filling; she should take no meat or heating food till after 4 or 5 days have passed; but should be kept to gruel or simple toast and tea. After this period she may be guided somewhat by her appetite, avoiding diversity and preferring simple, plain and nourishing articles of food.

MARKS, Mother's. — Blotches or stains, often quite superficial, and affecting only the skin. Some, however, though not rising above the surface, involve the adjacent cellular tissue; while others show the form of warts or moles, or form tumors. Another form is *nævi*, produced by the enlargement or excessive intermingling of the smaller blood-vessels. They may be of every shape and color. *Treatment:* Usually, they must be let alone. Warts and moles can be destroyed. (See *Warts* in SURGERY.) If a *nævus* is attached by a slender portion of skin, and hangs like a cluster of berries, by tying a thread tightly around the pedicle, it will fall off in a few days, when touching the base of it with caustic will usually cure. Pressure and cold lotions have been the most general and successful modes of treatment for nævi; in cases where the pressure by bandage and compress, inclosing a piece of coin, can be early adopted and steadily persevered in, it is the best means to eradicate projecting marks, the discolored skin being afterwards destroyed by caustic; care must be taken to increase the pressure by degrees. When these measures fail, their removal can usually be effected only by surgical operation.

MEASLES. — This is one of the principal eruptions, affecting individuals but once, and produced by contagion. The rash usually appears on the 4th, but sometimes on the 3d, 5th, or 6th day, of a febrile disorder; and, after a continuance of 4 days, gradually declines with the fever. The disease generally commences from 10 to 14 days after the contagion has been received. The eruption first shows itself in distinct, red, and nearly circular spots. As these increase in number, they coalesce; forming small patches of an irregular figure, but approaching nearest to that of semicircles or crescents. These patches are intermixed with single, circular dots, and with interstices of the natural color of the skin. On the face they are slightly raised, so as to give the sensation of inequality of surface to the finger passing over the skin. The disappearance of the eruption is followed by scaling off of the skin. *Treatment:* In ordinary cases no treatment is needed except keeping the bowels in order. If the eruption should be unusually delayed, or if, after having once appeared, it should recede again, put the feet in warm water, and give warm drinks; and if this should not succeed, give syrup of ipecac in teaspoonful doses, until there is free vomiting. Lemonade and the the juices of fruit are useful; and 10 drops of the dilute sulphuric acid, in ½ oz. of water 3 times a day, is a good cooling remedy. After recovery, the greatest care is necessary for weeks against catching cold. *Homeopathic:* Aconite should always be given first, for the primary fever, and then followed by pulsatilla, when the rash comes out; a dose every 3 hours; belladonna must be chosen for severe headache, sore throat, and great intolerance of light; a dose every 3 hours; for chest or bowel complications, consult the articles on bronchitis, pneumonia, and diarrhea; should the rash suddenly disappear from a chill, then put the patient into a hot bath, and give bryonia, a dose every hour.

MECONIUM.—The first evacuation from the child's bowels; of a dark-green or deep-black color, and very tenacious. It seems to be formed of the mucous secretions of the intestines, mixed with bile. The discharge usually takes place soon after birth, but sometimes it is delayed for many hours, and causes restlessness, colic, etc. *Treatment:* The first milk of the mother will generally have the effect to relieve this difficulty; therefore, the child should be put to the breast as soon as possible, and no artificial feeding allowed if it can be avoided. If this does not succeed, give 1 teaspoonful of sweet oil, or ½ dr. of flake manna, or, if these fail, 1 fl. dr. of warm castor oil.

MENSTRUATION.—About the age of 14, the young girl's form expands, her breasts enlarge, and there comes from the womb a bloody discharge, which, unless interrupted by pregnancy or other cause, afterwards occurs once in 28 days, usually until she is about 49 years old, and hence called the "menses," "monthly flow", the "catamenia," the "monthlies," the "courses," the "flowers," the "changes," etc. The flow lasts, ordinarily, from 4 days to a week, and amounts, on an average, in healthy conditions, to about 5 oz.; it varies considerably in different persons, and may even do so at different times in the same individual without any serious impairment of health. So necessary is this menstrual secretion to health, that if from any cause its first appearance is prevented, or if it is suppressed or retained, the system suffers seriously.

MENSTRUATION, Absence, or Retention of.— This may depend upon congenital malformation, as absence of the ovaries, uterus, or vagina, closure of the cervix, imperforate hymen, etc.; or it may be dependent upon the health or habits of the patient. *Treatment*: If malformation be suspected, recourse must be had to an examination, and the defect, if possible, relieved by operation. If the retention be dependent on constitutional causes, remove them. If the patient is of a full habit, venesection, mild diet, hip-baths, etc. When the reverse obtains, an opposite plan of treatment must be followed; tonics, as tartrate of iron and potash, 1 dr.; wine, 1 pt.; dissolve the iron in the wine, and take 1 dessertspoonful 3 times a day, before meals; a generous diet, exercise, warm clothing, hip and foot baths, always bearing in mind that the woman is not sick because she does not menstruate, but that she does not menstruate because she is sick, or in other words that the *amenorrhœa* may be merely a symptom of deranged health. *Homeopathic*: Pulsatilla should be given if there are premonitory symptoms, and the period is slow in making its appearance. A drop dose twice daily.

MENSTRUATION, Cessation of. — Called by women the "change of life," the "critical period," etc. It usually occurs at or about the age of 49, though in some instances earlier; on the other hand it may be much later. As the change of life approaches, the menses become more or less irregular. They may be very scant or very profuse, amounting to a real hemorrhage. In many cases the change takes place so gradually, that the woman passes through it before she is aware. Others less fortunate are afflicted with dizziness, headache, flushes of heat, nervousness, debility, piles, itching and other unpleasant symptoms for years. *Treatment*: Symptoms must be treated as they arise; in general, a tonic course should be pursued, as nature will accomplish this change of life perfectly well, if her forces are not diminished by prostration or debility. Give citrate of iron and quinia, 1 dr.; sherry wine, 2 fl. oz.; mix; 1 teaspoonful 3 times a day; and support with generous diet.

MENSTRUATION, Painful. — The cause may be a neuralgic, inflammatory, or other painful condition of the womb; or displacement of the womb, or some obstruction, as bending or stricture of the neck of the same organ. The pains are sometimes so violent as to resemble labor pains. The discharge is usually scanty, and sometimes accompanied with shreds and clots. *Treatment*: Stricture, or narrowing of the neck, except when from an inflamed condition of the lining membrane, can only be cured by the passage of instruments to enlarge the canal. During the pains, rest in bed, cloths wrung out in hot water and applied over the lower part of the belly and between the thighs, hot stimulating teas, cups over the loins, and anodyne suppositories, as morphia, 1 gr., extract belladonna, 2 gr., with 1 dr. cocoa-butter or suet, made into 4 suppositories, are good. In the congestive form, the spirits of mindererus in tablespoonful doses, with ½ to ¾ gr. of acetate of morphia, 3 or 4 times a day while the pain lasts, are the best remedies. *Homeopathic*: Give chamomilla, pulsatilla, and cocculus, together with the application of hot fomentations to the abdomen.

MENSTRUATION, Profuse. — An increase of the menstrual flow in frequency or in quantity, and may be either active or passive, the former occurring in robust plethoric habits, the latter in the reverse. The most common causes are excitements, fevers, internal congestions, displacements of the uterus, and approach of the critical period, etc. It may be confounded with the hemorrhage arising from abortion, foreign growths, etc., within the uterus. *Treatment*: In persons of a full habit, venesection may be necessary; rest, saline laxatives, astringents, etc. In the interval, moderate diet, cold baths, etc. In debilitated cases, rest, tonics and astringents, and opium, good diet, etc. The following tonics and astringents are excellent remedies in this complaint: Sulphate of quinine, 1 dr.; tinct. of chloride of iron, 2 fl. dr.; enough water to make of the whole 4 fl. oz.; mix, and take 1 teaspoonful 3 times a day; bromide of soda, 1 oz.; fl. ext. of ergot, 4 fl. oz.; mix, and take 1 teaspoonful 3 times a day. *Homeopathic*: China if there is great weakness or faintness, and if the attack lasts long, and the blood is dark red: a drop dose every 3 or 4 hours. Ipecacuanha if there is sickness, the blood very bright, and occasional pains occurring; a drop dose every 3 or 4 hours. Calcarea carb., in the intervals, especially if the flow comes before the month's time, and the patient is of a strumous habit; 2 grains twice daily, dry on the tongue.

MENSTRUATION, Suppression of.—This most frequently arises from wet feet, and catching cold. It occurs also in two forms: *Acute*, when the discharge is arrested during the flow; as, by cold, emotions, etc.; and *chronic*, where it occurs in consequence of the acute, or from gradual falling of the health, disease of ovaries, and critical period, etc. *Treatment*: The most important point in the early treatment is not to confound the disease with pregnancy and cause miscarriage by the course adopted. In the acute form, if there is much constitutional disturbance, venesection, or cups to the loins, laxatives, baths and opium to relieve pains. In the chronic form, if possible, remove the cause; use tonics, aloetics, and the means above mentioned; there being but few direct emmenagogues. Among the earliest measures, the hot foot-bath, drinking hot teas, hot fomentations to the abdomen and putting the patient into a warm bed, will often succeed without much resort to drugs. 5 gr. of powdered capsicum taken in capsules or sauce, will often relieve the pain and excite the flow. Whatever may be the measures resorted to they will generally be more efficient if used about the time when the regular flow should occur. *Homeopathic*: Aconite is suitable to cases of sudden suppression resulting from a chill or mental emotion, and should be given early in drop doses every 3 hours, followed by pulsatilla, which will give more general relief than any other medicine, and especially to the nervous and delicate fair-haired women who suffer from uterine colic, and affections of the mucous mem-

branes. A drop dose 2 or 3 times daily, with an occasional dose of sulphur at bedtime.

MILK, Deficiency, or Superabundance of. — These may arise from mental anxiety, grief, sorrow, defective nutrition, etc. *Treatment*: Promote a vigorous state of health; wet a cloth with a warm infusion of Palma Christi, or castor oil plant, or fennel seed; keep it applied to the breast externally, and at the same time use the infusion of any of them freely as a drink. In case of superabundance, give internally, in their regular doses, iodide of potassium, belladonna, colchicum, or iron, and apply externally either belladonna or colchicum.

MILK FEVER.—This occurs generally about the third day, if the milk does not appear before. It begins usually with a chill; the pulse is quick, full and hard; the breasts are sometimes hard, full and distended; but sometimes the secretion is suppressed and the breasts are empty and soft. *Treatment*: The bowels should be moved gently with mild saline laxatives, as teaspoonful doses of Epsom salts, or rhubarb and magnesia; with 10 to 30 drops of spirits of nitre, to cool the fever, or 2 to 5 gr. of Dover's powder, with 10 to 20 of the citrate or nitrate of potash, and the breasts should also be drawn. It usually subsides in 24 to 36 hours.

MILK-LEG.—This occurs usually in the second or third week after delivery; is limited to the lower extremity, and chiefly to one side, exhibiting to the touch a feeling of numerous irregular prominences under the skin. It is hot, white and unyielding; and is accompanied sooner or later with fever. After a few days the heat, hardness, and sensibility diminish; and the limb remains swollen for a period. The disease frequently consists in obstruction of the iliac or other veins. Owing to the pressure of the heavy uterus the serous part of the blood is forced out into the cellular membrane of the limb. *Treatment*: The application of leeches or cupping-glasses near the groin; fomentations to the limb, etc., and, when the active state has subsided, the use of a bandage applied gently at first, but afterwards gradually tightened. In this painful disease much attention should be given to placing the patient in bed as comfortably as possible, laying the leg on pillows, and so supporting it that the foot shall be raised a little higher than the hip. The limb should be assiduously fomented by means of flannels wrung out of hot saleratus water, the bowels kept in order by cooling aperients, such as drachm doses of Epsom salts, or 1 or 2 Seidlitz powders every day, and pain should be allayed by 6 gr. doses of Dover's powder, as often as necessary.

MILK-SCAB.—A disease of nursing infants, and usually occurs during the first period of dentition. It is an eruption of numerous, small, white pustules in clusters upon a red surface. It generally breaks out on the face first, mostly on the cheeks or forehead, attended by violent itching. The vesicles, which are filled with an acrid fluid, become broken by friction, and the humor dries into thin, yellowish scabs. As the irritation increases, the scabs grow thicker from the constant secretion beneath them. The isolated patches run together, and the eruption gradually spreads over the whole face, and sometimes the entire body. There is considerable heat and redness in the surrounding skin, and the child, who is exceedingly restless and fretful, is constantly rubbing the affected parts. *Treatment*: Anoint thoroughly with oxide of zinc ointment every evening, and very gently wash off the ointment and those scabs that are loose the next morning with warm borax water, a saturated solution. Use simple water dressing during the day.

MISCARRIAGE.—This term is applied to the expulsion of the fœtus before the seventh month, or before there is a probability of its living; its expulsion after the seventh month, and before the full time is termed premature labor. A great variety of causes may provoke miscarriage; such as over-exertion, shocks, blows, falls, mental emotions, fright, anger, joy or sorrow, when excessive, and disease, especially the eruptive diseases, and syphilis. When miscarriage is threatened, the patient generally experiences a sense of uneasiness, languor, pain in the back, and periodical pains of an expulsive character in the lower part of the abdomen, often with more or less flowing. *Treatment*: Perfect quiet, and rest in bed in a horizontal posture, on a hard bed, lightly covered with clothes, in a cool room, cold, wet napkins to the vulva, and a decided opiate, either 30 drops of laudanum by the mouth, or 40 by injection. If these means fail, and the flowing continues, the tampon, or plug, must be resorted to, and drachm doses of the fl. ext. of ergot administered every hour. For a plug, a sponge wet with vinegar, or a handkerchief, or any small pieces of linen may be pressed into the vagina, till it is full; and then a T bandage is applied. If further measures should be needed, and the dangerous flowing still continues, an experienced physician is required.

MOUTH, Infants' Sore, or Aphthæ.—This very common affection of infants generally makes its appearance about the second or third week after birth. A few days before, the inner surface of the mouth will be found reddened, and small, red, elevations grouped in clusters on the lips, cheeks, gums, and other parts of the mouth. These patches soon become covered with a white, cheesy-like substance, resembling curdled milk. If this coating be removed, it leaves the surface beneath unbroken, smooth and red. Sometimes these patches run together and cover the whole mouth, and in severe cases extend down the throat. The affection is not dangerous, but is often painful, and prevents the child from nursing. It may be communicated to the mother, and cause excoriation and soreness of the nipples. *Treatment*: Keep the child's bowels in order, and apply locally equal parts of powdered borax and white sugar; put a pinch of this powder upon the child's tongue 5 or 6 times a day.

MOUTH, Nursing Sore.—This occurs to nursing women and even to those advanced in pregnancy. There is a scalding sensation upon the tongue and hot watery discharge from the mouth, the roof of which especially shows evidence of inflammation, and small, hard, painful swellings form on the tongue and cheek, which ulcerate

and are very sore. There is feverishness, and the bowels are costive; but if the ulceration extends to the bowels there is diarrhea. After weaning it disappears. *Treatment*: Mild laxatives, if the bowels are constipated; if diarrhea, spiced rhubarb and chalk mixture, with 20 gr. of chlorate of potash 3 or 4 times daily, with small doses of iron and quinine. This complaint implies an asthenic or debilitated state of the system; therefore support in every way with generous diet and wine.

MUMPS. — It begins with soreness and stiffness in the side of the neck; soon followed by swelling of the parotid gland, which is painful, and increases for 4 or 5 days; after the 4th or 5th day the swelling subsides, and disappears in from 7 to 10 days; generally both glands swell at the same time, but sometimes one only is attacked; after the swelling has subsided, the other is attacked; there is generally fever, with hot, dry skin, quick pulse, furred tongue, constipated bowels and scanty high-colored urine; from effects of cold and imprudence, the disease sometimes suddenly leaves the glands of the neck and affects the breast of the female, and the testicles of the male; sometimes causing irreparable injury. *Treatment*: The swelled gland should be fomented with a flannel wrung out of an opiate lotion, ½ oz. of laudanum to 1 qt. of hot water, and, when very painful, should be poulticed 3 or 4 hours with a hot linseed meal poultice; costiveness should be relieved by a tablespoonful of castor oil, or ½ oz. of Epsom salts; the bowels should be kept open by 1 teaspoonful of the salts every morning; should the disease change to the brain or the testicles, the feet should be immersed in hot mustard water, and still more attention given to keeping the bowels free. *Homeopathic*: Redness of the face and eyes, also of the swelled gland, with headache, give belladonna; tendency to the brain, delirium, wild, staring look, and nervous excitement, give hyoscyamus; fever, heat and chills, jaws stiff, and difficult swallowing, give mercurius. In ordinary cases, the chosen remedy may be repented, 3 times a day; should the disease be transferred to the brain, testicles or ovaries, it may be necessary to repeat it every 3 hours; dissolve 10 or 12 globules in ½ tumbler of water, and give 1 teaspoonful to a child, or 2 teaspoonfuls to an adult as a dose; the patient should be kept in a proper temperature, but not too warm, and care should be taken to prevent his taking cold by exposure in any way.

NIPPLES, Sore.—(See *Breast.*)

OVARIES, Inflammation of. — Catching cold from getting the feet wet, etc., while menstruating, excessive fatigue, excessive sexual indulgence, etc., may be causes. *Treatment*: Perfect quiet, with hot fomentations, hops and mush poultices, and anodyne and counter-irritating embrocations to relieve pain, and general treatment for any fever, are necessary in the acute stage, and later, repeated blisters. For ovarian dropsy, when the accumulation is large, a surgical operation is necessary.

PERINEUM. Laceration of.—This, during labor, if up to, but not through the anus, and if the patient when passing water turn upon her hands and knees and uses extreme cleanliness, will generally heal, so as to give little or no subsequent inconvenience. Yet it would be better, immediately after labor, to close it by quill suture. Complete laceration of the perineum into the anus is attended with distressing incontinence of feces, and is prevented from healing by the action of the sphincter muscle.

PREGNANCY. — One of the most significant signs of pregnancy is the sudden stopping of the menses; if in addition to this, about the 5th or 6th week after the last catamenial period, there should be morning sickness, swelling of the breasts, and the circles around the nipples should be conspicuously dark and wide, the woman's condition is evident. Soon after the 4th month, quickening, or the first motion of the child perceived by the mother, takes place; but the only unmistakable sign of pregnancy is pulsation of the fœtal heart discovered by auscultation, and this is not usually manifest before the 5th or 6th month. It must be remembered that the woman is not sick, but only in a peculiar condition, and in order to pass through it successfully little is needed but ordinary sanitary rules and good common sense. She should take a reasonable amount of out-door air and exercise; but she should remember that while making a human being, she is engaged in a great and sacredly important work, and should not allow herself to be over-fatigued by exertions either of body or mind; her best physical energies and nervous vigor should be reserved for the benefit of the immortal being within her. If nausea is excessive, 10 gr. of oxalate of cerium, or of pepsin, occasionally administered, has oftimes removed it; the same amount of the new remedy, *ingluvin*, prepared from the gizzard of the fowl, has suited other cases; champagne has been of excellent service also for the same purpose; and, recently, it has been discovered that the gentle dilatation of the mouth of the womb by the finger has completely relieved the nausea when all other efforts have failed. The average duration of pregnancy is 280 days, counting from the last catamenial period; a variation of a few days, or even weeks, may take place in exceptional cases; but this is the rule by which it is generally wise to reckon.

PRICKLY HEAT.—(See *Lichen* in MEDICINE.)

RICKETS.— A disease generally confined to childhood, characterized by a large head, prominent forehead, protruded breast bone, flattened ribs, tumid belly, emaciated limbs, and great general debility. The bones, more particularly those of the spine and legs, become distorted; the stools are frequent and loose, a slow fever succeeds, and, unless the child rallies, it wastes away and death ensues. When recovery takes place there is always more or less deformity left. *Treatment*: The treatment of rickets depends more on proper domestic management than on direct medication. Careful nursing, warm dry clothing, thorough ventilation, moderate exercise, and, above all, a light nutritious mixed diet abounding in nitrogenous matter and the phosphates (see *Food, Nutritive Power of*, in HYGIENE) will do much to effect a cure. To these may be added the administration of 1 gr.

doses of quinine twice a day; and occasionally 1 dr. phosphate of soda or rhubarb.

RUPTURE, or HERNIA, Of Infants. — This defect is quite common among infants, and particularly those with delicate constitutions. When it takes place at the navel it is called *umbilical hernia*; if in the groin, *inguinal hernia*. The defect may be known by the protrusion of a portion of the intestine or abdominal viscera, forming a tumor beneath the skin. Umbilical hernia may be reduced by placing the child on its back and making gentle pressure upon the protruding part; it should then be retained in place by a suitable bandage. For this purpose, take a hemisphere made of wood, cork or ivory, of suitable size, place the convex surface on the opening, and retain it there with cross strips of adhesive plaster and a bandage round the body. If this be worn a sufficient length of time, a radical cure will generally be effected. Inguinal hernia is more difficult to treat. No one but a qualified physician or surgeon should attempt its management.

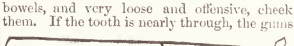
SCALD HEAD.—Children are often troubled with a dirty, yellowish incrustation which forms on the scalp; it usually appears on top of the head, and keeps spreading. It is caused by an excessive secretion thrown out on the surface, which thickens into a dry, scaly crust, partially covering the scalp. If any part of this crust be removed, the skin underneath exhibits a red, angry appearance. Uncleanliness and keeping the head too warm are generally the cause. *Treatment*: In addition to the most particular attention to the preservation of the health and cleanliness, the scales should be removed by thorough washing with soap and water, and, if necessary, by poultices; the hair should also be shaved, or cut off as closely as possible; the head should be kept covered with a cloth wet with equal parts of linseed oil and lime water.

SLEEP-WALKING, or SOMNAMBULISM. — Children are most subject to sleep-walking. When adults are affected with it, the cause may generally be traced to mental exhaustion, over-excitement, or emotional feeling. The most preferable method of awakening a somnambulist is by dashing cold water on the face. It is well to occasionally administer an aperient, and also to rectify any errors of diet, if necessary, and to remove, by the exercise of judicious and kindly advice and change of scene, undue excitement or morbid feeling. The other precautions, such as securing the feet, etc., during sleep, guarding the exits of the bed-chamber, are obvious.

SNUFFLES (Coryza).—Infants are often troubled with a kind of catarrh, or obstruction of the nose, which prevents them from breathing whilst they are sucking. It also annoys the child during sleep, and gives rise to a peculiar snuffling sound, similar to snoring in adults. In some cases there is a considerable flow of mucus from the nose. *Treatment*: (See *Colds* in MEDICINE).

TEETHING.—The first sign of teething is heat in the mouth of the child, felt by the mother during sucking, flow of saliva, biting and grinding the gums. The temporary set usually appear in the following order: 2 front in each jaw, *incisors*, about the 7th month; 1 tooth next to each of the preceding, *lateral incisors*, from the 7th to 10th month; first grinding teeth, *anterior molars*, about the close of 12th month; stomach and eye teeth, *canines*, from the 14th to the 20th month; back teeth, *posterior molars*, from the 18th to the 37th month. If the gums are examined, it will be found that the ridge, previously perceived along the edge of the jaw, has disappeared, and the gum is full and rounded. (For child's jaw, see cut in ANATOMY—*Alimentation, Organs of.*) *Treatment*: When the bowels are confined, give a gentle purgative. The warm bath at 96 degrees soothes the child. If there are more than two good movements of the bowels, and very loose and offensive, check them. If the tooth is nearly through, the gums

Lancing the Gums.



A Gum Lancet.

inflamed and feverish, and distress is shown, use the lancet. If there is much bleeding, it can be stopped by taking a clean, soft linen towel and pressing it with the finger firmly against the gum. If this fails, a little powdered alum may be put on the finger and pressed against it. Give the child fine splinters of ice to melt in its mouth, and let it enjoy the fresh air.

URETHRA. Tumor of.—An excrescence, varying in size from a large pin's head to that of a horse-bean, is liable to grow from the female urethra, causing great distress through its exquisite sensibility. *Treatment*: It should be cut off, and a caustic applied to the surface. Immediately after, a sponge dipped in diluted vinegar should be applied, to prevent injury to surrounding sound parts; and if necessary to introduce the caustic within the urethra, it must be by means of a tube with an aperture in it corresponding to the diseased surface.

URINE. Retention of, After Delivery.—This is more particularly the case where the labor has been prolonged or very difficult, and the bladder injured by the passage of the child. *Treatment*: It will be necessary in some cases to draw off the urine with a catheter; this must be done by a physician, or skilled nurse. The application of warm fomentations to the region of the bladder, or sitting over a chamber which contains hot water, is sometimes very useful.

URINE. Retention of, in Children.—The bladder may be very much distended and painful when pressure is made in that region. Sometimes there is fever, sleeplessness, piteous moaning and crying, drawing up of the limbs and twisting of the child's body. *Treatment*: A folded napkin wrung out of warm water, and laid over the region of the bladder, will have a salutary effect. (See in MEDICINE, *Urine, Retention of.*)

VAGINA, Anterior Fistula of.—A communica-

tion between the bladder and the vagina. It generally results from sloughing of the parts after a tedious labor. *Treatment*: As soon as it is discovered, the patient should be made to lie on her face; the utmost cleanliness should be enforced by means of astringent injections and fomentations; by which means the cicatrization and contraction of the aperture will be promoted. When the spontaneous processes of cure are carried so far as can be, art must step in; and most wonderful have been the triumphs of modern surgical art in this operation. Until Dr. Marion Sims, of New York, and other eminent surgeons, demonstrated to the world the feasibility of closing up by a surgical operation this opening between the vagina and bladder, the unfortunate sufferer from this fistula had no other prospect before her for years, except to live with the constant stench of urine dribbling upon her garments, or upon a mass of cloths kept about her person, as the best result in her power. The first surgeons in all our large cities now perform this operation.

VAGINA. Posterior Fistula of.—This must be treated at first by cleanliness and mild laxatives. If after a time the aperture does not close, it must be treated as in the above last case. This fistula is an opening through the posterior wall of the vagina, and anterior wall of the rectum, making a communication between the two; causing a calamity but little inferior to that of the anterior fistula; and, fortunately, equally amenable to the resources of surgical art, by means of a similar operation.

VAGINA. Prolapse of.—When the posterior wall falls down, bringing with it the rectum, there is great distress and difficulty in getting rid of the discharges; when the anterior wall, with the bladder, falls down, there is great irritability of the bladder, difficulty of emptying it, decomposition of urine, and other ill consequences. *Treatment*: Cold astringent injections, tonics, baths of alum water, and firm perineal bandage are the first set of remedies. Should these fail, it may be necessary to resort to a pessary, a thing which no one, however, should use if he can help it. If these do not succeed, there is an ingenious surgical operation, which consists of two parts: 1st, in contracting the circumference of the vagina; 2nd, in uniting the posterior portions of the labia, so as to bring forward the perineum, as it were, to act as a natural cushion and support to the prolapsed parts.

WASHING THE CHILD.—Immediately after the the birth of the child, it should be carefully anointed and rubbed well over the entire body with a little hog's lard or some sweet oil, and especially in the arm pits, in the groins, and wherever the limbs are folded upon each other; then take a piece of dry flannel and wipe the child until it is clean and dry. After this a little warm water and fine soap may be used to remove the grease. Particular pains should be taken to have the child perfectly clean at this first bathing; by observing care in this respect, scaly eruptions and excoriations of the skin will in many instances be avoided. The temperature of the room should be warm, and the child bathed at least once a day; at first the water should be about new-milk warm, but the temperature should be gradually lowered, and after a few weeks may be used cold. Never bathe the child in a cold room.

WASTING AWAY (Marasmus).—Consists of a scrofulous affection of the mesenteric glands, attended with a gradual wasting of the body or flesh, distended, hard abdomen, pale, sickly appearance of the skin, sunken eyes, variable appetite, which is sometimes voracious; irregular action of the bowels, the evacuations resembling soap-suds and very offensive. If the disease continues long, fever sets in. The disease frequently becomes developed in a child during the irritation of teething, or is called into activity by the use of unwholesome food, want of pure air and cleanliness. *Treatment*: Fomentations, friction and the warm bath should be faithfully employed externally; the abdomen, especially, should be daily rubbed with the warm flat hand very gently, but long and perseveringly; and let the hand during the process, be so often wet with tepid brandy that 5 or 6 teaspoonfuls be rubbed in every day. For a tonic, internally: Iodide of potassium, 1 dr.; syrup of sarsaparilla, 4 oz.; mix; ½ teaspoonful before each meal for a child of 2 years. Let there be as much as possible of out-door air and generous diet; and when practicable, let the little patient be changed for awhile to a new dwelling-place, and new scenes.

WET-NURSING.—There are times when reasons may prevent the mother from suckling her offspring. Ill-health, a delicate constitution, failure of the milk, or other physical causes may render it entirely impracticable. In all such cases it is better to employ a wet nurse, if a suitable one can be obtained, than attempt to bring up the child by hand. In large cities the risk is much greater than in the country, where fresh milk can be obtained without difficulty. In selecting a nurse, it is of the greatest importance that she be perfectly healthy. Her age should be about the same as that of the mother, and her confinement have occurred about the same time. She should be free from all eruptions, as tetters, ulcers, glandular swellings, and all scrofulous taint. She ought to have a supply of good milk, be possessed of a kindly disposition, cleanly in her habits, and have a fondness for children. Having engaged such a nurse, enforce upon her mind the necessity of regular habits and strict attention to diet. She should avoid all heating or stimulating beverages, spices, flatulent food, or quack nostrums; bathe frequently, take proper exercise, and breathe pure, fresh air.

WHITES (Leucorrhœa.)—This signifies a discharge from the vagina, generally white, or nearly colorless and transparent, sometimes yellow, or green, or slightly sanguineous, and of varying degrees of consistency. When severe, it is accompanied by a sense of weight, heat and soreness in the vagina, irritation of the bladder, pain in the lower belly and thighs, etc. There is almost always headache, languor, debility and pain in the back. *Treatment*: The bowels should receive the first attention. An oz. of Epsom salts, dissolved in 1 gill of water, and first one-half taken, and in 4 hours the other half, if the

first does not operate, will frequently cool the inflamed vagina. Besides the regulation of the bowels, little can be accomplished beyond removal of the causes of the complaint, when they can be discovered, and promoting the general health and strength in every way possible. *Homeopathic:* Calcarea carb. is of the greatest value in the treatment of this affection of young women—2 gr. twice daily dry on the tongue, followed by occasional doses of sulphur. Sepia is most suitable to those cases of leucorrhœa occurring in married women, where there is a tendency to falling of the womb. A drop dose twice daily. The general health should be attended to, and local injections of calculated water—a teaspoonful of the pure tincture to a teacupful of water, cold—is often of great value, if there is much irritation. A lotion of a teaspoonful of hydrastis to ½ tumblerful of water, should there be much relaxation. China will relieve the weakness consequent on the leucorrhœal flow; a drop dose twice or thrice daily.

WOMB. Bleeding from.—Whatever the cause, rest and quiet are imperative. The patient should be placed in bed in a moderately cool room, with the hips elevated, and cloths wet with fresh or ice-water applied over the belly, thighs and genitals, and in severe cases ice may be introduced into the vagina, and pressed against the neck of the womb; if following labor, gentle pressure should be made over the womb to cause it to contract. If these means fail, a soft handkerchief, a piece of soft sponge, or pieces of soft linen or cotton, wet with cold water, or iced water, or with some astringent solution, as alum water, or a weak solution of the persulphate, or perchloride of iron, must be carefully introduced into the vagina and pressed against the neck of the womb until the vagina is full.

WOMB. Falling of, or Prolapsus.—A sinking of the uterus nearly or quite down to the os externum. It often occurs in early pregnancy. The causes may be congestion of the uterus, tumors, tympanitis, distention of the colon, relaxation of the ligaments, too early "getting up" after labor, tight lacing, dancing, running, or any severe muscular exercise, leucorrhœa and other exhausting discharges, straining, coughing, etc. There is pain in the back and groin, extending down the thighs to the knees or toes. The patient suffers great distress in standing or walking, and in voiding the urine and fæces. *Treatment:* In slight cases, rest in a horizontal position, with cold or astringent injections, are often sufficient. In prolapsus after confinement it is particularly necessary. Bandages, when they relieve, act by supporting the abdominal muscles, and those of the back; hence they may be useful in women who have borne many children, and in whom these muscles are much relaxed. They can never be regarded as uterine supporters. In decided prolapsus, mechanical support by means of pessaries becomes necessary. These differ in shape according to the end to be obtained, and the peculiar views of the practitioner using them. The cheapest and a good support will be found to be a piece of fine firm sponge, cut to a proper size, to admit when damp of being pressed up to the vagina to hold the womb in its place. The sponge should have a stout piece of small cord sewed two or three times through its centre, up and down, and left sufficiently long to allow its being taken hold of to remove the sponge, once a day, or every other day at the farthest, for the purpose of washing, cleaning, and using the necessary injections; and this must be done while the patient is lying down, to prevent the womb from again falling or prolapsing. After having injected some astringent solution, wet the sponge in the same, and introduce it sufficiently high to hold the womb in its place. A liberal use of iron tonics is needed. Mix fine iron filings with as much ground ginger. Dose, ½ teaspoonful 3 times daily in a little honey or molasses, increasing or lessening the dose to produce a blackness of the stools. Continue this course until well.

WOMB. Inflammation of.—The signs of this trouble are pain, fever, vomiting, swelling of the belly, and tenderness at the neck of the womb, extending to the loins and thighs, and great prostration, and perhaps delirium. *Treatment:* The bowels should be opened by a mild saline laxative. The belly, and especially the lower portion, should be completely covered with a large hot meal, or hops and bran poultice; leeches should be applied to the inside of the thighs; opiates may be administered by suppositories. Soothing injections may also be made into the vagina. If the inflammation becomes chronic, repeated blistering may be required in the groins, and over the womb.

The Sick Room.

REMARKS. — In the sick room, as well as in most other departments of life, cleanliness should be observed in every respect; have a ventilation which provides pure air without a draft; a uniform temperature suited to the necessities and wishes of the patient; such light as shall carry health to the body without blinding the eyes; quiet and rest that shall the most soothe and pacify should be secured, and food of the right kind and proper quality. When the brain is affected the room must be darkened and kept perfectly quiet. A sick child should never be suddenly aroused, but spoken to gently and soothingly. If it makes a great resistance to taking medicine the doctor should be informed, as the excitement produced may do more harm than the medicine would do good. A sick child never should be left alone for more than a few minutes at a time, yet it should be carefully guarded from excitement and noise, and other children should be kept away from it. In diseases of the chest a child should be raised by pillows into a half sitting position, as this makes it more easy for it to breathe. In administra-

tion of medicine, if the dose is not given in the department of MEDICINE, do not neglect to consult the doses so frequently stated through MATERIA MEDICA and PHARMACEUTICAL CHEMISTRY.

AIR. To Cool.—It is often necessary, besides the ordinary ventilation, to devise some means to cool the sultry summer air of a sick room. For this purpose the following methods are recommended: 1. Hang thick towels, dipped in cold water with a little vinegar added, to the open window-sash.—2. Put 4 large cakes of ice in the different corners of the room; place each cake on a stout netting suspended on a frame; thus provide a clear drainage to the water; avoid noise and jar in placing the cake in position, and permit nearly all the surface of the ice to be acted on by the air of the room; to the bottom of each net attach pieces of bunting reaching entirely across the net and down to a receptacle on the floor; these pieces conduct the ice-water and so completely expose it to the action of the air as to abstract a very large portion of the heat; have nets suspended as high as consistent with convenience in placing the ice, because the cold air would descend.

BED-PANS. — These should be used in all cases where there is debility, or where the patient should remain quiet, as in fractures. The best for common use is a shovel-shaped pan. After the pan has been used, the nurse should immediately remove it from the room and empty it, and it should be well cleaned before being brought back; in case of infectious diseases a strong solution of copperas and carbolic acid should be thrown into it before removal from the room.

BED-ROOM. Of the Sick.—A sofa or reclining chair, upon which the patient can be placed while his bed is being changed and made up, should, if the size of the apartment will admit of it, form a part of the furniture. Two tables, a small one for the bedside, to contain the medicines in use, etc., and a larger one for the reception of other things, are desirable. Two or three bed-room chairs will be required; the wash-stand may well be supplied with an extra bowl and an additional water pitcher and goblet; add then spoons and glasses for administering medicines, and a liberal supply of soap, towels, etc. The room of a convalescent should be made to look as bright and cheery as possible. Trifling changes may be made in the arrangement of the furniture; a new picture, or one from another part of the house, hung where it can easily be seen by the invalid; illustrated newspapers or new books placed on the table, a few cut flowers, and one or two plants in bloom, do much to brighten a room. Wood-stoves are far preferable to coal-stoves in a sick room; in any case, all the flues should be closed and no gas be allowed to escape into the room. A tin of water should be placed on the stove, so that the air may not become too dry. Should the room be heated by hot air, it is well to place a basin of water near the registers, or a basin of boiling water occasionally beneath.

BEDS and BED-CLOTHES. — Narrow beds, (iron bedsteads) with fresh hair or moss mattresses, are the best. These beds are easily moved, and thus the patient will not be compelled to look constantly at the same cracks in the wall, or count the same three spots in the corner. He can be moved now into a shaded corner, now to the western windows, to see the sun go down, again in front of the fire, that he may look at its cheerful blaze, and anon into the most secluded corner, that he may rest and sleep. All this is an immense gain, and is sure not only to comfort the prisoner, but to shorten his illness. A very excellent mattress for sick persons is the woven wire, which is a strong fabric of wire interwoven in all directions, with plenty of spring to it, and which yields to pressure in every direction. If this mattress is used, it is usually sufficient to place 3 or 4 folds of a blanket over it. Water or air mattresses are also very comfortable, and especially useful in chronic cases, as they prevent the constant pressure from inducing bed-sores. There are also many ingenious beds in use for the sick, which can be lifted or lowered at pleasure. The bed-clothing must be light; counterpanes and coverlets must be discarded from the sick-room, and only good, light blankets be employed. The pillow-cases and sheets are better of cotton than of linen. They should be placed smoothly over the bed, and be changed frequently—daily in the case of infectious fevers. The bed the patient lies on should be absolutely flat and perfectly smooth. If a blanket be placed between the mattress and the bottom sheet, it is necessary to take great care that no wrinkles or inequalities are left in it. The bottom sheet must always be protected as far as possible from everything likely to soil it. Since it is very desirable not to disturb the patient oftener than is absolutely necessary, this may be done by the means of draw-sheets, which are placed under the middle of the patient, or under any part of the body where a discharge is issuing, or likely to issue. Draw-sheets are made of old sheeting doubled and sewed together, their size depending upon the requirements of the case. These should be removed as soon as they become soiled. The sheets and blankets should be tucked well in around the bed in cold or chilly weather. Nothing is more easy to an experienced nurse, or more difficult to an inexperienced one, than to change the bed linen with the person in bed. Everything that will be required must be at hand, properly aired, before beginning. Move the patient as far as possible to one side of the bed, and remove all but one pillow. Untuck the lower sheet and cross sheet and push them towards the middle of the bed. Have a sheet ready folded or rolled the long way, and lay it on the mattress, unfolding it enough to tuck it in on the side. Have the cross sheet prepared, and roll it, also, laying it over the under one and tucking it in, keeping the unused portion of both still rolled. Move the patient over to the side thus prepared for him; the soiled sheets can then be drawn away, the clean ones completely unrolled and tucked in on the other side. The coverings need not be removed while this is being done; they can be pulled out from the foot of the bedstead and kept wrapped around the

patient. To change the upper sheet take off the spread and lay the clean sheet over the blankets, securing the upper edge to the bed with a couple of pins; standing at the foot draw out the blankets and soiled sheet, replace the former and put on the spread. Lastly change the pillow cases. (See *Beds and Bed-clothes* in HYGIENE.)

BED-SORES. — To guard against bed-sores, the position of the patient should be frequently changed, to relieve the constant pressure on any one part, and he should be bathed often with tepid salt water, or weak spirits and water, to stimulate a more active circulation of the skin, being careful, of course, to avoid wetting his clothing or the bed-clothing, lest he catch cold. Abrasions of the skin, after being well bathed, should be covered with collodion, and its application repeated as often as may be required. If sores or sloughs have formed, these should be bathed with a mixture of spirits and water, of sufficient strength to cause slight smarting, with a few drops of carbolic acid, and then dressed with covering of lint wet with the same, and all pressure removed by suitable pads, or, better, by air or water pillows. These are made of rubber cloth, and of various sizes and shapes. Sometimes one or more thicknesses of soft buckskin, spread with soap-plaster, with suitable holes cut out, will be found useful to relieve the pressure. Ordinarily no application of lotion, ointment, or plaster can be of any service unless the pressure upon the sore can be relieved.

BEDS, To Warm.—One of the best articles for this purpose is an India rubber bag, holding 2 qts., to be filled with hot water. It closes with a tight metal stopper. Another convenient article used in a sick room, is a sand-bag. Get some clean, fine sand, dry it thoroughly in a kettle on the stove, make a bag about 8 in. square of flannel, fill it with the dry sand, sew the opening carefully together, and cover the bag with cotton or linen cloth. This will prevent the sand from sifting out. Heat the bag quickly by placing it in the oven, or even on the top of the stove. The sand holds the heat a long time; and the bag can be tucked close to the form without hurting the invalid. It is a good plan to make 2 or 3 of the bags, and keep them ready for use.

CASTOR OIL, To Disguise. — The following formula affords a method of completely disguising castor oil: Glycerine, castor oil, of each, 2 fl. oz.; oil of cinnamon, 4 min. The essential oil should be rubbed up with the glycerine, the castor oil added, and the mixture well shaken before using; ½ of the mixture will be an adult dose.

CLEANING THE SICK ROOM.—It is important that the sick room should be well cleaned, and the best time to do it is in the morning. If, however, the patient has not had a good night's rest, or if he has been restless and unable to sleep during the night and inclined to sleep during the morning, it would be well to put it off until he has had some rest. As little dust as possible should be raised; if the floor be covered with carpet, sprinkle moist tea leaves over it, and it should then be lightly swept with a hand-brush or broom. All soiled articles should be removed, and only those necessary be returned after washing.

COD-LIVER OIL, To Disguise.—Mix a tablespoonful of it intimately with the yolk of an egg, add a few drops of essence of peppermint, and ½ tumbler of sugared water. Another method is to add ether to the oil, or Hoffman's anodyne instead of the ether, in the proportion of 15 minims of the ether or anodyne to each ½ oz. of oil.

CONTAGION.—(See same in HYGIENE.)

CONVALESCENCE. — With convalescence come manifold dangers that must be guarded against with jealous care. A single act of imprudence then may render unavailing all the watchful anxiety of the previous weeks. An invalid is peculiarly liable to take cold when first allowed to sit up. The room should be slightly warmer than usual, the chair or couch on which he is to sit covered with a blanket, and he himself well wrapped in blankets and shawls. If possible, close-fitting flannels should be worn, and the feet must be covered with stockings. He should not be allowed to remain too long out of bed the first time, and it is well to have it warmed before he returns to it. No visitors should be admitted, and all excitement should be avoided until he has had time to rest after the exertion. Except those actually engaged in the care of the sufferer not more than one friend at once should ever be allowed to enter the sick room. In some cases quiet is absolutely essential to recovery, and it is always desirable. The visitor should sit where the invalid can see without being obliged to turn his head; he should enter and leave the house and move about the room quietly; carry a cheerful face and speak cheerful words, but tell no lies to be cheerful; do not fall into gay and careless talk in the attempt to cheer the patient; don't ask questions, and thus oblige the patient to talk; talk about something outside, and not about the disease and circumstances of the patient; tell the news, but not the list of the sick and dying; never whisper in the sick room; if possible carry with you something to please the eye and to relieve the monotony of the sick room—a flower, or even a picture; if desirable, some little wholesome delicacy to tempt the appetite will be well bestowed; but it is most unkind kindness to tempt the sick to eat too much of rich cakes, preserves, sweetmeats, etc. The weakness and languor inseparable from long illness render convalescence sometimes a very tedious and trying time. The small stock of strength is unequal to the demands made upon it, and it should be husbanded in every possible way. At night the invalid should have something to take the last thing before going to sleep; any light nourishment will answer —a cup of cocoa, beef-tea, or thin custard; a delicate sandwich, and if stimulant is ordered, a glass of wine taken then will prevent exhaustion during sleep. At the early morning hours, from 3 to 5, the powers of life should be re-inforced by food, as they are considered then to be at their lowest ebb. If it is impossible to heat anything, a cold drink is better than nothing. Half a pint of milk, with the white of one egg beaten up in it, may be given. There is usually little appetite at this early hour, and something must be

chosen that can be easily taken. During convalescence, properly regulated exertion is highly serviceable; but it should never be carried so far as to produce exhaustion, and should be pursued for some time indoors, before it be attempted in the open air; the latter, at first, should always take place in a carriage, that can be opened or closed at will; the patient may then attempt short walks in the open air; but, in all cases, it is of importance that he is not unduly fatigued, as, otherwise, injury instead of benefit will be the result. A patient should never be allowed to sit up longer than is agreeable to his feelings, and never so long as to produce a sense of fatigue.

DEATH. Pains of.—Those most conversant with death scenes unite in their testimony to contradict the popular impression about its sufferings. As far as they can judge from appearances, the period of dissolution is not, in the great majority of instances, distinguished by great pain. The light of science and experience upon a subject which has heretofore been considered peculiarly dark and gloomy, consigns to a merited oblivion those false and dismal expressions, "last struggle," "pangs of death," "death-agony," etc.

DEATH, Resuscitation from Apparent.—The most powerful means for this purpose is unquestionably the use of artificial respiration according to the Sylvester method. (See *Asphyxia*, in MEDICINE.) But there may occasionally be some incidental helps; in one instance a person was brought to by pouring water from a height upon the pit of the stomach; switching that most sensitive part of the organism, the skin, may have a powerful effect; sound has great power to rouse the unconscious; the beating of a drum, a sudden scream, and especially music, when it is touchingly and skillfully performed.

DEATH, Signs of.—The importance of being able to decide between death and a state of suspended animation, is obvious. There may be an apparent cessation of breathing and of the beatings of the heart, the eyes may be partly open and glassy, the jaws and fingers somewhat rigid, and there may be increasing paleness, coldness and rigidity. But none of these signs are decisive; there are a few others that leave no room for mistake: 1. Hold a mirror before the mouth and nostrils, and, if there is any breathing at all, it will be made manifest by the moisture that will dim its surface.—2. Place a lighted lump under the arm or leg of the person, so near that its flame will gradually burn the skin; if he be alive, there will first be a blister; but, if dead, the skin will not be raised at all, and there will only be the scar of a burn.—3. Tie a piece of twine tightly around the person's finger; if he be living, the finger will become red and swollen; if dead, no change will be produced.—4. Let fall into the person's eye a few drops of a solution of sulphate of atropia, 4 gr. to the fl. oz. of water; if he is living, the pupil will soon become dilated; if dead, no change will occur.—5. The reverse of this experiment may be tried by means of a few drops of tincture of calabar bean, if accessible; applied in the same manner they will cause the pupil to contract.

DIFFICULT BREATHING. To Relieve.—In all such cases the chest should be raised, allowing the head to fall back. The completest extension backward of the head and neck will give the surest relief.

DISINFECTANTS.—(See same in HYGIENE.)

DRINKS, For the Sick.—In fevers, small pieces of ice held in the mouth and allowed to dissolve sometimes answer the purpose, but not in the majority of cases. Up to a certain point, the action of water taken internally, in fevers, is excellent. Aside from allaying irritation by quenching thirst, it flushes the kidneys, carrying off much of the effete material produced by the high temperature. This is especially the case with acids. One drachm of hydrochloric acid added to 1 qt. of water will give it sufficient acidity to accomplish the desired purpose, while at the same time it adds to the pleasantness, and sometimes relieves nausea. The use of acids in fevers is highly commended by some authors. The same amount of sulphurous acid may be added to 1 qt. of water when the bowels are loose or there is a tendency that way. In these cases acidulated barley-water is pleasant and nourishing. The same may be said of toast water. In constipation, oatmeal water may be used in the same manner. A few tamarinds added to a glass of water will often assuage thirst and open the bowels gently. A weak infusion of cascarilla or orange-peel, acidulated slightly with hydrochloric acid, was with an eminent authority a favorite thirst-allaying drink for fever patients. Raspberry vinegar is a useful drink. Sweet fruits, although at first agreeable and refreshing, must be taken with care and moderation, for they often give rise to a disagreeable taste, and at cept to produce flatulence and diarrhea. (For *Milk*, see that topic in HYGIENE.)

FOOD, For the Sick.—As a rule, diet for the sick should be simple and nutritious, and so prepared as to be most easily and readily digested. During the acute stage of disease, the liquid forms, as broth, gruels, etc., are generally preferable. Meats should be cooked lightly, and the best methods are by boiling and broiling. Boiled food is usually the most easily digested, but not always the most nutritious. Fried meats of all kinds are indigestible, and should find no place in the dietetics of the sick. Variety is not less important than quality. Both sick and well soon tire of sameness of food. It should be borne in mind that the body requires a variety of substances to supply its constantly recurring wants and preserve or restore its health, and that the food must furnish them. All kinds of ripe fruits not of an acid quality, such as apples, pears, peaches, plums, grapes, raspberries, strawberries, blackberries, sweet cherries, sweet oranges, melons, cantaloupes, and such others, will not disagree with the patient at the proper stage for tempting the appetite. Have always a clean napkin; change it every time food is partaken of. If the patient is too weak to use a spoon or fork himself, be careful not to cram. If, with a languid movement of the hand, the poor sufferer

should bid you "begone" with all the nicely-prepared food, take it kindly, but try it again at some other time. Patience must be exercised. Bullying will do no good. Do not let the patient know before what he is to eat or when it is coming. But it is well to ascertain if he has any longing for a particular article. (See COOKING FOR THE SICK, in CULINARY.)

FRICTION. — In medicine, friction, whether simple or conjoined with liniments, is a therapeutical agent of considerable power. By it the circulation is promoted in debilitated parts, and medical substances (iodine, mercurials, opium, etc.) are made to penetrate the pores of the skin. The benefit of friction, which consists of motion and heat, whether or not the same be raised by rubbing the body with a coarse cloth or the flesh-brush, has advantages by which the obstructions of the pores and cutaneous glandules are opened, their stagnating juices broken into small particles, dissolved, and rendered fit to be carried off in perspiration, in the room of which new juice will succeed with new vigor to the body; and longevity is this way most certainly promoted. Simple friction is performed by the hand alone, or with a piece of flannel, a hair glove, or a flesh brush. If it be performed by short, brisk strokes with the tips of the fingers, and with great celerity, when the naked hand is the agent, and if it be continued for an hour or upwards, and repeated several times a day, its influence in reducing swelled glands and swellings of the joints, in starting into action partly paralyzed muscles, as well as in alleviating rheumatic pains, is very great; besides being well performed, the friction should be continued for (at least) half an hour, in order to render it useful. Gentle, slow and equable friction, by producing a continued repetition of an agreeable impression on the nervous system, acts both as an anodyne and hypnotic. The operator should sit by the side of the bed, and introducing the hand under the bed-clothes, rub the legs or the arms (or other parts) gently with equally lengthened but slow movements. When the invalid is a child, its influence is more powerful when aided by a monotonous, but a soft, tune, which, although it operates upon a distinct sense, yet, by combination, renders the friction more soporific. When friction is accompanied with the use of any acrid or irritating substance, or is intended to introduce any active remedy into the system, the rubbing should be brisk, and of sufficient force to slightly abrade and inflame the cuticle; and should be continued until the substance, which is usually in the form of ointment, either wholly or partially disappears, owing to its absorption by the skin. The hand of the operator should, in most cases, be guarded by a glove; otherwise he is likely to share with the patient the effects of the medicine, a result not always agreeable or even safe.

LIGHT.—The sick chamber should be the room in the house most exposed to the sunlight. If it is possible to place the bed where the patient can see the sky, so much the better. If the sun becomes too bright it is easy to exclude it, but light is an absolutely essential element in recovery. The fewest patients die in the southerly exposed wards of hospitals. The inhabitants of dark villages in the mountains, even with the pure air which surrounds them, show a greater proportion of idiocy than those in other parts of the land. It is only in a few affections of the eyes or brain that an exclusion of light is required, and those are so rare as to be only the exceptions which prove the general rule. Smoking kerosene lamps, gas, etc., contaminate the air, but light is necessary in the sick room. The lamp may be placed in the hall, or a lantern hung outside of the window, admitting light into the room.

MEDICINES, Administration of. — Medicines should be given at regular intervals, and strictly in accordance with their directions. Should the patient be asleep when the hour arrives for its administration, he should not be disturbed, except in particular cases. Liquid medicines should never be measured out with a spoon; a graduated medicine glass should be in every sick room. Should the medicine be an acid and the spoon used be silver, the medicine is altered and often rendered poisonous, and, instead of being beneficial, is injurious. Medicine should be taken well diluted. Powders, if in small bulk, may be mixed with a little jelly or sugar, and taken from a spoon. Should the powder be in a large quantity, it may be mixed with water or mucilage. Pills may be easily swallowed by placing them on the tongue and taking a mouthful of water; in swallowing the water the pills will be washed downwards.

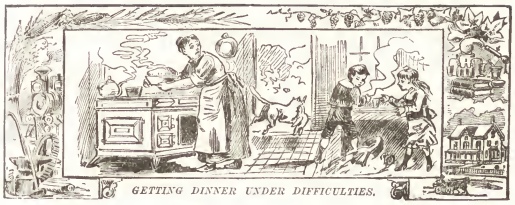
NIGHT-SWEATS.—The cure for night-sweats depends entirely on the cause. Malaria gives rise to them, and then the cure is quinine and arsenic. Debility may cause them. In that case tonics and good nutritious food should be used. Consumption causes it, and the cure is sulphuric acid, 10 to 20 drops in water each hour. After the acute stage of intercostal rheumatism is passed and the patient is prostrated, and convalescence retarded by profuse sweating during sleep, administer in the evening 2 full doses of chloral hydrate.

NURSING. — The first requisite for a good nurse is obedience to the directions of her superior officer, the physician. Too many, who have undertaken the business of nursing, have done so with the idea that they are to prescribe for the patient, and decide upon the proper medical treatment. This is a false and erroneous idea; for, while it is well that the nurse should have a good education, should understand much of medical science and methods, and should be so intelligent as not to give a blind and slavish compliance even to the physician; yet, generally speaking, she should be in a mood of mind to cordially carry out his directions, and to submit the medical care of the patient to him, who alone has the responsibility. Next to obedience comes neatness; the nurse should be naturally neat; then come cheerfulness, energy, a sunshiny disposition, a happy countenance, etc.; to insure which she must of course possess good health and great endurance; for the life of a nurse is a laborious life.

PART 2.

DOMESTIC LIFE.


COOKING
THE LAUNDRY
AROUND THE TABLE
MARKET
BUTTER
EGGS
MARKETING
CHILDHOOD.



GETTING DINNER UNDER DIFFICULTIES.

CULINARY.

CONFECTIONERY.

CANDIES.

REMARKS. — The different stages through which sugar passes in the process of candy making are as follows: The sugar is boiled until it becomes a perfectly transparent syrup; if further boiled until a portion "touched" between the forefinger and thumb, on opening them, is drawn into a small thread, which crystallizes and breaks, this stage is called the *thread*. If boiled again, it will draw into a larger string, and if bladders may be blown through the drippings from the ladle with the mouth, it is now called *bloom* sugar, or "boiled to the blow." If, when reboiled, the skimmer is dipped in, and shook over the pan, and then given a sudden flirt behind, the sugar will fly off like feathers; this is called the *feathered* stage. The next stage is called the *crackled* stage, or "boiled to the crack." In this stage the sugar hangs to a stick dipped into it, and if put directly into a pan of cold water turns hard and snaps. The next stage is the *caramel*, and is tested by dipping a stick first into the sugar, and then into cold water, when, on the moment it touches the latter, it will, if matured, snap like glass. It has now reached a full candy height. Throughout, the fire must not be too fierce, less it burn the sugar. If it is desired to work old candy over, dissolve it in water and run through a jelly-bag until clear.

ACID. To Remove. — If the candy is too acid, dissolve it in water, then put in a sufficient quantity of lime or chalk in powder to cause strong effervescence; after it has subsided, pass through a flannel bag; let the pan it is dissolved in be capable of containing twice as much as is put in.

ALMOND CHOCOLATES. — Prepare the almonds as if for burnt almonds (see *Burnt Almonds*) and then roll into chocolate, previously warmed.

ANISEED SUGAR PLUMS.—Dry 2 lbs. green anised in a stove; rub it in the hands to break off the stems; winnow to rid of dust; then put in a swinging basin, and coat with sugar boiled to thread; when coated sufficiently, whiten and polish.

BARBERRY DROPS. — Mix the juice of ripe barberries with powdered and sifted loaf sugar till they become a soft paste; heat over the fire, stirring all the time, but not letting it boil; remove from the fire; add a little more sugar; stir well, and deposit it in drops on a tin, or a sheet of paper; dry the drops in a nearly cold oven.

BARLEY SUGAR.—Boil clarified loaf sugar to the thread; then pour in for every pint of liquid sugar 2 teaspoonfuls of lemon juice and 6 or 7 drops of essence of lemon. Stir well and boil again, till as before, it is brittle; while this is boiling, slightly oil a marble slab; on this pour the sugar; when cool, cut it up into strips with a pair of scissors, and twist the sticks a little with the hand.

BISCUIT PASTE.—Prepare some paste as for Savoy cakes. (See *Savoy Cakes*, in CAKES.) Take $\frac{1}{6}$ of the mixture, and add dissolved chocolate; stir the whole well and divide into 2 equal portions; to 1 part add some more of the mixture; mix together prepared cochineal or carmine and infusion of saffron; stir this into another portion of paste; divide it, and add to 1 part some more of the paste; butter or paper a square tin, and spread on a spoonful of each colored paste in rotation; bake it in a moderate oven, and when cold cut it into pieces as required.

BRANDY BALLS.—Boil brown sugar to the crack; work in good peppermint and 1 oz. ivory black to 7 lbs. sugar; roll them to the proper size and cut them off; then roll round with the hand.

BURNT ALMONDS.—For each lb. of sifted almonds use 2½ lbs. loaf sugar, made into a syrup. A round bottomed copper pan is the best for making these in. Boil the almonds in the sugar until they crack; take from the fire, stir and sep-

arate for the second coat. Put 2 lbs. more of syrup into the pan; add the drainings from the first operation, and do the same thing over again; repeat this until finished; finally, drain; dry, and color with cochineal.

ALMOND CANDY or HARDBAKE.—Boil 1 lb. of sugar and ½ pt. of water until it becomes brittle when dropped in cold water; then add ½ lb. of almonds blanched and split, the juice of ½ a lemon, and 1 oz. of butter. Boil until the candy hardens at once in the water. Pour it out on a well-oiled dish. When cold it may be taken off the plate and kept for use in a tin box. Time, half an hour.

ALMOND CREAMS.—Blanch and pound 5 oz. of sweet and 1 oz. of bitter almonds to a paste; put to this loaf sugar to taste, rubbed with lemon-rind, and pounded. Rub smoothly a dessert spoonful of corn-flour into 1 qt. of milk, or if it is to be had use 1½ pt. of cream; add the yolks of 3 eggs well beaten. Put the whole, when well mixed, into a saucepan, set it on the fire, and stir constantly until it thickens; but on no account allow it to boil. The whites of the eggs may be whisked, and a little placed on the top of each glass. Time, about ten minutes to boil the cream. Sufficient for a dozen custard-glasses.

CANDIED BONBONS.—Heat 1 lb. of sugar until it registers 40 deg., then cool it down to 38 deg., by the addition of some essence to flavor, either aniseed cordial, cheery water, maraschino, or almond may be used. Let it cool, and beat it with a wooden spoon until it forms a paste, when put it in a basin until wanted. Next, get a wooden tray about 1 ft. square, and 2 in. deep, fill it with dry starch finely powdered, and stamp the starch all over with an ornamental cutter, leaving about ½ in. between each interstice. Melt part of the paste in a sugar boiler, rub the spout with whiting, and fill the patterns in the starch with the sugar; let it dry for two hours; take them out, brush them to clear away the loose starch, place them in a candy pan, cover them with some syrup at about 36 deg. of heat, and cover with a sheet of paper. Allow the bonbons to stay fifteen hours in a drying closet, then break the top only of the sugar, throw off the syrup, put the bonbons on a wire strainer, and give them their finishing touch by letting them again dry in the hot closet.

CINNAMON DROPS.—Mix ½ oz. of powdered cinnamon, or ½ tea-spoonful of oil of cinnamon, with 1 lb. of pounded sugar and ½ pt. of water; boil the syrup to a candy height or until it snaps when put into cold water; then spread it on a large flat dish, well oiled, and score it, before it hardens, into small squares, or drop it evenly on paper. Time to boil, about a quarter of an hour.

COFFEE CREAM CARAMELS.—Melt 2 lbs. of sugar with as little water as possible in a vessel on the fire; when the sugar begins to bubble, pour in slowly 1 teacupful of rich cream and stir carefully; add 2 oz. of fresh butter and extract from 2 oz. of coffee, stirring gently and continuously while adding. As soon as cooked sufficiently to be brittle when dropped in cold water, pour into buttered tin dish, and when nearly cooled, mark off with a buttered knife into squares.

DATE CREAMS.—One cupful of molasses, 1 egg, ½ cupful of butter, and 1 cupful of hot water in which a teaspoonful of soda has been dissolved; 1 spoonful of mixed spices, and 1 large cupful of dates, chopped fine. Cut in squares, like frosted creams, bake in a moderate oven, and spread boiled frosting over the top.

EVERTON TAFFY.—Put into 1 teacupful of water 1 lb. of powdered white sugar, and when the sugar is dissolved, add ½ lb. of butter beaten to a cream and keep constantly stirring the mixture until a little of it put on a buttered dish firmly sets; add lemon or other flavoring to taste just before taking from the fire. Pour out on a dish that has been buttered. Never undertake to make candy of any kind in a tin saucepan.

FRENCH VANILLA CREAM.—Break into a bowl the white of 1 or more eggs, as is required by the quantity you wish to make, and add to it an equal quantity of cold water; then stir in the finest powdered or confectioners' sugar until it is stiff enough to mold into shape with the fingers. Flavor with vanilla to taste. After it is formed into balls, cubes or lozenges, place upon plates to dry. Candies made without cooking are not as good the first day. This cream is the foundation of all the French creams.

HICKORY-NUT CANDY.—Crack the nuts and chop them fine. Then measure as many cups of the nuts as of white granulated sugar. Put the sugar by itself in a saucepan, and shake the pan slightly until the sugar is dissolved. Then pour in the nuts and stir around. Pour this into buttered tins, and before it is quite cold cut into small squares. Any other kind of nut can be used if preferred; peanuts make a delicious candy made in this way.

MAPLE SUGAR CREAMS.— Grate maple sugar, mix it in quantities to suit the taste with French cream, adding enough confectioners' sugar to mold into any shape desired. Walnut creams are sometimes made with maple sugar, and are delicious.

NUT CREAMS.—Chop almonds, hickory nuts, butter nuts, or English walnuts, quite fine. Make the French cream, and before adding all the sugar, while the cream is still quite soft, stir into it the nuts, and then form into balls, bars or squares. Three or four kinds of nuts may be mixed together.

ORANGE DROPS.—Grate the rind of 1 orange and squeeze the juice, taking care to reject the seeds. Add to this a pinch of tartaric acid; stir in confectioners' sugar until it is stiff enough to form into small balls the size of a small marble. These are delicious.

ORANGE-FLOWERS' CANDY.—Put 1 lb. of doubly-refined loaf sugar into a saucepan with ½ pt. of water, and boil gently for ten minutes. Throw in 2 oz. of freshly-gathered orange-flowers, and leave them in the boiling syrup for five minutes, then turn them into a bowl, and let them remain for two days. Boil the syrup

once more until it rises high in the pan; strain upon sheets of paper which have been placed upon large flat dishes, and loosen it from the paper before it is quite cold. Store the candy in canisters.

BUTTER-SCOTCH.—Dissolve 2 lbs. of sugar in 2 pts. of water; boil and add 2 tablespoonfuls of butter, and sufficient flavoring extract to suit.

CANDIED FRUITS.—Take the fruit out of the syrup, and let it drain on a sieve; dip the sieve with the fruit into luke-warm water; take it out; let it drain, and dry in the stove; boil some fresh syrup to the blow; put in the fruit, and boil in it; with a spoon rub the sugar against the side of the pan, to grain it; when it begins to whiten put the fruit in the white part separately; with two forks take it out and lay it on sieves or wire frames, for the sugar to drain from it.

CARAMELS.—These are made by boiling clarified sugar till it is very brittle; then pour it on an oiled slab or sheet of tin, and, as soon as it is cool enough to receive an impression with the finger, stamp it in small squares with a caramel mold; then turn over the mass; wipe the bottom and put it in a dry place to harden. When caramels are to be flavored, put the flavoring in when the sugar has come to the crack; then reboil, and finish as before. If flavored with chocolate, it must first be dissolved in water; if coffee caramels are wanted, an infusion of the coffee must first be made, strained through a cloth and stirred into the syrup gradually; if the caramel is to be flavored with lemon, grate the rind with a lump of sugar, add a few drops of lemon juice with water enough to dissolve the sugar completely, and stir the whole into the boiled syrup.

CHANTILLY BASKETS.—Prepare some ratafias; boil some sugar to the caramel degree; rub the inside of a mold with oil, dip the edge of the ratafias in sugar and stick them together; place the face of the ratafias towards the mold, except the last two rows on the top, placing their faces to meet the eye when the sugar is cold; take it out; join the bottom and top together with the same sugar; make a handle of spun sugar, and place over it; line the inside with pieces of Savoy or sponge cakes; fill with custard or whipped cream, and stick in here and there, in the cream, small pieces of the cake. The ratafias can be replaced by cherries, grapes, or oranges; the last are peeled and divided into small pieces; the cherries and grapes can be used either fresh, preserved, wet, or dried.

Chantilly Basket.

CHEWING GUM. — 1. 1 lb. refined parafine; ½ lb. white sugar; color to suit; melt and pour into a candy pan, and divide when cool into squares —2. 1 lb. spruce gum, or Venice turpentine; ½ lb. parafine; melt together; and divide when cool into desired shape.

CHOCOLATE.—Warm a mortar and pestle until hot; wipe the mortar out clean, and put prepared nuts in it; pound the nuts until reduced to an oily paste; if it is required sweet, add ½ or ⅔ of its weight in powdered loaf sugar; pound it again so as to mix it well together; place it in a pan and put it in the stove to keep warm; take a portion, roll well on a slab with a roller, until reduced to a smooth paste; put in another pan, and keep warm until the whole is similarly disposed of; then place it again on the stone; work it over and divide into pieces; put these into molds; shake them and let them cool.

CHOCOLATE CANDY. — 1 cup of molasses, 2 of sugar, 1 of milk, ½ of chocolate, a piece of butter ½ the size of an egg; boil the milk and molasses together, separate the chocolate fine, and mix with just enough of the boiling milk and molasses to moisten; rub perfectly smooth; then with the sugar stir into the boiling liquid; add the butter and boil 20 minutes.

CHOCOLATE CREAMS. — 2 cupfuls of powdered sugar to ½ cupful of boiling water or milk; put on the stove and boil ten minutes; grate ½ square of Baker's chocolate; place this on top of a steaming kettle; leave it there until soft; take off the cream and beat it until perfectly white; roll into little round balls, and dip them in the melted chocolate; flavor with vanilla.

CHOCOLATE KISSES.—1 lb. sugar; 2 oz. of chocolate, pounded together and finely sifted; mix with the whites of eggs well beaten to a froth; drop on buttered paper and bake slowly.

CHOCOLATE PISTACHIOS. — Warm sweet chocolate by pounding it in a hot mortar; when reduced to a malleable paste, take a little and wrap round a blanched pistachio nut; throw it in nonpareils of various colors, covering it all over; fold in colored or fancy papers with mottoes.

COCOANUT CANDY.—2 cups of white sugar; ½ cup of water; boil; put the pan in a larger pan of water and stir until cool; when it begins to get stiff, stir in the grated cocoanut, and when cold cut into cakes.

COLORS, For Candies. — The following are healthy and desirable; nearly all others should be avoided: *Bistre.* Light brown, prepared from wood soot; sugar may be substituted for this or any other shade of brown, by continuing the boiling after it has passed the degree of caramel, until it is burnt; but mix water with it so as to lessen the shades; dissolved chocolate may also be substituted. — *Black.* Ivory or bone charcoal, ground fine and mixed with a little gum Arabic. — *Blue.* Rub indigo in warm water until the required color is obtained; or, dissolve ½ lb. in 1 lb. oil of vitriol. — *Carmine.* Reduce 1 oz. of cochineal to a fine powder; add to it 6 qts. of clear rain or filtered water; put this into a large tin saucepan, and boil for 3 minutes; then add 25 gr. of alum, and let it boil 2 minutes longer; take it off to cool; when it is blood warm pour off the clear liquor into shallow vessels, and put them by to settle for 2 days, covering them with paper when it is settled, decant off the pure liquid; then dry the carmine for use — *Green.* Boil the leaves

of spinach about 1 minute in a little water, and when strained bottle for use. — *Lemon.* Use a solution of saffron. — *Orange.* Yellow, with a portion of red. — *Purple.* Madder or logwood, intensified with a little indigo. — *Red.* Cochineal, 4 oz.; boil 5 minutes in ½ pt. of water; then add 1 oz. cream tartar and ½ oz. pounded alum; boil 10 minutes longer; add 2 oz. sugar, and bottle for use. — *Yellow.* Rub with some water a little yellow gamboge on a plate.

COMFITS.—These are small seeds preserved in sugar. Sift the seeds in a hair sieve; put them in the comfit pan, and rub well about the bottom until warm; boil clarified loaf sugar; pour over the seeds about 2 tablespoonfuls; rub and shake about the pan, until dry; give another charge and repeat the above process; give 4 or 5 charges, increasing the amount of syrup each time, dusting flour over them before the last charge; sift them in a hair sieve; put them again in the pan and proceed as before until of the required size.

COUGH CANDY.—7 lbs. gran. sugar; ¼ oz. cream of tartar; 3 pts. water; color with a spoonful of saffron water; boil to the crack; pour out on the slab; when stiff add ½ oz. tartaric acid, 1 teaspoonful of aniseed, and 2 drops of peppermint; mix thoroughly, and pull; when done form into strips, rolls or drops.

COUGH LOZENGES.—(See same in CHEMIST AND DRUGGIST.)

CREAM CANDY.—Take sugar and add an equal quantity of cold water; wet a little starch —about 2 tablespoonfuls of starch to every cup of sugar; rub it smooth and set aside for use; set the sugar and water over the fire to boil, but do not stir after it begins to boil; let it boil till it hardens readily when dropped into cold water; as soon as it has reached that state pour in the starch, stirring rapidly; and let it boil, while being constantly stirred, for a minute or two; then pour into a well buttered dish and set aside until cool enough to work with the hands; add to it while working such flavoring as is preferred; work till very light; draw it out into a flat piece and cut into sticks.

DROPS.—These are made by taking the desired amount of sugar and dissolving it in the required flavor; then boil it to the consistency of thick syrup; drop it on to plates or sheets of paper, and put it away to cool. The almond flavor is obtained by blanching the almonds, crushing them, adding a little lemon juice and 1 pt. of water to every lb. of almonds, putting the compound into a cloth and wringing out the milk. Cocoanut drops require the sugar to be added to the whites of 3 eggs, beaten to a stiff froth; then the cocoanut is added. Chocolate drops require no sugar; the chocolate is warmed, a little butter added, and rolled into shape; then nonpareils are sprinkled over the top. Coffee drops are made the same as cocoanut drops. When the flavor of fruit is desired, the pulp of the fruit is stirred with the sugar.

FRENCH CANDY.—Take 2 lbs. best loaf sugar; put into an enameled saucepan with just enough water to wet it; set it on a clear fire; boil 10 minutes and remove any scum that may arise; this done, remove it from the fire. Dip a little candy in a basin of cold water. If it does not form a ball between thumb and finger, when cool, return it to the fire and boil a few minutes longer. If it has a brittle feeling, add a tablespoonful of water and boil again; when it is boiled to the right point, set it aside to cool. Divide it then into as many parts as different flavors are desired; drop the desired flavor, after being mixed with the desired color, on each piece; roll the piece like a piece of dough until thoroughly mixed.

FRUITS, To Candy.—(See CANDIED FRUITS.)

GINGER CANDY.—1 lb. loaf sugar; a few drops of acetic acid or the juice of ½ lemon; a dessertspoonful of essence of Jamaica ginger; boil the sugar with just water enough to dissolve it to the ball; add the acid and the essence; rub the sugar with a silver spoon against the sides of the sugar boiler to whiten; pour it into small moulds or into a tin pan; mark it off into the desired shapes and put away to dry.

GUM DROPS.—Cheap gum drops, better than those of gelatine, can be made as follows: Mix 1 lb. of starch with sufficient cold water to make a stiff paste; then pour over boiling water to make it clear; add ½ lb. glucose and 1 to 1½ lbs. sugar; stir briskly over a moderate fire; flavor with any essence desired, and pour into starch molds.

HOARHOUND CANDY.—7 lbs. sugar, white or brown; ¼ oz. cream of tartar; 1 qt. water; ½ pt. strong hoarhound tea; boil to the feather; grain against the sides of the pan with spoon, 2 or 3 minutes, then pour out on the slab; form into flat sticks, rolls or drops, with a hoarhound cutter, which are made in two styles, with movable knives or with fixed divisions.

Hoarhound Cutter, with Knives.

HOARHOUND LOZENGES. — (See CHEMIST AND DRUGGIST.)

JUJUBE GUM.—1 lb. jujubes; very white and picked gum Arabic, 2 lbs.; powdered sugar, 2 oz.; pound the jujubes in a marble mortar with 5 pts. of water; put the whole into a pan, and boil until reduced to 3; strain the decoction through a cloth; beat up the white of an egg with a glass of water, and mix part with the decoction as it boils; throw in a little at a time of the remaining part, to check the ebullition; when all used, take off the scum; put again on the fire; add gum and sugar powdered and passed through a horse-hair sieve; stir until dissolved; when of the consistence of honey, place it in the bain-marie, and neither stir nor touch it; when it has acquired body enough, pour it into molds, previously oiled with good olive oil; place in the stove to finish drying; when dry, take it out and cut in small pieces.

LEMON CANDY.—6 lbs of sugar; add to it 3 pts. of water; put the mixture over a slow fire for ½ hour; clarify with a little dissolved gum Arabic; skim off the impurities as they rise to the surface of the boiling sugar; when it becomes perfectly clear take a spoonful and drop it into cold water; flavor with oil of lemon; pour off thinly; cut into sticks.

LICORICE PIPES.—8 lbs. of sugar, 12 oz. of licorice; warm the licorice and cut in thin slices; dissolve in 1 qt. of boiling water; stir well; let it settle; pour off free from sediment; dissolve the gum in the clear part, and mix into a paste; roll out a piece in a round form, until it is about the size of the largest end of the stem of a tobacco pipe; dry them in the stove.

LOZENGES.—Dissolve in ¼ pt. of hot water ½ oz. of gum Arabic; when cold stir it up with 1½ lbs. of loaf sugar and a spoonful of any powdered spice, or 12 drops essence; roll and beat the whole up into paste; make into cakes and punch out the lozenges with a round stamp; dry them near the fire. In place of the spice any flavoring may be used that is desired.

MODELLING.—In modelling candy figures, correct proportions are very important. The form of the body is first made with the fingers, the more minute parts with the tools and a pair of scissors. In making a doll, make the whole length 6 times the length of its foot, 8 times that of its head; the thumb as long as the nose or the biggest joint of the middle finger; the fore finger shorter than the third, and the little finger shorter than the third by one joint; the width of the wrist as long as the thumb; the ear the length of the nose, its breadth half its length; the arm 3 times the length of the head, or 4 faces; the leg, from the knee-joint to the bottom of the foot, two heads and a half; the foot, which is ⅙ of the human stature; divide the body into 3 parts—first the toes from the top of the large one to the lowest joint of the little one, next the middle of the foot, and lastly the heel and instep. After the proportions have been determined upon, it is important that the form be true to nature; not only in making dolls, but in making flowers, baskets, etc., graceful and natural positions must be aimed at, avoiding the stiff and awkward.

Gouge. *Rose Stick.* *Foot Tool.* *Cutting Tool.*

MODELLING TOOLS.—Four tools are required—a rose stick, the thin, flat end being used for forming the leaves of roses out of the paste by flattening a piece on a table until it is of the required form and size; the other end for fluting and making borders, etc. A foot tool, used for forming the edges and borders, the circular end being used to work underneath any part, or circular mouldings, and also for the paws of animals. A cutting tool, for which purpose the curved thin end is used, also for the formation of leaves, and the opposite end for fluting; a gouge, used in the formation of leaves for flowers. The curves of each tool are also used for different purposes in modelling, and for forming the raised and depressed parts. There are many others, but these will be sufficient, with the dotting or pointing tool; a piece of round pointed stick will do for this last.

MOLASSES CANDY.—Take 2 qts. of molasses; boil over a slack fire from 25 to 35 minutes; test it after it has boiled 20 minutes by taking some out on the end of a clean spoon, and dipping into cold water; if it hardens quickly it is boiled enough; when boiled put in a teaspoonful of baking soda, and stir well; pour out into oiled or buttered tins; when cooled, with your hands well buttered or oiled, pull until the candy is white.

NUT CANDY.—To 1 lb. brown sugar add 3 tablespoonfuls of water; when it boils add ¼ lb. butter; when thick and ropy, drop in the nuts; take from the fire and stir till it grains; then pour into buttered tins.

OILED PAPER, To Make.—Melt some lard, or use sweet oil, and with a varnish brush go over one side of the paper lightly; then lay it between unoiled sheets of paper; put it away for 5 or 6 hours, and it will then be ready to wrap around the candy.

PASTES.—Take 1 oz. of picked gum tragacanth; wash it in water; put in a clean pot and pour on it ½ pt. of water; stir it frequently; let it dissolve 24 hours; squeeze it out through a coarse cloth; put it into a mortar, adding gradually 6 or 8 oz. of sugar; work until it is a smooth white paste. When it is wanted for use, take the required quantity, work more sugar into it and add the flavoring desired. When fruit flavor is wanted, take ¾ lb. reduced pulp to 1 lb. sugar, cut the paste into the desired shape, form it into rings or mold it it into figures.

POP CORN BALLS.—The corn being popped, salted, and kept as warm as possible, sprinkle over it a mixture of gum Arabic and ½ lb. sugar, dissolved in 2 qts. water, and boiled a few minutes; stir the corn thoroughly; mold into balls with the hands. If desired, sprinkle with a solution of carmine to the mixture, after it has been balled, to give a red tint.

PURITY, Of Candy, To Test.—If the candy be dissolved in water, its purity may be tested as follows: If the water remains transparent the candy is pure; but if milky or depositing a sediment, terra alba or some harmful adulteration has been used.

ROCK CANDY.—Take a brass kettle; make 8

or 10 holes at equal distances from each other around the sides of the kettle; pass threads through these; stop the holes upon the outside; boil the sugar to the feather; pour it into the kettle; put it into a warm place 5 or 6 days; pour off the syrup; pour it over again; set it away; repeat this process 2 or 3 times; then again set it away until cool, when the threads may be removed with the candy clinging to them.

STARCH MOLDS.—Take 2 or 3 flat boxes an inch deep; fill them with powdered starch; into this press any patterns desired; into these the compound is to be dropped, the dropper in one hand and a piece of wire in the other to cut off the fluid as it falls.

SUGAR CANDY.—1. 2 cupfuls of white sugar; ½ teaspoonful of cream of tartar; 1 cupful of cold water, and 1 teaspoonful of butter; boil without stirring.—2. 3 cupfuls sugar; ½ cupful of vinegar; ½ cupful of water; juice of 1 lemon; boil without stirring, till brittle; pour on a buttered dish, and pull until quite white and light.

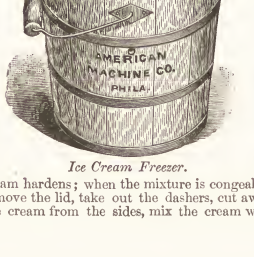
SUGAR PLUMS.—Take a quantity of sugar syrup, in the proportion to their size; add a drop or two of any esteemed flavoring essence; if the bon-bons are preferred white, when the sugar has cooled stir it round the pan till it grains and shines on the surface; when ready, pour through a funnel into leaden molds, of various shapes, and slightly moistened with oil of sweet almonds; as soon as the plums are cold, take them from the molds; dry them for 2 or 3 days in the air, and put them upon paper. If required to be colored, add the color just as the sugar is ready to be taken off the fire.

TAFFY.—(See *Molasses*, or *Sugar Candy.*)

WALNUT CREAM DROPS.—The cream is made in the same way as that for chocolate creams; it is then made into a disc and ½ a walnut kernel stuck on each side; the cream may be colored or flavored with chocolate, coffee, vanilla, lemon, etc. as desired.

ICES AND CREAMS.

REMARKS ON MAKING.—When not possessed of a machine, having procured the necessary ingredients, secure a small, deep tub, not less than 8 inches greater in diameter than the inside can or freezer; see that the tub has a hole in the side near the bottom, with a plug, which can be drawn at pleasure, to let off surplus water which would retard freezing. Have near at hand a spatula of hard wood, with which the cream can be scraped from the sides of the freezer. Have also a smaller one with which mix coarse salt and ice together, and deposit the same between the can and the ice tub. Pound the ice fine. When the cream is flavored, place it in the freezer, which put in the tub; pile the salted ice around it; if there is a crank, turn it slowly at first, increasing the speed as the cream hardens; when the mixture is congealed, remove the lid, take out the dashers, cut away the cream from the sides, mix the cream with the spatula until it is smooth and soft; reinsert the dashers; cover the can again, and work until the cream is hard and well set. If there is no crank, use the spatula repeatedly instead. For ease and rapidity, there is, of course, nothing so good as a well-constructed, quick and reliable freezing machine, such as the "American," shown in the cut. For the best freezing mixtures and colorings, see those topics in this department.



Ice Cream Freezer.

ALMOND CREAM.—Take 6 oz. bitter almonds, blanch and pound them in a mortar; add by degrees a little rose water; boil very gently in 1 pt. of cream until highly flavored with them; pour the cream into a bowl; stir in 1 lb. powdered loaf sugar; cover it; set it away to cool gradually; when cold, strain it and stir gradually, but very hard, into 3 pts. of cream; freeze, and let stand about 2 hours, when freeze the second time, and serve at once.

APRICOT ICE.—Skin, divide and stone 6 large ripe apricots; blanch, pound and add the kernels to the fruit; juice of 2 lemons; ½ pt. of water, and 2 oz. of clarified sugar; put in an earthen crock for 1½ hours; strain and mix the whites of 3 eggs beaten to a firm froth with 4 oz. of powdered sugar; add this to the prepared water; mix thoroughly and freeze; 12 oz. of jam can be used instead of the fresh fruit.

APPLE ICE.—Pare and core some apples; cut them in pieces into a preserving pan; cover with water; boil until reduced to a marmalade; strain; to 1 pt. of apple water add ½ pt. syrup, the juice of a lemon, and a little water; when cold, freeze.

BARBERRY ICE.—First soften the berries by either boiling in the syrup or putting in a stew-pan, and stirring over the fire until tender; pass them through a sieve, mix, and freeze.

BISCUIT ICE CREAM.—Dry and pound 2 oz. of sponge cake; mix with 1 pt. of custard; flavor slightly with lemon; sweeten and freeze. Savoy cakes may be used and a few ratafias.

BROWN BREAD ICE.—Make a custard of eggs and milk, flavored with vanilla; cut up some brown bread into dice, dry it in the oven; put it hot into the cold custard; freeze; pour iced custard around it in the dish in which it is to be served.

CHERRY CREAM.—Made in the same way as cherry ice, only using 1 qt. of cream in place of the water.

CHERRY ICE.—2 lb. cherries; 4 oz. ripe gooseberries; ½ pt. syrup; ½ pt. water; the juice of 2 lemons; pound the cherries with the stones in a mortar; pass the juice of the fruit through a sieve; mix the syrup and water with it; freeze.

CHOCOLATE CREAM.—1 qt. of cream; 1 pt. of new milk; 1 lb. sugar; 2 well-beaten eggs; 5 tablespoonfuls grated chocolate rubbed smooth in a little milk; flavor to taste; heat the milk almost to boiling; pour it by degrees in with the beaten egg and sugar, and freeze.

CHOCOLATE ICE.—Set 4 oz. of grated chocolate over a slow fire with 2 tablespoonfuls of water; when dissolved remove from the fire; add a cupful of warm water; mix with cold syrup; freeze and serve.

COFFEE CREAM.—1 qt. cream; 5 oz. fine coffee; 12 oz. sugar; roast the coffee; stir until it is a good brown color; throw into the custard cream while quite hot; cover closely; let it infuse for an hour or two; then strain and freeze.

COLORS, For Ices. — *Green.* Pound spinach leaves, or beet leaves; express the juice; boil in a teacup in a saucepan of water to take off the rawness. — *Red.* Use beet root sliced, and some liquor poured over. — *White.* Use almonds finely pounded, with a drop of water; or use cream. — *Yellow.* Use yolks of egg or a bit of saffron steeped in the liquor and squeezed; the flower of the crocus is also used; it has no taste.

CURRANT ICE.—1½ pts. ripe currants; ½ pt. raspberries; 1 qt. cream; the juice of 2 lemons; 12 oz. sugar; mix as raspberry.

FILBERT CREAM.—1 qt. cream; 1 lb. nuts; 12 oz. sugar or 1 pt. syrup; crack the nuts; roast the kernels in the oven; when done, pound them with a little cream; make a custard, and finish as almond ice.

FREEZING MIXTURES.—Coarsely pulverize the salts when about to use them, and do not mix until just before throwing them in the liquid ingredients. 1. Snow or pounded ice, 2 parts; salt, 1 part.—2. Snow or pounded ice, 5 parts; salt, 2 parts; sal ammoniac, 1 part.—3. Snow, 8 parts; concentrated hydrochloric acid, 5 parts.

GINGER CREAM.—6 oz. of preserved ginger, 1 qt. of cream, ½ pt. of the syrup from the ginger; sugar sufficient to sweeten it with; the juice of 2 lemons; pound the ginger in a mortar; add the cream, etc., and freeze.

GOOSEBERRY ICE.—Same as cherry ice, using 2 lbs. of gooseberries to 1 lb. cherries.

LEMON CREAM.—Same as lemon ice, using 1 qt. cream instead of the water.

LEMON ICE.—6 lemons, juice of all and grated rind of 3; 1 large sweet orange, juice and rind; 1 pt. water; 1 pt. sugar; squeeze out every drop of juice and steep in it the rind of orange and lemons 1 hour; strain, squeezing the bag dry; mix in the sugar and then the water; stir until dissolved, and freeze by turning in a freezer, opening three times to beat all up together.

MARASCHINO ICE.—Make a lemon ice, using less water, and making up the deficiency with Maraschino; be careful the taste of the lemon does not prevail too much.

ORANGE CREAM.—Mix 1 qt. milk or cream, 1 lb. sugar, the juice of 8 oranges, the rinds of 4 oranges rubbed on the sugar, and 4 yolks of eggs; when the compound begins to thicken, stir briskly, and strain, freezing when cool.

ORANGE ICE.— 6 oranges, juice of all, and grated rind of 3; 2 lemons, the juice only; 1 pt. sugar dissolved in 1 pt. water; prepare and freeze as you would lemon ice.

PEACH CREAM.—Same ingredients, with the exception of 1½ pts. cream instead of ½ pt. of water, and the same process of making as peach ice.

PEACH ICE.—1 lb. of the pulp of ripe peaches; ½ pt. of syrup; ½ pt. of water; the juice of 2 lemons; mix as apricot; if the fruit is not ripe enough to pulp, open and take out the stones; put them in a stewpan with the syrup and water; boil until tender; pass through a sieve; mix in the pounded kernels; when cold freeze.

PINE APPLE CREAM.—Put on the fire in a copper or tin vessel 1 lb. of strained pine apple pulp; 12 oz. sugar; 1½ pts. milk or cream; yolks of 3 eggs; beat till thick; do not boil the cream; strain the mixture into a vessel and set aside to cool; freeze.

PINE APPLE ICE.—1 lb. pine apple; 1 pt. syrup; ½ pt. water, and the juice of 2 lemons; cut the pine in pieces, and put it into a stewpan with the syrup and water, and boil until tender; pass it through a sieve; add the lemon juice, with 2 or 3 slices of the pine cut in small dice; mix, and when cold freeze.

PISTACHIO CREAM.—1 qt. cream; 8 oz. of pistachios; 12 oz. sugar; blanch and pound the pistachios with a little of the cream; mix; flavor with a little essence of cedrat, or the rind of a fresh citron rubbed on sugar; color it with spinach; make it into a custard with eggs, and when cold strain and freeze.

PUNCH ICE.—Make a lemon ice; rub off the yellow rind of the lemons on sugar; when the ice is beginning to set, work in the whites of 3 eggs to each qt., beaten to a strong froth; mix with sugar; when nearly frozen, take out the pot from the ice, and mix well with it a glass of rum and of brandy; after the spirit is well mixed, replace the pot and finish freezing.

RASPBERRY ICE.—1 qt. ripe raspberries; 4 oz. ripe cherries; ½ pt. syrup; ½ pt. water, and juice of 2 lemons; mash the fruit and pass it through a sieve; mix with it the other articles; add a little prepared cochineal to heighten color; freeze.

RATAFIA CREAM.—For 1 qt. cream, crumble 6 or 8 oz. ratafia cakes quite fine, and mix with the cream when it is frozen.

STRAWBERRY CREAM.—3 pts. thin cream; 2 lbs. powdered sugar; 3 pts. of ripe strawberries; mash the fruit; strain through a fine wire strainer; add the cream and sugar and freeze as rapidly as possible.

STRAWBERRY ICE.—8 pts. of the best scarlet pines; 1 pt. syrup; ½ pt. water, and the juice of 2 lemons; mix as raspberry.

TEA CREAM.—Put ½ oz. fine orange-flavored tea into an earthern pot and pour on it 1 pt. boiling milk; let it stand until nearly cold; pour it off fine; strain to free it from any particles of leaf; put the liquor into a large stew pan, with enough lump sugar to make it sweet; when it is hot add to it ¼ pt. rich cream and the yolks of 5 eggs; stir over a slow fire until it becomes a thick custard, and then take from the fire; stir occasionally until it is cool, to prevent a skin forming; freeze in the usual manner.

TEA ICE.—1 qt. cream; 2 oz. best green tea; 12 oz. sugar; put the tea into a cup, and pour on it a little cold river water containing a small portion of carbonate of soda; let it remain for an hour or two, then add a little boiling water; strain it, and add to the cream and eggs; finish as the others.

TUTTI FRUTTI CREAM.—1 pt. of milk, 1 qt. cream, yolks of 5 eggs, beaten light with the sugar; 3 cups of sugar, 1 lemon, juice and grated peel; 1 glass of pale sherry, and ½ lb. crystallized fruits, chopped; heat the milk almost to boiling; pour by degrees over the eggs and sugar, beating all together well; return to the fire, and boil 10 minutes, or until set into a good custard; when cold, beat in the cream, and half freeze before you stir in ½ lb. of crystallized fruit—peaches, apricots, cherries, limes, etc.—chopped very fine; beat in with these the lemon and wine; cover again, and freeze hard. In all fruit ice creams the beating of the custard should be very hard and thorough, if you would have them smooth.

VANILLA CREAM.—Take 1 qt. rich new milk, put in it a vanilla bean broken in two, and set it over the fire in a water-bath to heat; separate the whites and yolks of 3 eggs and beat them very light; when the milk almost boils, stir up the beaten yolks with 4 cups of crushed white sugar, and add to them the hot milk little by little, beating steadily the while; then beat in the frothed whites; place again over the fire, stirring it briskly for 15 minutes; pour it out into a deep dish and set aside to cool; when quite cold beat into it 3 pts. sweet rich cream, and freeze.

VANILLA ICE.—1 qt. cream; ½ oz. vanilla; 12 oz. sugar; cut the vanilla into small pieces, and pound it with the sugar until quite fine; add the cream and eggs; make it into a custard; strain, and when cold freeze.

WENTWORTH'S CREAM.—5 qts. pure cream; 2 lbs. best pulverized sugar; sufficient extract of vanilla to flavor to taste; stir together; turn into the can; beat until it fills the can; freeze.

COOKING.

REMARKS. — In cooking, to make the art a success, it is best to remember a few general rules. The following are the most important: When anything is made too salt, counteract it by adding a spoonful of vinegar and a spoonful of sugar. When about to cook, get together everything that you expect to use; see that the fire is right to begin with and remember that as much depends on the baking as on the molding. Look at the object in process of baking from time to time, and especially at the beginning; turn it round, if necessary, in case it be heated more on one side than on the other, to prevent burning. In baking meat and fish, keep the bottom of the pan covered with broth or water, and place a piece of buttered paper over the object in the pan. It not only prevents it from burning, but acts as a self-basting operation, and keeps the top moist and juicy. If the top of a cake bakes faster than the rest, place a piece of paper on it. Regularity and attention to time are the main secrets of boiling. Less heat is requisite to keep liquids boiling in copper and iron saucepans than in those made of tin. Great waste of fuel arises from making liquids boil fast, when they only require to be kept slowly boiling. The average time for boiling fresh meat is from 18 to 20 minutes for every pound. Dried or salted fish or meats require soaking in cold water before boiling. Meat and poultry will lose their flavor and firmness if left in the water after they are done. When the meat is desired blanched, put it into cold water; gradually raise it to the boiling point; take the meat out at once; plunge it into cold water; leave it there until quite cold; then remove it and wipe dry; it is now ready to be dressed, or for further cooking. In broiling, the gridiron should always be greased first. It is better to broil before the fire than over it. To fry well, rub the meat in a small quantity of fat, butter, or oil, which has attained a proper degree of heat, instead of placing it in cold fat and letting it soak in while melting. In roasting, all dark meats, such as beef and mutton, put down to a sharp fire for at least 15 minutes, until the outside has acquired a coating of condensed gravy, and then remove back, and allow to cook gently. Lamb, veal, and pork, if young and tender, should be done at a moderate fire. Veal should even be covered with paper. Very rich meat, if covered with paper, does not require basting. Fowls, place close to the fire, to set the skin, and in about 10 minutes rub over with a small piece of butter. Meats, while roasting, dredge with flour, just at the time when the gravy begins to appear. There are a few tables that are very valuable to housekeepers, as follows: Flour, 1 lb. is 1 qt.; meal, 1 lb. and 2 oz. are 1 qt.; butter, 1 lb. is 1 qt.; powdered white sugar, 1 lb. and 1 oz. are 1 qt.; 10 eggs are 1 lb.; a common tumbler holds ½ pt.; a teacup is a gill; best brown sugar, 1 lb. 2 oz. are 1 qt.; a tablespoonful is ½ oz.; 4 teaspoonfuls equal 1 tablespoonful; 16 large tablespoonfuls of a liquid are ½ pt.; 8 large tablespoonfuls are 1 gill; 4 large tablespoonfuls are ½ gill or 1 wineglass; 1 common wineglass is ½ gill; 1 common tumbler is ½ pt.

The following is a list of the chief French and other phrases used in bills of fare and cooking, with an explanation of each :

Allemande.—The white sauce known as *veloute*, thickened with cream and whites of eggs, and seasoned with nutmeg and lemon juice.

Angelica.—A plant preserved in syrup ; used to ornament pastry, tarts, etc.

Aspic Jelly.—A transparent jelly made from meat, and used to garnish fancy dishes.

Au bleu.—Fish dressed so as to give a bluish tint.

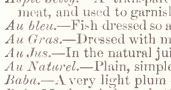
Au Gras.—Dressed with meat gravy.

Au Jus.—In the natural juice, or gravy.

Au Naturel.—Plain, simple cookery.

Baba.—A very light plum cake.

Bain-Marie.—A loose-bottomed vessel or cistern to be put on a hot hearth, or stove, and partly filled with hot water, to keep sauces, soups, etc., up to scalding heat without burning or reducing the quantity.



Bain-Marie.

Bard.—Thin slice of fat bacon to cover any meat or game where "larding" is not preferred.

Bechamel.—A French white sauce made from ham, veal, onions, and a variety of seasoning.

Beignet.—A fritter of any kind, fruit, vegetables, meats, etc., that is dripped in batter or egg and fried.

Bisque.—Is a shell-fish soup.

Blanc.—A white broth in which to boil poultry, lamb, etc., to make them look white.

Blanch.—Anything put into cold water, boiled, strained and then plunged into cold water.

Blanquettes.—Thin slices of any white meat warmed up in white sauce, and thickened with yolks of eggs.

Boudin.—An entree or side dish prepared with any kind of *quenelle* or force meat.

Bouilli.—Beef stewed and served with sauce.

Bouillon.—The common soup or broth.

Braise.—A mode of stewing in a close-covered vessel.

Brioche.—A spongy cake somewhat like Bath buns.

Calipash.—The glutinous meat of the upper shell of the turtle.

Calipee.—The glutinous meat of the lower shell of the turtle.

Caramel.—Sugar boiled until the water all evaporates, and then used for ornamental purposes.

Casserole.—A stew-pan, also a rice crust molded in form of a pie, baked and filled with *puree* or mince of game, or a *blanquette* of white meat.

Compote.—Fruit stewed and served with syrup, or stewed pigeons and small birds.

Consomme.—A strong, rich gravy used for enriching soups and gravies.

Coulis or *Cullis.*—Rich, brown gravy, made from stewing ham and veal a long time. Used to color, thicken and flavor soups and sauces.

Croquantes.—A bright colored mixture of fruit and boiled sugar.

Croquettes.—Finely flavored minces of meat, fish, foul, etc., made into plain or fanciful shapes and fried.

Croustades or Dresden Patties.—Rich paste in fancy molds and filled with mince.

Crouton.—A sippet of bread fried and used to garnish hashes, etc.

Daubes.—Meat or fowl stewed in sauce.

Dessossey.—To bone.

Papapillote.—A cutlet wrapped in oiled or buttered paper.

Entree.—Side dish for first course.

Entremet.—A corner dish for second course.

Escalopes.—Collops or round slices of meat.

Espagnol.—A brown sauce used as the foundation of many other sauces.

Faggot.—A tiny bunch of parsley, thyme, and bay leaf tied together.

Farce.—Stuffing or force meat.

Flance.—Side dishes for grand dinners.

Foncer.—Ham, veal or bacon laid at the bottom of a bake or saucepan, under meat.

Fondue.—A light and pleasant preparation of cheese.

Fricandeau.—A fancy dish of boned turkey or larded veal as an *entree.*

Fricassee.—Chickens, etc., cut in pieces in a white sauce, with truffles, mushrooms, etc., as accessories.

Fritter.—Anything incased in a covering of batter or eggs, and fried.

Galette.—A peculiar kind of French cake.

Gateau.—A cake.

Glaze or Glace.—Stock boiled down to a paste, and when needed warm in the *bain-marie*, and put on with a brush to improve the looks of braised dishes.

Godiveaux.—Various kinds of force meats.

Gratin.—*Au Gratin.*—A term applied to certain dishes prepared with sauce and baked.

Haricot.—So called from the French word for beans with which the dish was originally made. Now understood as any thick stew, or *ragout* of mutton, beef, or veal, cut in pieces, and dressed with vegetables and roots.

Jardiniere.—A mode of stewing vegetables in their own sauce.

Lardon.—The piece of bacon used for larding.

Leasen.—A mixture of egg and cream.

Lit.—A layer of anything.

Luting.—A paste to fasten the lids on pie pans ; for preserving game.

Maigre.—Dishes for fast days, made without meat.

Marinade.—A liquor to boil or stew fish or meat in.

Matelote.—A rich stew made of fish and wine.

Mayonnaise.—Cold salad dressing.

Menu.—The bill of fare.

Meringue.—Pastry made of sugar and whites of eggs beaten to a snow.

Mignonnette.—Peppercorns ground very coarse.

Miroten.—Pieces not larger than a crown piece made into a *ragout.*

Nougat.—A mixture of almonds and sugar.

Nouilles.—A kind of vermicelli.

Panada.—Soaked bread used in the preparation of French force meat.

Paner.—To use bread crumbs.

Poele.—A kind of broth in which to boil fowls. Much used in nice French cooking.

Pot-au-feu.—The stock-pot.
Profeterolles.—A kind of pastry creamed inside.
Puree.—A thick soup.
Quenelles and *Godiveaux.*—Different kinds of force meat balls.
Ragout.—A very rich sauce, or made dish.
Relevees.—The remove dishes.
Remoulade.—Salad dressing.
Rifacimento.—Meat dressed a second time.
Rissoles.—Balls of fine mince put in paste, or rolled in egg or bread crumbs, and fried, as an *entree* or garnish.
Roux.—A thickening made of butter and flour.
Salmis.—Game, hashed when half roasted. Hash differs from *salmes* by being made of well done meat.
Sauce Piquante.—An acid sauce.
Saute.—Fried; sometimes the frying-pan is called *saute.*
Seasoning.—Three bay leaves, six cloves, a blade of mace, pepper and salt.
Souffle.—The very lightest of puddings.
Stock.—Essence extracted from meat.
Tamis or *Tammy.*—A fine strainer of woolen canvas for straining soups, sauces, etc.
Timbale.—A sort of pie made in a mold.
Trifle.—A second-course dish, made of sponge cake, macaroons, jams, etc., brandy or wine, and liqueurs.
Tourte.—A kind of tart baked in shallow tins.
Turbans and *Mazarines.*—Ornamental *entrees* of forced meats and fillets of poultry, game or fish.
Veloute.—White sauce.
Vol-au-Vent.—Very light puff paste cut in fanciful shapes, the interior scooped out after baking, and filled with *ragouts* of minced sweetbreads, chicken, game or fish.

BISCUITS, CRACKERS, ETC.

ABERNETHY BISCUIT.—Take 8 lbs. flour; 1½ lb. butter; 1 qt. sweet milk; 12 oz. sugar; 1 oz. caraway seeds; 6 eggs; mix dough of the above, break in pieces of about 2 oz., mold, roll out, prick, and bake in a moderate oven.

APPLE BISCUIT. — Boil 12 fine apples until they become pulpy; take them out and rub through a hair sieve; add 2 lbs. of powdered loaf sugar, and 2 or 3 drops of oil of lemon or cloves; mix together; roll the mixture into separate masses of the size and thickness of a bun; cut them into any shape desired; then dry in a very slow oven.

BAKING POWDERS.—The very best and freshest qualities of materials only should be used, and the powder preserved in perfectly air-tight receptacles, or the strength will soon disappear. —1. Take 16 oz. corn flour and dry it well; mix with it 8 oz. of bicarbonate of soda and 5 of tartaric acid.—2. Tartaric acid, ½ lb.; bicarbonate of soda and potato farina or British arrowroot, of each ¾ lb.; dry perfectly by a very gentle heat; mix in a dry room; pass the mixture through a sieve, and at once put them into packets.

BATH BUNS.—½ oz. German yeast made into a sponge as for plain buns; ½ lb. flour; ¼ lb. butter; mix the whole lightly together with 6 yolks of eggs and a little milk; when ready, work in ¼ lb. rough broken loaf sugar; lay them out on a buttered baking sheet in the shape of a rock; put a few comfits on the top of each and bake in a sharp oven.

BREAKFAST BISCUIT.—To each qt. of flour, take 3 teaspoonfuls of yeast powder; 1 heaping tablespoonful of lard, and enough sweet milk to make the dough as soft as can be handled; salt to taste; put the yeast powder in the flour; sift it all together through a sieve; put in the lard, rubbing it in well; add the salt, then the milk or water; sprinkle the bread-board and dough with flour; work until it is smooth enough: then roll out about an inch thick, and cut with a round cake-cutter; stick with a fork; grease the dripping-pans and put them in.

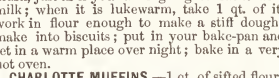
BUNS.—1 cup of milk; 1 cup of sugar; 1 cup of yeast; flour to make a batter; let it rise over night, then add ½ cup melted butter, 1 cup of sugar, flour to knead it, and let it rise again; roll and cut into cakes, and let it rise again.

BUTTER CRACKERS. — Rub 3 tablespoonfuls of butter into 1 qt. of flour; add 1 saltspoonful of salt; 2 cups of sweet milk; and ½ teaspoonful of soda dissolved in hot water; knead well for ½ hour; roll into an even sheet; cut with a wineglass; prick with a fork, and bake hard in a moderate oven; hang them up in a muslin bag in the kitchen 2 or 3 days to dry.

BUTTERMILK BISCUIT.—2 cups of good buttermilk; 1 of sour cream; 1 heaping teaspoon of soda; a pinch of salt; mix soft and roll as you like.

CENTENNIAL BISCUIT. — Make good corn mush, just as if you were going to eat it with milk; when it is lukewarm, take 1 qt. of it, work in flour enough to make a stiff dough; make into biscuits; put in your bake-pan and set in a warm place over night; bake in a very hot oven.

CHARLOTTE MUFFINS.—1 qt. of sifted flour; 3 eggs, the whites and yolks beaten separately



Muffin Pans.

until stiff; 3 cups of milk, and a little salt; mix quickly, beat well, and fill the hot irons half full.

CHEESE BISCUIT.—2 oz. of butter; 2 of flour; 2 of grated cheese; a little cayenne pepper, and salt; make into paste, and roll out very thin; cut into shape desired; bake a very light brown, and serve as hot as possible.

CHOCOLATE BISCUIT.— Mix some chocolate powder with white of eggs and powdered loaf sugar, into a paste; mold into biscuits, and bake at a gentle heat on a sheet of white paper.

CINNAMON MUFFINS.— 1 cup of sour milk; ½ cup of sugar; 1 egg; 1 tablespoonful of cinnamon; 1 tablespoonful of soda dissolved in a little hot water.

COCOANUT BISCUIT. — Break the shell of a cocoanut; remove the dark inner husk; grate the white kernel, and simmer slowly for ½ hour in 1 qt. milk; strain the milk through a towel; squeeze the grated nut to obtain all the milk; add to the milk a teaspoonful of salt, a gill of liquid yeast, or ½ oz. of compressed dough in an earthen or wooden vessel; cover with a thick towel; set in a moderately warm place to rise; when light and spongy knead for 20 minutes with flour enough to prevent sticking; make it into little biscuits; put them into a baking-pan; cover them with a towel; let them prove to rise again for 10 minutes, and then bake in moderate oven.

CORN MUFFINS.—1½ cups of corn-meal; the same of flour; 2 teaspoons of baking powder; ½ cup of sugar; ½ teaspoon of salt; small tablespoon of melted butter; 2 eggs; milk enough to make a stiff batter.

CRACKERS. — Take 1 large cupful of bread dough; roll out on the molding-board; spread on it a piece of butter and lard together, as large as a goose egg; sprinkle a little flour over it; fold it up, and pound with something heavy a long time; take a small piece at a time; roll out very thin; stamp with a clock key, and bake very quickly.

CRACKNELS.—Flour, 1 pt.; add a little grated nutmeg, the yolks of 2 eggs, 2 or 3 spoonfuls of rose-water, and cold water q. s. to make a paste; roll in ½ lb. butter, and make into desired shapes; in 1 hour put them into a kettle of boiling water, and boil until they swim; then throw them into cold water; take them out; and when dry, bake them on tins.

CREAM CRACKERS. — Rub together 14 lbs. flour and 1 lb. butter; add 1 lb. pounded sugar, 48 eggs, and flavor; mix thoroughly, and work it quite stiff and smooth; roll out quite thin; cut them with a cutter into any form; put them into boiling water and boil them till they float; remove with a skimmer and dry them on cloths; bake on clean pans without being buttered, in a warm oven.

CREAM MUFFINS.—1 qt. of sweet milk; 1 qt. of flour; 6 eggs; 1 tablespoonful butter; the same of lard; melt together; beat the eggs light, the whites and yolks separately; add the milk, with a little salt; then the shortening; lastly the flour, stirring in lightly; bake immediately in well-greased rings, half filled with batter; oven hot; send to the table at once.

CREAM OF TARTAR BISCUIT.—1 qt. of flour; 1 pt. milk; 1 teaspoonful of soda; 2 of cream of tartar; and 1 of salt; butter the size of an egg; mix the cream of tartar with the flour; rub in the butter and salt; dissolve the soda in a teaspoonful of boiling water; mix all together lightly.

CROSS BUNS.—2½ lbs. flour; ½ lb. sifted sugar; coriander seeds, cassia, and mace, of each, powdered, a sufficiency; make a paste with ½ lb. butter; dissolve in ½ pt. hot milk; work with 3 tablespoonfuls of yeast; set it before the fire for an hour to rise; make it into buns; set these before the fire on a tin for ½ hour; brush over with warm milk and bake to a nice brown in a moderate oven.

DROP BISCUIT. — 1 qt. of flour; 3 teaspoonfuls of baking powder; 1 small teaspoonful of salt; piece of butter the size of an egg, rubbed thoroughly in the flour; 1 pt. of milk; drop from a spoon in buttered pans; bake in quick oven.

EGG MUFFINS. — 2 eggs well beaten; 1 pt. of milk; 1 teaspoonful of salt; 2 tablespoonfuls of yeast and flour to make a batter; mix together; stand in a warm place over night; in the morning, stir in a tablespoonful of melted butter and ½ teaspoonful of soda dissolved in a little hot water.

ENGLISH BUNS.—½ lb. of flour; ½ lb. of butter; 4 eggs; 1 wineglass of yeast; 1 pt. of milk; 1 wineglass of brandy and rose-water mixed; a little cinnamon and nutmeg; after it is well raised, add ½ lb. of sugar, and 6 oz. of flour; bake in a moderately hot oven.

FRENCH BUNS.—1 cup of currants; 1 lb. of flour; 1 teaspoonful of baking powder and 2 tablespoonfuls of ground cinnamon; put these in a sieve; rub ½ lb. of butter to a cream; mix it with the sifted flour and add the currants; beat 3 eggs with ¾ lb. of sugar until very light; mix all together, stirring as rapidly and as little as possible; drop the mixture on buttered tins, in rough spoonfuls, an inch apart.

GINGER CRACKERS. — 1 pt. of molasses; 1 cup of sugar; 6 oz. butter; a small piece of soda dissolved in a tablespoonful of sour cream; cloves and ginger to taste; flour enough to roll out thin and cut.

GRAHAM BISCUIT. — Take 1 qt. of water or milk; butter the size of 1 egg; 3 tablespoonfuls sugar; 2 of baker's yeast; a pinch of salt; enough white flour to use up the water, making it the consistency of batter cakes; add the rest of the ingredients, and as much Graham flour as can be stirred in with a spoon; set it away till morning; in the morning grease pan and flour hands; take a lump of dough the size of a large egg; roll lightly; let them rise 20 minutes, and bake in a tolerably hot oven.

GRAHAM CRACKERS. — ½ cup butter; ½ cup sugar; 4 eggs; 1 cup of fine white flour; ½ teaspoonful soda; enough Graham flour to roll out.

GRAHAM GEMS.—To 1 qt. Graham flour add ½ pt. fine white flour; enough milk or water, a little warm, to make a thick batter; no salt or baking powder; have the oven hotter than for biscuit; let gem-pans stand in the oven till you get ready; beat batter thoroughly; grease your pans; drop in while the irons are smoking hot; bake quickly a nice brown.

GRAHAM MUFFINS. — 1 egg; a little sugar; 1 pt. sour milk; 1 teaspoonful of soda; flour enough to thicken; bake in a quick oven; 2 or 3 spoonfuls of sour cream with the milk improves them.

GRAHAM PUFFS. — 1 egg; 1 pt. sweet milk; 1 pt. Graham flour; a pinch of salt; beat the egg thoroughly; add the milk; then the flour gradually; beat the whole mixture briskly with an egg-beater; pour into cast-iron gem-pans, well greased and piping hot; bake in a very hot oven.

HOMINY MUFFINS. — Take 2 cups of fine hominy, boiled and cold; beat it smooth; stir

in 3 cups of sour milk; ½ cup of melted butter; 2 teaspoonfuls of salt, and 2 tablespoonfuls of white sugar; add 3 eggs well beaten; 1 teaspoonful of soda dissolved in hot water; 1 large cup of flour; bake quickly.

LUNCHEON BUNS.—1 lb. of flour; 6 oz. butter; ¼ lb. of sugar; 1 egg; ¼ pt. of milk; 1 dessertspoonful of baking powder; 5 drops of essence of lemon; warm the butter without oiling it; beat with a wooden spoon; stir the flour in gradually with the sugar; mix the ingredients well together; make the milk lukewarm, beat it up with the yolk of the egg and the essence of lemon, and stir these into the mixture; add the baking powder; beat the dough well for about 10 minutes; divide it into 24 pieces; put them into buttered tins or cups; bake in a brisk oven from 20 to 30 minutes.

MADEIRA BUNS.—Butter, 8 oz.; 2 eggs; flour, 1 lb.; powdered sugar, 6 oz.; ½ nutmeg; powdered ginger and caraway seeds, of each, ½ teaspoonful; work well together; add as much milk as required; ferment; lastly, bake on tins in a quick oven.

MARYLAND BEAT BISCUIT. — Rub 1 tablespoonful each of butter and lard into 1 qt. of sifted flour; with 1 teaspoonful of salt; gradually add milk enough to make a stiff dough, mixing it with the hand.

MILK BISCUIT.—Mix 1 pt. of milk with 6 oz. of butter; ½ teacupful of pulverized sugar; 1 teaspoonful of salt; 1½ teacupfuls of yeast; flour enough to make a sponge; let it stand till perfectly light; knead it into a loaf; return to the tray till it rises again; then roll out the dough; cut it into small cakes, and let stand ½ hour; bake in quick oven ¼ hour; leave them in the pans till wanted for tea, to prevent the under crust hardening.

MOTHER'S MUFFINS.—1 pt. milk; ½ cup of yeast; flour for stiff batter; small quantity of salt; 1 egg; spoonful of lard; set to rise over night.

MUSH BISCUIT. — 1 qt. of milk or water; a piece of lard the size of an egg; 1 tablespoonful of salt; put on the fire; when boiling, add sufficient corn meal to make a rather stiff mush; when milk warm, add 1 cup of yeast and sufficient flour to make into dough; work well; in the morning make up into cakes; let rise about 15 or 20 minutes; then bake.

OATMEAL CRACKERS.—1 teacupful oatmeal and enough tepid water to wet and make into dough; mix well and quick; the harder the dough the better; if it can be rolled out with the rolling-pin, begin to roll, stopping to press the ragged edges with your fingers; keep at it in the same way till it is ⅛ or ¼ inch thick; be quick or it will get too dry under your hands; make only dough enough at one time for 1 cracker; do not brown it any in baking.

OATMEAL GEMS.—Take 1 cup of oatmeal and soak it over night in 1 cup of water; in the morning add 1 cup of sour milk, 1 teaspoonful of saleratus, 1 cup of flour, a little salt; bake in irons as other gems and muffins. If on first trial you find them moist and sticky, add a little more flour, as some flour thickens more than others.

PICNIC BUNS.—8 oz. butter; 14 oz. flour; 6 oz. sifted sugar; 2 eggs; ½ a nutmeg; teaspoonful sifted ginger; large spoonful of caraway seeds; beat the butter to a cream; add the eggs, well beaten; mix the other ingredients together and work them well into the butter; add a tablespoonful of flavoring essence; bake in tin patty pans, in a moderately hot oven.

POTATO CAKES.—Equal amounts of potatoes and flour and a small piece of butter or lard; rub thoroughly together; roll out and cut as for biscuits, not too thick; bake in a rather quick oven; when done to a light brown, cut open and butter; eat warm.

QUEEN MUFFINS.—1 qt. milk; ¾ of a cup of yeast; 2 tablespoonfuls white sugar; 1 tablespoonful of lard or butter; 1 of salt; flour to make a good batter; 2 eggs; set the batter without eggs; in the morning beat the eggs very light; stir to a batter; bake in muffin rings 20 minutes in a quick oven.

RAISED MUFFINS.—1 qt. of milk; a little salt; 2 spoonfuls yeast; 2 eggs; a piece of butter, the size of an egg, melted in the milk, warmed; make in the morning and raise until night, or vice versa; eggs to be put in just before cooking; flour; bake in rings in a spider over a slow fire; split and butter before sending to table.

RICE BISCUIT.—Mix together 3 lbs. of wheat flour and 1 lb. rice flour; put this in a pan; make a hole in the middle; rub in by degrees 1 lb. 10 oz. of loaf sugar; ½ lb. butter; make the whole into a dough; ¾ pt. milk with an egg or two, dissolving first in the milk 1 oz. of volatile salt; roll out the dough into a thin sheet; cut out the biscuits with a plain round cutter; rub milk over the tops; throw them into rice flour; put them on buttered tins, so as not to touch; bake in a moderately brisk oven.

RICE MUFFINS.—Boil rice soft and dry; take ½ cup rice; stir in 3 spoonfuls sugar, piece of butter size of an egg, and a little salt; 1 pt. sweet milk; 1 cup yeast; 2 qts. flour; let it rise all night; if sour in the morning, add a little soda dissolved in milk; bake in muffin rings.

ROCK BISCUIT.—6 eggs; 1 lb. of sifted sugar; ½ lb. of flour; a few currants; break the eggs into a basin; beat them well until very light; add the pounded sugar; when this is well mixed with the eggs gradually dredge in the flour, and add the currants; mix all well together; put the dough with a fork on the tins, making it look as rough as possible; bake the cakes in a moderate oven, from 20 minutes to ½ hour; when done allow them to get cool; store them away in a tin canister, in a dry place.

SAFFRON BUNS.—Make a sponge of best white flour, sweet baker's or brewer's yeast and warm sweetened milk, over night; simmer, according to quantity, saffron threads in new milk, sweetened to taste, till all the color is extracted; let it cool to blood heat; add ¼ lb. or ½ lb. of oiled butter; work up to a light spongy consistency with the yeast and flour; let it rise again; work on a warm board into small round buns; set them either in a tin with hollows for each or on a common baking tin; cover with warm cloths; let them rise again; bake in a moderately quick oven for 20 or 30 minutes; when half

baked wash over with warm milk and sprinkle with crystal sugar on top, if desired; enough saffron should be used to make the buns a deep yellow color when broken.

SALLIE'S BISCUIT.—3 good-sized potatoes boiled and mashed fine; 1 tablespoonful sugar; ½ pt. boiling water; when cool add 1 cup yeast, let it rise till light; then add 1 qt. water and flour to knead; knead ½ an hour; set it to rise light again before baking.

SALLY LUNN.—1 scant qt. flour; 4 eggs; 1 teacupful milk; 1 teacupful lard and butter mixed; 1 teaspoonful cream tartar; ½ teaspoonful soda, dissolved in hot water; 1 of salt; beat the eggs very light, yolks and whites separately; melt the shortening; sift the cream tartar into the flour; add the whites.

SCOTCH BISCUITS.—1 pt. soft yeast; 1 qt. lukewarm water; 1 teacupful of shortening, lard and butter; 2 teacupfuls of brown sugar; 1 lb. dry currants; 1 lb. raisins—cut in two; ¼ lb. citron; take 6 eggs, beat them and put in allspice, cloves and nutmeg, according to taste; mix sugar and butter first; add eggs and fruit; then add yeast, water and flour; mold out into 3 long loaves; set to rise about 4 hours; bake in an ordinary heated oven about 1 hour.

SEED BUNS.—2 lbs. of flour; 8 oz. of dripping; 6 oz. sugar; 1 oz. caraway seeds; 1½ teaspoonfuls of yeast; as these should rise quickly, mix as for other yeast cakes; when risen, roll out very lightly on a well floured board; cut with a tumbler; bake quickly in a hot oven.

SNOWFLAKE BISCUIT.—Rub butter the size of an egg into a quart of flour; sift a teaspoonful of salt and 2 teaspoonfuls of sea-foam through the flour; whip 2 cups of milk for a minute with a cupful of new-fallen snow; stir it into the flour; let the dough be as soft as you can handle; roll out thin; cut out with a small cake cutter; bake in a quick oven.

SODA BISCUIT.—½ cup of shortening rubbed in the flour; 1 pt. of sour milk; 1 even teaspoonful of soda and half as much salt; mix very soft and bake in a quick oven.

SODA CRACKERS.—5 small cups of flour; 2 small cups of corn-starch; two teaspoonfuls of salt; 5 teaspoonfuls of cream tartar; pass through the sieve 3 times; chop 2 tablespoonfuls of firm lard in the flour; dissolve 2 scant teaspoonfuls of soda in 2 tablespoonfuls of warm water; add about a pint of milk; stir into the flour and mix to a smooth dough; roll out thin; cut into squares; rub the surface with sweet milk; bake in a very moderate oven; do not brown.

SPANISH BUNS.—1 pt. of flour; 1 pt. sugar; 1 cup sweet milk; 1 cup butter; 4 eggs, beat separately; 1 tablespoon cinnamon; 1 teaspoon cloves; 1 teaspoon soda; 2 teaspoons cream tartar, or 3 spoons baking powder; bake on tins when taken from the oven; sprinkle with white sugar while hot.

SPONGE BISCUIT.—Stir into a pint of lukewarm milk ½ teacup of melted butter, 1 teaspoonful of salt, ½ teacup of family, or 1 tablespoonful of brewer's yeast; add flour till it is a very stiff batter; when light, drop this mixture by the large spoonful on to flat buttered tins, several inches apart; let them remain a few minutes before baking; bake them in quick oven till they are a light brown.

SWEET BISCUIT.—Rub 4 oz. of butter into 8 oz. of flour; add 6 oz. of ground loaf sugar; the yolks of 2 eggs, the white of 1; roll the paste thin; cut it with a wineglass or cutter; egg over the top of each with the remaining white; sift on sugar; bake in a moderate oven.

TEA BISCUIT.—Soften ½ cupful of lard or butter in a bowl; add 1 qt. of flour with 2 full teaspoonfuls of baking powder sifted in it; mix into a middling light dough, with about ½ of a pint of milk with 1 teaspoonful of salt dissolved in it; when mixed turn out on the board; knead a little; roll in a sheet ½ in. thick; cut them out with a plain round cutter; place them close together in a quick oven and bake.

WASHINGTON BISCUIT.—1 lb. flour, the yolk of 1 egg, some milk; make into a stiff paste; knead till smooth; roll thin; cut into biscuits; bake in a slow oven till dry and crisp.

WHITE BISCUIT.—Put as much sweet milk into your stirring dish as you wish to use; scatter in white flour; stir at the same time as for mush, until as stiff as can be stirred with a spoon; knead until smooth; roll ½ in. in thickness; cut into small cakes; prick with a fork; bake in a quick oven.

WINE BISCUIT.—Rub into 1 lb. of dry flour 4 oz. butter, 4 oz. white powdered sugar, 1 egg, and 1 spoonful or 2 of cream to make it into a paste; when mixed, put currants into ½ and caraway into the rest; cut and bake in tins.

BREAD.

REMARKS.—The most nutritious bread is made from wheat flour; but there are many things necessary to the production of a really good loaf of bread, besides good flour. We must have good yeast, which has been kept at a proper temperature. We must arrest the first stage of fermentation at the right time, and remember to knead the loaf well. All of these precautions will be of no avail if the oven is not properly heated when the bread is first put in; and this heat must be maintained throughout the whole process of baking. Care should be taken to adapt the loaves to the size of the oven. The flour must be sifted before using. When taken out of the oven hot, never set flat on a table. Take it out of the tins and wrap in clean linen, and set on end till cool. If it has a thick hard crust, first wrap in a wet cloth, then a dry one over it, and let it sweat until it becomes soft. Hot bread is not very healthy, yet it is sometimes eaten. It should then be cut with a hot knife and laid on a napkin. It is well to remember that 14 lbs of American flour will make 21½ lbs. of bread, and thus save some waste of flour by a wrong calculation.

ÆRATED.—Divide 3 lbs. flour into two por-

tions; mix up the first with water holding in solution 2 oz. bicarbonate of soda; then mix the second portion of flour with water, to which 1 oz. of muriatic acid has been added; knead each mass of the dough thoroughly; when done, mix both portions together as rapidly and perfectly as possible; form the mass into loaves and bake immediately.

APPLE.—Prepare a dough exactly as if for rusks; when very light, roll out a cake about ½ in. thick; spread stewed apples over it, and over that place another cake of dough; put it into a pan to lighten for a short time; bake; have some thin slices of apples stewed very tender, and when the bread is baked lay these slices of apples all over the top; sprinkle well with sugar, some small bits of butter, and either nutmeg or cinnamon; put it back in the oven long enough for the sugar to form a coating on the top; take it out, and, when cold, slice it nicely for tea.

BOSTON BROWN. — Sift together ½ pt. of flour, 1 pt. corn meal, ½ pt. rye flour, 1 teaspoonful salt, 1 tablespoonful brown sugar, 2 teaspoonfuls baking powder; peel, wash, and boil 2 mealy potatoes; rub them through the sieve, diluting with ½ pt. of water; when quite cold, use it to make a batter and pour it into a well-greased mold, having a cover; place it in a saucepan of boiling water; simmer 1 hour without the water getting into it; take it out of the water; remove the cover, and bake about 30 minutes.

BREAD. TO MAKE.—To 1 qt. of milk or water, put ⅛ of a teacupful of yeast; add flour to the thickness of batter, and let it rise over night; then add flour enough to knead softly until it will not cling to the board; let it rise in the pan; make into small loaves; let it rise again; bake in a moderate oven; be sure not to let it stand in the oven after it is done.

BROWN.—1. 1 qt. of rye; 2 qts. of Indian meal, scalded; ½ teacup of molasses; 2 teaspoonfuls of salt; 1 teaspoonful of saleratus; 1 teacup of home-brewed yeast, or half as much distillery yeast; make it as stiff as can be stirred with a spoon with warm water; let it raise from night till morning; put it in a large, deep pan, and smooth the top with the hand dipped in cold water; let it stand awhile; bake 5 or 6 hours. —2. Set a sponge with wheat flour; after the sponge has raised well, mix the dough with rye flour; work well; after the dough has raised well mold it into loaves, and raise again; bake on an oven bottom; when almost done take the loaves out of the oven; wash them on top with a little brown sugar and water; then set them back to finish baking.

BUCKWHEAT MEAL.—To 2 qts. of sifted buckwheat meal, add hot water enough to wet the same; when cool, add 1 teaspoonful or more of salt, ½ pt. of yeast, and ½ teaspoonful of molasses; then add wheat flour enough to make into loaves; knead well; when risen light, bake or steam 3 or more hours. If this should get sour while rising, add 1 teaspoonful of sugar and a little saleratus, dissolved in water.

BUTTERMILK.—2 qts. of buttermilk, come to a boil; pour over 2 qts. of flour; stir rapidly; add cold water until it is as thin as it can be stirred; if not cool enough for the yeast by this time, set in a water pail, stirring it all the while; stir in the yeast which is already soaked; empty all in the bread-pan, where the flour is already warmed, with a hole in the middle; cover it tight; set it where it will keep warm all night.

COCOANUT. — To 1½ pts. of Graham flour and 3 tablespoonfuls of cocoanut, add ½ pt. of cold water; mix well; knead on a board until little flour is left on it; make into rolls; bake from 30 to 40 minutes in a moderate oven; when quite cold cut and serve in thin slices.

CORN.—1. Take 1 pt. corn meal; ½ pt. wheat flour; 1 tablespoonful butter; 1 teaspoon of sugar; ½ teaspoonful of cream of tartar; 1 pt. of milk; 2 eggs; stir well together; bake ½ hour. —2. Mix 2 qts. of new corn meal with 3 pts. of warm water; add 1 tablespoonful of salt, 2 tablespoonfuls of sugar, and 1 large tablespoonful of hop yeast; let it stand in a warm place 5 hours to rise; add 1½ teacupfuls of wheat flour and ½ pt. of warm water; let it rise again 1½ hours; pour into a pan well greased with sweet lard, and let it rise a few minutes; bake in a moderately hot oven 1½ hours.

CORN ROLLS.—1 qt. of milk; 1 pt. of wheat flour; ½ pt. of corn meal; 1 oz. of butter; 1 teaspoonful of salt; 1 teaspoonful of soda dissolved in 2 teaspoonfuls of the milk; 2 teaspoonfuls of cream of tartar sifted with the flour; 2 eggs, the whites beaten stiff; scald 1 pt. of milk over boiling water; add the butter, salt, and the meal; mix smooth in a little of the cold milk; stir and let it cook until like thick mush; stir in the cold milk and the yolks of the eggs well beaten; then the flour, soda, and the whites of the eggs gently; bake in gem-pans in a quick oven.

CORN STARCH.—Set a sponge in the usual manner with flour; let it rise; add sufficient water to make the amount of dough required; add a pinch of salt; make the dough the required stiffness by adding equal quantities of flour and corn starch; proceed in all respects as for ordinary bread.

CRUSHED WHEAT ROLLS. — Work Graham flour into cold crushed wheat mush, so soft that you can barely roll it out 1 in. thick; do not knead it much; cut it into small shapes with a knife; bake quickly in a hot oven.

FRENCH.—Put 1 pt. of milk into 3 qts. of water; in winter, let it be scalding hot, but in summer little more than milk warm; put in sufficient salt; take 1½ pts. of good ale yeast, free from bitterness; lay it in 1 gal. of water the night before; pour off the yeast into the milk and water; then break in rather more than ¼ lb. of butter; work it well till dissolved; beat up 2 eggs in a basin; stir them in; mix about 1½ pecks of flour with the liquor; in winter make the dough pretty stiff, but more slack in summer; mix well, and the less it is worked the better; stir the liquor into flour as for pie crust, and after the dough is made over cover it with a cloth; let it rise while the oven is heating; when the rolls or loaves have lain in a quick oven about ¼ hour, turn them on the

other side for ¼ hour longer; take them out and chip them with a knife, which will make them look spongy and of a fine yellow.

FRENCH ROLLS.—1 lb. of flour, 2 ozs. of butter; the whites of 3 eggs well beaten; rub these together; add a tablespoonful of good yeast; a little salt; milk enough to make a stiff dough; cover; set in a warm place till light, which will be an hour or more, according to the strength of the yeast; cut into rolls; dip the edges into melted butter to keep them from sticking together; bake in a quick oven.

GERMAN YEAST.—Time, 1½ to 2 hours. 1 lb. flour; 1 tablespoonful of salt; 2 oz. of dried German yeast; 1 cupful of water; 1½ pts. of warm water; dissolve the yeast in a small cupful of cold water; add to it 1½ pts. of warm water; put the flour, mixed with the salt, into a broad, deep pan; make a hole in the middle of the flour, and pour in the water and yeast; knead it up quickly; let it stand near the fire; cover over with a thick cloth for 1 hour; then divide into loaves; bake accordi g to their size.

GRAHAM.—Make a sponge as for white bread with wheat flour, 1 square of compressed yeast to 2 qts. of water; when light, make up the dough with Graham flour and ½ teacupful of molasses; let stand to rise again; make up the loaves with the hands; when light, bake.

HOE CAKE.—Scald 1 qt. of corn meal with just hot water enough to make a thick batter; stir in 2 large spoonfuls of good butter; beat this a little; add ½ teaspoonful of salt; bake in buttered pans ¾ hour; serve hot.

HOMINY.—A large cup of cold boiled rice or hominy; as much Indian corn meal; the same of flour and milk, to make thick batter; beat in 3 eggs; 1 teaspoonful of salt and 1 dessertspoonful of sugar; stir in 1 tablespoonful of butter melted; bake in a shallow tin pan in a hot oven; cut it out in squares, and serve hot on a napkin.

HOUSEHOLD.—Remove the flake-bran from flour, 14 lbs.; boil the bran in 1 gal. of water until reduced to 7 pts.; strain, cool, and knead in the flour; add salt and yeast as for other bread.

LEAVENED.—Use leaven instead of yeast, and proceed in the same way; 1 lb. to each 32 lbs. of flour,

MILK YEAST.—Take 1 cupful of milk; add hot water to warm the milk; mix sifted flour to make a thin sponge; let stand over night in a warm place; in the morning add ½ cupful of butter, and flour to sufficiently stiffen for bread; knead thoroughly; fill pans ½ full; in a warm place allow the loaves to rise to the top of the pans; bake in a steady oven, not too hot, 1 hour.

NAPLES.—1 lb. of flour; rub into it 1 oz. of fresh butter, 1 egg, 2 spoonfuls of good yeast, a little salt, ½ pt. of milk; mix all well; let it rise 1 hour; do not work it down, but cut it in pieces the size of your thumb; bake on tins in a quick oven.

POCKET BOOKS.—A lump of dough about as large as a quart bowl; 2 eggs beaten light; 1 tablespoonful of lard, and flour enough to make it as stiff as the dough; work it well; about an hour before baking spread it out thin on the bread-board and sprinkle on a very little soda and a dessertspoonful of white sugar; work well again; roll out thin, and grease the surface with butter; cut them out a little larger than biscuits and double over; put in pans and let them rise again; bake quickly.

POTATO.—Boil 8 large potatoes in salted water; when soft, peel off their skins and mash them thoroughly, either on the molding or the bread-board, with a rolling-pin, or put in the pot over the fire, in which they were boiled, and mash fine with a potato-masher; put the potatoes into the pan; add enough Graham or wheat flour to make it into a thick dough; turn in a cupful of hot water or milk; when cool enough, stir in a cupful of home-made yeast, or 3 tablespoonfuls of baker's yeast; add a teaspoonful of salt and set in a warm place to rise; when risen, knead the whole mass thoroughly; when it has risen again very lightly, knead only enough to put into well-greased pans; let it rise 20 minutes; bake in a moderately hot oven.

POTATO ROLLS.—Boil 4 good sized potatoes with their skins on; squeeze them in a towel to have them dry and mealy; then remove the skin and mash them perfectly smooth with a spoonful of butter and a little salt; beat the yolks of 3 eggs; stir into the potatoes; then add 1½ pts. milk, and a large spoonful of yeast; beat in the flour until it is a stiff dough; set to rise, and when risen, bake in a quick oven.

PULLED.—Take from the oven an ordinary loaf of bread when it is about half baked; with the fingers, while it is yet hot, pull it apart in egg-sized pieces of irregular shape; throw them upon tins; bake them in a slow oven to a rich brown color.

RICE.—Boil ½ lb. of rice in 3 pts. of water till the whole becomes thick and pulpy; with this and yeast, and 6 lbs. of flour, make your dough.

RUSKS.—In cold weather, to make up 2½ qts. of flour, mix into a paste with 1 pt. of boiling water; 2 tablespoonfuls of sugar; 3 of flour; and 2 large Irish potatoes boiled and mashed smooth; in the evening make up dough with this sponge; add 3 well-beaten eggs; ¾ lb. sugar; ½ pt. fresh milk; set it away in a covered vessel, leaving plenty of room to swell; next morning work into the risen dough, which should not be stiff, ½ lb. of butter and lard mixed; make into rolls or biscuits; let the dough rise for the second time; flavor with 2 grated nutmegs or ½ oz. of pounded stick cinnamon; when very light, bake in a quick, steady oven till of a pretty brown color; glaze with the yolk of an egg, and sprinkle with powdered white sugar.

SALT RISING.—Take 2 or 3 pts. of new milk; stir in flour until it is of sufficient thickness; set in a dish containing water nearly as hot as you can bear your hand in; keep it as near the same temperature as possible; in 6 or 7 hours it will be up, unless the flour is too fine; if it is, add a little Graham or corn meal; have your flour and some warm milk ready; put in the sponge and as much of the milk as is necessary to make the dough sufficiently thin; make in loaves and set

in a warm place to rise; when sufficiently light, bake, and you will have as good and light bread as you ever tasted.

SWEET POTATO PONE.—Take 12 or 15 nice sweet potatoes; boil until well done; peel, mash and rub through a sieve to get out all strings or tough fibres; add sugar to taste; ½ doz. eggs; butter to make it very rich; ground cloves, nutmeg and sweet milk enough to make it the consistency of custard; pour the mixture in a buttered pan, and bake.

TEA ROLLS.—To 1 qt. of flour take 1 tablespoonful of lard; 1 cup of milk; 1 teaspoonful of salt; 4 even teaspoonfuls of good baking powder; rub the lard into the flour in which the baking powder has been sifted, together with the salt; add the milk; mix lightly; roll out and cut with a large round mold; turn 1 half over to the other; glaze with milk and bake in a mediumly hot oven for 20 minutes.

UNFERMENTED.—To each lb. of flour add, separately, 1½ dr. of bicarbonate of soda, and 1 dr. of tartaric acid (both perfectly dry, and in very fine powder); rub them well together with the hands until thoroughly incorporated; form the whole into a dough with water, as quickly as possible, and at once bake in a quick oven. About 8 or 9 oz. of water are required for every lb. of flour.

VIENNA.—2 lbs. sifted flour banked around pan; ½ pt. milk; ½ pt. water; mix a thin batter; quickly add ½ pt. milk, in which has been dissolved ½ oz. salt and ½ oz. compressed yeast; leave remainder of flour against side of pan; cover and keep free from air 45 minutes; mix in rest of the flour until dough leaves side and bottom of pan; let stand for 2½ hours; divide into 1 lb. pieces; subdivide into 12 pieces; fold corner of each piece to centre; turn over to rise for 30 min.; put in hot oven; bake in 20 min.

VIENNA ROLLS.—Have ready in a bowl 1 tablespoonful of butter or lard; make it soft by warming a little and stirring around with a spoon; take 1 qt. unsifted flour; add to it 2 heaping tablespoonfuls baking powder; mix and sift them thoroughly together; place in the bowl with the butter; take more or less sweet milk, to form a dough of usual stiffness, according to the flour; put into the milk ½ teaspoonful salt; stir it into the flour, etc., with a spoon; turn out on a board and knead sufficiently to make smooth; roll out ½ in. thick and cut with a large round cutter; fold each one over to form a half-round, wetting a little between the folds to make them stick together; place them on buttered pans so as not to touch; wash them on top with milk to give them a gloss; then bake immediately in a hot oven about 20 min.

WATER RISING.—Take 1 qt. pitcher and a spoon; scald them; fill the pitcher ½ full of boiling water; cool to the temperature of good hot dish water; stir in flour to make a batter as thick as flour pancakes; ½ teaspoonful of salt and as much soda; cover closely; set where it will keep quite warm; stir occasionally; it will raise in 5 or 6 hours.

YEAST.—1. Pare and boil 1 doz. mealy potatoes; boil 30 minutes; when boiling, put in another kettle 1 handful of loose hops or 2 tablespoonfuls of pressed hops, and 3 qts. cold water; cover and let boil; when the potatoes are cooked, drain off all the water and mash very fine; strain the boiling hop water into the mashed potatoes; stir well and add ½ cup of sugar, ½ cup of salt, and 1 pt. of flour; when the salt, sugar and flour are mixed, stir well and strain through a colander; let it stand until blood warm; stir in 1 cup or cake of yeast; set to rise in a temperature of 75°; keep in a stone jar or pot with a tight cover, which should be firmly fastened.—2. Take 12 common sized potatoes; boil soft and mash hot; pour over 1 pt. boiling water; add 1 pt. cold water; strain through a colander; add 1 teacup sugar, 1 tablespoon salt; when cool add 1 teacup baker's yeast; set in a warm place; allow it to rise light several times and beat down; place in a glass jar, cover tightly, and set in a cool place. ½ a teacupful of this is sufficient for 2 ordinary sized loaves of bread.—3. Take 3 handfuls of peach leaves and 3 medium-sized potatoes; boil them in 2 qts. of water until the potatoes are done; take out the leaves and throw them away; peel the potatoes; rub them up with 1 pint of flour, adding cool water sufficient to make a paste; pour on the hot peach leaf tea and scald for about 5 minutes. If you add to this a little old yeast, it will be ready for use in 3 hours; if you add none, it will require to stand a day and a night before use.—4. To a pint of new milk put 1 teaspoonful of salt on a large spoonful of flour; stir well and keep it lukewarm by the fire; in an hour it will be fit for use. Twice as much must be used as of common yeast. If sour, put in saleratus—a teaspoonful to 1 pt. of yeast, when ready for use. If it foams up lively, it will raise the bread; if not, throw it away.—5 (*Vienna.*) Powder and mix Indian corn, barley and rye; then macerate in hot water; rack off the liquor and allow it to clear, when saccharification takes place; add a minute quantity of ordinary yeast; remove the scum which rises and compress in a hydraulic press, when drained.

CAKES.

ADJUNCTS TO CAKE MAKING.—Get every article ready previously to its being wanted, and place before the fire, that it may become gently heated. Have a good sized bowl, a strong wooden spoon, a good egg beater, fine sifted flour, fresh eggs, the sweetest of butter, powdered sugar, and flavoring. A wooden spoon is useless without an untiring arm to wield it; and the finest of flour, the best of butter, the freshest of eggs will avail nothing unless properly mixed. Thoroughly dry and warm the flour; wash currants in a hair sieve; wipe dry in a cloth; then set before the fire; before using them, dust them over with a little flour. Rub the sugar to a fine powder and pass through the sieve. Beat the eggs well in a basin. The butter should be perfectly sweet and free from buttermilk. Beat the butter and sugar thoroughly

together. To melt the butter, place it in a basin set in hot water. If sour milk or buttermilk is used in making cake, place it in the oven as soon as put together, unless, like hard ginger-bread or cookies, it needs to be rolled out or molded. In that case it is not injured if it stands for some hours. If soda and cream of tartar are used, sift the latter with the flour. The soda should be dissolved in cool water or milk. After buttering the cake tins scatter a little flour over them, and the cake will not stick to the tin. If the oven is likely to bake hard at the bottom, put a paper in the bottom of the tin. Butter it well first.


Egg Beater.

ABERFRAW.—$\frac{3}{4}$ lb. of butter; $\frac{1}{4}$ lb. of loaf sugar; 1 lb. flour; add the butter by degrees and work with the hand; roll out and cut with a glass.

ALMOND.—1 lb. of butter; 1 lb. of sugar; 1 lb. flour; 2 lbs. of sweet almonds blanched and pounded; $\frac{1}{2}$ lb. desiccated cocoanut; the juice and grated rind of 1 large lemon; 10 well beaten eggs; 1 gill of wine or brandy.—2. 1 lb. of ground almonds; add 2 lbs. of powdered sugar; the whites of 9 eggs; beat the mixture well with a wooden spoon for 10 minutes; lay it out upon wafer-paper, in oven shapes, with a tablespoon; bake them in a slow oven; when done, break off all the paper but what sticks to the bottom of the cakes.

ALMOND COOKIES.—2 lbs. of butter; 3 lbs. of sugar; 1 lb. of almonds blanched and chopped, cut in halves or pounded; 2 teaspoonfuls of cinnamon; 1 teaspoonful saleratus; 1 cup of boiling water; 1 lemon; 1 doz. eggs; knead the flour enough to make the dough as stiff as cooky dough should be; roll and cut in fancy shapes, and after they are in the tins sprinkle the almonds thickly over them.

ALMOND DROPS.—Take 9 oz. flour; 6 oz. sugar; $\frac{1}{2}$ lb. butter; 4 eggs; 2 teaspoonfuls of baking powder; stir butter and sugar first; rub the powder into the flour; add the rest; pour into square tin pans, filling them about $\frac{1}{2}$ in.; strew cinnamon, sugar and sliced almonds over it; scald the almonds first; bake a light brown, and when done, cut into squares.

ALMOND SPONGE.—10 eggs; 1 lb. of sugar; $\frac{1}{2}$ lb. of flour; a few drops of lemon; when ingredients are well beaten, add $\frac{1}{2}$ lb. sweet almonds, blanched and pounded in a white mortar or stout bowl. (To blanch pour boiling water upon them.) Add a little peach extract, and bake in a brisk oven.

AMMONIA.—1 cupful butter; 2 of sugar; 3 of flour; $\frac{1}{2}$ pt. of cream, a piece of ammonia the size of a small hickory nut; 1 lb. of fruit; 3 eggs, reserving the white of 1. This cake should not be cut for 2 weeks.

ANGEL FOOD.—Beat the whites of 11 eggs to a stiff froth; sift into these, a little at a time, 10 oz. powdered sugar; mix carefully and lightly; sift 5 oz. of flour 4 times; add a level teaspoonful of cream of tartar to the flour; sift again; then sift it into the eggs and sugar, a little at a time; mix carefully and lightly; when all the flour is used, add a teaspoonful of vanilla essence to the cake; put it into a new cake pan without buttering or lining the latter; bake in a moderate oven about $\frac{3}{4}$ of an hour, testing the cake with a broom straw; let the cake cool gradually at the mouth of the oven with the door open; when cold, loosen around the edges and turn out.

ANISEED.—1 lb. 2 oz. of powdered sugar; 1 lb. of flour; 5 eggs; 2 oz. aniseed; beat up the sugar and 3 eggs in a bowl; add the other 2 eggs; after being well beaten, mix in half the flour and aniseed; take it out of the bowl and mix it on the table with the rest of the flour; have a wooden mold with figures on it, cut in to the depth of an inch; press the mixture in it and cut off all that rises over the mold; cut each figure separate and place them on a waxed cake-pan; let them dry in a warm room for 4 or 5 hours; cook in a slow oven.

APPLE FRUIT.—Soak 2 cups dried apples over night; in the morning drain and chop fine in a chopping-bowl; add 1 cup of molasses; let it boil slowly on back of stove 3 or 4 hours, until the molasses has thickened; let it cool; add 1½ cups of brown sugar, 1 cup of sour milk, 1 teaspoonful each of cloves, allspice and cinnamon, 1 teaspoonful soda, 3 eggs, 3½ cups of flour; add raisins and currants, if desired; stir the flour well in the last thing; bake in 2 square tins or 1 large 5 qt. basin; if in the latter, bake slowly 2½ hours.

APPLE SHORT-CAKE.—1. Fill a square breadtin $\frac{3}{4}$ full of sliced sour apples; make a thick batter of $\frac{1}{2}$ cupful of sour cream, $\frac{1}{2}$ cupful of buttermilk, 1 teaspoonful of saleratus, a little salt and flour to make quite stiff—a little stiffer than cake; turn this over the apples; bake 40 minutes; serve with sauce, or cream and sugar flavored with nutmeg.—2. Season apple sauce with butter, sugar, and nutmeg; make a nice shortcake; open, butter and spread with applesauce; serve with sweetened cream.

AUSTIN.—3 cups sugar; 1 cup butter; 5 cups flour; 1½ cups milk or water; 1½ cups chopped raisins; 2 eggs; 2 tablespoonfuls molasses; 1 teaspoonful soda dissolved in water; salt and spice.

BACHELOR'S BUTTON.—Rub 2 oz. of butter into 5 oz. of flour; add 5 oz. of white sugar; beat 1 egg with ½ the sugar; put into the other ingredients; add almond flavoring according to taste; roll them in the hand about the size of a large nut; sprinkle them with lump sugar; place them on tins, with buttered paper; bake lightly.

BANBURY.—Mix well together 1 lb. of currants; ¼ lb. finely minced kidney suet; 2 oz. each of candied orange and citron shred small; a few grains of salt; a full ½ oz. of powdered cinnamon and nutmeg; 4 oz. of macaroons, or sponge-cake, reduced to powder and moistened with a tablespoonful of milk; make a paste of $\frac{3}{4}$ lb. of butter to 1 lb. of flour; mold very smooth; roll out into thin squares; spread the mixture upon one; cover with a second; mark with the back of a knife in regular divisions;

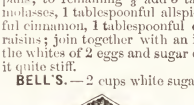
bake very light brown; sift sugar over them.

BANNOCK. — Into 1 pt. of Indian meal stir 1 pt. of buttermilk; ½ teaspoonful of salt; 1 teaspoonful of molasses; 1 of butter; and add 2 well-beaten eggs; 1 pt. of wheat flour; thin with milk to a thin batter; last, stir in 2 large teaspoonfuls of soda dissolved in hot water; pour into buttered shallow pans; bake 1 hour in a quick oven which bakes top and bottom brown.

BATH.—Mix well together 1 lb. of flour; ½ lb. of butter; 5 eggs and a cupful of yeast; set the whole before the fire to rise; after it rises, add ½ lb. white sugar; 1 oz. caraway seeds well mixed in; roll the paste into little cakes; bake on tins.

BEEFSTEAK.—2 cupfuls sugar; ½ cupful butter; 1 cupful milk; 3½ cupfuls sifted flour; 3 eggs; 1 teaspoonful soda; 2 teaspoonfuls cream of tartar; divide into 3 equal parts; put ⅔ in 2 pans; to remaining ⅓ add 3 tablespoonfuls of molasses, 1 tablespoonful allspice, 1 tablespoonful cinnamon, 1 tablespoonful cloves, 1 cupful raisins; join together with an icing made with the whites of 2 eggs and sugar enough to make it quite stiff.

BELL'S.—2 cups white sugar; ½ lb. butter; 5 eggs; 3 cups flour; 1 teacup sweet milk; 2 teaspoons baking powder; 2 teaspoons vanilla; 1 lb. currants; ½ lb. citron; bake 2 hrs. in a slow oven; beat the butter and sugar together; then add the other ingredients; bake in small cake-pans of different shapes.



Diamond Cake Cutter.

BLACK.— 3 cupfuls of butter; 1 qt. of sugar; 3 pts. of flour; ½ pt. of molasses; ½ pt. of brandy; ½ pt. of wine; 1 teaspoonful of saleratus; 1 oz. each of all kinds of spices; 12 eggs, 3 lbs. of raisins; 2 of currants; ½ lb. of citron; bake in deep pans, in a moderate oven, between 3 and 4 hours; this is one of the best rich cakes.

BLACK CHOCOLATE.—1 cup butter; 2 cups sugar; 2½ cups flour; 5 eggs; 1 cup sour milk; 1 teaspoon soda, dissolved in a little boiling water; ½ cake Baker's chocolate, grated and put in the cake before stirring in the flour; bake in jelly tins in 4 layers. *Filling*: 1 lb. white sugar wet with a little cold water; add the whites of 3 eggs slightly beaten; ½ cake grated chocolate; cook in boiling water until it thickens; flavor with vanilla; spread between the layers and out-side the cake; sprinkle grated cocoanut over the top.

BOSTON.—1 cup of sugar; 1 cup of milk; 1 teaspoonful of butter; 1 egg; 2½ cups of flour; 2 teaspoonfuls of cream tartar; 1 teaspoonful of soda; flavor with nutmeg or lemon.

BOSTON COOKIES. — 2 cups sugar; 1 cup butter; 1 cup milk; 1 egg, and the yolk of another; ⅓ teaspoonful of saleratus, and 1 teaspoonful of cream tartar; mix stiff; roll thin; rub the white of 1 egg on the top; sprinkle on a little sugar.

BREAKFAST.—1½ cups of light bread dough; 2 ditto of white sugar; ½ teacup butter; 3 eggs; ½ teaspoon soda; 1 teacup stoned raisins; cloves, cinnamon or nutmeg to taste; rub the raisins in flour; stir the butter with the hand; if not thick enough, add a small bit of flour; put a layer of the batter in deep scalloped or plain cake pan; then a layer of raisins; and so on, until all the batter is in the dish; place in a warm place for 2 hours; then bake.

Scalloped Cake Pan.

BRIDAL SPONGE.—12 eggs; their weight in granulated sugar and the same of flour; beat the yolks of the eggs, and the sugar well together; beat the whites to a stiff froth; sift the flour very lightly; add a teaspoonful of the beaten white of egg and 1 of flour alternately till all is used; add the grated rind and juice of a lemon; put a well greased paper in a tin baking pan; bake the cake in a very hot oven; if it is getting too brown on top, cover with a piece of letter paper.

BRIDE'S.—1. Wash 2½ lbs. of fresh butter in plain water first, then in rose water; beat the butter to a cream; beat 20 eggs, yolks and whites separately, for 30 minutes; have ready 2½ lbs. of the finest flour, well dried and kept hot; 1½ lbs. of pounded sugar, sifted; 1 oz. of spice in fine powder; 3 lbs. of currants nicely cleaned and dry; ½ lb. of almonds, blanched; ¾ lbs. of sweetmeats, cut, not too thin; keep all by the fire; mix all the dry ingredients; pour the eggs strained into the butter; beat the whites of the eggs to a strong froth; mix ½ pt. sweet wine with the same quantity of brandy; pour it into the butter and eggs; mix well; put all the dry things in by degrees; beat very thoroughly; have ½ lb. of stone jar raisins chopped

Bride Cake.

as fine as possible; mix them carefully so that there shall be no lumps; add 1 teacupful of orange-flower water; beat the ingredients together a full hour at least; butter a hoop well; take a white paper, doubled and buttered; put in the pan round the edge; do not fill it more than 3 parts with batter, as space should be allowed for rising; bake in a quick oven 5 hours; cover it with icing, ornamenting it according to fancy. — 2 eggs; 1 lb. dark sugar; ¾ lb. butter; 1 lb. flour; 4 lbs. currants; 3 lbs. raisins; 2 tablespoonfuls mace; 2 nutmegs; 2 tablespoonfuls cinnamon; a little less of cloves; 1 lb. citron, cut in slices (pour ½ the brandy over it, and let it stand while making the cake); 1 gill of brandy; stir the butter and sugar well together; add the spices; then the yolks of the eggs well beaten; then a few of the currants (some floured, and some without flour); then a little flour, and a little of the whites of the eggs, and more fruit, more flour, more whites, fruit, and so on, until all are in; add ½ teaspoonful soda and ½ teaspoonful cream tartar, dissolved in 1 tablespoonful milk; let it foam; mix well together with the hand; add a teacupful of darkest molasses and a little vanilla, or a castor bean, which is better; put it in the pan in layers and pack it hard; bake 3 or 4 hours; it is to be covered with icing and ornamented with appropriate devices.

BRIOCHE. — Beat ½ lb. butter until it is in a cream; take 3 eggs and beat until light; mix thoroughly with the butter; add to this ½ lb. sifted flour; mix 1 small cake compressed yeast; then a gill of water; set to rise over night in a warm place; put in a turban form, and bake in a quick oven.

BUN LOAF.—Take 5 lbs. of flour, and 5 teaspoonfuls of soda; mix well; add 1 lb. of raisins; 1 lb. currants; 2 oz. candied peel; 2 oz. citron; ½ lb. brown sugar; ½ lb. treacle; ½ lb. lard or butter; 2 teaspoonfuls allspice; when well mixed add as much fresh buttermilk as will make it the right consistency; bake slowly in deep tins.

BUTTERMILK COOKIES. — 1½ cupfuls of butter; ⅞ cupful buttermilk; 2 cupfuls of sugar; 1 teaspoonful each of saleratus and lemon extract.

CALIFORNIA.—2 cups sugar; 1 cup water; 1 cup butter; 3 cups flour; 2 eggs; 1 teaspoon cream of tartar; ½ teaspoon soda; spice to taste.

CARAMEL.—3 cups of sugar; 1½ cups of butter; 1 cup of milk; 4½ cups of flour; 5 eggs; 2 teaspoonfuls of baking powder; bake in layers. Then take and mix 1½ cups brown sugar; ½ cup of milk; 1 cup molasses; 1 teaspoonful of butter; 1 tablespoonful of flour; 2 tablespoonfuls of cold water; boil this 5 minutes; add a cake of Baker's chocolate (grated); boil until it is the consistency of custard; add a pinch of soda; stir well; remove from the fire; when cold flavor with vanilla; spread between the layers and on top of the cake; set it in a sunny window to dry.

CARAWAY. — Break 3 eggs into a bowl, which place in another containing boiling water; whisk with them ½ lb. of castor sugar for 15 minutes; while beating, gradually add boiling water to that in the outer bowl; when the batter is thick, mix in 6 oz. of fine flour; sift with a teaspoonful of baking powder and 2 oz. of butter dissolved, but not oiled; add ½ teaspoonful of caraway seeds, carefully picked and cleansed; put the cake in a buttered tin; bake from 30 to 40 minutes.

CARAWAY COOKIES. — 1 cup butter; 2 of white sugar; 3 eggs; ½ cup seeds; flour enough to make a stiff paste; roll it very thin with sugar instead of on the board; cut it in round shapes; bake about 15 minutes.

CENTENNIAL. — Rub 2 lbs. of dry fine flour with 1 of butter; mix it with 3 spoonfuls of yeast in a little warm milk and water; set it to rise 1½ hours before the fire; beat into it 2 lbs. of currants, 1 lb. of sugar sifted, 4 oz. of almonds, 6 oz. of stoned raisins, chopped fine, ½ nutmeg, cinnamon, allspice, and a few cloves, the peel of a lemon chopped as fine as possible, 12 yolks and whites of eggs; beat separately and long; beat well; butter the pan; bake in a quick oven.

CHILDREN'S.—1 pt. cup of white coffee sugar; 1 teacup of butter; 3 eggs; 1½ cups of sweet milk; ½ teaspoonful of soda dissolved in hot water; 1½ pts. of flour; season with ground mace and nutmeg.

CHOCOLATE. — Stir ½ lb. of pounded sugar and the yolks of 12 eggs well together; add a little lemon peel; stir in also ½ lb. of flour; beat the whites of the 12 eggs to snow and stir them in; fill a large squirt with this mass and make large dots on paper; bake slowly; then scoop out the lower part with a spoon, and fill with whipped cream mixed with sugar and vanilla: put 2 together to make a round ball; ice them with chocolate prepared thus: boil to every ¼ lb. of chocolate 3 oz. of fine white sugar, with a little water till it is a sufficient thickness; take it off the fire; stir it well till a skin rests at the top; when the cakes have been spread with this, put them into the oven for a few minutes to dry.

CHOCOLATE ECLAIRS.—Take the weight of 4 fresh eggs in sugar; half the weight in flour; mix with the latter ½ teaspoonful of cream of tartar and ¼ teaspoonful of soda very thoroughly; beat the yolks of the eggs until light;

Small Cake Pans.

add slowly the sugar, keeping it very light; alternate the beaten whites of the eggs with the flour; bake in pans having compartments, or in small cake pans; drop a spoonful of batter in each, or in a paper-lined and well-buttered pan, making the cakes as nearly of a size as possible; the oven should be quick; when done, take out; place 2 together, allow them to cool; cover with the chocolate.

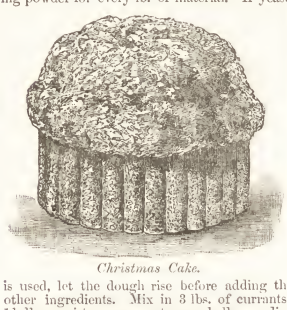
CHOCOLATE KISSES.—3 heaping tablespoonfuls of grated chocolate; 1 lb. of granulated sugar; the whites of 4 eggs; beat the eggs to a froth, not too stiff; add the sugar and chocolate; stir well together; flavor with 30 drops of vanilla; drop on buttered paper with a tea-

spoon; bake in a moderate oven for 10 minutes.

CHOCOLATE MACAROONS.—Put 3 oz. plain chocolate in a pan; melt on a slow fire; work it to a thick paste with 1 lb. of powdered sugar and the whites of 3 eggs; roll the mixture down to the thickness of about ¼ inch; cut in small round pieces with a paste cutter, either plain or scalloped; butter a pan slightly; dust it with flour and sugar in equal quantities; place in it the pieces of paste or mixture; bake in a hot but not quick oven.

CHOCOLATE MARBLE.—2 cups sugar; ½ cup butter; 1 cup sweet milk; 2½ cups flour; 2 eggs; 3 teaspoons baking powder; 1 teaspoon lemon extract; dissolve 2 blocks chocolate in a little boiling water; add ½ cup sugar and 1 teaspoon vanilla; to this add 2 tablespoons of cake and stir well; marble it through the cake; first a little of the white cake, then the chocolate, until the pan is full; bake slow and even.

CHRISTMAS.—Take 5 lbs. of flour; mix with it a dessertspoonful of salt; rub in ⅜ lb. of butter, and 1 lb. lard; put in 1½ oz. German yeast, or ½ pt. of good fresh brewer's yeast, and knead as for common bread; if there is any difficulty about the yeast, baking-powder may be used, allowing a heaped teaspoonful of ordinary baking powder for every lb. of material. If yeast



Christmas Cake.

is used, let the dough rise before adding the other ingredients. Mix in 3 lbs. of currants; 1½ lbs. moist sugar; nutmeg; ¼ lb. candied lemon peel finely minced; 1 tablespoonful of brandy, and 4 eggs well beaten; butter the tins, and line them well with buttered paper; bake in a moderate oven about 2 hours.

CHRISTMAS COOKIES.—4½ cups sugar; 1½ of butter; 1 of thick cream; 1 teaspoon of soda; 2 eggs; flavor with orange or lemon extract; powder with sugar, and put a few raisins in the centre.

CIDER FRUT.—8 cups of flour; 10 eggs; 6 cups of sugar; 3 cups butter; 2 cups milk, clabber preferred; 4 teaspoonfuls of cream of tartar; 2 teaspoonfuls soda; 2 lbs. seeded raisins; 2 lbs. French currants; ½ lb. thinly sliced citron; raisins scalded in ½ pt. of sweet cider; when cold sprinkle flour over them to prevent them from settling; cloves, allspice, cinnamon, and mace to taste; bake 4 hours.

CIDER SPICED.—½ cup butter; 1½ cups sugar; 1 cup cider; 1 egg; 2 teaspoonfuls of cinnamon; 2 of cloves; ½ nutmeg; 1 teaspoon soda; flour enough to make a stiff batter.

CINNAMON.—1 cup sour cream; 1 cup sugar; ½ cup melted butter; 1 egg; ½ teaspoon soda; mix as for cookies; roll out; spread ground cinnamon over the top; roll up as a roll jelly cake; slice off with a sharp knife and bake.

CITRON.—1 cup of butter; 2 of sugar; 3 of flour; 4 eggs; 1 cup of milk; 1 teaspoonful of soda; 2 of cream of tartar; a pinch of salt; make the cake; put in the pan; cut the citron thin, and put into the cake endways; push down until the batter covers the citron; this will prevent the citron from falling to the bottom of the pan.

COCOANUT.—2½ cups powdered sugar; 1 cup butter; 4 full cups prepared flour; whites of 7 eggs, whisked stiff; 1 small cup of milk, with a mere pinch of soda; 1 grated cocoanut; ½ teaspoonful nutmeg; the juice and ½ the grated peel of 1 lemon; cream, butter, and sugar; stir in the lemon and nutmeg; mix well; add the milk and whites and flour alternately; stir in the grated cocoanut swiftly and lightly; bake in 4 jelly-cake tins. *Filling*: 1 lb. sweet almonds; whites of 4 eggs, whisked stiff; 1 heaping cup powdered sugar; 2 teaspoonfuls rosewater; blanch the almonds; let them get cold and dry; pound in a Wedgewood mortar, adding rose-water as you go on; save about 2 doz. to shred for the top; stir the paste into the icing after it is made; spread between the cooled cakes; make that for the top a trifle thicker and lay it on heavily; when it has stiffened somewhat, stick the shred almonds closely over it; set in the oven to harden, but do not let it scorch.

COCOANUT COOKIES.—2 cups of sugar; 1 cup of butter; 2 eggs; ½ grated cocoanut; make just stiff enough to roll out; roll thin.

COCOANUT JUMBLES.—½ lb. cocoanut; ½ lb. sugar; whites of 2 eggs; 2 tablespoonfuls of flour; 2 tablespoonfuls of milk of cocoanut; grate the cocoanut; beat the eggs very light and mix all together; form into small cakes or pyramids; bake in a moderate oven.

COCOANUT POUND.—Beat ½ lb. of butter to a cream; add gradually 1 lb. of sifted flour; 1 lb. of powdered sugar; 2 teaspoonfuls of baking powder; a pinch of salt; 1 teaspoonful of grated lemon-peel; ¼ lb. of prepared cocoanut; 4 well-beaten eggs; 1 cupful of milk; mix thoroughly; butter the tins, and line them with buttered paper; pour the mixture in to the depth of 1½ in.; bake in a good oven. When baked take out, spread icing over them, and return the cake to the oven a moment to dry the icing.

COCOANUT PUFFS.—The whites of 3 eggs beaten very light; 1 small teacupful of fine white sugar; 1 tablespoonful of corn starch; when these ingredients are mixed, put the mixture into a custard saucepan or jug set in a pan of boiling water; stir constantly for 20 minutes; take it off the stove; add ½ lb. of desiccated or grated cocoanut; when well mixed drop in teaspoonfuls on buttered paper; bake in a

very slow oven, as they must not brown at all.

COFFEE.—Coffee, 1½ cups; 1½ cups sugar; ½ cup molasses; 1 cup of chopped raisins; 1 of currants; nearly 1 cup of butter; 1 teaspoon of soda; 1 nutmeg; a little citron, cinnamon, cloves, spices of any kind you have; stir together sugar, molasses, spices, fruit and butter, and pour on the coffee hot; add flour to make as stiff as fruit cake.

COFFEE LAYER.—Bake 2 sponge cakes and let them cool; take 2½ cups of milk; 1 egg; 4 tablespoonfuls of sugar; 2 cups of flour; boil until it thickens; flavor with very strong coffee; place between the cakes, and frost the top.

COLD WATER.—1 teacupful of sugar; piece of butter the size of an egg; ½ teaspoonful of cream of tartar in a coffeecupful of sifted flour; ½ teaspoonful of soda in ½ teacupful of water; whites of 2 eggs beaten to a stiff froth and put in last; flavor to taste.

COMPOSITION.—1¾ lbs. flour; 1½ of sugar; ¾ lb. of butter; 4 eggs; 1 pt. of good milk, or ½ pt. of cream; 1 lb. of fruit; ½ nutmeg; ½ teaspoonful of cinnamon; sift thoroughly with the flour 1 teaspoonful of soda and double that quantity of cream of tartar; rub the butter and sugar together; break in the eggs; work them in well; add the flour, a little at a time, till it is well stirred in; then the spices; then the fruit, having floured and dried it; stir 15 minutes; pour in pans; bake immediately.

COOKIES.—Mix ½ cup of butter and 1½ cups of sugar to a cream; flavor with lemon or vanilla; add the beaten yolks of 3 eggs; when well mixed, put in the 3 whites of the eggs, beaten to a standing froth; stir until very light; work in flour enough to make a very soft dough; flour the hands well; shape little pieces into cakes, patting them out thin; brush the tops with sugar dissolved in milk; place far enough apart to prevent their touching, and bake in a quick oven.

CORN STARCH.—1 cup butter worked to a cream, with 2 cups sugar, 1 cup milk, 2 cups flour, in which is sifted 1 large teaspoonful yeast powder; the whites only of 6 eggs beaten to a froth; mix all these well; then add 1 cup corn starch; beat well; bake in a moderate oven.

COTTAGE.—¾ of a cup of butter; 1 cup of white sugar; 1½ cups flour; 4 eggs—yolks and whites beaten separately; 1 tablespoonful of sweet milk; 1½ teaspoonfuls of baking powder; a lemon and a little salt; rub the baking powder into the flour.

CRANBERRY SHORT-CAKE.—½ cup butter; 1 cup sour milk; 1 teaspoonful soda; ½ teaspoonful salt; flour to make the consistency of biscuit; bake in a tin; split in half while warm and spread both pieces with butter; stew 1 qt. cranberries; sweeten; put between and on top of layers; eat with sugar and cream.

CREAM.—Sift ½ lb. flour into 3 oz. creamed butter; add an even teaspoonful baking powder, 2 tablespoonfuls powdered sugar, a pinch of salt, ½ teaspoonful of grated lemon peel, 1 cupful of cream that has turned a little, and a beaten egg; mix the batter; pour it into a buttered and papered tin; bake in a moderate oven.

CREAM COOKIES.—Stir together thoroughly 1 cup of sour cream and 1½ cups of white sugar; add a small teaspoonful of soda, dissolved in a little warm water; stir in immediately about a cup of flour; then add the white of 1 egg well beaten; mix in enough flour to roll easily; roll thin, as they will raise more than half; bake in a moderately hot oven, being careful to not brown them.

CREAM LAYER.—1 cup sugar; ⅔ cup sweet milk; 1 egg; 1 tablespoon butter; 2 scant cups flour; 2 teaspoons baking powder. *Filling:* ½ pt. sweet milk; 1 egg; 1 tablespoon corn starch; 2 tablespoons sugar; beat the egg, corn starch, and sugar together; stir into the milk while hot.

CREAM PUFFS.—Put 1 oz. of butter in 1 pt. water over the fire; when the water boils beat into it 4 oz. flour; let it cook 5 minutes; stir to prevent burning; remove from fire and beat into it 6 eggs, 1 at a time; when well beaten put upon a tin, well buttered and dusted with flour; use 1 tablespoonful of flour for each puff; brush the tops with a beaten egg; bake them brown; cool them; open one side and fill with cream. *Filling:* Mix together (cold) 2 oz. corn starch; 2 oz. powdered sugar, and the yolks of 2 eggs; stir in about 1 pt. of new milk; put over the fire; stir until it has boiled 5 minutes; flavor with vanilla; fill puffs when cold.

CREAM ROSE.—Whites of 10 eggs, beaten to standing froth; 1 cup of butter creamed with sugar; 3 cups powdered sugar; 1 small cup sweet cream; nearly 5 cups prepared flour; stir the cream (into which it is safe to put a pinch of soda) into the butter and sugar; beat until the mixture is like whipped cream; flavor with vanilla, and put in by turns the whites and the flour; color a fine pink with cochineal; bake in 4 jelly cake tins; when cold spread with *Filling:* 1½ cocoanuts pared and grated; whites of 4 eggs whisked stiff; 1½ cups powdered sugar; 2 teaspoonfuls best rose water. Instead of cochineal, use strawberry or currant juice in their season, making allowance for the thinning of your batter, by adding a little more flour. Strain the cochineal, if it is used, and stir in drop by drop.

CUP.—Mix 3 teacups of sugar with 1½ of butter; when white, beat 3 eggs; stir them into the butter and sugar, together with 3 teacups of sifted flour, and rosewater or essence of lemon to the taste; dissolve 1 teaspoonful of saleratus in 1 teacup of milk; strain it into the cake; add 3 more teacups of sifted flour; bake the cake immediately, either in cups or pans.

CURRANT.—2 lbs. of flour; 1 lb. butter; 1 lb. sugar; 2 oz. candied peel; ¾ lb. each of currants and sultanas; 3 eggs; 2 teaspoonfuls each of carbonate of soda and cream of tartar; sufficient milk to mix to a proper consistency; rub the butter and flour well together; add the currants, sultanas and sugar, and the peel finely cut; beat the eggs well; add the milk; beat into the mixture; mix the carbonate of soda and cream of tartar with a little milk; while effervescing pour into the cake; beat the whole for about 5 minutes; have ready a cake pan lined with greased paper; pour in the mixture; bake in a quick oven about 3 hours.

DANDY.—2 cups sugar; 3 cups flour; 1 cup milk; 3 eggs; 3 teaspoonfuls baking powder;

put this in 2 pans; save enough for another, in which put 3 tablespoonfuls of molasses, 1 teaspoonful cinnamon, 1 of cloves, 1 of allspice, and 1 handful of raisins; put this, when baked, between the other two with jelly or icing.

DATE.—2 cupfuls brown sugar; 1 cupful of molasses; 1 cupful of butter; 1 cupful of cider; 3 eggs; 1 teaspoonful each of cinnamon and cloves; a little nutmeg; 1 teaspoonful of soda; 1 lb. of dates stoned and chopped, and flour to mix pretty stiff.

DELICATE.—Stir to a cream 1 lb. of powdered white sugar and 7 oz. of butter; add the whites of 16 eggs beaten to a stiff froth, ½ nutmeg, or 1 teaspoonful of rosewater, or lemon; stir in gradually 1 lb. of sifted flour; bake the cake immediately; the yolks can be used for custards.

DRIPPING.—Mix well together 2 lbs. of flour, 1 pt. of warm milk and 1 tablespoonful of yeast; let it rise ½ hour; then add ½ lb. brown sugar, ¼ lb. currants and ¼ lb. of good, fresh beef dripping; beat the whole well for nearly ¼ hour; bake in a moderately hot oven.

DROP COOKIES.—Whites of 2 eggs; 1 large cup of milk; 1 cup of sugar; ½ cup of butter; 2 teaspoonfuls of baking powder; flavor with vanilla, rose, or nutmeg; flour enough for thick batter; beat thoroughly; drop in buttered pans; dust granulated sugar on top; bake with dispatch.

DROP GINGER.—1. 1 cupful of butter or lard; 1 cupful of white sugar; 1 pt. of molasses; 3 eggs; 1 cupful of hot water with 2 teaspoonfuls of soda dissolved in it; 1 tablespoonful of ginger; flour enough to make a tolerably stiff batter; drop with a spoon into a long pan.—2. 1 cup of molasses; ½ cup of butter; 1 cup of milk; 3 cups of flour; 2 teaspoonfuls of ginger; 1 of soda; drop with a spoon on a buttered pan.

DUTCH.—6 oz. butter and lard mixed; 4 eggs; ½ lb. of flour; ½ lb. of sugar; beat the butter and lard to a cream; mix it with the eggs; add the flour and sugar, both warmed, and a little nutmeg and cinnamon; when well beaten, add a spoonful of brandy; bake 1 full hour in a buttered mold in a quick oven.

DUTCH COOKIES.—½ lb. pulverized sugar; ½ lb. butter, worked until a cream; add 6 eggs; the yolks first, and the whites beaten to a froth; then enough flour, into which put 3 teaspoonfuls of baking powder, to make a dough; roll thin; cut with a biscuit cutter; beat 1 egg; spread on each cooky; strew sugar, cinnamon and sliced almonds over them; almonds must be previously scalded.

EGG.—2 cups of sugar; 1 egg; a piece of butter the size of a large egg; 1 cup of sour milk; 1 teaspoonful of soda; a little salt and nutmeg; 1 teaspoonful of lemon; 3 cups of flour; beat the white of an egg separately, the sugar and yolk and butter together; bake in a thoroughly heated oven.

EGGLESS.—1. 1 cup sugar; ½ cup butter; 1 cup buttermilk; 1 teaspoonful of soda; 1 teaspoonful of cream tartar; 3 cups of flour; bake in a moderate oven.—2. 1½ cups sour milk; ½ cup butter; 2 cups chopped raisins; 1 teaspoonful soda; spice to taste; flour enough to make a thick batter.

FIG LAYER.—2 cups of sugar; ½ cup of butter; 3 cups of flour; 1 cup of cold water; whites of 6 eggs; 3 teaspoonfuls of baking powder; bake in layers. *Filling:* One cup of raisins; 1 cup of figs; ½ cup of sugar; white of 1 egg; beat all together and put between the layers.

FROST.—Beat 2 lbs. butter and 3 lbs. sugar together until quite light; add 30 eggs, 10 at a time, beating after each addition; then a little extract lemon; add 3 lbs. flour; stir just enough to mix; put in flat, square pans, greased, and bake in a slow oven; when done, frost on the under side and mark in squares.

FRUIT.—4 cups of flour; 2 cups of sugar; 1 cup of butter; 6 eggs (whites and yolks separated); 1 cup of cold water; 1 coffeecupful of hickory-nut kernels; ½ lb. of raisins, seeded, chopped and dredged with flour; 1 teaspoonful of soda, dissolved in hot water; 2 tablespoonfuls of cream of tartar, sifted in the flour; 1 teaspoonful of mixed nutmeg and cinnamon; rub butter and sugar together to a smooth cream; put in the yolks; then the water, spice and soda; next the whites and flour; then the fruits and nuts, stirred together and dredged; mix thoroughly and bake in 2 loaves.

GALETTE.—A great favorite in France. Sift 1 lb. of the best flour; put it in a heap on the pastry board; make a hole in the middle; put into it a pinch of salt and one of sifted sugar, ¾ lb. butter, and 1 gill of water; knead the ingredients together; when they begin to mix sprinkle over by degrees ½ gill of water, continuing to knead with the palm of the hand; when the paste is smooth make it into a ball and let it lie for 1 hour; at the end of this time roll out the paste to thickness of ¼ in.; pinch the edges; put the cake on a baking sheet; brush over the top with yolk of egg; score it in the form of diamonds; bake in quick oven for ½ hour, or until the galette is elastic to pressure of the finger.

GERMAN COFFEE.—2 heaping coffeecups of bread dough; 4 heaping tablespoonfuls of sugar; ½ cup of butter and drippings (equal parts of each); mix all well together; add 1 large handful of flour; mix well again; set it aside to rise; when sufficiently raised, roll out about ¾ in. thick; place in buttered tins; raise again until quite light; beat the yolk of an egg with a teaspoonful of milk, and rub it over the top with a brush; bake; when done, brush again with milk, and sprinkle with sugar and cinnamon on the top; or, before baking, brush over it melted butter, and sprinkle with sugar and cinnamon.

GINGERBREAD.—1. Rub ½ lb. butter into 1 lb. of flour; rub in ½ lb. sugar, 2 tablespoonfuls of ginger, and 1 spoonful of rose water; work it well; roll out; bake in flat pans in a moderate oven about ½ hour.—2. 2 cups of butter; 4 cups of sugar; 1 cup of milk; 2 eggs; 2 teaspoonfuls of soda; 2 teaspoonfuls of ginger; flour enough to roll out well.

GINGER COOKIES.—1 teacupful of brown sugar; 1 of New Orleans molasses; 1 of thick sour cream; 1 tablespoonful of ginger; 1 teaspoonful of salt; 1 tablespoonful of saleratus (dissolved in a little cold water); 1 egg; mix soft; roll ½ in. thick; bake in a moderate oven.

GINGER SNAPS. — Mix together in a deep pan 1 pt. West India molasses, ½ lb. butter or lard, ¼ lb. brown sugar, 2 large tablespoonfuls ginger, 1 teaspoonful cinnamon, a little cayenne pepper, also a little salt if lard is used, 1 teaspoonful soda dissolved in warm water, sufficient flour to roll out conveniently; let the whole be well incorporated into a large lump; knead it till it leaves the hands clean; beat hard with a rolling-pin, which will make it crisp when baked; roll out into thin cakes.

GOLD.—1. One lb. each of flour and sugar; ⅜ lb. butter; the yolks of 14 eggs; the juice and grated rind of 2 lemons. Stir the sugar and butter to a cream; add the yolks well beaten and strained; put in the lemon peel; then the flour (dried), and a teaspoonful of saleratus dissolved in a spoonful of hot water; beat 15 minutes; just before it goes into the oven, stir in the lemon juice very thoroughly. — 2. Yolks of 4 eggs; 1 cup of sugar; ½ cup of butter; ½ cup of milk; 2 cups of flour; ½ teaspoon of soda; 1 teaspoon of cream of tartar; citron and currants.

GRAHAM COOKIES.—2 cups sugar; 1 cup sour cream; ½ teaspoonful soda; mix quickly; roll and bake.

GROUND RICE.—Rub together 2 lbs. butter and 4 lbs. sugar; add 16 eggs; beat up thoroughly; add 2 pts. milk, 4 oz. ammonia, and flavor with lemon; stir all up; add 4 lbs. rice flour; mix thoroughly; drop on buttered pans the size of an egg, and bake.

HAMLET.—2 eggs; 1½ cups sugar; 1 cup of raisins chopped fine; ⅔ cup of butter; 1 teaspoon, each, of cloves, cinnamon and nutmeg; 1 teaspoon of soda dissolved in 2 tablespoonfuls of sour milk; mix stiff; cut out like cookies.

HICKORY NUT.—Take 1½ gills of maple syrup; 1 gill of medium thick, slightly soured cream; 1 pt. hickory nut meat; 1 teaspoon soda; a pinch of salt; a few drops of lemon essence or other seasoning; flour enough for medium thickness; bake in a moderately heated oven.

HONEY.—1 qt. strained honey; ½ pt. soda; ½ pt. melted butter; 1 teaspoonful of sugar dissolved in ½ cup warm water; ½ nutmeg and 1 teaspoonful ginger; mix these ingredients; then work in flour to roll; cut in thin cakes; bake on buttered tins in a quick oven

HONEY COOKIES. — 1 pt. honey; ½ cup butter; 1 cup sweet milk; 2 eggs; ½ grated nutmeg; beat the eggs and honey together until they froth; add the butter and milk; use yeast powder with the flour.

HUCKLEBERRY.—¾ lb. of flour; 6 oz. sugar; ¼ lb. butter; cream the sugar and butter; 3 eggs, beaten very light; 1 teacupful of sour milk; 1 teaspoonful of vinegar; ½ teaspoonful of saleratus dissolved in vinegar; 1 qt. of huckleberries; beat well together and bake.

ICE CREAM.—1 cup fine white powdered sugar; ½ cupful butter; cream them together; add ½ cupful of milk; whites of 4 eggs; 2 cupfuls flour; ½ teaspoonful soda in milk; 1 teaspoonful cream of tartar in flour. For the cream: 3 cupfuls powdered sugar; 1 cupful water; boil together until it becomes a clear syrup; beat the whites of 3 eggs to a froth; pour the syrup on to it; stir together; flavor with a teaspoonful vanilla; put between the three rounds of cake, and on top.

ICING.—1. ½ lb. of powdered sugar; 4 spoonfuls rose-water; the juice of 1 lemon; the whites of 2 eggs; beat all well together; cover the cake when half cold with a paste brush; set in a cool oven to dry the icing.—2. 1 lb. pulverized sugar; pour over 1 tablespoonful cold water; beat whites of 3 eggs a little, not to a stiff froth; add to the sugar and water; put in a deep bowl; place in a vessel of boiling water, and heat; when quite thick remove from the fire, and stir while it becomes cool till thick enough to spread with a knife. — 3. 1 lb. sweet almonds and 1 lb. loaf sugar; beat them in a mortar until they are well mixed and very fine; put them in a pan with the whites of 10 eggs that have been previously well beaten with the whisk; beat them well together with a wooden spoon; lay smoothly on the cake, about an inch thick, ½ hour before it is baked. For pink icing, add cochineal syrup; for blue, indigo; for yellow, saffron; for green, spinach syrup; and for brown, add chocolate.

IMPERIAL.—Cream together 1 lb. of the best butter and 1 lb. of white sugar; add 8 eggs, yolks and whites beaten separately; 1 lb. of raisins, stoned and chopped; ½ lb. of blanched almonds; ¼ lb. of citron, both thinly sliced; a little mace; 2 wineglasses wine; 1 lb. of sifted flour; bake in a steady oven.

INDIAN MEAL POUND.—Sift 1 pt. of yellow corn meal and ½ pt. wheat flour; into which first put 1 teaspoonful baking powder and a small spoonful salt; 1 grated nutmeg; 1 tablespoonful ground cinnamon; put ⅔ lb. granulated sugar and ½ lb. butter together; beat 8 eggs very light; add to the butter and sugar, alternately, with the meal, a little at a time; ½ cup milk; have dish or pan well buttered; bake long in a moderate oven.

JELLY.—Beat together thoroughly 1 cup of butter and 2 cups of sugar; add the beaten yolks of 4 eggs; stir in 1 cup of milk; 2 even cupfuls and ½ scant cup of sifted flour; beat the whites of the eggs; stir them into the batter; add 1 teaspoonful of lemon extract, 2½ teaspoonfuls of baking powder; stir 10 minutes; pour into the jelly cake pans; bake in rather a quick oven. When done, remove them from the pans, lay them on a cloth, and spread with tart jelly.

JELLY ROLL.—1 teacup of white sugar; 1 cup of flour; 4 eggs; 1 teaspoonful of cream tartar; ½ teaspoonful of soda; turn bottom side up; spread with jelly; roll up while warm.

JENNY LIND.—1½ teacups of sugar; ½ teacup of milk; the same quantity of butter; 3 eggs; 2 cups of flour; ½ teaspoonful of soda; 1 of cream tartar; bake in a long, shallow tin, for the top and bottom layer. For the middle layer the same, leaving out 1 egg; add 1 cup of raisins and 1 cup of currants; spice to the taste; roll the fruits in ½ cup of flour; put together with jelly and frost the top.

JUMBLES.— 1½ cups sugar; ½ cup butter; 2 eggs; ½ teaspoon soda; 1 of cream of tartar (dissolved in a little sweet milk); flour enough to make like pie crust; bake in waffle irons. Fill

the little holes with light and dark jelly, alternately.

KING.—¾ lb. of butter; 1½ lbs. of sugar; 1 nutmeg; 6 eggs; 1 cup of milk; flour to make an ordinary batter.

KIPFEL.—Beat up 1 lb. pounded white sugar with the whites of 8 eggs and a little vanilla flavoring; when mixed, make it up into the shape of small horseshoes; having minced 1 lb. sweet almonds, turn these kipfel round in them; bake the kipfel on wafers, in a very moderate oven.

KISSES.—1. Beat to a stiff froth the whites of 2 eggs; and beat into them, very gradually, 2 teacupfuls of powdered sugar and 2 tablespoonfuls of corn starch; flavor with lemon; butter tin sheets with mashed butter, and then cover with letter paper; drop on this the mixture in teaspoonfuls about 2 in. apart; bake 15 minutes in a warm oven; be sure that it is not warm enough to brown them; after they are taken out, let them stand until cold before removing them from the paper.

KNICKERBOCKER.—Beat ½ lb. fresh butter to a cream; ½ lb. of powdered sugar; ¾ lb. of sifted flour; 1 tablespoonful of orange-flower water, and 1 of brandy; 4 oz. of washed currants; 5 well-beaten eggs; beat the mixture until very light; line some shallow cake-tins with buttered paper; pour in the mixture until half full; bake in a quick oven.

LADY.—Break up 2 lbs. butter; mix in 3 lbs. sugar; rub well together for 5 or 10 minutes; add 2 pts. whites of eggs; beat up all light; add 4 lbs. flour and 1 oz. soda dissolved in 2 pts. milk with 2 oz. cream of tartar; mix all well together; bake in pans about 1½ in. deep, in loaves that will weigh from 2 to 3 lbs., when baked, take out of the pans and frost on the under side.

LADY FINGERS. — Beat the whites and yolks of 4 eggs separately; mix with the yolks 3 oz. of flour and 3 of powdered sugar; add the beaten whites, and afterwards a gill of rose-water; beat all together for a few minutes; put the mixture in a paper funnel; squeeze it out into the shape of fingers on paper which has had a little powdered sugar dusted over it; dust a little sugar over the fingers; let them stand 5 minutes; bake to a fawn-color in a moderate oven; fasten together after they have been baked with a little white of egg; keep them in a close-covered tin till wanted.

LAPLAND.—5 eggs; beat the whites and yolks separately till both are as light as may be; mix them together and add 1 pt. of rich cream and 1 pt. of sifted flour; half fill small tin shapes with the batter; set it to bake 10 minutes in a well heated oven, and send to table hot.

LEMON. — Beat 6 eggs, the yolks and whites separately till in a solid froth; add to the yolks the grated rind of 1 fine lemon, and 6 oz. of sugar dried and sifted; beat this ½ hour; shake in with the left hand 6 oz. of dried flour; add the whites of the eggs and the juice of the lemon; when well-beaten in, put immediately into tins; bake about an hour in a moderately hot oven.

LEMON COOKIES.—1 lb. of flour; ½ lb. of butter; 1 lb. powdered sugar; juice of 2 lemons, grated peel of 1; 3 eggs, whipped very light. Stir butter, sugar, lemon juice and peel to a light cream; beat at least 5 minutes before adding the yolks of the eggs; whip them in thoroughly; put in the whites; lastly the flour; roll out about ¼ in. thick; cut into round cakes; bake quickly.

LEMON GINGER. —½ lb. of butter; ½ lb. of sugar; 3 eggs; 1 small cup of milk; the same quantity of molasses; 3½ lbs. of flour; 1 teaspoonful of ginger; 1 of cinnamon; 1 tablespoonful of saleratus dissolved in the milk; the rind of 2 lemons and the juice of one; bake in a quick oven.

LEMON JELLY.—2 cups of sugar; ½ cup of butter; 1 cup of milk; 3 eggs; 2 teaspoonfuls of cream tartar; 1 teaspoonful of soda; 3 cups of flour; mix, and bake in fine thin layers. For the jelly, grate the rind of 3 small or 2 large lemons; add the juice of the same with 1 cup of sugar, 1 egg, 1 cup of water, 1 teaspoonful of butter, 1 tablespoonful of flour; mix with a little water; boil till it thickens; place between the layers of the cake.

LEMON PUFFS. — Beat and sift 1½ lbs. of loaf sugar; mix with it the peel of 2 lemons grated; whisk the whites of 2 eggs to a firm froth; add it gradually to the sugar and lemon; beat all together for 1 hour; make up into any shape you please; place the puffs on oiled paper on a tin; put them in a moderate oven; bake 6 or 8 minutes.

LEMON SNAPS. — 1 large cup of sugar; 2 cups of flour; a little more than ½ cup of butter; 2 eggs; 2 tablespoonfuls of hot water; ½ teaspoonful of soda; flavor with lemon; roll very thin.

LEMON SPONGE.—8 eggs; 10 oz. sugar; ½ lb. of flour; the juice and grating of 1 lemon; separate the eggs; beat the yolks, sugar and lemon until thick and light; whisk the whites until dry, which add with the flour, half of each at a time; mix all together, but avoid beating; butter your pan well, and bake in a moderate oven.

LIGHTNING.—Yolks of 4 eggs; 3 tablespoonfuls of sugar; the same of flour; about 2 tablespoonfuls of milk; the juice of half a small lemon; the whites of 3 eggs, beaten to a stiff froth; mix with the yolks, flour, etc.; put in a buttered pan and quick oven.

LINCOLN.—1½ lbs. sugar; 1 lb. butter; 1¾ lbs. flour; 2 lbs. suet; 1 pt. sweet milk; 1 tablespoonful soda; 6 eggs; 1 teaspoonful cloves; 2 of cinnamon; 1 gill of brandy.

LITTLE SHORT-CAKE.—Rub into 1 lb. of dry flour 4 oz. of butter; 4 oz. of white powdered sugar; 1 egg; 1 spoonful or 2 of thin cream to make into a paste; mix; put currants in ½ and caraways into the rest; cut, and bake on tins.

MACAROONS.—1. The whites of 3 eggs beaten to a froth; ½ lb. of powdered sugar; ½ lb. of desiccated cocoanut; ½ pt. rolled and sifted crackers; 1 teaspoonful extract of almonds; drop the mixture on buttered paper in a dripping pan; bake a light brown. —2. Mix ½ lb. of sweet and 2 oz. of bitter almonds; mix them with ½ lb. fine sifted sugar; put them in a cool oven until they take a pale brown color; add ¾ lb. of fine

sifted sugar; the whites of 2 large eggs beaten to a strong froth, or sufficient to make paste stiff enough to form into cakes.

MACHINE JUMBLES.—Rub together 3 lbs. sugar, and 2 lbs. 4 oz. butter; add 12 eggs, a few at a time; beat all up well; ¾ oz. of ammonia; 1½ pts. milk; a little ext. lemon; 5 lbs. 4 oz. of flour; stir sufficiently to mix.

MADEIRA.—Beat up with a whisk until quite light 6 eggs, ½ lb. of sugar, and a little lemon zest; when well beaten add ½ lb. fresh butter, slightly melted, and ½ lb. of flour; put into a round cake hoop, papered; place on top of the cake 3 slices of citron cut thin; dust a little sugar over the top; bake in a moderate oven.

MADELINE.—4 eggs; ½ lb. butter; ½ lb. sugar; ½ lb. flour; mix the butter, sugar, and the yolks of the eggs thoroughly; add the flour and mix again; then the whites of the eggs beaten to a stiff froth; grate in a little lemon rind; put in little dishes, each about ⅔ full; bake till done.

MALAGA.—2 cups of sugar; ½ cup of butter; beat to a cream; add ½ cup of sweet milk; mix 3 cups of flour with 3 teaspoonfuls of baking powder; beat the whites of 7 eggs to a froth; stir all together and flavor with lemon; bake in sheets. *Filling*: Whites of 3 eggs, beaten with sugar as for frosting; save out enough for the top of the cake; add 1 coffeecup of seeded and chopped raisins, 2 teaspoonfuls of lemon ext.; spread between the sheets.

MAPLE SUGAR.—3 cups of flour; 1 of butter; ½ of sour milk; 1½ of maple sugar, broken into small lumps; 3 eggs; 1 teaspoon soda.

MARBLE.—*1st Part*: White sugar, 1½ cups; butter, ½ cup; sweet milk, ½ cup; soda, ½ teaspoon; 1 teaspoon cream of tartar; whites of 4 eggs; flour, 2½ cups; beat the eggs and sugar together; mix the cream of tartar with the flour; dissolve the soda in the milk. *2nd Part*: Brown sugar, 1 cup; molasses, ½ cup; ½ cup sour milk; soda, ½ teaspoon; browned flour, 2½ cups; yolks of 4 eggs; cloves and cinnamon ground, each ½ teaspoon; mix the ingredients same as above. When both are prepared, put in the cake pan in alternate layers of each; or put them in spots on each other, making what is called leopard cake, until all is used: then bake as usual.

MERINGUE STRAWBERRY SHORT-CAKE.—Make a very light biscuit crust; and bake it in a jelly-cake pan; after it is baked, split it open and cover each half with berries; sugar slightly; on top of the berries pile the whites of eggs beaten to a very stiff froth; sweeten; set back in a quick oven to brown slightly; allow the whites of 2 eggs to each cake; 1 tablespoonful of sugar to each egg; if you like, make a soft custard with the yolks of the eggs.

MINISTER'S.—1 teacup sugar; 1 tablespoon butter; 1 egg well beaten; 2 cups flour; 1 of sweet milk; 1 teaspoon cream tartar; ½ teaspoon soda; 2 teaspoons extract of bitter almonds.

MOCK LADY.—2 cups sugar; ⅔ cup of butter; the whites of 4 eggs; 1 cup of sweet milk; ½ teaspoon soda in the milk; 3 cups of flour with 1 teaspoon cream of tartar; flavor with rose, lemon or vanilla; bake in sheets.

MONT BLANC.—2 even cups of powdered sugar; ¾ cup butter, creamed with sugar; whites of 5 eggs, very stiff; 1 cup of milk; 3 cups of flour, or enough for good batter; 1 teaspoonful soda, dissolved in hot water; 2 teaspoonfuls of cream of tartar, sifted in flour; vanilla flavoring; bake in jelly-cake tins. *Filling*: Whites of 3 eggs, whisked stiff; 1 heaping cup powdered sugar; 1 cocoanut, pared and grated; mix lightly together, taking care not to bruise the cocoanut; when perfectly cold, spread between and upon them.

MOSS.—Rub 6 lbs. of flour and 3 lbs. of butter well together; add 2 lbs. sugar and 8 eggs; flavor with ess. of lemon; mix well together until smooth and stiff; take a piece the size of an egg; push it through a sieve; form it in bunches to resemble moss; put on buttered pans; bake very carefully in a moderate oven to a delicate brown.

MOUNTAIN.—1 lb. of flour; 1 lb. of sugar; ½ lb. of butter; 1 teacupful sour milk; 6 eggs; 1 teaspoonful soda; 2 of cream of tartar; bake as jelly cake and spread frosting between and on top.

NEAPOLITAN.—1 lb. of flour; ½ lb. powdered sugar; ½ lb. of butter; 6 eggs; 6 yellows; ½ oz. of rose water or orange blossom water; mix the flour, sugar, butter and eggs together with the perfume; if too stiff, add a little milk; leave the dough ½ hour in a cool place; roll it out ½ in. thick; cut it with a small tin cutter of any shape; put the cakes on a pan slightly greased; color the tops with beaten egg and milk; chop some almonds up over them; cook in a very hot oven.

NEW YEAR'S.—1 lb. of flour; 1½ lbs. of almonds; 1 lb. of sugar; ¾ lb. butter; 6 eggs; 2 teaspoonfuls of cream tartar; 1 teaspoonful soda and ½ teacupful of milk; beat butter and sugar to a cream; add the eggs well beaten, then the milk, in which dissolve the soda; put the cream tartar in the flour; mix well; beat this all well; then stir in the blanched almonds; line a cake pan with well buttered paper; bake in a steady oven.

NEW YORK LUNCH.—Beat 16 eggs and 2 lbs. sugar together about 5 minutes; add 2 oz. ammonia, 1 pt. milk, and flavor; mix all; add the flour, stirring carefully, but sufficiently to mix; bake in little round pans, in a warm oven.

OATMEAL.—Take 3 heaping teaspoonfuls of grated cocoanut; add to it ½ pt. of the finest oatmeal; and 2 heaping teaspoonfuls of sugar; stir into it 1 gill of boiling water and mix it thoroughly together; turn it out on the rolling board, well floured; roll thin; cut it out as for common crackneels; put a bit of citron and ½ doz. currants into each cake; stick them into the dough; bake it in a slow oven; watch carefully, lest they brown a shade too deep.

OLD COLONY.—3 eggs; 1 scant cup butter; 2½ cups sugar; 1 cup sour milk; 3¾ cups flour; 1 teaspoon soda; spice to taste. Sift powdered sugar over the top of the cake.

ORANGE.—2 cups of flour; 2 cups of sugar; ½ cup of water; the yolks of 5 eggs and whites of 4; 2 teaspoonfuls of yeast powder; grated rind and juice of 1 orange.

ORANGE LAYER.—¾ cup of butter; 2 cups

sugar; ½ cup sweet milk; 3 cups flour; whites 10 eggs; 3 tablespoonfuls baking powder; grate the rind of 2 ordinary sized oranges into the cake; press out the juice into the icing; bake in layers like jelly cake; put the icing between.

ORLEANS.—1 liberal lb. best flour, dried and sifted; 1 lb. powdered sugar; ¾ lb. butter, rubbed to a cream with the sugar; 6 eggs, beaten light, and the yolks strained; 1 cup cream; 1 glass best brandy; 1 teaspoonful mixed mace and cinnamon; 1 teaspoonful soda, dissolved in hot water; 2 teaspoonfuls cream tartar, sifted with flour; add the strained yolks to the creamed butter and sugar; to this the cream and soda; in alternate supplies, the whites and flour; finally, spice and brandy; beat up hard for 3 minutes; bake in 2 square loaves in a not too quick but steady oven; cover with paper if the cakes hows signs of crustiness on the top before it has risen to the proper height; bake 1 hour; cover with lemon frosting when cool.

PARADISE.—3 eggs; 1 cup of butter; 2½ cups of sugar; 1½ cups of sweet milk; 1 small teaspoonful of soda; 4 large cups of flour; 1 lb. of raisins; cloves, cinnamon and nutmeg.

PARISIAN.—Make a mixture as for pound cakes, leaving out the fruit, peel, spices, etc.; bake in a round or oval hoop; when baked and cold, cut into slices, ½ in. thick; spread each slice over with jam or marmalade; cut the outside of the cake round, or flute to form a star; cut the centre out to about 1½ in. from the edge, leaving the bottom slice whole; fill this with preserved wet or dry fruits, creams, or a trifle. Ornament the top with piping, wet or dry fruits, and peels, or pipe with jam and icing.

PARLIAMENT.—Boil for 10 minutes 2 oz. of whole ginger, which has been well crushed in 1½ gills of water; strain, and let get cold; if it has wasted, add water to make up the original quantity; mix ½ lb. of raw sugar, sifted fine, with 1 lb. of flour; 1 small teaspoonful of caraway seeds, and ½ teaspoonful of carbonate of soda; put into this 2 oz. of butter or lard; well mix 1 teaspoonful of molasses with the ginger water; make all into a paste; roll it out on a board to the thickness of rather less than ½ in.; cut into any shape; put the cakes on a flour baking sheet; brush them over with water in which you have mixed a very small quantity of molasses; bake in a moderate oven for ½ hour.

PEACH SHORT-CAKE.—Make a dough as for soda biscuits, only shorter; roll to ½ in. thick; place on a baking tin; spread this with butter; place another layer of dough on top; bake in a quick oven; while hot, separate the two layers; spread mashed fresh peaches with plenty of sugar between, also over the top; serve with cream.

PINEAPPLE SHORT-CAKE.—A couple of hours before bringing cake on the table, take a very ripe, finely-flavored pine apple; peel it, cut as thin as wafers and sprinkle sugar over it liberally; then cover it close. For cake, take sufficient flour for one pie dish; butter the size of a small egg; 1 or 2 tablespoonfuls of sugar; the yolk of an egg; 2 teaspoonfuls of baking powder; a very little salt; milk enough to make a very soft dough; do not knead the dough, but just barely mix it; press it into the pie plate; rub the baking powder and butter, sugar and salt well throughout the flour; add the other ingredients then quickly; when time to serve, split the cake; spread the prepared pineapple between the layers; serve with nothing but sugar and sweet cream.

PLUM.—1. 1 lb. of flour; 1½ teaspoonfuls of baking powder; a little salt; ½ lb. each of butter, sugar, and currants; 2 eggs and ½ pt. of milk. — 2. 2 lbs. of large fresh raisins; 1 lb. of citron; 8 fresh eggs; 2 cups of powdered sugar; 1 of butter; 4 of flour; 1 of sweet milk; ½ teaspoonful of soda; 1 nutmeg, grated; ½ teaspoonful of ground cloves; sift the flour and put in the oven to brown, as you would coffee; cut the raisins in half and seed them; cut the citron in strips ½ in. wide; slice as thin as possible; bake in a 6 qt. basin 2 hours. For the icing, take the whites of 4 eggs; 2 cups of powdered sugar; 2 tablespoonfuls of corn starch; the juice of 1 lemon; 1 oz. of rose-water.

PORK.—1 lb. of pork; 1 cup molasses; 2 cups sugar; 1 pt. boiling water; 2 eggs; cinnamon, cloves, and allspice, 1 tablespoonful each; 2 teaspoonfuls cream of tartar; 1 teaspoonful soda; 1 lb. of raisins, chopped; flour to make it the consistency of any stirred cake; chop the pork fine and turn on the boiling water; let stand until no longer hot; bake very slowly.

POUND.—1½ lbs. of flour; 1 lb. of butter; 1 lb. fine white sugar; 10 eggs; 1 gill of brandy; ½ nutmeg, grated; 1 teaspoonful of vanilla or lemon extract, or orange-flower water; beat the butter and sugar to a cream; beat the eggs to a high froth; put all together; beat it until it is light and creamy; put in basins lined with buttered paper; let the mixture be 1½ in. deep; bake in a moderate oven for 1 hour; when done turn it gently out; reverse the pan; set the cake on the bottom until cold; let the paper remain until the cake is to be cut.

PUMPKIN.—For 2 loaves: 2 cups buttermilk; 3 cups each of wheat flour and corn meal; 1 cup stewed pumpkin; 1 cup molasses; ½ cup butter; 2 eggs; 1 tablespoonful soda; steam 1½ hours; bake ½ hour.

QUEEN.—Rub together 2 lbs. sugar and 2 lbs. butter; add 16 eggs, 1 pt. milk, 1 oz. of ammonia; stir all well together; add the flour; bake in square pans with a few currants on top.

RAISED.—6 lbs. flour; 3⅓ of sugar; 3 of shortening; ½ of lard; ½ lb. butter or nice beef drippings; 1 qt. sweet milk; 1 pt. fresh yeast; 2 eggs; 6 nutmegs; 2 lbs. raisins, or 1 lb. raisins and 1 of currants; take all of the flour, ½ the sugar, and ½ the shortening and mix well; heat the milk boiling hot; stir it in thoroughly; add the yeast and work all together; place in a warm place to rise. Better make it in the morning, and by evening it will be light. When light, add the rest of the required ingredients; work all in with the hands; cover and keep in as warm a place as convenient, as for bread. In the morning it will be light; dip out into pans which have greased paper linings; let them stand ½ hour, or long enough to become light in the pans; bake in the heat required for bread, 40 minutes. If sweet milk cannot be ob

tained, boiling water can be substituted, but milk is better.

RIBBON.— 1 cup of sugar; ½ cup butter; ½ cup sweet milk; 1 large teaspoonful of baking-powder; 2 cups of flour; 3 eggs, taking out 2 of the whites for frosting; bake in 3 layers; put spices and fruit in middle layer, between each light one, jelly; then frosting between each.

RICE.—8 beaten eggs; 1 lb. of white sugar; ½ lb. of butter; 1 lb. of rice ground very fine; a little salt; 3 tablespoonfuls of milk; and any flavoring liked. Cream the butter and sugar, add the eggs, then the milk and salt, stirring in the rice last. Bake in small pans.

RICE SPONGE.—Beat up 3 eggs for 2 minutes; add the peel of a lemon finely rasped. Boil 6 oz. of loaf sugar in ½ gill of water, and pour it boiling on to the eggs. Whisk the mixture for 20 minutes, or until it is very thick. The success of the cake depends on this being properly done. Have ready mixed 2 oz. of flour and 3 of rice flour and stir lightly into the batter. Bake in small tins, greased and sifted with a mixture of sugar and rice flour.

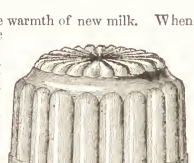
ROCHESTER.—1 lb. of butter; 1¾ lbs. sugar; 2 lbs. of flour; 8 eggs; 1 pt. of sour milk (½ pt. cream, to make it richer, can be substituted for ½ the last); 1 teaspoonful soda; 2 teaspoonfuls cream of tartar (put soda in the milk, cream of tartar in the flour); nutmeg to taste; and ½ wineglass of brandy improves it.

ROCK.—8 oz. of flour; 3 oz. of currants; 3 oz. of pounded sugar; 1 oz. of lemon peel, sliced fine; 1 teaspoonful of baking powder or ½ that quantity of soda. Rub all together and mix to a moderately stiff dough with buttermilk. Drop the mixture with a fork in little heaps on greased paper, so that the surface of each has a rough and uneven appearance; bake quickly of a light brown.

RYE TEA.—1 pt. sweet milk; 2 eggs well beaten; 1 tablespoonful of brown sugar; ½ teaspoonful of salt; stir into this sufficient rye flour to make it as stiff as common griddle-cake batter; bake in gem-pans ½ hour; serve hot.

SARATOGA.—White part: ½ cupful of butter; 1½ cupfuls of white coffee sugar; ½ cupful of sweet milk; 2 cupfuls of flour; the whites of 3 eggs beaten to a froth; 1 heaping teaspoonful of baking powder; flavor with lemons; bake in 2 round tins. Fruit part: ½ cupful of butter; 1 cup brown sugar; ½ cup sweet milk; 1 cupful of flour; ½ cupful each of raisins and currants chopped fine; 2 even teaspoonfuls of baking powder; the yolks of 3 eggs; bake in 1 round tin. Place first a layer of white; cover with icing; then a layer of fruit cake; cover also with icing; then another layer of white, and cover with the rest of the icing.

SAVOY.—1 lb. of loaf sugar, powdered; 1 pt. of good eggs; 14 oz. of flour; warm a pan free from grease, with the sugar in it, in the oven until you can scarcely bear your hand against it; take it out; pour in the eggs; whisk the whole together with a birch or wire whisk until it is quite light and cold, when it will be white and thick. If it should not whisk up well, warm again; beat it as before; or beat over the stove fire until it is the warmth of new milk. When finished, sift the flour and stir in lightly with a spoon; add a few drops of essence of lemon to flavor; butter some tin or copper molds regularly, with rather less on the top of the molds than the sides; dust with loaf sugar sifted through a lawn sieve; knock out all that does not adhere; again dust it with fine flour; turn it out; knock the mold on the board as before; tie or pin a piece of buttered paper round the mold, so as to come 2 or 3 in. above the bottom; fix the mold in a stand; nearly fill it; bake in a moderate oven. When done, the top should be firm and dry.



Cake Mold.

SCHOOL.—1 egg; 1 cup white sugar; 1 cup sweet milk; a piece of butter the size of an egg; 1 pt. flour; into which sift 2 teaspoons baking powder; work together with butter, sugar, and the yolk of the egg till it is light and foamy; add the milk and flour; then the beaten white of an egg; butter a piece of white paper, and lay in the bottom of the baking tin; pour in the cake; bake in a pretty hot oven.

SCOTCH COOKIES.—Beat 2 cups of sugar with 1 cup of butter and 5 tablespoonfuls of milk in which has been dissolved 1 teaspoonful of soda; beat 2 eggs quite white and add them; mix 2 teaspoonfuls cream tartar with ½ lb. flour and 1 teaspoonful of powdered cinnamon; mix the whole together; add more flour from time to time to make a dough; roll thin and bake quickly.

SCOTCH FRUIT.—1 cup of butter; 2 of white sugar; 4 of sifted flour; ¾ cup sour milk; 1 teaspoon soda; 9 eggs, beaten separately; 1 lb. raisins; ½ lb. currants; ¼ lb. citron; cream the butter and sugar; then put in the beaten yolks of eggs; while stirring in the flour add the whites well whipped; flavor with 1 teaspoon lemon, and 1 of vanilla extract; have raisins chopped a little, or, better still, seeded, and citron sliced thin; wash and dry currants before using; flour all fruit slightly; in putting cake in pan place first a thin layer of cake; then sprinkle in some of the three kinds of fruit, then a layer of cake, and so on; always finish off with a thin layer of cake; bake in a moderate oven for two hours.

SCOTCH SHORT-CAKE.—Rub together into a stiff, short paste 2 lbs. flour, 1 lb. butter and 6 oz. loaf sugar; make it into square cakes, about ½ in. thick; pinch them all along the edge at the top; over the whole sprinkle some white comfits; put the cakes on tins so as to touch each other by their edges; bake in a slow oven.

SEED.—1 lb. of flour; ½ lb. butter; ¾ lb. of powdered sugar; ½ cup of good yeast; 4 tablespoonfuls cream; nutmeg; a pinch of soda, dissolved in hot water; 2 tablespoonfuls caraway seeds; ¼ lb. citron shred very small; mix the

flour, cream, half the butter (melted) and the yeast together; work up well; set to rise for 6 hours; when very light, work in the rest of the butter rubbed to a cream with the sugar and the soda water; and when these ingredients are thoroughly incorporated, the seed and the citron; let it rise $\frac{3}{4}$ hour longer, until it almost fills the pans; bake steadily $\frac{1}{2}$ hour if you have put it in small pans; 1 hour if it is in large loaves.

SHREWSBURY COOKIES.—1 lb. flour; 1 lb. sugar; $\frac{1}{2}$ lb. butter; 3 eggs; 1 tablespoonful ground cinnamon; mix together the butter and flour; stir in the sugar and cinnamon; work the eggs into the paste; roll out thin; cut and bake in a quick oven at once.

SNOW.—1 tumblerful of flour; $1\frac{1}{2}$ tumblerfuls of sugar; 1 small teaspoonful of cream of tartar; no soda; the whites of 10 eggs; beat the eggs very light; sift the flour, sugar and cream of tartar together; stir gradually to the eggs; bake in a round, papered pan. After baking, frost with the white of 1 egg, 3 teaspoonfuls of powdered sugar, and cover with a grated cocoanut.

SNOWFLAKE.—3 eggs; $1\frac{1}{2}$ cups sugar; $\frac{1}{2}$ cup butter; $\frac{1}{2}$ cup milk; $\frac{1}{2}$ teaspoonful soda; 1 teaspoonful cream tartar; 2 cups flour; whites of 2 eggs; $\frac{1}{2}$ cup sugar; beat together; bake in jelly-cake tins; frost each layer; sprinkle with grated cocoanut.

SODA.—1 lb. of flour; 6 oz. butter or dripping; 6 oz. sugar; $\frac{1}{2}$ pt. milk; 1 teaspoonful of carbonate of soda; add 1 or 2 eggs, with $\frac{1}{2}$ lb. currants or caraway seeds; mix the soda thoroughly with the flour; rub in the butter; beat the whole with a wooden spoon for 20 minutes before putting into a well greased cake tin; bake for fully $1\frac{1}{2}$ hours.

SPANISH PUFFS.—Mix $\frac{1}{2}$ pt. of milk with 2 well beaten eggs; add by degrees 1 teaspoonful of flour, 2 oz. butter; the same of sugar, and the grated rind of 1 lemon; mix well; butter some saucers; pour in, and bake in a quick oven 20 minutes.

SPONGE.—4 eggs; 1 cup sugar; 1 cup flour; $\frac{1}{2}$ teaspoonful baking powder; 1 teaspoonful extract of orange; beat the yolks and sugar together 10 minutes; add the flour with powder sifted in, then the extract; add the eggs (whites) beaten to a froth; bake in a well buttered tin in a steady oven 30 minutes.

STARCH.—2 cups of sugar; 1 cup of butter; 1 cup of sweet milk; 1 cup of common starch; 1 pt. of flour; whites of 8 eggs; 2 teaspoonfuls of cream of tartar; 1 teaspoonful of soda.

SUGAR.—Blend well with the fingers 6 oz. of good butter with 1 lb. of fine flour; work it quite into crumbs; add a few grains of salt, 1 lb. of dry sifted sugar, a tablespoonful of the best cinnamon in very fine powder, and 1 large teaspoonful of mixed spices; to these the grated rinds of 3 sound fresh lemons; make these ingredients into a paste, with the yolks of 5 eggs, and about 4 tablespoonfuls of white wine, or with 1 or 2 more in addition, if required, as this must be regulated by the size of the eggs; half of very thick cream and half wine are sometimes used for them. Roll the mixture into balls; flatten them to something less than $\frac{3}{4}$ in. thick; bake them in a moderate oven from 15 to 20 minutes; loosen them from the baking sheets—which should be lightly floured before they are laid on—by passing a knife under them; turn them over; when quite cold, stow them in a dry, close-shutting canister.

SULTANA.—4 cups flour; 1 cup butter; 3 cups powdered sugar; 8 eggs, beaten light; strain the yolks; 1 cup cream or rich milk; 1 lb. sultana (seedless) raisins dredged thickly; 1 teaspoonful soda, dissolved in hot water; 2 smaller teaspoonfuls of cream tartar; $\frac{1}{2}$ grated nutmeg and $\frac{1}{2}$ teaspoonful cinnamon; cream the butter and sugar; sift the cream tartar with the flour; dredge the raisins with flour when you have picked them over with great care; wash and dry them; mix the beaten yolks with the creamed butter and sugar; then the spice and brandy; beat 3 minutes and stir in the cream or milk lightly with the soda water; put in first a handful of one and then a spoonful of the other; then the flour and whipped whites; at last beat in the fruit; bake in 2 large loaves or 4 small ones; bake slowly and carefully; ice thickly.

SUNSHINE.—The whites of 11 eggs and yolks of 6; $1\frac{1}{2}$ cups granulated sugar, measured after sifting; 1 cup of flour measured after sifting; 1 teaspoonful of cream of tartar and 1 of extract of orange; beat the whites to a stiff froth; gradually beat in the sugar; beat the yolks in a similar manner; add the beaten whites and the orange; stir in the flour; mix quickly and well, and place in pans; bake 50 minutes in slow oven.

SUPERB.—The whites of 12 eggs, the yolks only of 6; 1 lb. of sugar; 1 lb. of butter; $\frac{1}{2}$ lb. flour; $\frac{1}{2}$ lb. meal; the juice of 2 large lemons and 1 wineglassful of French brandy; cream the sugar and butter together; then mix with the yolks, well beaten; add alternately a portion of the whites, whipped stiff, and the sifted flour, until it is all in; the meal goes in with the flour; let it be baked carefully in a well regulated oven.

SWEET POTATO LIGHT.—1 qt. of flour; 1 qt. of sweet potatoes, boiled and grated; $\frac{1}{2}$ cup of lard; 1 cup of yeast; mix with either milk or water; knead well; let them rise twice; bake like tea biscuits.

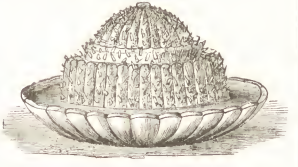
TEA.—1 pt. of dough taken from your bread; 1 teacupful of sugar; 1 of butter; 3 eggs; 1 cupful of raisins or currants; 1 teaspoonful, each, of cloves, cassia and allspice; $\frac{1}{2}$ teaspoonful of soda; stir till well mixed; bake in a slow oven.

TEMPERANCE.—2 lbs. of flour; $\frac{3}{4}$ lb. of butter; 1 lb. of sugar; 6 eggs; 1 teaspoonful of soda; mix flour and butter well together; put in the sugar; dissolve the soda in a little water and work that in; add the eggs well beaten; work well together; roll thin; cut in rounds or any shape you fancy; bake only a few minutes in a quick oven; flavor to taste.

TROWBRIDGE.—6 oz. of butter; the same of sugar; $\frac{3}{4}$ lb. of flour; 2 eggs; 1 teaspoonful of rose water; stir to a cream the butter and sugar; add the eggs, flour and spice; roll it out thin; cut into small cakes.

TIPSY.—Small sponge cakes steeped in bran-

dy; cover with grated almonds and candied peel; or stick almonds, cut into spikes, in them. They are usually piled on a dish, surrounded by a custard, and covered with preserves drained as dry as possible.



Tipsy Cake.

UNION.—2 cups of sugar; ½ cup of butter; ¾ cup of sweet milk; 3 cups of flour; whites of 6 eggs; ½ teaspoonful of soda and 1 teaspoonful of cream tartar. Custard: 1 pt. of milk; ½ cup of sugar; 2 eggs; 2 tablespoonfuls of corn starch; boil until like thick cream; spread between the layers when cool; flavor to taste.

VANITY PUFFS.—Beat the whites of six eggs to a stiff froth; sift in 1 lb. of powdered sugar; flavor with lemons; drop by small spoonfuls upon buttered paper; dry in a cool oven 2 hours.

VARIEGATED. — 1 cup powdered sugar; ½ cup of butter creamed with the sugar; ½ cup of milk; 4 eggs, the whites only, whipped light; 2½ cups of prepared flour; bitter almond flavoring; spinach juice and cochineal; cream butter and sugar; add the milk, flavoring the whites and flour; divide the batter into 3 parts; bruise and pound a few leaves of spinach in a thin muslin bag until you can express the juice; put a few drops of this into one portion of the batter; color another with cochineal, leaving the third white; put a little of each into small, round pans or cups, giving a light stir to each color as you add the next.

VERMICELLI.—Parboil 12 oz. of vermicelli; drain it on a sieve; put it into a stewpan, with 1 pt. of cream, 4 oz. of butter, 8 oz. of sugar, the essence of the rinds of 2 oranges, extracted by rubbing on a piece of sugar, and a little salt; cover with the lid; set the stewpan to simmer very gently on a slow fire, until the vermicelli has entirely absorbed the cream; add the yolks of 6 eggs and the whipped whites of 3; mix the whole together; put this preparation into a mold previously spread with butter and strewn with bread crumbs; bake the cake in the oven for about 1½ hours; when done turn it out on its dish; pour some damson sauce round the base; serve.

WAFERS.— 1 lb. sifted flour; 2 tablespoonfuls of butter; a little salt; enough milk to make stiff dough; rub the butter into the salted flour; wet with milk; roll thin; cut into small round cakes, and roll these again into cakes as large as a tea plate and as thin as stout writing paper; lift carefully to a floured pan and bake quickly.

WALNUT.—1. 1 lb. of flour; 1 lb. of sugar; ¾ lb. of butter; 1½ lbs. raisins; 1 nutmeg; 6 eggs; 1 wineglassful of wine; the kernels of 2 qts. walnuts; bake in a quick oven.—2. 1 coffeecup of sugar; 2 of raisins (stoned and chopped); 1½ cups of flour; ½ cup of butter; ½ cup of sweet milk; 3 eggs; 2 teaspoonfuls of baking powder; ½ nutmeg, grated; 1 teaspoonful of lemon or vanilla; 1 cup heaping full of nuts; crack the nuts and pick the meats out before you do anything else to the cake; bake slowly with a buttered paper in the bottom of the tin.

WASHINGTON.— 2 cupfuls of white sugar; 1 cupful of sweet milk; 4 eggs; beat the whites and yolks separately; add 3 cupfuls of flour; ½ teaspoonful of soda; 1 teaspoonful of cream of tartar; bake in round, flat tin pans; peel and grate 2 large apples and the rind of a lemon; add the strained juice of the latter; 1 heaping cupful of white sugar; 1 egg; let it boil up in a stewpan; pour it out; when quite cool spread over the cakes, which must be placed one over the other in layers.

WATERMELON.—White part: 2 cups of white sugar; 1 cup butter; 1 cup milk or water; 3 cups flour; whites of 8 eggs, well beaten; 2 teaspoonfuls quick yeast. Red part: ½ cup butter; ½ cup water; 2 cups flour; whites of 4 eggs, well beaten; 1 teaspoon quick yeast; 1 cup raisins; put the red part around the tube of the pan, and the white around the edges. Use as much coloring in the red part as you fancy.

WEDDING.—(See *Bride's Cake.*)

WHIGS.—1 lb. of flour; 4 oz. of butter; 4 oz. of sugar; ½ pt. of milk; 3 eggs; 1 teacupful of yeast; mix this well together; put in a cake pan; when light, bake in a moderately hot oven.

WHITE FRUIT. — 1 cup of butter; 2 cups of white sugar; 3 cups flour; ½ cup sweet milk; 1 teaspoonful cream of tartar; ½ teaspoonful of soda; whites of 8 eggs; 1 lb. of raisins; ½ lb. of citron chopped.

WHITE MOUNTAIN.—2 cups sugar; ½ cup of butter; whites of 7 eggs, well beaten; ½ cup of sweet milk; 2 cups flour; 1 cup corn-starch; 2 teaspoonfuls baking powder; bake in jelly-cake tins. Frosting: Whites of 3 eggs and some sugar beaten together; spread over the cake; add some grated cocoanut; then put the cakes together; put cocoanut or frosting on the top.

WHITE POUND.—1 cupful of fine white sugar and ½ cupful of butter; beat 10 minutes; add the whites of 4 eggs, well beaten; beat 10 minutes longer; sift 1½ cupfuls of flour, in which sift 1 scant teaspoonful of baking powder and 6 tablespoonfuls of milk; flavor with rose or bitter almond.

WHITE SPONGE. — Place a clean sieve over an earthen bowl, and measure into the sieve 1 cup of powdered sugar, ½ cup of flour, ½ cup of corn starch, 1 teaspoonful of best baking powder; run them through together; have ready the whites of 8 eggs, beaten to a stiff froth; add 1 teaspoonful of rose extract; mix thoroughly and bake in square tins about 2 in. deep, in a quick oven.

WINDSOR.—Beat the yolks and whites of 6 eggs separately; have ready the crumbs of 3 Vienna rolls soaked in milk; squeeze dry; mix the crumbs with 4 oz. of melted butter; add the beaten yolks and 2 oz. crushed sugar, with 1 teaspoonful of grated lemon peel; work the mix-

ture; add gradually 2 oz. each of raisins, almond paste, and candied orange peel; add the frothed whites of eggs; butter and paper a shallow tin; bake in moderate oven; when done sprinkle powdered sugar over it; sprinkle chopped almonds over the bottom of the cake tin before adding the cake.

YULE TIDE.—Place 1 lb. of fresh butter in a pan; keep it near the fire till melted; stir into it 1 lb. of powdered loaf sugar, a good tablespoonful each of allspice and cinnamon; by degrees put in the yolks of 10 eggs and their whites, separately, whisked to a froth; add 1 lb. candied citron peel sliced thin, 2 lbs. of currants cleaned and dried, 2 oz. of blanched sweet almonds, 1½ lbs. of flour, and 1 gill of brandy; mix all well together; bake for 3 hours.

ZEPHYR.—Wash the salt out of nearly ¾ lb. of butter; add to it ¾ lb. of powdered sugar and 3 well beaten eggs, a teaspoonful of rose water, and sifted flour enough to make a thin batter; stir it with a wooden spoon till the batter is perfectly smooth and so light that it will break when it falls against the sides of the mixing bowl; fill well buttered muffin molds (small) nearly half full with the mixture; bake in a quick oven; serve hot with newly-made butter.

Coffee, Tea, Etc.

CHOCOLATE.—Chocolate is composed of cocoa and sugar. (See same in Candies.) Its nutritive power is great, and its use is recommended to men of letters, consumptive people, and ladies, whose charms a cup of chocolate every morning for breakfast, is said to preserve surprisingly. However heartily one may have lunched, a cup of chocolate immediately afterward will produce digestion 3 hours after, and prepare the way for a good dinner. When required for use it should not be melted in a pan, which is liable to absorb the essential oil. Chocolate should not be prepared for the table till just before serving. The following are the most popular modes of preparation: 1. Take ¼ lb. of chocolate; the same of sugar; 1 qt. of milk and water; mix them equally together; boil till the cake dissolves, and flavor with a stick of cinnamon.—2. Take 3 even tablespoonfuls of Baker's chocolate, grated; put in a bowl or dish holding over a qt.; add 2 tablespoonfuls of white granulated sugar; mix the chocolate and sugar thoroughly; add 1 tablespoonful of boiling water; be sure and have the water boiling; stir until smooth; then boil 1 pt. of milk and 1 pt. of water together; when it boils pour it gradually over the chocolate mixture, stirring all the time.

COFFEE.—This, from its large proportion of albumen, is a most nutritive beverage, but, at the same time, from its quantity of fat, difficult to digest. Its aromatic qualities, however, strengthen the digestion. A cup of coffee is an excellent restorative and invigorating refreshment even for weak persons, provided that their digestive organs are not too delicate. If taken in excess, coffee produces sleeplessness and many baneful effects. Coffee sometimes produces great excitement, and a sensation of restlessness and heat ensues. For throwing off this condition, fresh air is the best antidote.

COFFEE, Essence of.—1. Boil 1 lb. of good coffee with ½ gal. of water till reduced to 1 pt.; let it cool; filter, and then boil again; add enough sugar to make a thick syrup; cool it; pour into a bottle, and cork up. 2 teaspoonfuls will, with a cup of boiling water, make a good cup of coffee.—2. Place the coffee in a deep, narrow filter; pass cold or tepid water through. For greater economy, divide the coffee into a series of filters, and treat in succession with the same liquid. To understand this, call them *a*, *b*, *c*, *d*, *e*: the liquid from *a* goes in *b*, then in *c*, etc.; *a* receiving always the clean water, is first exhausted and rejected; *b* becomes No. 1; a fresh filter, *f*, is added, to receive the liquid from the others; after awhile *b* is rejected, and *c* becomes No. 1; add again a freshly filled filter, *g*, and so on. The liquid obtained condense by evaporation, and sweeten with sugar; if sufficiently condensed to the thickness of syrup, it will keep without sugar. If mixed with sugared condensed milk, it will keep any length of time.

COFFEE, Preparation of.—In the preparation of coffee, long boiling extracts the bitter principle of the coffee, and therefore should be avoided. A good way to make it is as follows: Fit a small muslin bag inside the top of the coffee pot; pour a little boiling water through this, and, when the pot is hot, pour it off and put the coffee into the bag; pour boiling water gradually over it, and when it has all drained through, remove the bag, and send to table. The water should be poured on a little at a time or the strength of the ground coffee will not be thoroughly extracted. When it can be done, coffee should be sent to table in the same pot in which it was made, as this will prevent its getting cool; and coffee for breakfast is nothing to speak of if it is not hot. Time, 2 or 3 minutes. The old style is to take 1 teacupful of ground coffee; moisten with the white of an egg and cold water stirred well together; pour on boiling water; set it on the stove, and let it boil up 3 times; stir it down twice with a spoon; but the third time pour in ½ cup of cold water; let it stand 2 or 3 minutes and serve boiling hot. Another way is as follows: (*Cafe au Lait.*) Add to a large proportion of good hot milk, about 6 tablespoonfuls of strong coffee, being quite sufficient for a breakfast cupful of milk. Of the essence, 2 tablespoonfuls to the cup is sufficient. A little cream mixed with the milk, if the latter cannot be depended on for richness, improves the taste of the coffee, so also the richness of the beverage.

COFFEE, Substitutes for.—1. Collect dandelion roots at the end of the year; dry them at a gentle heat and reduce to powder. Some mix

coffee with it; others roast the root in the manner of coffee, but probably at the expense of its medicinal virtues. When reduced to powder, it is well to mix coffee with it when used. If it is necessary to give it more color and flavor, mix with it a sufficient quantity of roasted chicory, not exceeding ⅓ of the whole.—2. Cut dry beet root into very small pieces; gradually heat it in a close pan over the fire for about 15 minutes; introduce a little sweet fresh butter, and bring it up to the roasting heat. When fully roasted, take it out, grind, and use like coffee.—3. Take good wheat bran; mix with molasses until just lightly wet by thorough stirring; put in a hot oven on shallow tins; let it brown like coffee; stir often; when brown it is ready for use.—4. Roast rye with a little butter, and grind to powder.—5. Make coffee from the raspings of the crust of loaves of bread, procured at the baker's.—6. Roast horse beans along with a little honey or sugar. When roasted, add a small quantity of cassia buds and stir the whole until cold.

COFFEE, To Roast.—Never buy ground coffee if you can get any other. Coffee loses its aroma so rapidly after it is ground that it is worth your while to buy it whole, either in small quantities, fresh-ly roasted, or raw, and roast it yourself. You can roast in a pan in the oven, stirring every few minutes, or in the same upon the top of the range. Stir often, and roast quickly to a bright brown, not a dull black. While still hot, beat up the white of an egg with a tablespoonful of melted butter, and stir up well with it. This will tend to preserve the flavor. Grind just enough at a time for a single making.

COFFEE. To Settle.—The most common mode of settling coffee is by adding the white of an egg, in which case the yolk may be utilized by beating and stirring it into the milk designed for the coffee. A piece of isinglass or fish skin may be used. Another method is to dip a cloth in cold water and wrap it around the hot coffeepot, and the coffee will clear rapidly. If the egg-shells are thrown into the coffee, they will settle it as well as if the white were used.

CREAM FOR COFFEE, Substitutes for.—1. Beat 1 egg; sweeten with 1 spoonful of sugar; pour over this 1 pt. of water; make over night for use in the morning.—2. Beat 3 eggs with 2 oz. of sugar, and a small piece of butter, until the combination is complete; add warm milk, 1 pt.; put the vessel into another containing hot water; stir it one way until it acquires the consistence of cream.—3. Mix ½ tablespoonful of flour with a pint of new milk; let it simmer for 5 minutes; beat up the yolk of 1 egg; stir it into the milk while boiling, and run it through a sieve.

SAGO MILK.—Sago, 1 oz.; cold water, 1 pt.; macerate ½ hour; pour off the water; add of milk, 1½ pts.; boil slowly until the sago is dissolved.

TEA.—After the use of tea the mind is clear, the imagination active, the senses alert, and the disposition to exert oneself increased. Too great an indulgence is followed by subsequent reaction; but it so far retards the action of the vital functions as to partially prevent the assimilation of food by the digestive organs. Therefore, the old, who require less vital force than the young and middle aged because they waste less, should use it freely, but it should be used sparingly by persons who draw constantly upon their vitality. Avoid it in the morning when the entire system requires all the nutriment it can assimilate from the morning meal.

TEA, Iced.—1. Make the tea in the morning, very strong, and do not allow it to steep too long; keep in the ice box till the meal is ready; then put in a small quantity of cracked ice.—2. Place the tea in a pitcher in the morning with just enough cold water to cover it; at dinner time fill the pitcher with cold water from the well, before serving with ice.

TEA, Preparation of.—A silver or metal teapot is better than an earthenware one for drawing out the flavor and strength of the tea. The amount of tea used must depend upon the quantity required. The old-fashioned allowance is a very sensible one, that is, 1 large teaspoonful for each of the company, and 1 for the teapot. Before making the tea, pour ½ pt. of boiling water into the teapot, and let it stand for 2 minutes. Pour it out, and immediately put in the tea. Close the lid, and let it remain for a minute to heat; then pour upon it ½ pt. of boiling water. Let it stand for 3 minutes, add sufficient boiling water to fill the teapot, and the tea will be ready for use. Be careful not to drain all the liquor from the pot so long as it is necessary to continue to add boiling water, or the tea will be very weak, and if it is desirable to add a little fresh tea, let it be brewed separately in a teacup before it is added to that which is already made, as its strength will not be drawn out if it is put upon the old leaves. Perhaps it is unnecessary to say, unless the water is really boiling when it is put upon the tea there will be no good tea. Boiling after the tea is made injures the flavor, either by deadening or making it rank. Another way is to make a strong infusion by pouring boiling water upon the tea, and let stand 20 minutes, putting into each cup no more than is necessary to fill it about ⅔ full; then each cup is filled with hot water from an urn or kettle; thus the tea is always hot and equally strong to the end.

Condiments and Flavoring Essences.

REMARKS.—Cooking is much nicer if it is seasoned with herbs and spices. These cost very little. The best kinds are sage, thyme, sweet marjoram, tarragon, mint, sweet basil, parsley, bay leaves, cloves, mace, celery seed and onions. If you plant the seed of any of these in little boxes on your window sill, or in a sunny spot in the yard, you can generally raise all you need. Gather and dry them as follows: Parsley and tarragon should be dried in June

and July, just before flowering; mint in June and July: thyme, marioram and savory in July and August; basil and sage in August and September. Gather the herbs in the sunshine and dry by artificial heat. Their flavor is best preserved by keeping them in air-tight cans or in tightly corked glass bottles. Flavoring essences are made, either by dissolving 1 fl. oz. of the essential oil of the particular substance in 1 pt. of rectified spirit, or by digesting 4 to 6 oz. of the bruised spice, or 5 to 10 oz. of the dried herb in a like quantity of spirit. There are a few leaves which are little known as flavoring essences, yet as such they are excellent. Peach, almond and laurel leaves are all richly charged with the essence of bitter almonds. Make an infusion of either green or dry leaves and use a teaspoonful of the flavoring liquid. The leaves of cucumbers have a flavor like the fruit. The external leaves of the celery and the young leaves of gooseberries are excellent.

ALLSPICE. Essence of.—Essential oil of pimento or allspice, 1 fl. oz.; strongest rectified spirit of wine, 1 pt.; agitate until perfectly united; the next day decant the clear portion, if there is any sediment.

ALMONDS. Essence of.—1. 1 fl. oz. essential oil of almonds; 7 fl. oz. of rectified spirit.—2. Distil the residue of the almonds after the oil has been expressed from them.

ANCHOVIES, Essence of.—1. Beat 1 lb. of anchovies in a Wedgewood mortar; put them into a pipkin with 4 oz. of vinegar; boil for a few minutes; rub the pulp through a hair sieve; boil the bones in 1½ lbs. of water; strain, and add 2 oz. of salt, 2 oz. of flour of starch, and the pulped anchovies; let it boil; pass it through a hair sieve; color with powdered bole, or with annatto.—2. Simmer anchovies in their own weight of water for 2 or 3 hours, removing any scum that may rise; strain with pressure through a strong canvas bag; filter through flannel. This has the pure flavor of the fish, but add a little cayenne and salt to preserve it.

ANCHOVY SAUCE.—1. Stir 2 or 3 teaspoonfuls of prepared essence of paste of anchovy into 1 pt. of melted butter; let the sauce boil a few minutes; flavor with lemon juice.—2. 3 or 4 anchovies, chopped small; butter, 3 oz.; water, 1 wineglassful; vinegar, 2 tablespoonfuls; flour, 1 tablespoonful; stir the mixture over the fire till it thickens; rub it through a coarse hair sieve.

APPLE, Essence of. — 1. An alcoholic solution of valerianate of amylic ether in the proportion of 1 part to 6 or 8 of alcohol, forms a flavoring liquid under the name of apple essence.—2. 2 parts of aldehyd; chloroform, acetic ether, nitrous ether and oxalic acid, of each 1 part; glycerine, 4 parts; amyl-valerianic, 10 parts.

APRICOT, Essence of.—Butyric ether, 1 parts; valerianic ether, 5 parts; glycerine, 4 parts; amylic alcohol, 2 parts; amyl-butyric ether, chloroform, œnanthic ether and tartaric acid, of each 1 part.

ARISTOCRATIQUE SAUCE. — Green walnut juice and anchovies, equal parts; cloves, mace, and pimento, of each, bruised, 1 dr. to every lb. of juice; boil and strain; add to every pt. 1 pt. of vinegar, ½ pt. of port wine, ½ pt. of soy, and a few shallots; let the whole stand for a few days; decant the clear liquor.

ASPIC.—2 calf's feet; 4 lbs. veal; 3 lbs. ham; 2 large onions; 3 carrots; 1 gal. water; boil 5 or 6 hours, or until reduced to less than ½; strain; when cold, put the jelly into a stewpan with the whites of 4 eggs well beaten, a large bunch of savory herbs, 3 blades of mace (in shreds), a teaspoonful of white peppercorns, and sufficient salt; keep it well stirred until pretty hot; then let it gently simmer for about 15 minutes; after settling, pass it through a jelly bag till quite clear; cool a little; or cool, and at any time remelt.

BACON DRESSING.—Cut ½ lb. bacon fat into slices, then into very small pieces; fry them until the oil extracted is a light brown; remove the pan from the fire and add the juice of a lemon, a wineglassful of strong vinegar and a saltspoonful of pepper; pour it over the salad with the pieces of bacon.

BARBERRY, Essence of. — Strip barberries; cover them with water; put them over the fire, and be careful they do not burn; don't boil them; but when cooked, squeeze and strain them carefully; to 1 pt. of warm juice add 2 pts. of sugar; put the sweetened juice into a pitcher, which pitcher put into hot water until the juice is dissolved; bottle it.

BASIL WINE.—Green basil leaves, 4 or 5 oz.; sherry, cape or raisin wine, 1 pt.; digest for 10 days; press and strain; use it to give a turtle flavor to soups and gravies.

BASSETT SAUCE. — 1 pt. of water; a large teacup of sugar; butter the size of an egg; little nutmeg and essence of lemon; bring to a boil; take a little flour or corn starch well beaten into a thin paste; stir in until of the consistency wished; add a large tablespoon of vinegar.

BECHAMEL SAUCE.—Mix cold, and well together, in a tin saucepan, 2 oz. of butter and a tablespoonful of flour; add a pt. of milk; stir continually, and when thickened take off the fire; beat the yolk of an egg in a cup, with a teaspoonful of water; turn into the sauce and mix well; salt a little, and add pepper for vegetable; for puddings, add instead nutmeg and brandy or wine.

BENGAL CHINTI.—1½ lb. chillies; 1 lb. unripe mangoes; 2 lbs. red tamarinds; 1 lb. sugar candy; 1½ lbs. fresh ginger root; 1½ lbs. garlic; 1½ lbs. sultana raisins; 1 lb. fine salt; 5 bottles best vinegar. Soak the chillies for an hour in the vinegar; grind all with a stone and muller to a paste.

BROWNING.—1. 4 oz. sugar; 1 oz. butter; melt these in a frying pan or ladle with about a tablespoonful of water. Continue the heat until the whole is a dark brown; then lower the head and pour in gradually 1 pt. port wine; now remove the pan from the fire; stir the mixture well until the roasted sugar is entirely dissolved; then bottle. Add ½ oz. each of bruised pimento and black pepper; 5 or 6 shallots, cut small; a little mace and finely grated lemon peel, and ¼ pt. mushroom catsup. Shake the bottle daily for a week. Let it alone 5 or 6 days

and then decant into another bottle.—2. Put into a tin or porcelain saucepan ½ lb. of white sugar and a tablespoonful of water; stir over a slow fire until of a clear, dark brown color; do not let it burn; add a teacupful of water and a teaspoonful of salt; boil 3 or 4 minutes; cool; strain, and put away in closely corked bottles.

CAMP VINEGAR.—1. 12 chopped anchovics; 2 cloves of garlic minced; 1 dr. of cayenne; 2 oz. of soy; 4 oz. of walnut catsup; a pt. of the best vinegar; digest for a month and strain. —2. Vinegar, 1 qt.; walnut catsup, 1 pt.; mushroom catsup, 4 tablespoonfuls; garlic, 4 heads; cayenne, ½ oz.; soy, 2 tablespoonfuls; port wine, 2 glasses; 3 anchovies; a tablespoonful of salt; put them into a bottle; shake daily for a month, and decant.

CAPER SAUCE. — Put 12 tablespoonfuls of melted butter into a stewpan; place it on the fire; when on the point of boiling, add 1 oz. of fresh butter and 1 tablespoonful of capers; shake the stewpan round over the fire until the butter is melted; add a little pepper and salt.

CARAWAY, Essence of. — Bruised caraway seed, 1 oz.; rectified spirit, 8 oz.; oil of caraway, ¼ oz.; brown sugar, ½ oz.; digest for 8 or 10 days, and filter.

CARRAC SAUCE.—2 heads of garlic sliced; 5 spoonfuls of soy; 5 spoonfuls of mushroom catsup; 8 spoonfuls of walnut pickle; 15 anchovies, or 5 spoonfuls of essence of anchovies; 3 spoonfuls of mangoe pickle; 1 qt. of vinegar; mix in a bottle, and set in the chimney corner; shake daily for a month.

CATCHUP, CATSUP, or KETCHUP.—1. (*Beer.*) Take of good old beer, 2 qts.; white wine, 1 qt.; anchovies, 4 oz.; mix; heat to a boil; remove it from the fire; add of peeled shallots 3 oz.; mace, nutmegs, ginger and black pepper, of each, bruised, ½ oz.; macerate for 14 days, with frequent agitation; allow it to settle; decant and bottle the clear portion.—2. (*Cherry.*) 1 pt. of cherry juice; ¾ lb. of sugar; a teaspoonful each of ground cloves and cinnamon, with a dash of cayenne pepper; boil until a thick syrup; bottle and seal.—3. (*Cold.*) Take ½ peck of ripe tomatoes, cut fine; 1 small cup of grated horse radish, and the same of salt and black and white mustard seeds mixed; 2 tablespoonfuls of black pepper; 2 red peppers, without the seeds, and 3 celery stalks, all chopped fine, or celery seed; 1 cupful of nasturtiums and onions, mixed and chopped; 1 teaspoonful of ground cloves; 2 teaspoonfuls cinnamon; 1 teaspoonful mace; 1 teacup brown sugar; 1 qt. best cider vinegar; mix well and put in air-tight jars; do not heat it.—4. (*Cucumber.*) 1 bush. of table-sized green cucumbers; pare and grate them on a large grater into a sieve; squeeze and drain the pulp till very dry; add black pepper and salt; rub in thoroughly with the hands. Fill ordinary fruit jars half full of pulp; take white wine vinegar, let it come to a boil, and fill the jars; stir thoroughly, and seal the jars while hot. Put a tablespoonful of oil on top each jar to keep it air-tight.—5. (*Currant.*) 5 pts. of ripe currants; 3 pts. of sugar; 1 pt. of vinegar; 1 tablespoonful each of cinnamon, cloves, allspice and black pepper; ½ tablespoonful of salt; boil all together for ½ hour.—6. (*Gooseberry.*) 10 lbs. of gooseberries; 7 lbs. of sugar; 3 pts. vinegar; add cinnamon, cloves and allspice to suit the taste; boil slowly for 2 hours; put the sugar in last, and let it boil for a short time only.—7. (*Grape.*) 5 lbs. of fruit; 3 lbs. of coffee sugar; 1 pt. of vinegar; 1 tablespoonful of cinnamon; 1 of allspice; 1 of black pepper; ½ of cloves, all ground, and ½ of salt; pulp the grapes, and boil the skins in clear water until tender; boil the pulps separately; strain to remove the seeds; mix the spices in a little cold vinegar; put all together; boil about 5 minutes.—8. (*Mushroom.*) Take the full-grown flaps of freshly-gathered mushrooms; crush them with the hands; throw a handful of salt into every peck, and let them stand a night or two; put them into pans and set them in a quick oven for 12 hours; strain them through a hair sieve and press out all the juice; to every gallon of liquor put of cloves, Jamaica pepper, black pepper and ginger, 1 oz. each, and ½ lb. of common salt; set it on a slow fire and let it boil until half the liquor is wasted; put it into another vessel; when cold, strain and bottle it; cork up closely and cover the cork with oiled paper.—9. (*Oyster.*) Open 100 oysters and preserve all their liquor; add to them 1 lb. of anchovies, 3 pts. white wine, and 1 lemon sliced with half the peel; let this boil gently ½ hour; strain it through muslin; add to it cloves and mace, ½ oz. each, and 1 grated nutmeg; let it boil ½ hour more; add to it 2 oz. of eschalots; when cold, bottle it with the spice and eschalots.—10. (*Pontac.*) Take of the juice of elderberries and strong vinegar, of each 1 pt.; anchovies, ½ lb.; shallots and spice, q. s., to flavor; boil for 5 minutes; cool, strain and bottle. Use to make fish sauces.—11. (*Red Pepper.*) Cut up red peppers and place them in a preserving kettle until it is full; cover with the best cider vinegar and boil until the peppers have dropped to pieces; after removing from the fire, as soon as the sauce is cool enough, rub it through a wire sieve; it is better without salt or any other condiments; put up for use in large mouthed bottles or jars.—12. (*Tomato.*) Select fair ripe tomatoes; cut out all blemishes, also the hard parts about the stem end; slice them into a porcelain kettle; fill in full; add a red pepper and put the kettle over a slow fire to stew; gradually stir to prevent burning; when reduced to half the original quantity, strain the whole through a common wire sieve; to 5 lbs. of the pulp add 1½ lbs. of sugar, 1 pt. of cider vinegar, 1 tablespoonful of cloves, 1 of allspice, 2 of cinnamon, 1 of salt; put the mixture back over the fire and boil until the thickness suits.—13. (*Walnut.*) Boil or simmer 1 gal. of the expressed juice of walnuts, when they are tender; skim it well; put in 2 lbs. of anchovies, bones and liquor, ditto of shallots, 1 oz. of cloves, ditto of mace, ditto of pepper, and 1 clove of garlic; let all simmer till the shallots sink; bottle, and divide the spice to each; cork closely; tie the bladder over, and put it in small bottles.

CAYENNE, Essence of.—Put ½ oz. of cayenne pepper into ½ pt. of brandy; let it steep for a fortnight; then pour off the clear liquor.

CEDRAT, Essence of.—Press the yellow part of citron peel between two glass plates, and distil the flowers of the citron-tree.

CELERY, Essence of.—Celery seed, ½ oz. to 1 oz.; brandy, 4 oz.; digest for 8 or 10 days, and filter.

CELERY SALT.—Sift 4 oz. of finely powdered celery seed with an equal quantity of fine salt; put into bottles; cork tightly, and use for seasoning soups, salads, and warmed up meats.

CELERY SAUCE.—Put 2 oz. of butter into a saucepan; melt it; add 2 heads of celery cut up into inch pieces; stir the celery in the pan until it is quite tender; add salt and pepper with a little mace; mix 1 tablespoonful of flour in 1 cupful of stock and simmer ½ hour; a cupful of cream may be used instead of the stock.

CHERRY, Essence of.—1. Benzoic ether, 5 parts; acetic ether, 10 parts; oil of persico (peach kernels) and benzoic acid, each 2 parts; oxalic acid, 1 part.—2. To 5 parts acetate of ethyl, 5 parts benzoate of ethyl, 1 part œnanthylate of ethyl, and 1 part saturated solution of benzoic acid in alcohol, add 3 parts glycerine.

CHERVIL SAUCE.—Put a few mushrooms, parsley, chervil, shallots, 2 cloves, a bay leaf, and a few tarragon leaves, into some melted butter; let them soak for some time; add a little broth, white wine, pepper and salt; reduce it to a proper thickness, but do not skim it; when done, put in some chervil scalded and chopped; warm it all up together.

CHESTNUT SAUCE.—Use very large Spanish chestnuts; cut a slice in the side of each; roast them well; peel the nuts and put them into a saucepan of rich melted butter. If you use American chestnuts, boil them till quite soft; peel them and thicken the melted butter with them.

CHILI SAUCE.—Take 2 qts. of ripe tomatoes, 4 large onions, and 4 red peppers; chop them together; add 4 cups of vinegar, 3 tablespoons of brown sugar, 2 tablespoons of salt, 2 teaspoons each of cloves, ground cinnamon, ginger, allspice, and nutmeg; boil all together for 1 hour; bottle for use after straining through a sieve or coarse netting.

CHUTNEY SAUCE.—Sour apples (pared and cored), tomatoes, brown sugar, sultana raisins, of each 3 oz.; common salt, 4 oz.; red chillies and powdered ginger, of each, 2½ oz.; garlic and shallots, of each 1 oz.; pound the whole well; add, of strong vinegar, 3 quarts; lemon juice, 1 do.; digest, with frequent agitation, for a month; pour off nearly all of the liquor, and bottle it. Use for fish or meat, either hot or cold, to flavor stews, etc.

CINNAMON, Essence of.—Bruised cinnamon, 2 dr.; oil of cinnamon, 1 dr.; highly rectified spirit, 3 oz.; digest and strain.

CINNAMON, Tincture of.—Bruised cinnamon, 3 oz.; a bottle of Cognac brandy; digest for a fortnight, and strain.

CREAM DRESSING.—Where oil is disliked in salads, rub the yolks of 2 hard-boiled eggs fine with a spoon; mix with them a dessertspoonful of made mustard; stir in a tablespoonful of melted butter, ½ teacupful of thick, sweet cream, a saltspoonful of salt, and a pinch of cayenne pepper with vinegar enough to reduce all to a smooth creamy state; pour it upon lettuce or other salad ready for the table.

CURRY POWDER.—1. Coriander seed, 6 dr.; turmeric, 5 oz.; fresh ginger, 4½ dr.; cumin seed, 18 gr.; black pepper, 54 gr.; poppy seed, 54 gr.; garlic, 2 heads; cinnamon, 1 oz.; cardamom, 5 seeds; 8 cloves; 1 or 2 chillies; ½ cocoanut, grated; all but the last ground on a stone.—2. Coriander-seed, ½ lb.; turmeric, ½ lb.; cinnamon seed, 2 oz.; cayenne, ½ oz.; mustard, 1 oz.; ground ginger, 1 oz.; allspice, ½ oz.; fenugreek seed, 2 oz.; dry all thoroughly; pound in a mortar; rub through a sieve, and mix together.

CURRY VINEGAR.—Infuse 3 oz. of curry powder in a quart of vinegar, near the fire, for 3 days.

DEILLETS, Essence of.—3 oz. cinnamon; cloves, 1½ oz. (both well bruised); rectified spirit, 1 qt.; digest for a week.

DRAWN BUTTER SAUCE.—Season 1 cupful of flour with salt, pepper, and a pinch of nutmeg; mix it with some water into a paste; work in a piece of butter about the size of an egg; put the pan over the fire and boil for 20 minutes; take it off, and add some fresh butter in small portions at a time; stir continually to prevent the butter from rising to the top; add the juice of ½ lemon before serving.

DUTCH SAUCE.—Blend together 2 oz. of butter and a teaspoonful of flour; put it into a stewpan with equal quantities of stock and vinegar; stir for 2 minutes; add the beaten yolks of 2 eggs; keep up the stirring till the mixture thickens; if you let it boil it will curdle; add the juice of ½ lemon before serving.

EGG SAUCE.—Put 2 oz. of butter into a saucepan with a dessertspoonful of flour and a very little water; simmer gently; when ready to boil take the saucepan from the fire and stir in 2 oz. more of butter and 3 cold hard-boiled eggs cut up small; sprinkle a little salt on the egg.

FLAVORING ESSENCE.—Purified oil of bitter almonds, 8 drops; essence of lemon, 12 drops; oil of cinnamon, 8 drops; oil of nutmeg, 4 drops; highly rectified spirit, 1 oz.; add a few drops to puddings, custards, etc.

FRENCH DRESSING.—3 tablespoonfuls of oil to 1 of vinegar; 1 saltspoon heaping full of salt; an even saltspoonful of pepper mixed with a little cayenne.

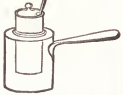
GARLIC SAUCE.—3 or 4 garlics; divide and boil in a little white vinegar and white stock, with a small piece of lean ham; when reduced, strain it off; add either white or brown sauce to the liquor; season with salt, pepper, and sugar; but leave out the vinegar.

GINGER, Essence of.—1. Fresh grated ginger, 3 oz.; fresh thin lemon peel, 2 oz.; brandy, 1½ pts.; macerate for 10 days.—2. Unbleached Jamaica ginger (bruised), 5 oz.; rectified spirit, 1 pt.; digest a fortnight; press, and filter.—3. The best Jamaica or China ginger, 2 oz.; proof spirit, 1 pt.; powder the ginger; mix it with the spirit; stop close; let it steep for 12 or 14 days.

GLAZE.—Gravy or clarified soups boiled until it gelatinizes on cooling. It is used as a species of varnish to cover various dishes for the table; may be spiced and flavored according to the fancy of the cook. White of egg is gener-

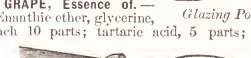
ally used as glaze for pastry, applied by a brush.

GOOSEBERRY, Essence of.—To 1 part aldehyd, 5 parts acetate, 1 part benzoate, and 1 part œnanthylate of ethyl, add 5 parts saturated solution of tartaric and 1 each of succinic and benzoic acids.



Glazing Pot.

GRAPE, Essence of.—Œnanthic ether, glycerine, each 10 parts; tartaric acid, 5 parts; succinic acid, 3 parts; aldehyd, chloroform, and formic ether, each, 2 parts; methyl-salicylic ether, 1 part.



Glazing Brush.

HARVEY SAUCE.— Chop 12 anchovies, bones and all, very small, with 1 oz. of cayenne pepper, 6 spoonfuls of soy, 6 ditto of good walnut pickle, 3 heads of garlic chopped not very small, ¼ oz. of cochineal, 2 heads of shallots chopped rather large, and 1 gal. of vinegar; let it stand 14 days; stir it well twice or thrice every day; pass it through a jelly bag; repeat this till it is quite clear; then bottle it; tie a bladder over the cork.

HIGDUM.—4 qts. of green tomatoes; 1 pt. of green peppers; 1 pt. white onions; all measured after chopping fine; add 1 pt. white mustard seed, 2 teacups fine salt, and 4 tablespoonfuls of ground cloves; let it stand over night; strain off the liquid; pour over sufficient boiling vinegar to cover the whole; put in bottles or cans, and cork closely.

HOT SPICE.—A delicious adjunct to gravies, steaks, chops and soups. 3 dr. each of ginger, black pepper, and cinnamon; 7 cloves; 1 oz. of mace; 1 of cayenne; 1 of grated nutmeg; 1 of white pepper; pound together; mix till well blended; then put in a perfectly clean, dry bottle for use.

KITCHENER'S SAUCE.—Salt, 3 oz.; black pepper, 2 oz.; allspice, horseradish, and shallots, of each, 1 oz.; burnt-sugar coloring, 1 wineglassful; mushroom ketchup, 1 qt.; bruise and scrape all; macerate for 3 weeks; strain and bottle.

LEMON, Essence of.—1. Fresh oil of lemons, 1 fl. oz.; deodorized alcohol (strongest flavorless rectified), 8 fl. oz.; exterior yellow rind of lemons (fresh), ½ oz.; digest 48 hours; filter.—2. To 1 part chloroform, 1 part nitric ether, 2 parts aldehyde, 10 parts acetate of ethyl, 10 parts valerianate of amyl, 10 parts saturated solution of tartaric acid, and 1 of succinic acid, add 5 parts of glycerine.

MAYONNAISE SAUCE.—Rub the yolks of 3 hard-boiled eggs with the yolk of 1 raw egg to a smooth paste; add a heaping teaspoonful of salt, 2 saltspoonfuls of white pepper, and 2 saltspoonfuls of made mustard; mix thoroughly and work a gill of oil gradually into the mixture, alternated with a teaspoonful of tarragon vinegar until you have used three tablespoonfuls of vinegar; if the sauce appear too thick, add a wineglassful of cream to it gradually.

MELON ESSENCE.—2 parts aldehyde; 1 part formiate; 4 parts butyrate; 5 parts valerianate of ethyl; 10 parts sebaic ether; 3 parts glycerine.

MINT SAUCE.—Wash the sprigs of mint; let them dry on a towel; strip off the leaves; chop them very fine; put in a sauce boat with a cupful of vinegar, a little salt and pepper, and 4 lumps of sugar; let it stand 1 hour; before serving, stir all together.

MUSHROOM SAUCE. — Have ready some cream sauce, rather thinner than usual; to this put a few small white mushrooms; reduce it to the proper consistence.

MUSTARD SAUCE.—1. Best flour of mustard, 2 lbs.; fresh parsley, chervil, celery and tarragon, of each ½ oz.; garlic, 1 clove; 12 salt anchovies (all well chopped); grind well together; add salt, 1 oz.; sweeten with grape juice or sugar; sufficient water to form the mass into a thinnish paste by trituration in a mortar; put into pots; thrust a red hot poker into each; and pour a little vinegar upon the surface.—2. Pour a very little boiling water over 3 tablespoonfuls of mustard; add 1 saltspoonful of salt; a tablespoonful of olive oil; stir slowly in; add 1 teaspoonful of sugar and the yolk of 1 egg; beat well together, and pour in vinegar to taste.—3. 1 cup of sugar; 1 cup of vinegar; 1 tablespoonful of butter; 4 eggs, and 1 tablespoonful of mustard; beat the eggs well; mix all together; turn into a new tin pail or basin and boil in water to a cream; strain through a thin cloth and it is done.

NUTMEG, Essence of.—Use essential oil of nutmeg, and proceed as for essence of allspice.

ONION SAUCE.—Boil the onions till they are tender; then squeeze the water from them; chop them; add butter that has been melted, rich and smooth, with a little good milk instead of water; give it one boil; serve it with boiled rabbits, partridges, scrag or knuckle of veal, or roast mutton; a turnip boiled with the onions draws out the strength.

ORANGE, Essence of.—1. Fresh yellow rind of orange, 4 oz.; rectified spirit and water, of each ½ pt.; digest for a week; press, filter and add of sherry wine, 1 qt.—2. To 2 parts aldehyde, 5 parts acetate of ethyl, 1 part each of formiate, butyrate, and benzoate of ethyl, 1 part salicyate of methyl, 10 parts essence of orange, 1 part saturated solution of tartaric acid, add 10 parts glycerine.

OYSTER FLAVOR.—Take fresh, large, plump oysters; beard them, and place them in a vessel over the fire for a few moments, in order to extract the juice; put them to cool; chop them very fine with powdered biscuit, mace and finely minced lemon peel; pound them until they become a paste; make them up into thin cakes; place them on a sheet of paper in a slow oven; let them bake until they become quite hard, pound them directly into powder, and place the powder in a dry tin box, well covered; keep in a dry place.

PEACH, Essence of.—Formic ether, valerianic ether, butyric ether, acetic ether, glycerine and oil of persico, each 5 parts; aldehyd, amylic alcohol, each 2 parts; sebaeylic ether, 1 part.

PEAR. Essence of.—Acetic ether, 5 parts; amyl-acetic ether and glycerine, each 2 parts.

PEPPERMINT, Essence of.— 1. A spirituous solution of the essential oil obtained by distillation and colored with spinach leaves.—2. Dissolve 1 oz. oil of peppermint in 15 oz. of strong alcohol; add 2 dr. peppermint in coarse powder, and after macerating 24 hours filter through paper.

PEPPER SAUCE.—Take 2 doz. peppers; cut them up fine, with double the quantity of cabbage; 1 root of horseradish grated; 1 handful of salt; 1 tablespoonful of mustard seed; 1 tablespoonful of allspice; 1 dessertspoonful of cloves; 2 tablespoonfuls of sugar, and a little mace; boil the spice and sugar in 2 qts. of the best cider vinegar, which, as soon as removed from the fire and while yet boiling, pour over the other ingredients; when cold, put it in jars; cover close and keep in a cool place.

PINEAPPLE, Essence of.—1. Butyric ether, 1 oz.; alcohol, 10 oz.; tincture of fresh lemon peel, 2 oz.; tincture of fresh orange peel, 2 oz.; rose water, 2 oz.; mix, and keep for 24 hours in a warm place; set aside for 3 days in a cool place; filter; 15 drops are sufficient for 1 qt. of pineapple lemonade.—2. To 1 part chloroform, 1 part aldehyde, 5 parts butyrate of ethyl, and 10 parts butyrate of amyl, add 3 parts glycerine and 100 parts alcohol.—3. Oil of pineapple, 1 dr.; tartaric acid, 1 dr.; simple syrup, 6 pts.—4. Pineapple juice (by expression), 1 gal.; sugar, 15 lbs.; fruit acid, 2 oz.

PORK SAUCE.—Cut 2 or 3 good sized onions into slices; fry them lightly; add a little broth, a few mushrooms chopped, a clove of garlic, vinegar and spice; let it boil ½ hour; reduce to a proper consistency; then skim and strain.

QUINCE, Essence of.—Pelargonate ethylie ether has the odor of the quince, and when dissolved in alcohol in due proportion forms quince essence.

RASPBERRY, Essence of.—1. Tincture of orris root (1-4), 2 oz.; acetic ether, 2 oz.; butyric ether, 1 dr.; spirit of nitrous ether, 1 oz.; chloroform, 1 dr.; glycerine, 1 oz.; alcohol 1 pt.; water enough to make 2 pts.—2. To 1 part each of nitric ether, aldehyde, formiate of ethyl, butyrate of ethyl, benzoate of ethyl, œnanthylate of ethyl, sebaic ethyl, salicylate of methyl, acetate of amyl, butyrate of amyl and succinic acid, and 5 parts each of acetate of ethyl and tartaric acid, add 4 parts of glycerine and 100 parts alcohol.

SALAD DRESSING.—Beat 2 eggs; add a piece of butter the size of ½ an egg; ½ teaspoonful of mustard, rubbed smooth in a little water; 4 tablespoonfuls of vinegar, and ½ teacup of boiling water; set it in a bowl in the top of the teakettle; stir occasionally till of the consisteney of cream.

SAUCE AU ROI.—Good brown vinegar, 3 qts.; soy and walnut ketchup, of each ½ pt.; cloves and shallots, of each 1 doz.; cayenne pepper, 1½ oz.; mix, and digest for 14 days.

SAUCE ROBERT.—Put 2 medium-sized onions, chopped very fine, with a large lump of butter in a stewpan; let them brown well, constantly stirring; add a teaspoonful of flour mixed with ½ pt. of good stock; salt and pepper; cook about 5 minutes; add a teaspoonful of mixed mustard and one of vinegar.

SOUP HERB SPIRIT.—Use prime thyme, sweet marjoram, sweet basil and summer savory; when thoroughly dried, pound and sift them; steep in brandy for a fortnight; the spirit will then be fit for use.

SOY.—Boil 1 gal. of the seeds of Dolichos soja till soft; add 1 gal. of bruised wheat; keep them in a warm place for 24 hours; add 1 gal. of salt and 2 gal. of water; after keeping them bunged up in a stone jar for 2 or 3 months press out the liquor. White haricots or kidney beans are good substitutes for Dolichos soja.

SPIRIT OF SAVORY SPICES.—Black pepper, 1 oz.; allspice, ½ oz.; nutmeg, ½ oz. (all pounded); infuse in 16 fl. oz. of brandy for 10 days.

STRAWBERRY, Essence of.—Butyric ether and acetic ether, each 5 parts; amyl-acetic ether, 3 parts; amyl butyric ether and glycerine, each 2 parts; formic ether, nitrous ether and methyl-salicylic ether, each 1 part.

SYRUP OF SUGAR.—To 1 lb. of crushed sugar put 1 pt. water; let boil slowly 10 minutes; skim well; squeeze the juice of ½ lemon in it; beat the white of 1 egg up very light; add to it 1 gill of cold water; stir it gradually into the boiling sugar; strain through a fine cloth.

TARRAGON VINEGAR.—Put fresh tarragon leaves into a stone jar; pour on them a sufficient quantity of the best wine vinegar to cover them; set the jar in a warm place for 14 days; then strain through a jelly bag.

TOMATO SAUCE, Preserved.—1. ½ a peck of ripe tomatoes, peeled and drained through a colander 24 hours, then made fine; put to them 1 small teacupful of salt, 1 full cupful of sugar, 1 cupful of white mustard seed, 1 gill of masturtium seed, 4 tablespoonfuls of horseradish, 2 doz. stalks of celery chopped up fine, or ½ oz. celery seed, 2 tablespoonfuls of ground black pepper, 1 qt. of good vinegar; do not boil; stir well, and bottle for use.—2. To 2 gals. of peeled and sliced green tomatoes put 5 tablespoonfuls of mustard, 3 gills of mustard seed, 2½ tablespoonfuls of black pepper, 2 of allspice, 2 of cloves, 1 gill of salt, 1 qt. of chopped onions, 2 qts. of brown sugar, 5 pts. of vinegar; beat the spice; boil all well together to the consistency of marmalade.

TOMATO SAUCE, Temporary.—(To serve with meats, etc.) Melt in a stewpan a dozen or two ripe tomatoes (which, before putting into the stewpan, cut in two and squeeze the juice and seeds out); then put 2 shallots, 1 onion, with a few bits of ham, 1 clove, a little thyme, 1 bay leaf, a few leaves of mace, and when melted rub them through a tamis; mix a few spoonfuls of good Espagnole and a little salt and pepper with this puree. Boil it for 20 minutes, and serve.

TURTLE, Essence of.— Essence of anchovies and shallot wine, of each, 3 oz.; basil wine, ½ pt.; mushroom ketchup, ½ pt.; the juice of 2 lemons; the yellow peel of 1 lemon; curry powder, ½ oz.; digest for a week. Use to impart the flavor of turtle to soups and gravies.

VANILLA, Essence of.—1. Vanilla (cut small), 2 oz.; rectified spirit, 1 pt.; digest a fortnight.—2. Vanilla, 2 oz.; water, 10 oz.; rectified spirit,

¾ oz.; cut the vanilla in small pieces; pound it fine in a marble mortar, with loaf sugar (about a pound); add the white of an egg and the spirit; put it into a glazed pot; tie a piece of writing paper over it; make a hole in it with a pin; stand the pot in warm water, keeping it at that heat for 24 hours; then strain for use.

WATERLOO SAUCE.—Strong vinegar, nearly boiling, 1 qt.; port wine, ⅜ pt.; mushroom ketchup, ½ pt.; walnut ketchup, ½ pt.; essence of anchovies, 4 oz.; 8 cloves of garlic; cochineal, powdered, ½ oz.; or red beet, sliced, 3 oz.; let them stand together for a fortnight or longer, occasionally shaking the bottle.

WESTPHALIAN ESSENCE.—1. Crude or empyreumatic pyroligneous acid, 1 pt.; sugar coloring, 2 oz.; dissolve; in a week decant the clear portion.—2. Tar, 3 dr.; sugar coloring, 2 oz.; hot crude pyroligneous acid, 1 pt.; agitate constantly for 1 hour; after repose decant the clear portion.

WHEY POWDER.—1. Gently evaporate whey to dryness; powder with about ½ its weight of lump sugar.—2. Sugar, 7 oz.; sugar of milk, 2 oz.; gum Arabic, 1 oz.; all in fine powder; mix well; 1 oz. dissolved in 1¼ pt. of water forms extemporaneous whey.

WORCESTERSHIRE SAUCE.—Mince 2 cloves of shallot, put the mince into a dry bottle, and pour over it a pint of Bordeaux vinegar; add 3 tablespoonfuls of essence of anchovy, 3 tablespoonfuls of walnut ketchup, 2 tablespoonfuls of soy, and as much cayenne as is approved; the quantity cannot be given, as cayenne varies so much in quality; cork the bottle, keep it in a cool place, and shake it twice a day for a fortnight; strain the sauce, put it in small bottles, cork closely, and store for use.

Custards, Puddings, Etc.

REMARKS.—Every sort of pudding, whether sweet or savory, should be dressed in a basin instead of in a cloth. To cause them to turn out well, rub the inside of the basin thoroughly with butter. In the preparation of meat puddings never use any meat that is tainted. The gradual heating of the meat will cause the smallest piece of tainted meat to contaminate all the rest. Also, be careful to see that the suet and fat are not rancid. The paste for puddings may be ordinary short paste (see Pastry) or that made with 2 to 6 oz. of butter or lard, or 3 to 8 oz. of chopped beef suet, to each lb. of flour, with or without an egg, and a little sugar. The first is most appropriate for those containing fresh fruit, and that with suet for meat puddings and those containing dried fruit. Milk, or milk and water, is often used instead of simple water to make the dough. Ginger, spices, savory herbs, etc., are common additions to the crusts of puddings. Where economy is an object, kitchen fat is frequently substituted for suet, and lard for butter. When self-raising flour is employed, an excellent plain pudding paste may be made by simply mixing it with very cold water, and immediately putting it into the water, which should be boiling, and kept in that state until the pudding is dressed. The water should boil quickly when the pudding is put in, and care be taken that it continues to do so, or the pudding will be heavy; and it should be moved about for a minute or two, that the ingredients may not separate. A pudding cloth should never be washed with soap, but simply dried as quickly as possible and kept dry and free from dust. Make the pudding bags of stout domestic or white flannel, tightly sewed, and the seam left on the outside. Wring it out of hot water and flour it well on the inside, before putting in the batter. Leave a space of nearly ½ for it to rise; tie tightly. When taken out, dip it in cold water, pulling the open end back over the pudding, letting it slip out without breaking.

ALMOND BREAD.—A loaf of Vienna bread, cut into slices; pound almonds with a little vanilla, and spread between the slices; turn the bread in milk to maintain the crust; tie the slices together and turn the loaf in 1 egg; fry on every side a few minutes in lard; pour over the whole a custard; beat an egg with a little milk; put a little sugar into milk already on the stove; add the egg, and remove as soon as the custard boils; season with cinnamon.

ALMOND CREAM CUSTARD.—Boil 1 qt. of cream; sugar and flavor to taste; blanch ¼ lb. of almonds; beat them fine; add a tablespoonful of rose water; beat well the whites of 9 eggs; add to the almonds; beat well together; mix with the cream; set on the fire, and stir until it almost boils; pour in a bowl and stir until cool; serve in glasses.

ALMOND CUSTARD.—1 pt. milk, half cream; ½ lb. almonds, blanched and powdered to a paste in a Wedgewood mortar; add gradually 2 tablespoonfuls rose water, yolks of 3 eggs and whites of 2, 4 tablespoons sugar; scald the milk; add the beaten eggs, sugar, and almond paste; boil, stirring constantly, till it thickens; make a meringue of the whites of 2 eggs and 2 tablespoonfuls powdered sugar; flavor with bitter almonds, and heap upon the top.

ALMOND PUDDING.—1 cupful of finely minced suet; 1 teacupful of milk; 4 oz. of bread crumbs; 4 oz. of well-cleaned currants; 2 oz. of almonds; ½ lb. of stoned raisins; 3 well-beaten eggs and the whites of 2 others; sugar, nutmeg, cinnamon, and a small glass of rum; butter a shape, and place part of the raisins neatly in rows; blanch the almonds; reserve half of them to be placed in rows between the raisins just before serving; mix all the remaining ingredients well together; put into shape and boil for 3 hours. The sauce: 1 tablespoonful of milk; yolks of 2 eggs, well beaten, and some sugar to taste; put it on the fire and stir it till it comes to the boil; let it cool; when lukewarm stir into it a glass of sherry or currant wine; serve in a sauce tureen.

AMBER PUDDING.—2 lbs. of raw apples; 3

oz. of sugar; 1 gill of cold water; 1 teaspoonful of lemon juice; yolks and whites of 4 eggs; 6 oz. of flour; 2 oz. of butter; ½ teaspoonful of yeast powder; a pinch of salt; put 2 oz. of the sugar in a saucepan, with ½ gill of water; place in the apples, pared and cored; squeeze over them the lemon juice; put the flour in a basin with 2 oz. of butter; rub the butter carefully in the flour; add the yeast powder, salt and remaining ½ gill of water; place the whole on a board and knead lightly together; roll the dough ¼ in. in thickness; wet the edges of a small pie dish with cold water, and line the edges with some of the dough; wet the dough with water or milk; roll the remaining dough thin; with a small cutter cut rounds out of the dough and place them on the edge of the pie dish, upon the dough already covering the edge; when the apples in the saucepan with the sugar, water and lemon juice have become soft, rub them through a wire sieve; then drop into the sauce, one at a time, the yolks of 4 eggs; mix the eggs and the apples together, without beating the yolks; pour them into the pie dish, in the hollow formed by the dough cakes; place the dish in the oven for 10 minutes.

ANGEL PUDDING.—2 oz. of flour; 2 oz. of powdered sugar; 2 oz. of butter melted in ½ pt. of new milk; 2 eggs; mix well; bake in small patty pans until nicely browned, and send to table on a dish covered with a small table napkin. A little powdered sugar should be sifted over each pudding, and slices of lemon served with them.

ANGEL'S FOOD.—1 box gelatine in 2 qts. of milk; put on the fire until dissolved; add 12 tablespoonfuls of sugar and yolks of 6 eggs, well beaten, let it boil a few minutes; flavor with wine or vanilla; stir in the whites of the eggs beaten to a stiff froth; put in molds to cool; serve with cream.

APPLE BATTER PUDDING.—4 beaten eggs; 1 pt. of rich milk; 2 cups of flour; 1 teaspoonful of salt; 2 even teaspoonfuls of baking powder; peel and core 8 ripe, tart apples; put into a deep baking dish; fill the centre of each with sugar, and pour the beaten batter over them; bake 1 hour; eat with cream and sugar; flavor with nutmeg or lemon.

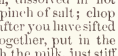
APPLE BLACK CAP.—Divide 12 large apples in halves; core and place them on a thin patty pan close to each other, with sides downward; squeeze a lemon over them; shred some fine lemon peel; throw it over them; grate fine sugar over all; set in a quick oven and bake ½ hour; when served, strew the sugar all over the dish.

APPLE BLOSSOMS.—Stew ½ doz. large apples into a nice, smooth sauce; add while warm ½ teaspoonful of fresh butter and sugar enough to make thoroughly sweet; heat a little butter in the frying pan; pour in a cup of bread crumbs, which must be stirred over the fire until they are pale brown; sprinkle these on the bottom and sides of a buttered mold; put 3 well beaten eggs and ½ teaspoonful of lemon juice into the apple sauce; then pour it into a mold; strew some of the bread crumbs over the top and bake 15 minutes; turn out on a hot dish, and serve with wine sauce.

APPLE CHARLOTTE.—Butter and flour lightly the pudding dish; line it with thin slices of bread, buttered on both sides; put a thick layer of apples, cut in thin slices; sugar, and a little cinnamon and a few pieces of butter; another layer of bread and butter; apples, sugar, cinnamon, and butter last; bake slowly for 2 hours; keep the pan covered until ½ hour before serving; let the apples on top brown.

APPLE CUSTARD.—Peel and core 8 large juicy apples; boil them till tender, in clear water; take them out and pulp them smooth through a sieve; add ½ lb. sifted sugar and the grated rind of 2 lemons; put the mixture into a deep dish, about ½ filling it; beat the yolks of 4 eggs light; add ½ teacupful of white sugar, and stir into 1 qt. of sweet milk; stir this over the fire until it is quite thick; let it cool; when cold, pour it over the apples; whip the whites of the eggs to a stiff froth, and pour over the top.

APPLE DUMPLINGS.— 1. 1 pt. of flour; 1 tablespoonful lard and butter mixed; 1 cup of milk; ½ teaspoonful of soda, dissolved in hot water; 1 of cream tartar; a pinch of salt; chop the shortening into the flour, after you have sifted this and the cream tartar together, put in the soda and wet up quickly with the milk, just stiff enough to roll into a paste less than ½ in. thick; cut into squares; lay in the centre of each a tart apple, pared and cored; bring the corners of the square neatly together, and pinch slightly; bake in a moderate oven; eat it with a hot, sweet sauce.—2. Roll out some dough, thicker than pie crust; inclose a handful of sliced ripe apples, well covered with sugar and butter; bring the edges together as in any other dumplings; place them side by side in a pudding pan; spread butter and sugar over them, and pour boiling water to about half cover the dumplings; put them in the stove and cook moderately fast until they are nicely browned. The butter, sugar and water make a nice sauce, which can be enriched with more butter and flavored with nutmeg if desired.



Apple Corers.

APPLE PUDDING.—Make a good paste; roll it out and place in a basin rubbed with dripping; press out the plaits so that the crust may be of an equal thickness all round; peel and cut up 4 large apples; put ½ of them in; then add 1 tablespoonful moist sugar and 1 of cloves; put in the rest of the apples; cover the top well over with paste; press it down, that the water may not get in; tie a cloth over; put it into boiling water and boil fast for 2½ hours, if the crust be made of dripping, and 1 hour longer if it be made of suet; take off the cloth; pass a knife around the edge of the basin; turn out the pudding carefully when sending it to table.

APPLE SAGO PUDDING.—Take 6 heaping tablespoonfuls of sago; cover with water; let it stand over night; in the morning add nearly 1 qt. of water; put over the tea kettle; let it stand until it is clear; then add a little salt; prepare 6 medium-sized apples (pleasant sour are nicest) by paring and digging out the cores; fill the apples with sugar and place in a nappy; pour the sago over them; bake slowly 1½ hours; serve with milk and sugar.

APPLE TAPIOCA PUDDING.—1 large cupful of tapioca; 1 cupful of sugar; 1 teaspoonful of salt; 1 teaspoonful of essence of lemon; a little nutmeg; 3 pts. of cold water; 3 pts. of pared and quartered apples; wash the tapioca; soak it 3 hours in the water, or over night; cook the tapioca in a saucepan, with the water, until it looks clear; stir often to prevent burning. It will take from 20 minutes to ½ hour; add the sugar, salt and lemon flavoring, and then the apples; turn into a buttered dish, and bake 1½ hours; let it stand in a cool room ½ hour before serving; serve with sugar and milk.

ARROWROOT PUDDING.—From 1 qt. of new milk take a small teacupful and mix it with 2 large spoonfuls of arrowroot. Boil the remainder of the milk and stir it among the arrowroot; add when cold 4 well beaten eggs, with 2 oz. loaf sugar, and the same of fresh butter broken into small pieces; season with grated nutmeg. Mix it well together, and bake in a buttered dish 15 or 20 minutes.

BACHELOR'S PUDDING.—Beat up 3 eggs; flavor with essence of lemon and grated nutmeg; add them to 4 oz. each of finely minced apples, currants, grated bread crumbs, and 2 oz. of sugar; mix thoroughly and boil in a buttered mold nearly 3 hours.

BATTER PUDDING.—Take 1 small baker's loaf; cut off the crust; pour over the rest 1 qt. boiling milk; when cold, beat it to a pulp; stir in 4 well beaten eggs, 1 small teacup of flour, and ½ yeast cake dissolved; bake 20 minutes; serve with a very sweet and highly flavored sauce, when hot.

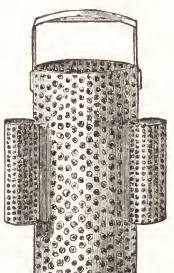
BERRY PUDDING.—Stew 1 qt. of blueberries or whortleberries; sweeten to taste; take stale bread, and butter each piece; immerse each piece in the berries; lay in a pudding dish first a layer of bread, then a layer of berries, taking care to have the last layer one of berries; eat cold, with milk and sugar.

BIRD'S NEST PUDDING.—Make the foundation of nest of blanc mange, corn starch or jelly; grate the rinds of 3 lemons or oranges, and arrange around the blanc mange to represent straw; extract the contents of four eggs through a small hole and fill the egg shells with hot blanc mange or corn starch; when cold break off the shells and lay the molded eggs in nest. Serve with jam or preserves.

Bird's Nest Pudding.

BLACKBERRY PUDDING.—3 pints of milk; 5 well beaten eggs; 3 pts. blackberries, which have been previously stewed, with a little sugar, flour, salt and 2 teaspoons of yeast powder.

BREAD PUDDING.—Cut slices of ½ in. thickness from a loaf of bread; take off the outside crust; cut the slices in small squares; pour enough warm milk over to moisten them; then beat 2 eggs light and stir them into a pint of milk; rub the inside of a tin mold with butter, and having picked and washed ½ lb. raisins, put them into the mold; lay the soaked bread on them; pour the milk and eggs over; dip a cloth in hot water; dredge flour over one side; tie it over the mold; boil for 1 hour; when done take the cloth from it, lay a dish over the mold, and turn the pudding upon it; serve with melted butter. —2. Put all scraps of bread into the oven until they become a nice brown; roll or grate them while hot quite fine; for a good-sized pudding, take ½ lb. of crumbs, ¼ lb. of brown sugar, ¼ lb. of currants or raisins, 1 pt. of milk, 1 teaspoonful of allspice and 1 pt. of boiling water; pour the boiling water over the crumbs; stir them well, and let them soak until soft; take all the ingredients; mix well; rub the pie dish with beef dripping; fill it; put some more dripping or butter on top of the pudding, and bake ½ hour.



Bread Grater.

BROWN PUDDING.—Take ½ lb. bread crumbs; ½ lb. of flour; 3 oz. of suet; 1 small teacupful of brown sugar; ½ teaspoonful of carbonate of soda; ½ teaspoonful of baking powder; ½ teaspoonful of salt; 1 teaspoonful of cinnamon; ½ teaspoonful of mixed spice; 1½ pts. of milk poured upon a tablespoonful of jam; mix well together; steam for 2 hours. Sauce for the pudding: Beat the yolk of an egg with 1 tablespoonful of sugar; add 1 teaspoonful of corn flour, 1 oz. of fresh butter, and 1 teacupful of water; pour it into a saucepan and stir it till it boils; add a glass of sherry and serve in a sauce tureen.

BUTTERMILK PUDDING.—Boil 1 qt. of fresh buttermilk; beat 1 egg, a pinch of salt, and a heaping teaspoonful of flour together; pour into the boiling milk; stir briskly, and boil for 2 or 3 minutes; serve while warm with sugar, or maple syrup.

CABINET PUDDING.—Spread the inside of a plain mold with butter, and ornament the sides with dried cherries and candied citron; fill the molds with alternate layers of slices of sponge-cakes and ratafia or macaroni; fill up the mold with a lemon custard made with 8 yolks of eggs, 1 pt. of milk or cream, 6 oz. of sugar, 1 glass of brandy, and the grated rind of 1 lemon; this custard must not be set, but merely mixed up; steam the pudding in the usual way, for about 1½ hours; when done, dish it up either with arrowroot sauce or a custard.

CANARY PUDDING.—The weight of 3 eggs in sugar and butter; weight of 2 eggs in flour; rind of 1 lemon; 3 eggs; melt the butter, but do not let it boil; add to this the finely-minced lemon

peel; gradually mix in the flour, stirring well all the time; beat up the egg well; blend the material perfectly; put in a buttered basin and boil for 2 hours; serve with a sweet sauce.

CATSKILL MOUNTAIN PUDDING.—1 pt. sweet milk; 1 qt. of flour; 1 tablespoonful of butter; same of sugar; ½ teaspoonful of salt; 2 eggs; 2 teaspoonfuls of baking powder; 1 teacup of currants or raisins; beat butter and sugar together; add eggs; stir milk and flour alternately until all is in, having previously mixed the powder into the flour; add fruit the last thing; steam 2 hours; eat with a rich egg sauce.

CHEESE PUDDING.—Into 2 qts. of boiling water, containing 2 tablespoonfuls of salt, stir 1 lb. of corn meal and ½ lb. of grated cheese; boil for 20 minutes, stirring it occasionally to prevent burning; put it in a greased baking pan; sprinkle over the top ½ lb. of grated cheese; brown in a quick oven; serve hot; if any remains, slice it cold and fry brown.

CHERRY DUMPLING.—Put cherries, fresh or canned, 3 in. deep on the bottom of a porcelain lined kettle; throw in sugar to sweeten; add ½ teacup of water; sprinkle over enough flour to slightly thicken the juice; roll out raised Graham biscuit crust, shortened with cream, about 1 in. thick; spread quite over the cherries; cover the kettle tight (shutting the cover in with a cloth spread over the top if need be); cook steadily on top of the stove (taking care that it shall not burn) ¾ hour or so till the crust is well cooked.

CHERRY PUDDING.—1 qt. of scalded milk; not quite a pt. of corn meal; a scant ½ pt. of sifted flour; 4 well beaten eggs; 2 teaspoonfuls of baking powder; 1 teaspoonful of salt; 1 pt. of whole ripe cherries; let the milk stand after heating until tepid; stir in the meal and flour, reserving a tablespoonful to mix the baking

Pudding Molds.

powder with; add the eggs and salt; then the cherries and baking powder; turn into a pudding mold or bag; steam 2 hours; eat with sugar and cream or butter sauce.

CHESTER PUDDING.—Take a large lemon; grate the rind and squeeze out the juice; 1 dozen sweet almonds; 1 dozen bitter almonds; pound them; 1 oz. butter; ½ lb. of loaf sugar; the yolks of 4 eggs; put all into a saucepan over a slow fire; when the butter melts, beat all together; line a dish with puff paste; lay in the mixture; bake in a quick oven; send to table on a napkin, with the whites of the eggs beaten and laid upon the top.

CHOCOLATE CUSTARD.—Scald a qt. of milk; stir in 4 heaping tablespoonfuls of grated chocolate and simmer 2 minutes to dissolve it; beat up the yolks of 6 eggs with 1 cup of sugar; add to the milk and chocolate; stir for a minute; then add vanilla flavoring and pour into your custard cups, which should be waiting in pan ½ full of boiling water in the oven; cook until you see that the custards are done; let them cool and then grate sweet almonds over the top; make a meringue of the whites of the six eggs and a little sugar; pile it on the top of each custard; grate more sweet almonds over that; set them in the oven to brown a little, or brown by holding a salamander or hot stove lid over them.

CHOCOLATE MERINGUES.—½ doz. eggs; 1 lb. sugar; 1 qt. milk; 6 tablespoonfuls of corn starch; 1 spoonful of vanilla, and 5 oz. of chocolate; break up the chocolate; put it in a pan; nearly cover it with milk; put it where it will heat very gently; as it dissolves, stir it into a smooth paste; add the milk gradually; stir until it reaches the scalding point; mix corn starch with 2 or 3 spoonfuls of milk; pour it slowly in; stir all the time until it is of the consistency of very thick boiled custard; set it aside to cool before putting in the vanilla; turn the rich brown creamy stuff into small glass dishes; cover the contents with a layer of batter made of the remaining sugar and eggs, the sugar boiled to a syrup, and the eggs beaten up and dropped suddenly into it; pour this on so as to stand up in little snowy peaks.

CHOCOLATE PUDDING.—1 pt. of rich milk; 2 tablespoonfuls of corn starch; 1 scant ½ cup of sugar; whites of 4 eggs; a little salt; flavoring. Beat the eggs to a stiff froth; dissolve the corn starch in a little of the milk; stir the sugar into the remainder of the milk, which place on the fire; when it begins to boil, add the dissolved corn starch; stir constantly for a few minutes, when it will become a smooth paste; now stir in the beaten whites of the eggs, and let it remain a little longer to cook the eggs; flavor the whole with vanilla; take out ½ of the pudding; flavor the remainder in the kettle with a bar of chocolate, softened, mashed and dissolved with a little milk; put ½ of the chocolate pudding in the bottom of a mold wet with water; smooth the top; make a layer with the white pudding; smooth it also; next the remainder of the chocolate pudding; serve with whipped cream, or a boiled custard made with the yolks of the eggs and flavored with vanilla.

CITRON PUDDING.—Sift 2 tablespoonfuls of flour; mix with the beaten yolks of 6 eggs; add gradually 1 pt. of sweet cream, ½ lb. of citron cut in strips, and 2 tablespoonfuls of sugar; mix thoroughly; pour the batter into buttered tins; bake 25 minutes; serve with wine or vanilla sauce.

COCOANUT PUDDING.—1. Beat 2 eggs with 1 cupful of new milk; add ½ lb. of grated cocoanut; mix it with 3 tablespoonfuls each of grated bread and powdered sugar, 2 oz. of melted butter, 5 oz. of raisins, and 1 teaspoonful of grated lemon peel; beat the whole well together; pour the mixture into a buttered dish;

bake in a slow oven; turn it out; dust sugar over it, and serve. This pudding may be either boiled or baked — 2. 3 slices of bread soaked in 1 pt. of milk; 6 eggs; beat the yolks well into the bread, using 1 egg at a time; add 1 oz. of butter; mix ½ lb. of desiccated cocoanut with the bread; add another pt. of milk; sweeten to taste; beat the whites of the eggs to a froth; mix with the compound just before baking; put in a moderately hot oven and bake for 1 hour.

COFFEE PUDDING.—Make 2 cupfuls strong extract of coffee by dripping it as slowly as possible; 8 cupfuls of milk; beat into the milk the yolks of 6 eggs; add 3 oz. powdered sugar; mix into this the coffee; pour the mixture into cups; put the cups in a pan with boiling water; the level of the water ought not to stand higher than half the cup; boil about 15 minutes.

CORN STARCH PUDDING.—4 tablespoonfuls (heaping) of corn starch; 1 pt. boiling water; the same quantity of scalding milk; salt; heat milk and water to scalding in a pail set in a pot of hot water; wet up the corn starch with a little cold milk; add the salt; stir this into the boiling milk and water until the mixture is about as thick as hot mush; turn into an uncovered deep dish, and set in hot water to keep warm until you are ready to eat it; eat with sifted sugar mixed with nutmeg or cinnamon and milk or cream, or with a simple custard poured over it, or with butter and sugar. If you have plenty of milk, use no water.

COTTAGE PUDDING.—1 cup of sugar; 1 tablespoon of butter; 2 eggs; 1 cup sweet milk; flour enough to make a tolerably stiff batter; ½ teaspoon of soda; 1 teaspoon of cream tartar; sift with the flour; 1 teaspoon of salt; rub the butter and sugar together; beat in the yolks, then the milk, soda, salt, and the beaten whites alternately with the flour; bake in a buttered mold.

CRACKED WHEAT PUDDING.—Take 1 qt. of unskimmed milk; then add to it 1 gill of cracked wheat, uncooked, 1 gill of sugar, and a small piece of stick cinnamon; place it in an oven of moderate heat; when about half done, stir the crust already formed, and leave it to form another, which will be sufficiently brown.

CRACKER PUDDING.—Mix 10 oz. finely powdered crackers with a wineglass of wine, a little salt, and ½ nutmeg, 3 or 4 tablespoonfuls of sugar, 2 of melted butter; beat 8 eggs to a froth; mix them with 3 pts. of milk; turn them on to the rest of the ingredients; let it remain till the crackers begin to soften; then bake it.

CRANBERRY DUMPLING.—1 qt. of flour; 1 teaspoonful of soda, and 2 teaspoonfuls of cream of tartar; sift together; mix into a soft dough with sweet milk; roll the dough out very thin in oblong shapes; spread over it 1 qt. of cranberries, picked and washed clean; add ½ lb. of sugar; sprinkle evenly; fold over and over; tie in a pudding cloth and put in a steamer, where let it cook over a steady fire for 1 hour.

CREAM CUSTARD.—1. Sweeten a pt. of cream with powdered white sugar; set it on a few coals; when hot, stir in white wine until it curdles; add rose water or essence of lemon to the taste; turn it into cups.—2. Mix a pt. of cream with 1 of milk; 5 beaten eggs; 1 tablespoonful of flour, and 3 of sugar; add nutmeg to the taste; bake the custards in cups or pie plates in a quick oven.

CURD PUDDING.—Pour 1 qt. of boiling milk on 1½ pts. of buttermilk; strain and press the curd lightly; beat well with 1 oz. of butter, 1 oz. of sugar, 1 teaspoonful of bread crumbs and 4 eggs; bake in cups ½ hour.

CUSTARD, Baked.—Beat the yolks of 4 fresh eggs for at least ½ hour; add 5 oz. of pulverized sugar; stir into the sugar and eggs 1 qt. of rich new milk, cold; add a teaspoonful of distilled rose water, or any flavoring extract you fancy; fill your custard cups and set them in a stone pan half filled with water, which may be warm at first—not hot; put the pan in a rather cool oven; gradually increase to a moderate heat; in about 20 minutes dip a teaspoon into one of the custards to ascertain if it is firm.

CUSTARD, Boiled.—1 qt. of milk; yolks of 5 eggs and the whites of seven; 6 tablespoons sugar; vanilla flavoring—1 teaspoon to the pint; heat the milk almost to boiling; beat the yolks light and stir in the sugar; take the milk from the fire; put a spoonful or two of the milk to the beaten eggs; beat well all the while; add more and more milk as you mix, until there is no longer danger of sudden curdling; stir in 5 whites whipped stiff; return to the fire; stir until thick, but not until it breaks; season with vanilla; pour into glass cups; whip the whites of 2 eggs to a meringue with a heaping tablespoon of powdered sugar; when the custard is cold, pile a little of this on the top of each cup.

CUSTARD BREAD PUDDING.—Make a custard with 1 pint of milk, 3 eggs, some sugar and flavoring; put it into a neat pudding dish; fit thin slices of buttered bread over the custard; don't lap the slices over each other; grate a little nutmeg over the top; bake in a moderate oven until the custard is done, but not until it turns to whey; serve warm.

CUSTARD, Burned.—Fill a glass bowl nearly full with 3 pts. of nice boiled custard; beat until perfectly light the whites of 6 eggs; to each egg allow 1 tablespoonful of puiverized white sugar; add gradually, beating all the time; heap the bowl with this meringue; with an iron plate or clean shovel, heated red hot, brown well all over until the delicate flavor is imparted that gives the name of burned custard.

DAMASCENE ROLLS.—Stew the cherries or whatever fruit you desire with a little sugar; roll out the pastry into a thin sheet, the thinner the better; spread over a thick layer of the fruit; then, commencing at one side, roll carefully until all the fruit is inclosed within the paste; pinch together at the ends; tie up in a strong cotton cloth; drop into a pot of boiling water; serve with sweet sauce.

DIPLOMATIC PUDDING. — Decorate a plain mold with a lining of currants and pistachio nuts; fill the outer part with jelly; when the jelly is set remove the lining by putting a little warm water in it; make a custard with a pt. of milk and 4 yolks of eggs; flavor the milk with

vanilla; add ½ oz. of isinglass; stir it into the custard when hot; break up 1 or 2 sponge cakes and maccaroons; cut up a few dried fruits; put a layer of each until the mold is full; pour in the custard; leave it in a cool place untill wanted; then dip the mold into tepid water a second; turn it out on a cold dish and serve.

DRIED APPLE PUDDING.—Wash 10 oz. of apples well in warm water; boil them in 1 qt. of water; when soft, add 10 oz. of sugar, 8 oz. of butter, and the juice and grated rind of 2 lemons; when cold, and ready to bake, add 5 well beaten eggs; bake with or without pastry.

DRIED PEACH PUDDING.—¾ lb. flour; 1 pt. dried peaches; 3 gills of beef suet; 1 teaspoonful of salt, and cold water. Chop the peaches and suet; mix them with the flour and salt; add water to stick the ingredients together in as stiff a dough as can be easily made with a spoon; tie it in a cloth, leaving room to swell, and steam or boil from 3 to 4 hours.

EGG DUMPLINGS.—Make a batter of 1 pt. of milk, 2 well-beaten eggs, a teaspoonful of salt, and flour enough to make as thick as for pound cake; have a clean saucepan of boiling water; let the water boil fast; drop in batter by the tablespoonful; take them with a skimmer on a dish; put a bit of butter and grated nutmeg, with syrup or sugar over them.

EGGLESS CUSTARD.—1 qt. of new milk; 1 teaspoonful of rennet wine, or a small piece of rennet; a little lemon, nutmeg, or vanilla, or any spice you prefer; 1 teaspoonful of sugar; if too sweet, the milk will not set firmly or quickly; stir all together and set by the stove or near the fire; cover closely; it should begin to stiffen in an hour; if it does not, add more wine or rennet; when firm, before the whey separates, take out the piece of rennet, if the skin was used, and set on ice till dinner. Eat with sugar and rich cream.

EGG PUDDING.—4 eggs, well beaten; 4 tablespoons of flour; add to the eggs until a smooth mass; then add 1 pt. of milk, slowly, and a pinch of salt; beat all smooth together; put in a well buttered dish, and bake about 20 minutes; eat with sauce made of butter and sugar, beaten together to a cream, and flavor with vanilla.

EXETER PUDDING.—Put in a proper sized basin 10 oz. of fine bread crumbs; 4 oz. of sago; 7 oz. of suet, chopped fine; 6 oz. of moist sugar; the peel of ½ lemon, grated; ¼ pt. rum, and 4 eggs; stir for a few minutes with a spoon; add 3 more eggs and 4 tablespoonfuls of clotted cream; mix well; it is then ready to fill the mold; butter the mold well; put in a handful of bread crumbs; shake the mold well till the greater part sticks to the butter; then throw out the remainder, and have ready 6 little sponge cakes, 2 oz. of ratafias and ½ lb. of either raspberry or strawberry jam; cover the bottom of the mold with a layer of ratafias; just cover them with a layer of the mixture; cut the sponge cake lengthwise; spread quickly each piece with some jam; put a layer in the mold; then a few ratafias; afterwards some of the mixture; and so on, until the mold is full; take care that a layer of the mixture is on top of the pudding; bake 40 minutes.

FARINA PUDDING.—Heat 1 qt. of milk to the boiling point; stir in dry 5 tablespoonfuls of farina; continue to stir it until quite thick; add 1 cupful of sugar and ½ teaspoonful of salt; flavor with lemon or vanilla; eat with sweetened milk or cream, with a little nutmeg or other flavoring added.

FARMER'S PUDDING.—1 cup of corn meal; ½ cup of flour; ½ cup of sugar; moisten with a little milk; boil 3 pts. of milk; pour slowly on the meal and stir until quite thick; add ½ cup of molasses and a little salt; bake in an earthen dish 2 hours.

FIG PUDDING.—Chop ½ lb. figs very finely; mix them with ¼ lb. of coarse sugar, 1 tablespoonful of syrup for 1 tablespoonful of milk, ½ lb. flour, ½ lb. suet, 1 egg, and a pinch of grated nutmeg; put the pudding into a buttered mold and boil for 4 or 5 hours.

FRANCATELLI PUDDING.—Pour 1 pt. of boiling milk on 10 tablespoonfuls of grated bread crumbs; let them stand 10 minutes; add the yolks of 4 eggs well beaten, 6 tablespoonfuls of sugar, 2 of butter; season with lemon or what you like; when beaten light, stir in the whites of the eggs, which have been well whipped; pour into a buttered dish and bake quickly.

FRUIT PUDDING.—Put a layer of any kind of fruit (previously stewed with sugar and allowed to get cold) in a deep glass dish; mix 3 tablespoonfuls of corn starch with 1 gill of milk; boil 1 pint of milk with the thin rind of 1 lemon; sugar to taste; when well flavored with the lemon, pour the boiling milk through a strainer on to the corn starch; stir and return to the saucepan; boil 5 minutes, or until it thickens; when cool enough not to break the glass pour on the fruit; leave it to get quite cold and set.

GELATINE PUDDING.—1 oz. gelatine; 1 pt. cold milk; set on the stove; let it come slowly to a boil; stir occasionally; separate the yolks and whites of 6 fresh eggs; beat the yolks well and stir slowly into hot milk; add ½ lb. of granulated sugar; when quite cold stir in 1 qt. of whipped cream; flavor with vanilla and lemon extract mixed; have the whites of the eggs beaten very stiff, and stir in the last thing; pack on ice.

GINGER PUDDING.—1 cup of butter; 2 of sugar; 1 of milk; 4 of flour; 1 tablespoonful of ginger; 1 teaspoonful of saleratus; 2 of cream of tartar; 4 eggs; beat the sugar and butter to a cream; stir in the eggs, which are to be well beaten; then the milk, and last the flour, in which the saleratus, ginger and cream of tartar are well mixed; bake in a pudding dish for 45 minutes; serve with lemon or vinegar sauce. After adding the flour beat but little.

GRAPE JELLY PUDDING.—Make in a pipkin or other closely covered dish; to 3 gills of rice take 1 qt. of grapes stemmed and washed; place a layer of the latter on the bottom of the pipkin; sprinkle upon them sugar enough to sweeten them; then a thin layer of rice, and so on, finishing off with the rice; handle carefully, so that the rice shall not mostly settle to the bottom; after it is set into the oven, put in water enough

to cover it; cook slowly 2 or 3 hours, or until the rice is very tender; serve cold, with a dressing of sweetened milk or cream, or grape juice if wanted.

HALF-PAY PUDDING.—Carefully wash and dry ¼ lb. of currants; stone the same quantity of raisins; chop an equal amount of suet; mix them with 8 oz. of stale bread, 3 table-spoonfuls of molasses, ½ pt. of milk, and 1 teaspoonful each of spice, salt and baking powder; put these ingredients into a mold which has been well buttered and floured; steam them about 3 hours. If the top of the pudding is watery, put it into a hot oven for 10 or 15 minutes to brown; when ready to use it, turn from the mold, and send to the table with cream sauce.

HARLAN'S PUDDING.—Take 3 oz. each of butter, sugar and flour; whisk 2 eggs thoroughly, and gradually mix with them the loaf sugar, which must be rubbed well on the rind of a lemon before it is pounded; add the flour and the butter partially melted, 1 saltspoonful of salt, and a little grated nutmeg; butter the insides of several cups; put a little jam at the bottom of each; fill them nearly full with the mixture; bake ½ hour; turn them out and serve with wine sauce.

HASTY PUDDING.—Put 1 pt. of milk, properly salted, into a clean qt. stewpan; have ready a basin of flour; as soon as the milk boils, take some flour in the left hand; let it fall lightly into the milk (which must be kept boiling fast the whole time); stir without ceasing; add flour until it is about the consistency of porridge; then let it boil a few minutes longer, still keeping it stirred; turn it out on a hot dish, stick pieces of butter all over it, sprinkle sugar and grate some nutmeg; the butter and sugar will melt and mingle, and, running all over and around it, form a delicious sauce. Do not be too sparing of butter and sugar.

HINGHAM PUDDING.—1 cup of molasses; ⅔ cup of butter or suet; 1 cup of water; 3 cups of flour; 1 cup of raisins and currants; 1 teaspoonful of soda; steam 3 hours. It is as good when 2 or 3 weeks old as when fresh; put it in and steam when wanted.

HOLIDAY PUDDING.—Take 2 large lemons and grate off the peel of both; use only the juice of 1, unless you like quite a tart flavor; add to the lemon ½ lb. of fine white sugar, the yolks of 12 and the whites of 8 eggs well beaten; melt ½ a lb. of butter in 4 or 5 tablespoonfuls of cream; stir all together; set the mixture over the fire; stir it until it begins to be pretty thick; take it off; when cold fill your dish a little more than ½ full, having previously lined its bottom with fine puff paste; bake carefully.

HOME PUDDING.—1 qt. milk; 4 eggs, beaten separately; 8 tablespoonfuls baking powder; ½ cupful sugar; bake in a greased pan 35 minutes. Sauce for this pudding: ½ pt. milk, 3 tablespoonfuls sugar, 1 tablespoonful of butter, 1 small tablespoon flour; heat the milk boiling hot; mix sugar, butter and flour, previously well beaten together, into it; flavor with vanilla.

HONEY PUDDING.—½ lb. honey; 6 oz. butter; ¼ oz. bread crumbs; 8 eggs; beat the honey and butter to a cream; add the bread crumbs; beat all together for 10 minutes with the yolks of the eggs; put into mold; boil 1½ hours; serve with any nice pudding sauce.

HUCKLEBERRY PUDDING.—1 qt. flour; 3 teaspoonfuls of baking powder; 1 pt. sweet milk; 1 egg; 3 tablespoons of sugar; a lump of butter the size of an egg; a little salt; stir in as many berries as you choose, not less than 1 pt.; steam or boil in a bag for 1 hour. Sauce: 1 cup of sugar; 1 egg; ½ cup butter; beat these together till light; fill the dish with boiling water; there will be a sort of cream on the top; when serving dip the gravy ladle deep in the bowl, so that the first one helped to pudding will not have all the cream; flavor with vanilla.

INDIAN SUET PUDDING.—½ lb. suet; 1 cup of molasses; 1 pt. of milk; 1 egg; 1 teaspoonful of ground cloves; 1 teaspoonful of ground cinnamon; 1 teaspoonful of salt, nutmeg and raisins; mix the suet and molasses and put on the fire to warm; add milk, eggs, spices and fruit, either chopped raisins or currants, then Indian meal sufficient to make a thin butter; boil or steam 3 hours; serve with sauce.

JELLY CUSTARD.—To 1 cupful of any sort of jelly add 1 egg; beat well together with 3 teaspoons cream or milk; after mixing thoroughly bake in a good crust.

KING GEORGE'S PUDDING.—1 pt. of bread crumbs; ½ pt. flour; 1 teaspoonful of baking powder, sifted in flour; a little salt; ½ lb. raisins; ½ lb. currants; ½ lb. chopped suet; coffeecupful of milk; 1 egg; tie tightly in a bag; boil 3 hours; eat with hard sauce.

LEMON CUSTARD.—Stir 3 wineglassfuls of lemon juice, with ½ lb. of powdered loaf sugar, 1 glass of white wine and ½ wineglass of water with a little grated lemon peel; mix all together; put the ingredients into a saucepan on the fire; stir it until it becomes thick and of a proper consistence.

LEMON DUMPLING.—Mix with 10 oz. of fine bread crumbs, ½ lb. of beef suet chopped extremely fine, 1 large tablespoonful of flour, the grated rinds of 2 small lemons, or of 1 very large lemon, 4 oz. pounded sugar, 3 large or 4 small eggs, beaten and strained; last of all the juice of the lemons strained; divide the mixture into 4 equal portions; tie in well floured cloths; boil them 1 hour.

LEMON MERINGUE PUDDING.—1 qt. milk; 2 cups bread crumbs; 4 eggs; ½ cup butter; 1 cup white sugar; the juice of 1 large lemon and ½ the rind grated; soak the bread in the milk; add the beaten yolks, with the sugar and butter rubbed to a cream, also the lemon; bake in a buttered dish until firm and browned slightly; draw to the door of the oven and cover with a meringue of the whites whipped to a froth with 3 tablespoonfuls of powdered sugar and a little lemon juice; brown very slightly; sift powdered sugar over it and eat cold.

LEMON PUDDING.—9 eggs, the whites beaten to a stiff froth; 2 lemons, the grated rind and juice; 1 lb. of sugar; nearly 3 oz. of butter creamed; 1 pt. of milk; 1½ even tablespoonfuls of flour; beat the yolks and sugar until very light; add the butter, with which the flour has been smoothly mixed; then the lemons, the

milk, and the eggs, which must be beaten in slowly, gently and thoroughly; bake in deep, paste lined plates; put it in quite a hot oven, reducing the heat after the first 8 or 10 minutes.

LEMON TAPIOCA.—Take a teacup of large tapioca and soak it over night in a pint of water; in the morning make a rich lemonade with 2 or 3 lemons and 1 pt. of water; put it with the tapioca, and boil until clear; if too thick, add more water; boil until tender; drain off the water and add the peel, cut into straws, to the tapioca before quite done; eat cold with cream.

LEMON WHIP PUDDING.—Soak 1 oz. of gelatine and the thin rind of 2 lemons in 1 pt. of cold water for 1 hour; take out the rind; set the water and gelatine on the fire, and when the latter is all dissolved add $\frac{3}{4}$ lb. of loaf sugar and the juice of 3 lemons; let all boil together for 5 minutes; then pour out the mixture and let it stand until it is cold and beginning to set; beat stiffly the whites of 2 eggs; add them to the mixture; beat the whole for about $\frac{1}{2}$ hour, till it becomes of the consistency of sponge; pile it lightly in a dish, leaving it rocky in appearance; pile fresh lady fingers around the base; serve with boiled custard poured around it on the pudding plates. The custard is made with the yolks of the 2 eggs and 1 whole egg.

MACARONI PUDDING.—Butter a pie-dish; cover the bottom with $2\frac{1}{2}$ oz. uncooked macaroni; pour over it 1 qt. of cold milk; add 2 tablespoonfuls of sugar; stir in 2 well-beaten eggs; flavor with 1 teaspoonful of vanilla or any flavoring desired; put bits of butter over the top; dust a little grated nutmeg over top; bake slowly 2½ hours.

MALAGAN PUDDING.—$\frac{1}{2}$ cup of rice; 1 cup sugar; 2 eggs; 1 pt. of milk; $\frac{1}{2}$ lemon and salt; soak the rice over night; beat the yolks of the eggs with 1 tablespoon of the sugar, and grate in the lemon rind; add the rice and milk; bake 1 hour; take the whites of the eggs and beat to a stiff froth with the rest of the sugar; then add the lemon juice; pour it over the pudding after it is baked, and brown it in the oven 2 or 3 minutes; eat cold.

MANHATTAN PUDDING.—Dissolve a walnut of saleratus in 1 tablespoonful of hot water; mix 1 cupful of milk, 3 well-beaten eggs, 2 tablespoonfuls of flour (mixed with cold milk), 1 pinch of salt, and 4 oz. of chopped citron; add saleratus, and mix all thoroughly; pour the mixture into a buttered mold; tie the mold in a floured cloth; boil 1½ hours; turn out, and serve with a fruit sauce.

MARLBOROUGH PUDDING.—Grate apples enough to make 8 oz.; add to this 8 oz. of fine white sugar which has been well rubbed on the rind of a large lemon, 6 well-beaten eggs, 3 tablespoonfuls of cream, the strained juice of 3 lemons, 8 oz. of butter; add quantity at pleasure of orange flower water, and the grated peel of an orange and a lemon; line the pie dish with rich puff-paste; put in the mixture, and let it bake in a quick oven.

MERINGUES.—1 pt. clear white sugar syrup; slowly boil it till it begins to bubble; test it by rubbing a spoonful against the side of the pan, where it turns white. Vigorously whisk the whites of ½ doz. eggs in a basin; pour its contents into the boiling sugar; mix the whole into a stiff batter or paste; lay large egg-shaped spoonfuls of it on to strips of paper laid on a long narrow board of hard wood; spoon out a long row of these ½ eggs at about 1 in. distance from each other; sift some finely powdered white sugar over the whole; as soon as that is a little dissolved, place the board in a rather slow oven; watch them rise; in a few minutes slip them out; strip off the papers with a broad knife; pop a pat of preserve or jelly on the flat side, so as to stick it fast to another half, and so form a complete egg-shaped meringue, which pile up with others on a large silver waiter.

MILK PUDDING.—With 1 pt. of milk thicken 3 gills of flour; stir it gradually till quite smooth; boil until done; stir in ¼ lb. of butter while hot; put by until just before dinner; then beat 5 eggs very light, the whites and yolks separately; add 5 large tablespoonfuls of powdered sugar, a little mace or rind of lemon, and a little juice; bake quickly, and serve immediately from the oven.

MINUTE PUDDING.—Place over the fire 1 teacup sweet milk for every guest; let it come to a boil; stir in 1 egg and 1 teaspoon flour wet with a little milk; stir well; let it cook a few minutes; oil common teacups with butter and put the pudding into them; when cool turn the cup in a saucer; the pudding will slip out; serve with sweetened cream.

MOLASSES PUDDING.—3 cups of flour; 1 each of molasses, melted butter, and hot water; 1 teaspoonful of soda; steam 3 hours; serve with sauce of sugar and butter worked to a cream with a little hot water added, and flavoring.

MONDAY'S PUDDING.—Cut the remains of a good cold plum pudding into finger pieces; soak them in a little brandy and lay them cross-barred in a mold until full; make a custard with 1 pt. of milk and 5 eggs; flavor with nutmeg or lemon rind; fill up the mold with it; tie it down with a cloth; boil or steam it for an hour; serve with a little of the custard poured over, to which has been added a tablespoonful of brandy.

NOODLE PUDDING.—3 eggs beaten light; add a little salt and flour to make a paste that will roll; roll the paste ⅛ in. thick; fold the paste and shred fine; boil in clear water with a little salt; put them into the water while it is boiling; do not allow them to stick together, or uncover the pot for 10 minutes; take them out and drain well; bake them 1 hour; beat 2 eggs light; mix them in a qt. of milk; stir in the noodles; add salt, sugar, and spices to taste; bake as custard.

ORANGE CUSTARD.—Boil the rind of ½ good orange very tender; then beat till it is fine; add to it a spoonful of the best brandy, the juice of an orange, ¼ lb. of loaf sugar, and the yolks of 4 eggs; beat well for 10 minutes; pour in by degrees 1 pt. of boiling cream; keep beating as you pour into your cups; set the cups in an earthen dish of hot water; let them stand till they are set; take them out and spread preserved orange peel over the top of each cup; serve hot or cold, according to taste.

ORANGE MARMALADE PUDDING.— 1 cupful of fine bread crumbs; ½ cupful sugar; 1 cupful of milk or cream; 4 eggs; 2 teaspoonfuls of butter; 1 cupful orange, or other sweet marmalade; rub the butter and sugar together; add the yolks well beaten, and the milk, bread crumbs and the whites whipped to a froth; put a layer of this in the bottom of a well-buttered mold; spread thickly with some pretty stiff marmalade; then another layer of the mixture, and so on until the mold is full; have the custard mixed on top; bake in a moderate oven about an hour; turn out of the mold upon a dish; serve with sweetened cream or custard.

ORANGE PUDDING. — Peel and slice 3 or 4 oranges; lay in a pudding dish with ½ cup of sugar; make a custard of 1 pt. of milk, the yolks of 3 eggs, 1 spoonful of corn starch, and ½ cup of sugar; when cold pour over the oranges; beat the whites of 3 eggs and ½ cup of pulverized sugar to a stiff froth and pour over; put in the oven a few minutes to brown; eat cold.

PARADISE PUDDING.—3 eggs; ½ lb. of bread crumbs; 3 apples; currants; juice of ½ lemon; nutmeg; salt; mince the apples; beat the eggs and stir them into the bread crumbs and other ingredients; rub the currants in a small quantity of flour before they are put into the mixture; boil 1½ hours; eat hot with sauce.

PEACH TAPIOCA.—Soak ½ pt. tapioca in ½ pt. of cold water for several hours or over night; fill a baking dish ½ full of nice canned peaches; leaveing out the syrup; sprinkle sugar over the peaches, to suit the taste; bake ½ hour; add ½ pt. of the peach syrup to the tapioca, as much boiling water as is needed to thin it, and ½ teacup of sugar; boil this till perfectly clear; then pour over the peaches; bake slowly for another ½ hour; when cold, serve with sugar and rich cream.

PINE-APPLE CUSTARD.—On the day before you wish to use the custard, peel and pick to pieces with 2 forks a nice pine-apple; put plenty of sugar over it and set it away; next day make a custard; when cool, mix with the pine-apple which will have become soft and luscious and thoroughly sweetened.

PINE-APPLE PUDDING. — Butter a pudding dish, and line the bottom and sides with slices of stale cake (sponge cake is best); pare and slice thin a large pine-apple; place in the dish first a layer of pine-apple; then strew with sugar, then more pine-apple, and so on until all is used; pour over a small teacupful of water, and cover with slices of cake which have been dipped in cold water; cover the whole with a buttered plate, and bake slowly for 2 hours.

PINE-APPLE TAPIOCA.—Allow to 1 large cup of tapioca ½ large pine-apple, or the whole of a small one; pare and grate the fruit; put a small quantity of tapioca in the bottom of a dish, then some of the grated fruit and sugar, mixing it more through and through than for strawberries or peaches; add water, and bake.

PLUM PUDDING.—1. 1 loaf of baker's bread; cut in thin slices and buttered; butter the pan well; put a layer of bread and of raisins, a little cinnamon, nutmeg and sugar; then a layer of buttered bread; continue until the pan is full; put milk enough around it to soak it 1 night; cover with a plate to keep it down; before putting it into the oven, heat from 3 to 7 eggs, according to size of pudding; add milk enough to have it moist, but not to have it run over in the oven; add also a little wine or brandy; eat with brandy sauce.—2. 1 lb. of beef kidney grease; 1 lb. of dry raisins; 1 lb. and 3 oz. of fresh bread crumbs; 1 tablespoonful of flour; 12 oz. of brown sugar; 9 oz. of orange peel and citron mixed; a little salt; ½ grated nutmeg; a pinch pulverized ginger; some lemon peel chopped fine; 10 eggs; 4 tablespoonfuls of good brandy or rum; and 1 tablespoonful of sweet cream; wash the raisins in lukewarm water; place them in a basin or wooden bowl, with the peel already cut into square pieces, and steep in a little brandy; trim the beef kidney fat, and chop it very fine, with 1 spoonful of flour; mix it well with the crumbs of bread, brown sugar and the eggs; add the raisins, the peel, the rest of the brandy, salt, nutmeg, ginger, and, last of all, and after it is all well mixed, the cream; spread all this in a large napkin, well buttered; fold up the corners of the napkin; tie to the level of the pudding, so as to make it round; plunge into a saucepan of boiling water; let it boil at least 4 hours constantly; take it out and let it drain in a sieve; cut it from the top so as to keep on a level; then turn it out on a dish, removing the napkin carefully, so as not to disturb the fine part of the pudding; sprinkle with a little rum sauce; apply a match to the pudding when it is on the table or when entering the dining-room; serve a little rum sauce separately.

Plum Pudding.

POOR MAN'S PUDDING.—1 cup molasses; 1 of sour milk; ½ cup butter or beef drippings; 1 teaspoonful soda; flour to make as stiff as can be easily stirred; use raisins as taste or purse dictate; put in a spouted cake tin and steam 3 hours; eat with sweetened cream, or any sauce preferred.

PRUNE PUDDING.—Heat a little more than 1 pt. of sweet milk; when boiling, stir in gradually the following: 1 large spoonful corn starch (or 2 of flour, if more convenient); mix smoothly with a small quantity of cold milk; add 3 or 4 well-beaten eggs, enough sugar to sweeten, 1 teaspoon butter, and a little grated nutmeg; let this come to a boil; then pour it into a well buttered dish; add 1 teacup seeded prunes just before placing in the oven; bake about 20 minutes. The prunes must be previously stewed until tender; serve with or without sauce, as is preferred.

PUDDING SAUCES.—1. 1 cupful cream; 2 of sugar; 1 egg well beaten; 1 tablespoonful butter; 1 teaspoonful corn starch; boil all together till a thick syrup; take off the fire; add grated nutmeg and a glass of wine. — 2. 4 tablespoonfuls of sugar; 2 of butter; 1 of flour, beaten to a cream; add the white of an egg,

beaten to a froth; pour into the whole a gill of boiling water; stir it very fast; flavor with lemon, rose water, nutmeg or wine. — 3. ½ cup of butter; 2½ cups sugar; 1 dessertspoon corn starch wet in a little cold milk; juice of 1 lemon and ½ the grated peel; 1 glass wine; 1 cup boiling water; cream the butter and sugar well; pour the corn starch into the boiling water; stir over a clear fire till it is thickened; put all together in a bowl; beat several minutes before returning to the saucepan; heat once almost to boiling; add the wine, and serve. — 4. Beat 1 egg and 1 cup of white sugar to a froth; make ready a very thin batter with 1½ cups of water, and a piece of butter ½ the size of an egg; pour this batter boiling hot over the egg and sugar just as it goes to the table; flavor to taste; beat, while mixing, the boiled butter and sugar. — 5. (*Plum Pudding.*) Take ½ cupful of butter, and stir in a tablespoonful of flour; 1 cupful of sugar; 2 tablespoonfuls of vinegar; 1 pt. of boiling water, and ½ teaspoonful of cinnamon; set it on the stove, and stir until it boils.—6. (*Whip.*) Break 4 eggs; put the yolks into a small, deep stewpan; add 2 oz. of sifted sugar, a glass of sherry, a little lemon juice and grated peel, and a grain of salt; whisk the sauce over a moderate heat; take care to set the stewpan which contains the whip sauce in another of somewhat larger size, already containing a little hot water; as soon as it presents the appearance of a well-set creamy froth, pour over it the fig pudding or serve separately in a sauce boat. — 7. (*Wine.*) Boil the thin rind of half a lemon in 1 wineglass of water till the flavor is extracted; take it out and thicken the sauce by stirring into it 1 saltspoonful of rice flour or arrowroot which has been mixed in water or milk, and a walnut of butter; boil a moment; add ½ tumblerful of good wine; let the sauce get quite hot without boiling; sweeten a little; serve with the pudding.—8. (*Cream Sauce.*) Boil ½ pt. of cream, thicken it with 1 teaspoonful of corn starch, arrowroot or flour, a large lump of butter, with sugar to taste; when cold add either wine or brandy.—9. (*Hard Cream.*) Take 2 cupfuls of loaf sugar, finely pulverized, 1 teacupful of butter, which cream, until white and springy; then mix the sugar and butter till like cream. Stir in as much wine as it will take, or cream with any extract preferred, or grated nutmeg.

PUFF PUDDING.—4 eggs, yolks and whites beaten separately; add 3 cups of sweet milk, a tablespoonful of melted butter and 3 cups of sifted flour; stir in the whites the last thing; bake in buttered cups; eat hot with sauce.

PUMPKIN PUDDING. — 1 qt. of pumpkin after it is stewed and mashed fine through a sieve; 1 pt. of rich cream; 6 spoonfuls of chopped beef suet, or a ¼ lb. of butter; 8 tablespoonfuls of sugar; 4 eggs; a wineglass of wine, and half that quantity of brandy; ½ nutmeg, and a dessertspoonful of ground ginger; line pie-plates with pastry rolled thin at the bottom; ornament the tops with strips laid crosswise.

QUAKER PUDDING.—Slice up ¾ lb. of baker's bread; beat 8 eggs to a froth; stir in several large spoonfuls of sugar; mix it with 1 qt. of milk and a grated nutmeg; turn it on to the sliced bread; let the whole remain till the bread has soaked up most of the milk; stir in a couple of tablespoonfuls of flour, and a teaspoonful of salt; turn it into a pudding bag and boil it an hour; serve it with rich sauce.

QUEEN'S PUDDING.—8 or 10 fine juicy apples, pared and cored; ½ lb. macaroons, pounded fine; 2 tablespoonfuls sugar; ½ lb. cinnamon; ½ cup sweet, firm jelly; 1 tablespoonful brandy; 1 pt. milk; 1 tablespoonful best flour or corn starch; whites of 3 eggs; a little salt. Put the apples into a pudding dish, well buttered; fill ½ full of water; cover closely and steam in a slow oven until tender; cover, cool, and drain off the water; put into each apple a spoonful of jelly and a few drops of brandy; sprinkle with cinnamon and sugar; cover again, and leave alone for 10 minutes; scald the milk and stir in the macaroons, salt and flour; wet in a little cold milk; boil all together 1 minute; take from the fire; beat for a few minutes, and let it cool before whipping in the beaten whites; pour over the apples, and bake ½ hour in a moderate oven; eat hot with cream sauce.

RASPBERRY DUMPLING.—Make a puff paste and roll it out; spread on raspberry jam and make into dumplings; boil them an hour; pour melted butter into a dish and strew sugar over it for sauce.

RHUBARB PUDDING. — Line your pudding dish with slices of bread and butter; cover with cut up rhubarb strewed with sugar; then slices of bread and butter; and so on alternately, until your dish is full, having the rhubarb and sugar on top; cover with a plate and bake ½ an hour; eat warm.

RICE BLACK-CAP PUDDING.—Butter a pudding basin and stick raisins or prunes all over the bottom; pour into the center a teacupful of dry rice; tie a cloth tightly over the basin and plunge it into boiling water; boil for an hour, when it will turn out a nice shape with the raisins or prunes covering the top of the rice, which form the black cap.

RICE PUDDING. — 1. Wash a large cupful of rice in cold water; boil it in water for 6 minutes; drain off the water; put the rice on in 1½ pts. milk; let it boil until soft; stir occasionally to prevent its burning; when done, put into a basin; stir in a pat of butter; when cold, add 4 eggs, a little ground cinnamon, grated nutmeg and lemon zest; sweeten to taste; bake in a buttered pudding dish, in a moderate oven, putting a few bits of butter over the pudding; when done, serve with a dust of sugar. — 2. Wash 4 oz. of rice through two waters; put it into a baking dish with 3 oz. of sugar and a teaspoonful of flavoring; pour in 3 pts. of milk; put it into a moderate oven to bake 1½ hours, or until it is of a creamy consistence.

ROLY-POLY PUDDING. — Make a rich pudding paste with flour and butter, without suet, but as light as possible; roll it out thin and cut to the breadth of 8 or 10 inches, making it at the same time as long as you please; use ½ lb. flour and 5 oz. of butter wet with water; when rolled out quite smooth, spread on it a thick layer of any jam, but leave about an inch of all

the edges bare; roll it round and twist the ends together; wrap it in a nicely floured cloth, and boil it for 2 or 3 hours, according to size; take it up quite hot, and when served cut it cross-wise.

SAGO APPLE PUDDING. — 1 qt. of boiling water turned upon a cup of pearl sago; have the pudding dish filled with apples pared and quartered; stir the sago well and turn over the apple; bake and eat with sauce.

SAGO PUDDING. — Soak 1 cupful of sago in warm water until it is all swelled alike; add water as it thickens, keeping it warm on the back part of the stove; when all swelled, peel 6 sour apples; core them; put them in the sago; sprinkle some sugar on the top; bake until the apples are soft—say ½ hour; eat with cream and sugar.

SAVORY CUSTARD. — Take the yolks of 2 eggs and the white of 1; put in a small basin; add 1 gill of beef tea and ½ saltspoonful of salt; whip up the eggs and the beef tea; take a small cup which will hold the mixture, and butter it; take a piece of white letter paper and butter it; tie it on the cup; have a saucepan with hot water and put it on the fire to boil; when the water is boiling, put in the cup, so that the water stands below the top of the cup; let it simmer for ½ hour; serve hot.

SCHOOL PUDDING. — Swell a teacupful of rice in 1 pt. of milk, sweetened and flavored to taste; when cold mix with it a well-beaten egg; have ready a pt. basin well buttered, and a breakfast-cupful of bread crumbs with a teaspoonful of moist sugar well mixed with them; lay the crumbs all round the basin thickly with a knife and the rice in the centre; lay more crumbs on the top and bake ½ hour in a quick oven; eat with jam.

SNOWBALL PUDDING. — Boil 1 qt. of rich milk and then thicken it with a tablespoonful of flour or arrowroot; beat up the yolks of 4 eggs with 3 tablespoonfuls of white sugar; pour the milk slowly into the eggs and sugar, stirring all the time; pour this custard into a pudding dish and brown it slightly; beat up the whites to a stiff froth; add 4 tablespoonfuls of sugar, and flavor with lemon; drop it on the custard (when browned) in the form of balls as large as an egg; set it back in the stove to brown a little.

SNOW PUDDING. — Cover ½ package of gelatine with a little cold water and, when softened, stir into a pint of boiling water; add 1 cupful of sugar, and the juice of 2 lemons; when cold and beginning to thicken, add the well-beaten whites of 3 eggs; beat all smoothly and lightly together; pour the mixture into a mold and set it away until hard; serve in the centre of a platter, with a boiled custard poured around, made with the yolks of 3 eggs, 1 pt. of milk, and ½ cupful of sugar.

SOROSIS PUDDING. — 3 sweet oranges; ¾ lb. sugar; ½ lb. sweet almonds; rose water; 16 eggs; 1 lb. fresh butter; puff paste; take the outside rinds of the orange; boil in several waters until tender; pound them in a mortar with the sugar; blanch the almonds and beat them very fine with rose water to keep them from boiling; break the eggs and froth 6 of the whites; beat very lightly the yolks and remaining whites; cream the butter, and beat all the ingredients together until perfectly light; line pie plates with a thin puff paste, and bake; sift sugar over tops of the pudding when drawn from the oven.

SPANISH CUSTARD. — 8 yolks of eggs; 8 teaspoonfuls of sugar; beat very light; add flavor if you like; put over a slow fire, stirring all the time until quite thick; then have small saucers, either of glass or china, and pour some on each saucer; serve in this way cold.

SPICED PUDDING. — Take 1 small square loaf of baked bread; peel off the crust; cut in pieces; pour upon it 1 pt. of boiling water; add 1 teaspoonful of salt; take 1 pt. of flour; add 1 heaping teaspoonful of baking powder; 2 coffeecups of raisins, seeded and chopped; mix all well with the flour, first powders and next raisins; add soaked bread, and 1 teaspoonful each of allspice, cinnamon, mace and cloves; add by degrees 1 coffeecup of sweet milk, and beat the mass well together; scald pudding bag, and put in the pudding, which should be pretty stiff; boil 3 hours.

SPONGE PUDDING. — 1 cupful of flour and 1 of powdered sugar mixed together, with 1 teaspoonful cream of tartar and ½ teaspoonful soda; 3 eggs; bake in 3 pie tins and spread with currant jelly; make a custard and pour over it, of 3 eggs, 1 cupful white sugar, 1 pt. of milk, and 1 teaspoonful of vanilla; stir the beaten eggs and sugar into the scalding milk; take from the fire as soon as it begins to thicken; flavor when cool; eat quite cool.

STRAWBERRY CUSTARD. — Make a nice boiled custard of 1 qt. of milk and the yolks of 5 eggs properly sweetened; boil till it thickens to the right consistency; take it off the fire, and put in the flavoring; take a gill of sugar and a pint of ripe strawberries; crush them together, and pass through a fine strainer; take the whites of 4 of the eggs; while beating them to a stiff froth add a gill of sugar, a little at a time; to the sugar and egg add the sweetened strawberry juice, beating all the while to keep it stiff.

STRAWBERRY PUDDING. — Cream a cup of sugar and a tablespoonful of butter; add the beaten yolks of 5 eggs and 2 cups of fine bread crumbs soaked in a quart of sweet milk; flavor with lemon or vanilla; pour into a deep pudding dish and bake until the custard is set; roll a pint of nice strawberries in powdered sugar; spread over the pudding and cover with a meringue made of the beaten whites and 3 tablespoonfuls of powdered sugar; return to the oven until the top is delicately browned.

STRAWBERRY PUFF PUDDING. — Sift 2 teaspoonfuls of baking powder with 1 pt. of flour; beat well 1 egg; add a little salt; mix with sweet milk till of the consistency of thick batter; place well-greased cups in a steamer; put into each a spoonful of batter; then a spoonful of strawberries, and cover with another spoonful of batter; steam 20 minutes; eat with cream and sugar, or a liquid hot sauce with a cupful of strawberry juice added.

STRAWBERRY TAPIOCA. — Soak over night 1 large teacupful of tapioca in cold water; in the morning put half of it in a yellow ware baking

dish, or in the porcelain one of a silver pudding dish; sprinkle sugar over the tapioca; then on this put 1 qt. of berries, sugar and the rest of the tapioca; fill the dish with water, which should cover the tapioca about ½ in.; bake in a moderately hot oven until it looks clear; eat cold with cream or custard.

SUET PUDDING.—1. Mince fine ½ lb. kidney suet, taking out all strings and skins; grate 1 pt. of bread crumbs, and pour over them 1 qt. of boiling milk; let steep for 1 hour; stir the suet and 6 even teaspoonfuls flour alternately into the bread and milk; add by degrees 6 eggs beaten very light; lastly a pinch of salt, 1 teaspoonful nutmeg and cinnamon, 1 wineglassful wine, and 1 of brandy; bake 1 hour; serve as soon as it comes from the oven with wine sauce.—2. ½ cupful chopped suet, 1 cupful corn meal, ½ teaspoonful soda; scald these together; make a thick batter; 1 cupful chopped apples; ½ cupful sugar; 2 eggs; 2 large tablespoonfuls of flour; ½ lb. raisins; spices to taste; bake in a hot oven for 2 hours.

SWISS PUDDING.—Sift together ½ lb. flour, 1 heaping tablespoonful of baking powder, and 1 of salt; rub together 4 oz. of granulated sugar and 2 oz. of butter; when they are well mixed, so as to be granular, but not creamy, add the flour gradually until all is used; make a hollow in the middle of the flour; put into it 1 egg, ½ teaspoonful of lemon flavoring, and ½ pt. of milk; mix to a smooth paste; put into a well buttered and floured mold, and set this into a large pot, with boiling water enough to come ⅔ up the side of the mold; steam the pudding ¾ hour; turn the pudding out of the mold and send it to the the table with this sauce: Stir together over the fire 1 oz. each of flour and butter; as soon as they are smooth pour into them ½ pt. boiling milk; add 2 oz. sugar and ½ teaspoonful of lemon flavoring; use with the pudding as soon as it boils up.

TAPIOCA MERINGUE.—Set 1 cupful of tapioca, with 1 pt. of water, on the back of the stove to swell; when it has taken up all the water, add milk till it is of a proper pudding consistency; let it stand on the stove about 1 hour; then pour it into a pudding dish; flavor and sweeten to taste; add, while it is hot, the yolks of 3 eggs; spread over the top a layer of jelly or jam; beat the whites of the eggs to a stiff froth; add 3 tablespoonfuls of sugar, spread over the top, and set it back in the oven to brown.

TAPIOCA PUDDING.—1. Soak till quite soft 1 cup of tapioca; boil in milk enough to make it like jelly; constantly stir; salt when put to soak; pour out in molds; eat with cream, and sugar and currant jelly.—2. To 2 qts. of warm milk put 8 tablespoonfuls of tapioca, 4 beaten eggs, 1 tablespoonful of butter, and cinnamon or mace to the taste; mix 4 tablespoonfuls of white powdered sugar and 1 wineglass of wine; stir it into the rest of the ingredients; turn the whole into a pudding dish that has a lining of pastry; bake immediately.

TRANSPARENT PUDDING.—Beat 8 eggs very well; put them into a stewpan, with ½ lb. sugar pounded fine, and the same quantity of butter; some nutmeg grated; set it on the fire; keep stirring till it thickens; put a rich puff paste round the edge of the dish; pour in the pudding when cool; bake it in a moderate oven; candied orange and citron may be added.

VANILLA CUSTARD.—Boil for ¼ hour a piece of vanilla in 1 qt. of milk, with 6 oz. of powdered sugar; break into a dish 6 eggs; beat the 6 yolks with the white of 1; mix them with the milk; then pour into the cups; cook in a pan surrounded by water.

VIRGINIA PUDDING.—Take 5 eggs, reserving 3 whites for sauce; 1 pt. milk; 1 gill of cream or 1 oz. of butter; 3 tablespoonfuls of flour; bake ½ hour; beat the whites of 3 eggs to a froth with 6 tablespoonfuls of sugar; pour over the pudding just before it is eaten; flavor to taste; serve cold.

WASHINGTON PUDDING.—Put 1 teacup of seeded raisins into the flour, and add ½ teaspoonful of salt, the same quantity of good cinnamon, and ½ teaspoon of ground cloves; sift the flour and spices from the raisins, and make a batter with 1 cupful of sweet milk, 1 cup of molasses and 1 egg; add a cupful of chopped suet (sprinkle with flour while chopping), and ½ teaspoonful of soda dissolved in 1 tablespoonful of hot water; last of all the floured raisins; steam in a buttered mold 2½ hours; serve with any nice sauce.

WEE PUDDING.—¼ lb. of flour; ¼ lb. butter; ¼ lb. sugar; 2 eggs; the rind of 1 lemon; beat for 20 minutes; ½ fill teacups; bake 20 minutes.

Eggs, Cheese and Toast.

REMARKS.—There are over a hundred ways of cooking eggs. Hard boiled eggs cannot be recommended to any one; but if the white of eggs is eaten slightly coagulated, it is digested quite as rapidly as any article of diet in use. If it is cooked so long that it is formed into hard congula, and then swallowed in pieces, it takes a long time for the gastric juices to chymify it. Therefore, if hard boiled eggs are preferred, cut them up very fine and masticate carefully. If the eggs get frozen so as to crack the shells in severe cold weather, keep them frozen until wanted for use; then bring them into a warm room, pour boiling water over them and leave them to cool; then they should be used immediately.

BAKED EGGS.—1. Butter a clean, smooth saucepan; break as many eggs as will be needed into a saucer, one by one; allow no broken yolk to remain, nor let them crowd, lest the yolks break; put a small piece of butter on each; sprinkle with pepper and salt; set it in a well heated oven and bake until the whites are set.—2. Beat up 6 eggs, 1 tablespoonful of flour, and 6 of sweet milk; melt a piece of butter in a frying pan; when hot turn the whole in and bake in a very hot oven; serve as soon as done.

BOILED EGGS.—Hold the eggs for an instant

over the steam of the saucepan before they are placed in it, which do very gently. Boil 3 minutes and the whites will become partially solid; 5 minutes and the whites will become hard and the yolks partially hard; 8 or 10 minutes and they will become hard throughout.

BREADED EGGS.—Boil hard and cut in round, thick slices; pepper and salt, and dip each in beaten raw egg; then in fine bread crumbs, or powdered cracker crumbs, and fry in butter, hissing hot; drain off every drop of grease and serve hot.

BUTTERED EGGS.—4 new laid eggs; 2 oz. of butter; break them into a basin, and beat them well; put the butter into another basin, which place in boiling water; stir till the butter is melted; pour that and the eggs into a lined saucepan; hold it over a gentle fire, and as the mixture begins to warm pour it two or three times into the basin and back again, that the two ingredients may be well incorporated; keep stirring the eggs and butter one way until they are hot, without boiling; serve on hot buttered toast.

CHEESE FONDU.—1 cup of bread crumbs, dry and fine; 2 scant cups of fresh milk; ½ lb. dry, rich cheese, grated; 3 eggs, whipped light; 1 tablespoonful of melted butter; pepper and salt; a pinch of soda; dissolve in hot water; soak the crumbs in the milk; beat in the eggs, the butter, seasoning and cheese; pour into a neat pudding dish; strew dry bread crumbs over the top; bake in a quick oven until delicately browned; serve in the pudding dish at once.

CHEESE OMELET.—Beat up 3 eggs with pepper and salt to taste, and 1 tablespoonful of grated (Parmesan is best) cheese; put a piece of butter the size of an egg into the omelet pan; as soon as it is melted pour in the eggs, and, holding the handle of the pan with one hand, stir the omelet with the other, by means of a flat spoon; the moment the omelet begins to set, cease stirring, but keep shaking the pan for a minute or so; with the spoon, double up the omelet, and keep on shaking the pan until the under side is of a good color; turn it out on a hot dish, colored side uppermost, and serve quickly.

CHEESE SANDWICHES.—2 parts of grated Parmesan or Cheshire cheese; 1 of butter; a small proportion of made mustard; pound them in a mortar; cover slices of bread with a little of this; lay over it slices of ham, or any cured meat; cover with another slice of bread; press them together; cut into mouthfuls that they may be lifted with a fork.

EGG OMELET.—1. Break 3 eggs and beat for 1 minute with ½ spoonful of salt and ¼ as much pepper; have your pan hot, with 1 tablespoonful of melted butter in it; pour in the eggs; scatter over them 3 crushed square crackers; when cooked sufficiently roll the omelet toward one side of the pan by slipping a fork under one side and turning it over; place the omelet on a hot dish and serve at once.—2. Take 6 eggs and beat separately; allow 1 tablespoonful of milk to each egg; stir in flour to make a batter; take 1 cupful of milk, put on the stove, and stir in the batter until it is like starch; add a piece of butter the size of a walnut, and a pinch of salt;

Omelet Pan.

take this from the stove; pour into the dish in which you would serve; stir in the yolks of the eggs, which have been beaten; beat the whites until you can turn the platter bottom side up; add them, mixing thoroughly; put in a quick oven and bake 10 minutes; eat immediately. It is better to fry omelets in regular omelet pans, as they are made thin in order that the omelet may be done quickly.

EGGS. A la Creme.—Hard-boil 12 eggs; slice them thin in rings; in the bottom of a large baking dish place a layer of grated bread crumbs, then one of eggs; cover with bits of butter, and sprinkle with pepper and salt; continue thus until the dish is full; be sure that the crumbs cover the eggs upon top; over the whole pour 1 large teacupful of sweet cream, and brown nicely in a moderately heated oven.

EGG SANDWICH.—Boil fresh eggs 5 minutes; put them in cold water; when quite cold peel them; then after taking a little white off each end of the eggs cut the remainder in 4 slices; lay them between bread and butter.

EGGS, Au Gratin.—Cut some hard boiled eggs in slices; lay them on a well buttered dish with grated Parmesan cheese, black pepper and the least bit of powdered nutmeg; sprinkle some baked bread crumbs over all; put the dish in the oven, and serve as soon as the contents begin to color.

FRENCH EGGS.—Boil hard; remove the shells; roll in cracker crumbs; fry in butter until brown; make a gravy of butter, crumbs and cream and pour over them.

FRICASSEED EGGS.—Boil eggs hard; take out a portion of the yolks whole; cut the remainder into quarters with the whites; make some good gravy boiling hot; put in minced thyme and parsley; add it to the eggs with a little grated nutmeg; shake the whole up with a piece of butter until it is of the proper consistence; garnish with eggs boiled hard and chopped up fine.

FRIED EGGS.—Have ready a frying pan containing hot fat; drop the eggs in separately; let them fry for 1 minute; drop some more hot fat over them; 3 minutes will cook them.

ITALIAN CHEESE.—Boil a knuckle of veal; when perfectly cooked, strain the liquor, remove the fat, take out the bones, and chop the meat fine; add 1 grated nutmeg, ½ oz. each of cloves, allspice and pepper; put the entire mixture on

the fire to simmer gently; when the liquor becomes jelly, pour into a mold; let it remain until the next day; line the mold with hard-boiled eggs cut in slices.

PICKLED EGGS.—1. Boil the eggs for 10 or 12 minutes; throw into cold water; when cold, take off the shells; cover them with vinegar, containing a mixture composed of beets, boiled very soft and mashed fine, with salt, pepper, cloves, and nutmegs to suit the palate.—2. Put the eggs on the stove in cold water; let it stand and boil for 1 hour—the heart is then mealy; remove the shells; stick 4 or 5 cloves in each egg; pour hot vinegar over; add other spices if you like; let stand a few days.

POACHED EGGS.—Place some water in a frying pan and let it boil; then add a little salt and break the eggs in the water; let them remain about 2 minutes, or until they are done, then remove with a strainer and serve immediately with butter, pepper and salt; or, a better plan to keep the eggs from spreading, place small muffin rings in the boiling water, pour the eggs into the rings and boil the same time; remove the rings and take up the eggs singly. They may be served on slices of nicely browned and buttered toast, or on slices of fried ham. The following is a good sauce for poached eggs: Make the sauce by putting ½ cupful of hot water in a saucepan, with a teaspoonful of lemon juice, 3 tablespoonfuls of veal or chicken broth (strained), pepper, salt, mace, and a tablespoonful of butter, with a little minced parsley; boil slowly 10 minutes; stir in a well-whipped egg; then pour over the eggs.

RAMEQUINS.—Grate ½ lb. of cheese; melt 2 oz. of butter; when the butter is cool, mix it up with the cheese and the whites of 3 eggs well-beaten; lay buttered paper on a frying pan; put slices of bread upon it; lay the cheese on the top; set it on the fire for about 5 minutes; take it off and brown it with a salamander.

SCRAMBLED EGGS.—1. Place butter the size of a walnut in the pan and allow it to melt; take care to prevent browning or burning; break 3 eggs and beat sufficiently to break the yolks, about a dozen strokes of the fork being sufficient; turn into the melted butter; stir from the bottom of the pan to prevent it from sticking until done; add salt and pepper, and turn into a hot dish.—2. Grate an ordinary sharp cheese, 1 tablespoonful for every 2 eggs; put some butter into a frying pan; when melted throw in the cheese; stir for a minute or two until the cheese melts; add the eggs, pepper and salt; mix with a fork until cooked; serve with fried bacon and baked potatoes.

SHIRRED EGGS.—6 eggs; 3 tablespoonfuls of gravy; enough fried toast to cover the bottom of a flat dish; a very little grated cheese; 1 teaspoonful of butter; melt the butter in a frying pan; when hot, break into this the eggs; stir in the gravy; pepper and salt to taste; continue to stir very quickly until the whole is a soft, yellow mass; have ready in a flat dish the fried toast, spread thinly with anchovy paste; heap the shirred eggs upon this, and serve before it has time to harden.

STUFFED EGGS.—Boil the eggs hard; cut them in two lengthwise, and remove the yolks, which chop; add some cooked chicken, lamb, veal or pickled tongue chopped fine; season the mixture; add enough gravy of the raw yolk of eggs to bind them; stuff the cavities; smooth them and press the two halves together; roll them in beaten egg and bread crumbs twice; when just ready to serve, dip them, in a wire basket, into boiling lard, and when they have taken a delicate color, drain; serve on a napkin and garnish with parsley or any kind of leaves, or serve with tomato sauce.

TOAST, Buttered.—Have a small bowl of boiling water on the range, in which put a good bit of butter; as you draw each piece of toast from the fork dip it in the hot water till thoroughly moist; place it in a plate; keep it warm until you have finished toasting all the slices; when all are done if you have any hot water and melted butter remaining, pour it over the toast.

TOAST, Dry.—Procure a loaf of bread about 2 days old; cut off as many slices as may be required; trim off the crusts and ragged edges; put the bread on a toasting fork; hold it before a very clear fire; move it backward and forward until the bread is nicely colored; turn it and toast the other side, and do not place it so near the fire that it blackens.

Toasting Forks.

TOAST, Milk.—1. Toast the bread until it is nicely colored; in the meantime place your milk on the stove to boil; then add a little butter and salt to the milk; when both toast and milk are ready, pour the latter over the toast and serve hot; a little flour may be added to the milk to thicken it.—2. Stir enough flour into milk, when boiling, to make it like thick cream; add enough sugar to sweeten to the taste, vanilla to flavor, and a small piece of butter; put this over the toast just before setting on the table.

TOMATO OMELET.—Break 6 eggs into a bowl; give about a dozen whirls of the beater; have ready in a frying pan a great spoonful of butter; heat it; run quickly over the bottom of the pan; pour in your eggs; with one hand loosen all around the edges of the omelet with a cake turner, and with the other shake the pan; let an assistant lay on ½ the omelet 5 or 6 slices of canned tomatoes; invert a hot dish over the pan; upset the latter; dish the omelet; strew the omelet thickly with dry cheese, grated and seasoned; singe with a red hot shovel held very close to the cheese; serve hot.

WELSH RAREBIT.—1. Select rich cheese, the milder the better; to make 5 rarebits take 1 lb. of cheese; grate it; put it in a tin or porcelain-lined saucepan; add ale enough to thin the cheese sufficiently; stir until melted; have a slice of toast ready for each rarebit (crusts

trimmed); put a slice on each plate and pour cheese enough over each piece to cover it; eat while hot. — 2. Put into a frying pan ¼ lb. of cheese cut into thin slices; pour on ½ pt. of sweet milk; stir in a beaten egg; add ½ teaspoonful of mustard, a little less red pepper, already ground, and a teaspoonful of nice butter; stir this mixture all the time; add lastly a few crackers well broken up; after thoroughly incorporating them into the mixture, turn it all into a heated dish and cover it.

FARINACEOUS FOOD.

FOR much of this kind of cooking, the farina boiler, made like the glazing pot (see *Glaze*, in CONDIMENTS AND FLAVORING ESSENCES), is a great convenience, saving labor of constant stirring and preventing burning.

CORN MEAL MUSH. — The meal should be ground very fine, and made from white-fleshed grain. Sift 1 qt. of corn meal; add a teaspoonful of salt; stir in as much boiling water as will make it of the required stiffness; stir rapidly to prevent burning, and in a few minutes it will be done; serve with milk.

CORN MEAL MUSH, Fried. — Prepare the quantity you wish as above directed; set it aside to become cold; when ready for it, cut into square or oblong strips; fry in nice pure lard, or merely with a piece of bacon fat, if it is not in the least degree rancid.

CRACKED WHEAT. — 1 pt. of the cracked grain; 2 qts. of water; boil in a smooth iron pot over a quick fire; stir in the wheat slowly; boil fast; stir constantly for the first ½ hour of cooking, or until it begins to thicken; lift from the quick fire, and place the pot where the wheat will cook slowly for an hour longer; keep it covered closely; stir now and then, and be careful not to let it burn at the bottom. When ready to dish out, it is a neat way to have molds moistened with cold water; cover lightly and set in a cool place; eat warm or cold with milk and sugar.

GRAHAM MUSH.—Stir Graham flour slowly into boiling water until it is the desired thickness; salt to taste; keep it boiling all the time; then set it back and let it cook slowly about 5 minutes.

GRAHAM MUSH, Fried. — Thicken boiling water with Graham flour until it forms a stiff mush; salt to taste; pour into a pan to cool; cut in thin slices; roll in flour, and fry brown, using plenty of lard to keep from burning.

GRITS.—Cook in the same way as corn meal mush, only boiling a little longer. Eat with milk, or butter and syrup.

HOMINY, Lye, or HULLED CORN. — Fill a large kettle half full of sifted wood ashes; fill up with cold water and boil until the lye is very strong; put it aside to settle; drain off the lye; return to the kettle, and when it is boiling hard, put in shelled corn; keep boiling as fast as possible for 5 or 10 minutes, or until the hull is eaten off; skim the corn into a colander, and pour plenty of cold water over it; rinse and rub it in a pan of water, after which it must be boiled in clear water for 3 or 4 hours, or until tender; be careful not to burn, and put no salt in while cooking; have the tea-kettle full of boiling water, and add to the corn as occasion requires; during the last hour let the water boil away so that when done it will be almost dry.

HOMINY, Baked.—To 1 cupful of boiled hominy (small kind) allow 2 cups of milk, a heaping teaspoonful of butter, a teaspoonful of white sugar, a little salt, and 3 eggs. Beat the eggs very light, yolks and whites separately; work the yolks first into the hominy, alternately with the melted butter; when thoroughly mixed, put in sugar and salt, and go on beating while you soften the batter gradually with the milk. Be careful to leave no lumps in the hominy; stir in the whites, and bake in a buttered pudding dish until light, firm and delicately browned.

HOMINY CROQUETTES.—Mix a tablespoonful of melted butter with a pt. of small, cold boiled hominy; add a teaspoonful each of salt and sugar, and 2 beaten eggs; beat until smooth; then make into small cakes or balls; flour each one well; fry in butter or dripping, or both.

MACARONI. — This is made of flour, water, butter, and the yolk of 1 egg; when these are mixed into a paste, roll it out as thin as a wafer; leave it to dry from ½ to 1 hour; then roll it round and round; cut the roll into narrow strips.

MACARONI, A la Creme.—Cook the macaroni 10 minutes in boiling water; drain this off, and add a cupful of milk, with a little salt; stew until tender; in another saucepan heat a cup of milk to boiling; thicken with a teaspoonful of flour; stir in a tablespoonful of butter, and lastly a beaten egg; when this thickens pour over the macaroni after it is dished.

MACARONI, Baked. — Prepare in the dish in which it is to be served; fill the dish ½ full of macaroni broken in length of 1 or 2 in.; cover with boiling water and place on the back of the stove for ½ hour; if there is any water remaining in the dish, drain it off; drop lumps of butter here and there over it; season with pepper and salt; cover with rich milk; grate a layer of cheese all over the top; bake in a moderate oven ½ hour or more.

MACARONI, Boiled.—Boil ½ lb. of macaroni, and, while draining it from the cold water, stir together over the fire 1 oz. each of butter and flour; as soon as they bubble, gradually pour into the sauce they make, 1 pt. of boiling water; beat it with a fork or egg-whip until it is smooth; season with a teaspoonful of salt and a saltspoonful of pepper; put the macaroni in it to heat; cut an onion in small shreds; brown it over the fire in a very little fat; when both are done, dish the macaroni, and pour the onion out of the frying pan upon it.

MACARONI, With Horseradish. — Grate the horseradish and mix with vinegar; first beating up the yolk of an egg, and mix it with the vin-

egar; boil the macaroni; lay it in salt and water in a deep dish, with a little bit of butter or cheese on top to make it brown; eat it with the horseradish sauce.

MACARONI, With Kidney.—Wash and cut 1 kidney small; chop an onion fine, and fry a light brown in 1 tablespoonful of butter; add 1 teaspoonful of salt, a saltspoonful of white pepper, and a very little red pepper; put the kidney in this; cover closely; let them stew for 2 hours; stew ½ can of tomatoes, seasoned with salt, pepper and butter; boil ½ lb. of macaroni in 2 qts. of water and 1 tablespoonful of salt; let the water come to the full boil before putting in the macaroni; boil 20 minutes, or till tender; put the macaroni in the colander and run cold water over it; put a layer of macaroni in a baking dish, spread over it a teaspoonful of butter, part of the stewed kidney, some of the gravy from the kidney, and a layer of stewed tomatoes, and so on till the dish is full; let the macaroni and the butter be on top; sprinkle with a tablespoonful of fine bread crumbs; bake for ½ hour in a quick oven.

MACARONI, With Oysters.—Boil macaroni in a cloth to keep it straight; put a layer in a dish seasoned with butter, salt and pepper; then a layer of oysters; alternate until the dish is full; mix some grated bread with a beaten egg; spread over the top and bake.

MACARONI, With Tomato Sauce.—Throw 1 lb. of macaroni into a saucepan of boiling water and salt; when tender, strain off all the water; put it into a saucepan with 3 oz. of butter, 3 oz. of grated Parmesan cheese and tomato sauce, made as follows: Ripe tomatoes; wash, dry and cut them into a saucepan without any water, with salt, pepper, a few cloves, a little onion and celery; boil till sufficiently done; pass through a sieve and pour into the saucepan of macaroni.

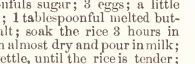
MACARONI, With White Sauce.—Warm ½ lb. macaroni, boiled and washed, in the following sauce: Stir over the fire 1 oz. each of butter and flour; pour in 1 pt. of boiling water and milk as soon as the butter and flour are mixed; season with salt and pepper to taste.

OATMEAL MUSH.—Soak the oatmeal over night in enough water to wet it; in the morning stir into boiling water; cook a few minutes.

POLENTA.—Boil coarse meal in water until it is rather thick and pasty; when it sets, and is still hot, cut it in thin slices; sprinkle it over with grated Parmesan cheese; fry in butter or sweet oil.

RICE.—1. Pick over the rice and wash it in cold water; to 1 pt. of rice put 3 qts. of boiling water and ½ teaspoonful of salt; boil it just 17 minutes from the time it begins to boil; turn off all the water; set it over a moderate fire with the cover off; steam 15 minutes; milk used instead of water improves this.—2. Chop an onion very fine and fry it in butter till it be of a gold color; stir in a teacupful of rice; let it cook in the butter for a few minutes; stir all the time; add 1 pt. of good gravy and let it simmer slowly; when nearly cooked, add a little grated nutmeg, Parmesan cheese, salt and pepper to taste; mix it up well; when thoroughly done let it stand a few minutes before the fire; just before serving stir in a small piece more butter; serve garnished with croquettes of any kind of meat, with stewed tomatoes or with slices of fried bacon.

RICE CROQUETTES.—½ cup of rice; 1 pt. of milk; 2 tablespoonfuls sugar; 3 eggs; a little grated lemon peel; 1 tablespoonful melted butter; 1 spoonful salt; soak the rice 3 hours in warm water; drain almost dry and pour in milk; stew in a farina kettle, until the rice is tender; add the sugar, butter and salt; simmer 10 minutes; whisk eggs to a froth; add them cautiously; remove saucepan from range; return and stir awhile; remove and add grated lemon peel; turn out upon a well-greased dish to cool; when cold, flour your hands and roll into oval balls; dip in beaten egg, then in cracker crumbs, and fry in lard.



Rice Croquettes.

RYE TOAST.—To 1 qt. rye flour add 1 even teaspoonful of salt and sufficient boiling water to make a stiff dough; put it in a buttered pan; have a bright, clear fire, and the grate well raked; prop the pan in front of the grate, and as brown crust forms strip it off and keep it hot and dry; repeat this till it is all brown; break it up; pour hot cream over it, and serve in a covered dish.

TURKISH PILAU.—1. 1 cup of beef stock; 1 cup of tomato juice strained; 1 cup of rice; boil these together 20 minutes; add ½ cup of butter and boil 10 minutes; it must be boiled in an inner kettle or stirred all the time, as it burns easily; the rice must be whole when done; eat while very hot or it is not good.—2. Cut up 6 small onions and a carrot; chop up ½ bunch parsley fine; fry it in butter; add salt, pepper, and a clove; moisten with 3 tablespoonfuls of broth; let it cook ½ hour; then strain, having added more soup; if no soup is ready, water will do; take ¾ lb. of rice, well cleaned; put it in the sauce; cook it all until done; having greased a form with butter, put in the rice; bake it in a hot oven for 10 minutes.

FISH.

REMARKS.—On the proper cleaning of fish preparatory to dressing it, depends much of its delicacy and flavor. Slit the fish sufficiently open to permit the inside to be thoroughly washed, and use sufficient water. The flavor of all fish is improved by adding a little salt or vinegar to the last water in which they are washed. The sound, milt, and roe, should be carefully cleaned and preserved. When boiled, place all large fish, with the skin whole, on the fire, in cold water; if crimped, or cut into slices or pieces, in boiling water; if whole, do not cover with more than 2 or 3 in. of water, or the skin will crack. To scale fish easily, dip it in boil-

ing water 1 minute. Salt fish are quickest and best freshened by soaking in sour milk. Large fish should be boiled or baked; small ones fried or broiled. In broiling fish, butter the gridiron and place the flesh side next the fire; when this side is done turn over and cook the other side more thoroughly. It may be remarked here, as indeed it should be in regard to the whole culinary art, that dressings and sauces, as well as even modes of cooking, are largely interchangeable; so that when a receipt is deemed too costly or elaborate, some simpler one will not be difficult to find to substitute, though applied to a different fish or other article of food.

ANCHOVY. — 1. Fry to a pale amber color, in oil or butter; having previously scraped clean, soak an hour or two in water, wipe dry, open it without dividing the fish, and remove the back bones. — 2. Remove the larger bones from the fish; pound them to a smooth paste in a marble mortar; add a little bay salt and cayenne pepper at will; rub the pulp through a fine hair sieve, and about ¾ fill the pots with it; cover the surface of each to the depth of about ½ inch with good butter in a melted state; keep in a cool situation.

BAKED FISH.—1. Scale, wash, and wipe dry, inside and out, a 2 or 3 lb. fish; make a stuffing of 1 pt. grated bread, 2 tablespoonfuls melted butter, pepper and salt to taste, 1 raw egg, a little celery salt, 1 onion chopped fine; do not wet the bread crumbs; the egg and melted butter will moisten sufficiently; tie over the fish thin slices of salt pork; fill a dripping pan ½ full of hot water; place the gridiron on the pan; after laying the fish on the gridiron cover all with another pan; bake in a hot oven till the pork is well shriveled; remove the upper tin, allowing the fish to brown. — 2. Take any nice fish, boil it; remove the bones; chop considerable parsley very fine, with 1 small onion; have about as much bread crumbs as fish; take a pudding dish and butter it; lay in a layer of bread crumbs, then a layer of fish, ending with the bread crumbs; mix parsley and onion, with salt and pepper through your bread crumbs; put lumps of butter over the top, with a very slight grating of nutmeg, and pour over it all sweet cream or very rich milk, till it rises nearly to the top; bake in a quick oven till it has a nice, rich brown crust.

BLUE FISH. — Chop an onion and fry it in butter; add ½ lb. of soft, fine bread crumbs, a teaspoonful of fresh butter, a little chopped parsley, pepper, salt, and a few drops of lemon; after cooking a very little take it up and add a well-beaten egg; stuff your blue fish with this; serve the fish with a drawn butter sauce having a little finely-chopped pickled asparagus in it.

CATFISH.—Take a large catfish and cut it up into pieces 2 in. in length and 1 in. in thickness; beat up 3 eggs with a little salt and pepper and a teaspoonful of Worcestershire sauce; dip the fish in the egg batter, and roll in corn meal or bread crumbs; fry a deep brown; garnish with lemon, parsley, or celery tops, and send to the table with a cucumber salad.

CHOWDER. — Have a good haddock, cod, or any other solid fish; cut it in pieces 3 in. square; put 1 lb. of fat salt pork in strips into the pot, set it on hot coals and fry out the oil; take out the pork and put in a layer of fish, over that a layer of onions in slices, then a layer of fish, with slips of fat salt pork; another layer of onions, and so on alternately until your fish is consumed; mix some flour with as much water as will fill the pot; season with black pepper to the taste; boil for ½ hour; have ready some crackers soaked in water till they are a little softened; throw them into the chowder 5 minutes before taking up; serve in a tureen.

CLAM CHOWDER.—Boil a peck of clams and pick them out, being careful to preserve the clam water clear; let it stand to settle the sand; fry a few pieces of salt pork; mince fine with sliced onions, until all are browned; add the clam water with about twice as much clear water; boil some potatoes, thinly sliced, 15 minutes; stir 4 teaspoonfuls of flour in 1 pt. of milk; let it boil up once or twice; set the pot where it will scald but not boil; add the clams and a few split crackers; salt and pepper to taste.

CLAM FRITTERS. — Put into an earthen dish 3 spoonfuls of flour, a teaspoonful of yeast powder and 2 whole eggs; mix this with a little clam juice; mince a pint of clams and mix with this batter; put 2 or 3 spoonfuls of lard into a shallow frying pan, while hot; deposit your mixture therein by spoonfuls to fry; turn over after 3 or 4 minutes; let them fry a moment longer; take them out, and after draining them on a cloth, serve.

CLAMS, Deviled. — Chop clams fine; season with melted butter and salt; add the yolk of an egg, lemon juice, and a little mace; put in the shells; sprinkle with cracker dust; baste with melted butter or sweet oil; set in an oven to bake.

CLAMS, Scalloped. — Chop the clams fine; season with pepper and a little salt; mix in another dish some powdered cracker moistened with a little warm milk, part of the juice of the clams, a beaten egg or two, and a small spoonful melted butter; stir into this the chopped clams; bake in small patty pans; send them to table in the tin pans; or wash, wipe, and butter some of the large clam shells; fill them with the mixture and bake.

CODFISH. Baked.—Cut a large fine piece out of the middle of the fish; skin it carefully; stuff with a stuffing composed of the yolks of 2 eggs boiled hard, the roe half boiled, bread crumbs, grated lemon peel, butter, pepper, and salt to taste; bind it with the undressed white of an egg; sew in the stuffing with white thread; bake in a Dutch oven before the fire; turn it frequently; baste with butter; serve with shrimp sauce, plain butter, or oyster sauce.

CODFISH BALLS.—Take of nice white codfish, 2 lbs.; put into a kettle with sufficient cold water to cover the fish, and let it boil till perfectly tender; remove it to a pan of cold water; separate from bones, skin, etc.; place in an earthen or bright tin mixing pan; mash fine, with about double the quantity of nicely steamed potatoes; add 3 or 4 slices of light bread crumbed, or previously soaked in milk; add 2

eggs and a teacup of butter, with black pepper to suit taste; mash and mix thoroughly; make as moist as is wished with sweet milk; make into flat balls; fry in hot lard, as you would mush.

CODFISH, Boiled. — Tie up the head and shoulders well; place it in the kettle, with enough cold water to cover it; cast in a handful of salt; when done enough drain it clear of the scum; remove the string; send it to table garnished with the liver, the smelt and the roe of the fish, scraped horseradish, lemon sliced, and sprigs of parsley; or, with oysters fried, or small fish fried; serve with anchovy or oyster sauce.

Cod for Table.

CODFISH, Broiled.—Clean the fish; cut it into slices of about 1 in. thick; dry them well with a clean cloth; rub them with thick melted butter; sprinkle a little salt over them; place them on a gridiron over a clear fire; when one side is done, turn them carefully to broil the other; serve with melted butter and anchovy sauce.

CODFISH CUTLETS. — Steam the cod till nearly done; cut a slice and have a batter of self-raising flour ready; mix the batter with 1 egg and water; put the piece of fish in the batter in the pan; fold it over when it sets, having first sprinkled pepper and salt on; make the cutlets as well shaped as you can; have potatoes cut in small balls and fried.

CODFISH, Fried.—Cut the middle or tail of the fish into slices 1 in. thick; season them with salt and pepper; fry them of a light brown on both sides; drain them on a sieve before the fire; serve them on a well heated napkin with plenty of crisped parsley round them; serve with melted butter and anchovy sauce.

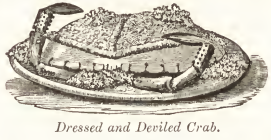
CODFISH, Matelote of.—Cut off the head of a codfish weighing 5 lbs.; remove bones from the the fish, and fill it with a dressing made of ½ pt. oysters, 1 scant pt. of bread crumbs, ½ tablespoonful of pepper, 2 teaspoonfuls of salt, 2 tablespoonfuls of butter, ½ onion, 1 egg, and ½ tablespoonful of chopped parsley; place 5 slices of pork both over and under the fish; boil the bones in a pint of water; pour this around the fish; bake an hour and baste often with gravy and butter; have a bouquet in a corner of the baking pan; make a gravy and pour around the fish; garnish with fried smelts.

CODFISH MAYONNAISE. — Take the fish, when cold, and remove the skin and bones; for sauce put some thick cream in a porcelain saucepan and thicken it with corn flour, which has been mixed with cold water; as it begins to boil stir in the beaten yolks of 2 eggs; as it cools, beat it well to prevent the mixture from becoming lumpy; when nearly cold stir in the juice of 2 lemons, a little tarragon vinegar and a pinch of salt, with a little cayenne pepper; peel and slice some very ripe tomatoes or cold potatoes; steep them in vinegar, with cayenne, powdered ginger and plenty of salt; lay these around the fish; pour over the cream sauce.

CODFISH OMELET.—Break into small pieces the thickest parts of a dressed cod; season with a little grated nutmeg and a little pounded mace; beat up 6 eggs well; mix it; form it into a paste; fry it as an omelet; serve as hot as possible.

CRABS, Baked.—Remove the meat from the shell; mix it with bread crumbs—crout ¼ will be sufficient; add white pepper, salt, a little cayenne, grated nutmeg, and ½ doz. small lumps of butter, each about the size of a nut; add the butter to the fish, after it has been returned to the shell; squeeze lemon juice over it; lay a thick coat of bread crumbs over all, and bake.

CRABS, Cold Dressed.—Open the crabs; take out all the flesh and fat, and the white meat from the claws; mix the meat well with ½ tablespoonful mustard, ½ spoonful vinegar, and ½ tablespoonful white pepper, and a pinch of cayenne; wash and clean the shells; fill with the meat thus prepared and serve; garnish with parsley.



Dressed and Deviled Crab.

CRABS, Deviled.—Boil your hard crabs and take out the meat and mince it; grate 2 oz. of bread crumbs and mix them with 2 hard boiled eggs chopped fine, some cayenne, salt and lemon juice; add all this to 6 oz. of the crab meat; make moist and rich with cream; clean the shells; fill them with the mixture; put some bread crumbs over the top and brown in a hot oven.

CRABS, Minced.—Extract the meat from the shell; mince small; place it in a saucepan with a gill of white wine, pepper, salt, nutmeg, cayenne pepper, and 2 tablespoonfuls of vinegar; stew it for 10 minutes; melt 2 oz. of butter with an anchovy and the yolks of 2 eggs; mix the whole well together; thicken with stale bread crumbs; garnish with strips of thin toast and sprigs of parsley.

CRABS, Potted.—Cut the meat of a crab, parboiled, into small pieces; put a layer of these into a potting can, or any deep tin dish; sprinkle salt, pepper, cayenne and pounded mace over; add a layer of the spawn and coral, then a layer of the cut meat, and so on, till all is used; press it down; pour melted butter over it, and

let it stand for ½ hour in a slow oven; take it out; leave it to cool; remove the butter, and turn the meat into small pots; pour clarified butter over them, and put by for use.

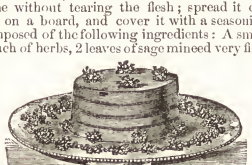
CRABS, Stuffed.—Let your crabs cook 20 minutes; take them out, and let them cool; cut the crabs in 2 parts; keep the shells, which clean well; take the meat out and hash it; make a milk sauce, not too thick; add an onion hashed fine, and previously cooked in butter; spice the sauce very strongly with salt, cayenne pepper, mustard, spices, nutmeg, etc.; let the crabs cook in this sauce 10 minutes; add some bread crumbs to the preparation, to give it some consisteney, and thicken with a few yolks of eggs.

CURRY OF COLD FISH.—Bone, skin and cut up the large kinds, and do the smaller sorts in rather thick cutlets or whole; put into a stewpan a good lump of butter, and 1 tablespoonful each of chopped pickles and preserved tomatoes; when these are hot add 1 tablespoonful of curry, which has been mixed with ½ pt. of milk or cream and the beaten yolks of 2 eggs; make the whole quite hot; stir gently; add the fish, and when hot serve all together, with a good rim of boiled rice round the dish, and the juice of ½ lemon squeezed over.

EEL PATTIES.—Take 3 medium-sized eels and cut them up into inch pieces; put them in a stewpan; add salt; cover them with cold water; when the water comes to a boil take them off the fire; wash them in cold water; scrape off any fat that may adhere; return them to the stewpan with just enough hot water to cover them; add a blade of mace, a bay leaf, a few whole peppers, a few sprigs of parsley, and a lemon cut into slices; stew gently until the fish will separate from the bone; remove the fish from the broth, pick it into small pieces; set them aside; reduce the broth a little, strain, and thicken with flour and butter; return the fish to the broth; simmer a moment; fill your patties and serve; make patty shells as directed for oyster patties.

EELS, Boiled.—Choose the smallest; simmer in a small quantity of water, into which a quantity of parsley has been put; garnish and serve with sauce.

EELS, Collared.—Take a large eel, cut off the head and tail, and remove the skin and backbone without tearing the flesh; spread it out flat on a board, and cover it with a seasoning composed of the following ingredients: A small bunch of herbs, 2 leaves of sage minced very fine,



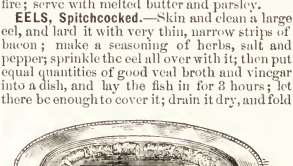
Collared Eels.

2 cloves, 2 blades of mace, and a little allspice and whole pepper well pounded, with salt to taste; roll up the eel, beginning with the broad end, and bind it tightly with a tape; boil down the backbone, head and tail with pepper, salt, mace and vinegar; put the eel into this liquor, and stew about ¾ hour; when tender set it aside; boil up the liquor with more vinegar and spice, if required, and when cold add it to the fish.

EELS, Fricasseed.—Cut up 3 lbs. of eels into pieces of 3 in. in length; put them into a stewpan and cover them with Rhine wine, or ¾ water and ¼ vinegar; add 15 oysters, 2 pieces of lemon, a bouquet of herbs, 1 onion quartered, 6 cloves, 3 stalks celery, a pinch of cayenne; pepper and salt to taste; stew the eels 1 hour; remove them from the dish; strain the liquor; put it back into the stewpan with a gill of cream and an ounce of butter rolled in flour; simmer gently a few minutes; pour over the fish; serve with a toasted milk cracker.

EELS, Fried.—Clean and skin the eels; cut off their heads; divide them into pieces 3 or 4 in. long; then score across in 2 or 3 places; season them with pepper and salt, and dust them in flour, or dip them into an egg beaten up; sprinkle them with finely grated bread crumbs; fry them in fresh lard or dripping; let them drain and dry on the back of a sieve before the fire; serve with melted butter and parsley.

EELS, Spitchcocked.—Skin and clean a large eel, and lard it with very thin, narrow strips of bacon; make a seasoning of herbs, salt and pepper; sprinkle the eel all over with it; then put equal quantities of good veal broth and vinegar into a dish, and lay the fish in for 3 hours; let there be enough to cover it; drain it dry, and fold



Spitchcocked Eels.

it in a buttered paper, first turning and skewering it backwards and forwards, that it may be more conveniently cooked. When on the spit, baste frequently, and add ½ pt. of white wine to mix with the drippings in the pan for this purpose. Take off the paper a few minutes before it is quite done, and baste and flour, that it may be of a nice brown. Fried bread may be placed round the dish, and broiled slices of salmon; or they may be varied with small soles fried of a beautiful color. Time to roast, from 30 to 35 minutes.

EELS, Stewed.—Skin, empty and wash the fish well in cold water; cut off the heads, and the rest into short lengths; wipe dry with a clean cloth; put them into a deep pie dish with some veal stock, more than sufficient to cover them; first rub over each piece of eel, separately, with a mixture of cayenne pepper, salt, and some finely powdered, dried savory herbs, and minced parsley; cover the pie-dish over

with a plate; put it in the oven; let the contents stew until the fish is sufficiently cooked and tender; remove all the fat which has risen to the surface; 5 minutes before serving it, lift the fish out carefully into a hot dish; stir into the gravy 1 large wineglass of port wine, the juice of half a fresh lemon, and 1 teaspoonful of Worcestershire sauce; when hot, pour over the fish and serve; garnish the dish with fried parsley and slices of lemon.

FISH CROQUETTES. — Pick the fish left over from a previous meal, carefully removing skin and bone. Make a sauce with 1 oz. of butter, and the same of sifted flour; put this in the saucepan, with a pint of boiling water, salt-spoonful of salt, a very little white pepper, and a dust of nutmeg; stir thoroughly, so that it is smooth; cook the fish slightly in this sauce; put it aside in a dish to cool; when cold, flour a board and lay the fish paste on it; dust with a pounded cracker and roll out the paste. Have the yolks of 2 eggs well beaten; cut the paste in strips about 2 in. long and an in. wide; roll them over on themselves; dip in egg and fry in hot fat; let them just brown, do not break the croquettes; if they are greasy, put them on paper to absorb the excess of fat; sprinkle a little well-chopped parsley over them.

FISH STEW. — Take 1 onion, cut very fine; have lard quite hot in a good-sized stewpan; drop the onion in and let it fry brown; dust in 2 tablespoonfuls of flour; as soon as it is brown pour in boiling water; season the gravy with salt, black and red pepper and a piece of garlic; have a good-sized fish cut in half, put it in the stewpan, having enough gravy to cover it; let it cook slowly, merely simmering, and keep well covered; when the fish is nearly done add a tumblerful of claret wine and a wineglassful of Madeira; do not stir it; just shake until it mixes; let simmer a few minutes; take the fish up as whole as possible and put on a dish; pour gravy over it and garnish with thin slices of lemon and sprigs of parsley and celery.

FLAKED FISH. — Make a sauce by dredging some flour in 2 oz. of hot butter in a stewpan; add ½ lb. of cold fish nicely flaked, 1 oz. of cold butter, a dessertspoonful each of anchovy sauce and mixed mustard, 1 teacupful of cream, some pepper, salt, and a few bread crumbs; make hot and serve in a buttered dish, with the addition of a few bread crumbs; brown the top in the oven.

FROGS. — Only the hind legs are eaten; fry them brown in sweet table butter, first dipping them in a batter of cracker dust, which should adhere closely when cooked, forming a dainty cracknel of a golden brown color, with a crisp tang to it when submitted to the teeth.

GRAVY, For Baked Fish. — Brown a sliced onion in a little butter; add gradually a pint of stock; thicken with a tablespoonful of prepared flour; let the mixture simmer with a bunch of parsley nearly ½ hour; strain the gravy; add salt and a teaspoonful of walnut catsup.

HALIBUT, Baked. — Put a halibut steak weighing about 1 lb., in the middle of a pan; sprinkle it with a piece of garlic the size of a pea; cut fine; spread with tomato enough to cover the fish; cover with bread crumbs; add a little butter and salt; then garnish the fish with more tomatoes and bake 20 minutes; take on the dish in which it is served.

HALIBUT, Broiled. — Nape of halibut; butter; pepper and salt; wash and wipe the nape very dry; sprinkle a little flour on it; put the skinny side next to the fire; broil moderately ½ hour, turn when necessary; when done put on butter and salt; serve hot.

HALIBUT, Head of.—Put 1 pt. of wine, a few anchovies, an onion stuck with cloves, a bunch of sweet herbs, and some pepper into a stewpan; fill it nearly with water; stew for an hour; strain it, and put in the head of a halibut; stew it till tender; when done enough thicken the gravy with butter and flour; add a little fish sauce and serve it up with force-meat balls made of a part of the fish pounded and rolled up with crumbs of bread, thyme, marjoram and nutmeg, bound together with the yolk of an egg. If the fish has been stewed in plain water add a glass of wine to the sauce.

HASHED FISH. — Make a sauce by putting together in a saucepan over the fire, some white wine, butter rolled in flour, shred shallot, grated lemon rind, chopped anchovy, and enough water to moisten with; when quite hot, place in it sufficient boned and sliced fish; keep the whole closely covered over the fire until it is made perfectly hot; add herbs at discretion.

HERRINGS, Baked.—Take off the heads of the fish; remove the entrails; wash and dry them with a cloth; sprinkle them with a seasoning of black pepper, cloves and salt, mixed; tie paper over them; put them in a pan, with a few bay leaves, and bake in a moderate oven; eat either hot or cold.

HERRINGS, Boiled.—Clean them; wash them over with vinegar; fasten the heads to the tails; put them in boiling water 10 or 12 minutes; garnish with parsley; serve with melted butter in which 1 tablespoonful of ketchup, 1 teaspoonful of chili vinegar, and 1 of made mustard has been mixed while making.

HERRINGS, Broiled. — Steep first in vinegar and water into which a handful of salt has been thrown; let them remain 10 minutes; take them out and broil them over a clear fire; rub the bars of the gridiron with suet; serve garnished with parsley; eat with melted butter with a little mustard and vinegar in it, or lemon juice instead of the latter.

HERRINGS, Fried.—Slice small onions; lay in the pan with the fish, or fry separately; serve the fish with the onions laid round them.

HERRINGS, Kippered.—Put the herrings in a basin; pour over enough boiling water to cover them; take them out immediately and put them skin downward in a frying pan; for 2 herrings put ½ oz. of butter and a tablespoonful of hot water into the pan; baste them frequently with it for 10 minutes; take care the fire is not strong enough to boil the fish; the slower the cooking proceeds the better; when placed on a hot dish, spread a small piece of butter over the fish; sprinkle lightly with pepper; serve very hot.

HERRINGS, Potted. — Take from 1 to 2 doz.

herrings, according to the number you purpose potting; choose them as large, fresh, and fine as you can; take 2 oz. of salt, 1 of saltpeter, 2 of allspice; reduce them to an impalpable powder; rub them well into the herrings; let them remain with the spice upon them 8 hours to drain; wipe off the spice clean; lay them on a pan on which the butter has been rubbed; season with nutmeg, mace, pepper, salt, and 1 clove in powder; 1 oz. each, save the last; lay in 2 or 3 bay leaves; cover with butter and bake gently 3 hours; when cool, drain off the liquor; pack the fish in the pots intended for their use; cover to the depth of ½ in. with clarified butter, just sufficiently melted to run; do not permit it to be hot; eat in 2 days.

KEDGEREE. — Chop small some cold boiled fish; add double the quantity of boiled rice; season with cayenne, white pepper, and salt; boil 2 or 3 eggs 3 minutes; add to the above chopped small with a large piece of butter; warm in a pan, and serve up hot.

LOBSTER, Boiled.—Set over the fire a saucepan containing water salted in the proportion of a tablespoonful of salt to 1 qt. of water; when the water boils put the lobster in; keep boiling briskly from ½ hour to an hour, according to the size of the fish; take the lobster out; wipe all scum from it; rub the shell with a very little oil or butter, to gloss.

LOBSTER, Broiled. — Cut the tail part of a lobster in two; rub a little sweet oil over the meat and broil; when done brush a little butter over it, with the juice of ½ lemon and just the suspicion of cayenne; put the meat back into the shell; send to table with a dish of broiled tomatoes and a fresh baked potato.

LOBSTER CROQUETTES.—Take the meat of 2 lobsters and chop it; slice 1 small onion, and brown it in a tablespoonful of butter; when cooked and off the fire, incorporate into this 2 tablespoonfuls of flour; add a little milk; to the chopped lobster add parsley, a little salt and a little red pepper; bind the lobster together with the yolks of 4 eggs; mix thoroughly with the butter in which the onion was cooked; shape properly and dip them in cracker crumbs and the yolk of an egg; fry in boiling lard.

LOBSTER CUTLETS.—Make a milk sauce well reduced; incorporate 2 shallots hashed very fine and cooked slightly before in a little butter; hash also very fine a small piece of boiled ham and the tails of 2 lobsters; which cook 10 minutes in sauce; add a little butter of lobster; thicken with 2 yolks of eggs and cool; divide the preparation in 2 equal parts, to which give the form of a cutlet; soak them in beaten eggs; roll them in some bread crumbs and fry them until they get a nice yellow color; arrange on a plate and put at each end of the cutlets a little claw of lobster or a curled paper; put round the plate some parsley and a few pieces of lemon, and serve.

LOBSTER, Deviled.—Take the meat out of the main shell of the fish; divest of the uneatable parts; mix the remainder with a little shred anchovy, olive oil, lemon juice, and what seasoning you may fancy; place the mixture in the shell; butter it outside; bake or broil until thoroughly hot; serve with dry toast and crisp parsley.

LOBSTER, Dressed.—Wipe over the shell of the lobster, when it is boiled, with salad oil; rub it off again; separate the body from the tail; break off the great claws; crack them at the joints; split the tail in halves; place the halves of the body upright in the dish; lay the claws and half tails round it; garnish with parsley.

LOBSTER, Fricasseed.—Boil the meat of a good sized lobster; when tender, cut it in small pieces; stew or simmer it gently for 10 minutes with a little chicken or lamb broth, a lump of butter, with pepper and salt to suit the taste; when almost ready to serve add a little cream, thickened with flour; stir in the gravy; let it come to a boil; toast some thin slices of bread, or some milk crackers; lay in the bottom of a deep vegetable dish, and pour lobster over them; add lemon juice.

LOBSTER, Rissoles of.—Extract the meat of a boiled lobster; mince it as fine as possible; mix it with the coral pounded smooth, and some yolks of hard boiled eggs, pounded also; season with cayenne pepper, powdered mace and a very little salt; take a batter of beaten egg, milk and flour; to each egg allow 2 large tablespoonfuls of milk and 1 large teaspoonful of flour; beat the batter well, and then mix the lobster with it gradually, till it is stiff enough to make into oval balls about the size of a large plum. Fry them in the best salad oil; serve them up either warm or cold.

LOBSTER, Roasted. — Take a live lobster; half boil it; take it from the kettle in which it is boiling; dry it with a cloth; while hot, rub it over with butter; set it before a good fire; baste it with butter; when it produces a fine froth, it is done; serve with melted butter.

LOBSTER, Stewed. — A middling-sized lobster is best; pick all the meat from the shell as whole as possible; put it in a stewpan with a piece of butter the size of a large egg, a little pepper, salt, and a teacupful of weak vinegar; stew about 20 minutes; eat when very hot.

MACKEREL, Baked.—Open and clean thoroughly; wipe very dry; pepper and salt the inside; put in a stuffing composed of powdered bread crumbs, the roe chopped small, parsley, and sweet herbs, but very few of the latter; work these together with the yolk of an egg; pepper and salt to taste; sew it in the fish; place the latter in a deep baking dish, and dredge it with flour slightly; add a little cold butter in small pieces; put the fish into an oven; 28 or 30 minutes will suffice to cook it; send in a hot dish to table, with parsley and butter.

MACKEREL, Boiled. — Clean and roll in a clean cloth; put in cold water; cook for 5 minutes after coming to a boil; serve with parsley sauce, made with a tablespoonful of flour; mix smooth with cold milk, and a piece of butter the size of a small egg; garnish with green parsley, and eat with stewed gooseberries.

MACKEREL, Broiled. — After taking out the gills and inside, clean and dry the mackerel with a damp cloth; fold in an oiled paper and put on the gridiron; when done on one side turn on the other; remove the paper and dress

on the dish in which it is to be served; split it down the back and put in a lump of butter mixed with finely chopped parsley and shives; add salt and pepper and a squeeze of lemon juice; serve before the butter is quite melted.

MACKEREL, Butter Sauce for.—½ cup of flour mixed with cold water till a smooth paste; stir enough of this paste into ½ pt. of boiling water over the fire to form a thick cream; add a little salt; stir steadily with an egg-whip for 2 minutes; remove from the fire and stir in ¼ lb. of butter, 2 tablespoonfuls of chopped parsley and the juice of ½ lemon; set it on the back part of the stove to keep warm, but on no account let it boil.

MACKEREL, Fillets of.—Split and cut a Spanish mackerel into fillets 2 in. square; season with salt and pepper; dip in butter and fry in hot lard; serve with boiled potatoes and a mayonnaise sauce containing a little parsley, onion, and cucumber pickle chopped fine.

MAITRE DE HOTEL BUTTER.—1 tablespoonful of butter; 1 of parsley chopped fine; 1 teaspoonful of lemon juice; 1 saltspoonful of salt; ¼ saltspoon of pepper; mix cold and spread over the fish on coming from the fire.

MOCK TERRAPIN.—½ calf's liver; season; fry brown; hash not very fine; dust thickly with flour, a teaspoonful mixed mustard, as much cayenne pepper as will lie on a half-dime; 2 hard eggs, chopped fine, a lump of butter as large as an egg, a teacup of water; let it boil a minute or two; cold veal will do, if liver is not liked.

OYSTER FRITTERS. — Drain some oysters thoroughly; chop fine; season with pepper and salt; make a batter of eggs and flour; stir the chopped oysters in this, and fry in hot butter; fry them whole; envelope in batter, 1 in each fritter.

OYSTER PATTIES.—1. Roll out some very light puff paste ½ in. thick; stamp it in rounds with a cutter 3 in. in diameter; press a small cutter, 2 inches in diameter on the middle of each to the depth of ½ inch; place the rounds on a buttered tin; baste them lightly with egg; bake in a quick oven; when done, take them out; remove the centre piece; scoop out a little of the inside, and fill the shells with prepared oysters.—2. Parboil 25 oysters in their own liquor; remove the oysters and season the liquid with lemon peel, nutmeg and pepper; strain and thicken with a heaping tablespoonful of flour, 1½ oz. of butter, a wineglassful of rich cream; mix, and then add the oysters; simmer all together a few minutes; fill the shells, and serve.

Oyster Patties.

OYSTER PIE.—Line a deep dish with a crust made as follows: To 2 qts. of flour add 3 teaspoonfuls of baking powder, 4 tablespoons of lard or butter and a little salt; mix with water as for biscuit; wash the oysters and strain the liquor; pour it over them; thicken a cup of water with a tablespoonful of flour; butter the crust on both sides; cut across in the centre; pepper and salt the oysters; bake well.

OYSTER SAUCE.—1. Blanch 1 doz. oysters in their own liquor; take the oysters out and add 2 blades of mace, 1 oz. of melted butter, and a cupful of thickened cream; return the oysters to the sauce; let them come to a boil; serve; salt to taste.—2. Set a basin on the fire with ½ pt. of oysters and 1 pt. of boiling water; let them boil 3 minutes and then stir in ½ cup of butter beaten to a cream, with 2 tablespoonfuls of flour; let this come to a boil and serve.

OYSTER SHORT-CAKE.—Boil 1 qt. of oysters with ½ cup of water, ½ cup of milk and ½ cup of butter; season with pepper and salt; thicken with a spoonful of corn starch; when the cake is done split open and spread the oysters between the pieces.

OYSTERS, Fricasseed. — For 1 qt. can, drain the oysters as dry as possible; put a piece of butter the size of an egg into your spider; let it get quite brown; put in your oysters; as soon as they commence to cook add as much more butter, which has been previously well mixed with a teaspoonful of flour; let it cook a moment and add 1 egg, beaten with a teaspoonful of cream; let this cook a moment and pour all over toasted bread.

OYSTERS, Fried. — Use the largest and best oysters; lay them in rows upon a clean cloth and press another upon them to absorb the moisture; have ready several beaten eggs; in another dish some finely crushed crackers; in the frying pan heat enough butter to entirely cover the oysters; dip the oysters first into the eggs, then into the crackers; roll them over that they may become well incrusted; drop into the frying pan and fry quickly to a light brown; serve dry and let the dish be warm.

OYSTERS, Panned. — Cut stale bread in thin slices; round them, removing all crust; make them to fit patty pans; toast them; butter, and place in pans; moisten with 3 or 4 teaspoons of oyster liquor; then place on the toast a layer of oysters; sprinkle with pepper; put on top a small piece of butter; place pans in a baking pan and put in oven; cover with a tin lid, or, if not large enough, another pan to keep in the steam and flavor; have a quick oven and when cooked 7 or 8 minutes, until "ruffled," remove cover and sprinkle with salt; replace cover and sprinkle with salt; replace cover and cook 1 minute longer; serve in the patty pans.

OYSTERS, Pickled.—Put the oysters and liquor in a porcelain kettle; heat slowly until the oysters are hot but not to boiling; take them out with a skimmer; let them cool; to the liquor, which remains in the kettle, add salt; a few pepper-corns, cloves, and a blade or two of mace; add the same quantity of vinegar as oyster juice; let the whole boil 15 minutes; then turn it out on the oysters.

OYSTERS, Roasted. — 1. Open 1 doz. large oysters on deep shell; add a walnut of butter, with a little salt and mixed pepper, red and black, and a pinch of cracker dust to each; place them on a broiler, over a sharp, clear fire, until done, and serve.—2. Large oysters not opened; a few minutes before they are wanted, put on a gridiron over a moderate fire; when done they will open; do not lose the liquor that

is in the shell with the oyster; send them in hot upon a napkin.

OYSTERS, Scrambled.—Take canned oysters; drain off the liquor; chop them up; season with pepper, salt, a little sage and thyme; add 2 eggs well beaten; put into a pan with melted butter; stir till done.

OYSTERS, Steamed.—Lay some oysters in the shell in some air-tight vessel; place the upper shell downwards so the liquor will not run out when they open; set them over a pot of boiling water where they will get the steam; steam them till they open; serve at once and heat hot, with salt and a bit of butter.

OYSTERS, Stuffed.—Chop fine 1 doz. oysters; mix with them the beaten yolk of 1 egg; thicken with bread crumbs and a tablespoonful of thick cream; salt and pepper to taste; fill the shells, rounding them nicely on the top; brown in a quick oven.

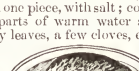
OYSTER STEW.—1. Take 1 qt. of oysters; put the liquor (a teacupful for 3 persons) in a stewpan; add ½ as much more water; salt, a good bit of pepper, a teaspoonful of butter for each person, and a teaspoonful of rolled cracker for each; put on the stove and let it boil; have the oysters ready in a bowl; the moment the liquor begins to boil, pour in all the oysters, say 10 for each person; watch carefully, and as soon as it begins to boil, count just 30 seconds, and take the oysters from the stove; have a big dish ready with 1½ tablespoonfuls of cold milk for each person; pour the stew on this milk and serve immediately.—2. In all cases, unless shell oysters, wash and drain; mix ½ cup of butter and a tablespoonful of corn starch; put with the oysters in a granite sauce pan; stir until they boil; add 2 cups of cream or milk; salt to taste; do not use the liquor of the oysters.

PERCH, Boiled.—First wipe or wash off the slime; scrape off the scales, which adhere rather tenaciously to this fish; empty and clean the insides perfectly; take out the gills; cut off the fins; lay the perch into equal parts of cold and of boiling water; salt as for mackerel; from 8 to 10 minutes will boil them unless they are very large; dish them on a napkin, garnished with curled parsley; serve with melted butter.

PIKE, Baked.—For a pike of 2 lbs. weight, chop 2 small onions, or shallots, if preferred, quite fine; also a good pinch of parsley; add a little grated nutmeg, pepper and salt; put ½ these in a fish pan, which should be rather flat and long; place the fish, well washed and cleaned, in the pan; sprinkle the other half of the ingredients over it; add a small tumbler of hock wine; put the fish into a moderately heated oven to bake; take care to baste it well occasionally; if required, add a little white stock; when thoroughly done, take it out and place it on the dish; take a piece of butter the size of a large hen's egg; mix it with 2 teaspoonfuls of flour; incorporate this with the gravy remaining in the pan, and stir it well until the butter is dissolved, when it will form a nice sauce.

PIKE, Boiled.—Wash and clean the fish thoroughly; skewer the head to the tail; lay it upon a drainer and put it in the fish kettle; let it have plenty of water, into which throw a handful of salt and a glassful of vinegar; when it boils, remove the scum as fast as it rises; it will take ¾ hour dressing, if a tolerable size; if very large, 1 hour; if small, ½ hour; serve with melted butter, and lemon sliced or whole.

SALMON, Boiled.—Boil a salmon whole, or head and shoulders in one piece, with salt; cover the fish with equal parts of warm water and Rhine wine, 2 or 3 bay leaves, a few cloves, etc.; when done use the water in making sauce by reducing it; add butter rolled in flour, to thicken, a pinch of cayenne, and the juice of 1 lemon. Serve with lobster sauce, or melted butter with a few sprigs of parsley boiled a few minutes in it.



Boiled Salmon.

SALMON, Canned.—Set the can in a kettle of hot water for about 20 minutes; while it is heating make a nice drawing of butter; add chopped parsley and hard boiled eggs, cut small; turn your salmon into a dish; pour over the drawing of butter; eat with mashed potatoes.

SALMON PIE.—Take a can of Oregon salmon, empty it carefully from the can so as not to break it; prepare a crust in a high dish beforehand; take a spoonful of flour, half as much butter and as much ground mace as will go on a penknife, a teaspoonful of salt, and work it well together; thin it with some of the liquor from the fish; add some chopped parsley to it, with a few peppercorns; stew the sauce; stir it so that it shall be smooth; when the sauce is done put on the fish; pour the whole carefully into the crust; bake for 10 minutes, until it is hot through, and serve.

SALMON, Roasted.—Take a large piece of the middle of a very fine salmon; dredge well with flour; while roasting, baste it with butter; serve garnished with lemon.

SALMON, Steamed.—Take a couple of pounds of salmon and steam them; place the fish in a tin dish; trim it with finely cut pieces of cooked tongue; here and there place little butter pieces on it; pour 2 or 3 glasses of sherry and 1 tablespoonful of the water from the fish over it; cover it up and let it well steam through without simmering; eat with potatoes in parsley sauce, or with stewed or frizzled mushrooms.

SALMON, Stewed.—Scrape the scales clean off; cut it in slices; stew them in rich white gravy; add, immediately previous to serving, 1 tablespoonful of essence of anchovies, a little parsley chopped very fine, and a pinch of salt.

SARDINE OMELET.—Take ½ doz. good sardines; drain them thoroughly; remove carefully the scales, and get them dry; make an omelet as usual, but the minute it begins to cook on the sides, place the fish lengthways on the omelet and turn the edges over them; put a very little chopped anchovy inside of each fish; do not cook too much.

SAUCE FOR FISH.—Take 1 pt. of milk and the fish drippings mixed; a little salt and pepper; mix until smooth 2 oz. of butter and 2 teaspoonfuls of flour; stir into the liquor when boiling; have ready a hard boiled egg, chopped fine, to add when ready for the table.

SHAD, Baked.—Make a dressing of bread crumbs, butter, pepper and salt, worked to a paste; fill the shad with the mixture; sew it up, and place it lengthwise in a baking pan with a little water and 1 oz. of butter; fill the space between the fish and the sides of the pan with slices of raw potatoes ¼ in. thick; serve fish and potatoes together; add a spoonful of self-raising flour to the gravy, and serve.

SHAD, Boiled.—Clean, wash and wipe a large shad; stuff with a dressing of bread crumbs, butter, salt and pepper; wet with milk, and sew up carefully with fine cotton; lay in the dripping pan; pour over it a cupful of hot water, and bake 1 hour; cover, except when you are basting it with butter and water; put into a hot dish and keep warm while you add to the gravy juice of 1 lemon and a tablespoonful of browned flour; wet with cold water and pepper; boil up well and serve in a gravy boat; garnish the fish with sliced lemon and sprigs of celery.

SHAD, Broiled.—1 shad; 2 oz. of butter; ½ teaspoonful of pepper; ½ teaspoonful of salt; split the shad, when cleaned, directly through the backbone with a strong sharp knife; grease the broiler slightly; place the fish between its leaves, and broil over a quick fire for 10 minutes; when done, remove quickly from the broiler; dress with the butter, pepper and salt; send it to the table as hot as possible; garnish with lemon quarters and a sprig of parsley at either end.

SHAD, Fried.—Clean the fish; cut off the head and split it down the back; save the roe and eggs when taking out the entrails; cut the fish in pieces about 3 in. wide; rinse each in cold water; dry on a cloth; use wheat flour to rub each piece; have ready hot salted lard and lay in the fish, inside down; fry until of a fine brown; turn and fry on the other side; fry the roe and egg with the fish.

SHRIMP SAUCE.—Take ½ pt. of shrimps; pick out all the meat from the tails; pound the rest in a mortar with the juice of half a lemon and a piece of butter; pass the whole through a sieve; make a pint of melted butter; put the meat from the tails into it; add a dust of cayenne; when the sauce boils stir it into the shrimp butter that has come through the sieve, with or without a tablespoonful of cream.

SMELTS, Baked.—Wash and dry the fish thoroughly in a cloth; arrange them nicely in a flat baking dish; cover them with fine bread crumbs; place little pieces of butter over them; season and bake for 15 minutes; just before serving, add a squeeze of lemon juice, and garnish with fried parsley and cut lemon.

SMELTS, Fried.—Let them be carefully floured; fry them in plenty of hot lard; when done drain them well in front of the fire, sprinkle them all over with very fine salt, and serve with fine parsley and lemon cut into quarters.

SMELTS, Potted.—Draw out the insides of the fish; season with salt and pounded mace and pepper; lay them in a pan with butter on the top; bake them; when nearly cold, lay them upon a cloth; put them into pots; clear off the butter from the gravy, clarify and pour it over them.

STURGEON, Baked.—Let it lie several hours in salt and water; boil it until the bones can be removed; pour vinegar over your fish and in the water and salt; when done, take it out to cool; then egg and bread crumb it; sprinkle clarified butter over it; place it in a moderate hot oven to brown; make a very thick sauce from the kidneys and good stock, with a tablespoonful of essence of anchovies; season it with cayenne pepper, salt, dust of sugar, juice of lemon, and a glass of wine.

STURGEON, Broiled.—Cut a fine piece of the fish, and, skinning it, divide it into slices; beat up 3 eggs, and dip each of the slices into them; powder fine bread crumbs mixed with finely chopped parsley; pepper and salt them; fold them in paper; broil them; be careful that the fire is clear; send them to table with essence of anchovies and soy, accompanied by cold butter.

TERRAPIN.—Put them in boiling water alive, and let them remain until the claws become soft; after they are cool, open them and pick out the meat, being careful not to break the gall; use only the meat and liver and claws; to 1 large terrapin use the yellows of 3 hard boiled eggs, mashed very fine, with 1 tablespoonful of flour, a little cream, salt and pepper, and sherry wine to taste; put in a clean tin pan with not quite ¼ lb. butter; let it melt, not allowing it to get brown; put in the terrapin (nicely picked); when warmed through pour in the dressing; let it boil up once or twice, and it is finished.

TROUT, Baked.—Clean the trout nicely, but handle very gently; lay in a dripping pan with water and butter just sufficient to keep it from scorching; bake slowly; baste often; when nearly done, prepare a sauce in the following manner: Have ready ½ pt. of cream, 1 gill of milk, 2 tablespoonfuls of melted butter, the beaten white of 1 egg, and some chopped parsley; put these ingredients into a farina kettle and let it get boiling hot; serve the fish in a hot dish with a few spoonfuls of this sauce over it.

Baked Trout.

TROUT, Fried.—Dry them thoroughly, and fry in hot oiled butter without shortening, or in pork fat; if the latter rub salt on the fish; lay on the fish, before serving, lumps of sweet butter.

TROUT, Stewed.—Wash and clean the fish; wipe it perfectly dry; put into a stewpan 2 oz. of butter; dredge in flour as it melts; add grated nutmeg, a little mace, and a little cayenne; stew well and, when fluid and thoroughly mixed, lay in the fish; slightly brown; cover with a pint of veal gravy; throw in a little salt, a small fagot of parsley, and a few rings of lemon peel; stew slowly 40 minutes; take out the fish; strain the gravy clear and pour it over the fish.

WHITE FISH, Boiled.—Lay the fish open; put it in a dripping pan, with the back down; nearly cover with water; to 1 fish put 2 tablespoons salt; cover tightly and simmer ½ hour; dress with gravy, butter and pepper; garnish with sliced eggs; for sauce use a piece of butter the

size of an egg, 1 tablespoon of flour, ½ pt. boiling water; boil a few minutes, and add 3 hard boiled eggs, sliced.

WHITE FISH, Broiled.—Cut in 2 pieces down through the centre of the back; lay in a pan and cover with cold water; add 1 tablespoonful of salt; let it lay about 2 hours; take it and wrap in a dry cloth; let it remain until ready for cooking; have a nice bed of coals, grease your gridiron well, salt a very little, and pepper your fish, and broil ½ hour, turning it when done on one side; lay it on a plate and pour melted butter over it.

FRITTERS, PANCAKES, ETC.

REMARKS.—To do away with the grease on the griddle for baking cakes, have the ordinary iron griddle ground smooth on a grindstone and rubbed off with a piece of fine sand paper wrapped round a block of wood. If the griddle be rubbed with a turnip, the desired smoothness will be obtained and the unpleasant smoke done away with.

APPLE PANCAKES.—Make 1 qt. of batter as for any other pancake; add 1 cup of finely chopped apple; stir each time a spoonful is taken out, in order to equalize it.

BARLEY CAKES.—Dissolve 1 yeast cake in 3 pts. of warm water; add barley flour enough to thicken, and salt to taste; let it rise over night, and in the morning, before using, add 1 teaspoonful of baking soda dissolved in a cupful of warm water and milk, or sufficient water and milk to make the batter suitable for baking; leave enough batter to raise the next portion, with milk, water and flour added.

BATTER CAKES.—With 1 qt. of flour sift 5 times 2 heaping teaspoonfuls of baking powder, or 1 teaspoonful of soda and 2 of cream tartar; add a tablespoonful of salt and sweet milk till the batter is of the right consistency; add 2 eggs, beaten whites and yolks apart, and then together; fry on a hot griddle, using as little fat to fry with as possible; if the griddle is of polished steel no fat at all will be needed.

BELL FRITTERS.—1 qt. of water; while boiling put in a piece of butter the size of an egg; draw it from the fire and add enough flour to make a thick batter; when it cools beat in 6 eggs, each one separately, and until batter is very light; have ready a kettle of boiling lard; drop the batter in from a spoon; place the fritters in a colander as soon as they are lifted with a fork from the lard, which keep at a boiling heat all the time they are cooking; serve either with a nice sauce, wine and sugar, or a small quantity of molasses made boiling hot.

BREAD GRIDDLE CAKES.—Soak 5 or 6 slices of stale bread over night in 3 cupfuls of buttermilk; in the morning mash the bread fine; add 2 well-beaten eggs, 3 teaspoonfuls of soda, a little salt and flour to make of the right consistence to fry.

BUCKWHEAT PANCAKES.—Take 1½ pts. of warm water, 2 teaspoonfuls of salt, ½ cupful of yeast, flour enough to make a batter as thick as you can stir easily with a spoon; mix thoroughly and set in a warm place to rise; in the morning add ½ teaspoonful of soda and warm water enough to make the batter as thin as you can bake it; have a hot griddle; rub it lightly with a nice piece of fat pork; bake cakes about 3 in. in diameter.

CHEESE FRITTERS.—Put about 1 pt. of water into a saucepan with a piece of butter the size of an egg, the least bit of cayenne, and plenty of black pepper; when the water boils throw gradually into it sufficient flour to form a thick paste; take it off the fire and work into it about ½ lb. of grated Parmesan cheese; then add the yolks of 3 or 4 eggs, and the whites of 2 beaten up to a froth; let the paste rest for a couple of hours; proceed to fry by dropping pieces of it the size of a walnut into plenty of hot lard; serve sprinkled with very fine salt.

CHERRY FRITTERS.—Make a batter of 1 pt. of milk, 4 beaten eggs, a pinch of salt, 2 even teaspoonfuls of baking powder and enough flour to make a little stiffer than pancake batter; beat thoroughly; stir in 1 pt. of stoned cherries and drop by the spoonful into hot fat; as they are taken from the fat, drain on an old but clean napkin; dust with powdered sugar and season with liquid sauce.

CORN MEAL CAKES.—2 cups of corn-meal; 1 cup of flour; a little salt; mix well together; 2 eggs well beaten; 1 pt. of thick sour milk; stir into a little of this, 1 even teaspoonful of soda; mix well together in a batter; fry on a well-greased griddle.

CORN MEAL FRITTERS.—Scald well a teaspoonful of corn meal by pouring boiling water over it; add ½ teacupful of sweet milk, an egg, a spoonful or two of flour, and a teaspoonful of baking powder; have ready a kettle of boiling lard; dip into the batter a teaspoonful at a time; if they fry into pieces, thicken with flour; when one side is brown turn them over and brown the other.

CRACKER GRIDDLE CAKES.—To 1 beaten egg add 2 pounded crackers, a pinch of salt, and milk enough to make a thin batter.

CREAM FRITTERS.—Heat 1 pt. of rich milk to a boiling point; have a thin stick of cinnamon in it to flavor; add ½ cup of sugar, after taking out the cinnamon, 2 tablespoonfuls of corn starch and 1 of flour, made smooth with a little cold milk; cook about 2 minutes; stirit to keep it from burning; take it off the stove; add the yolks of 3 eggs well beaten; return it to the fire a moment or two to set them; remove again from the fire; add a small bit of fresh butter and ½ teaspoonful of any flavor you prefer; butter a dish and pour the custard on it until ¼ in. thick; when cold and stiff cut into pieces 3 in. long and 2 in. wide; roll these gently in sifted cracker crumbs; then in egg beaten and sweetened; then in cracker crumb again; put them in a wire basket and fry in hot lard to a good color; put them in the oven for 2 or 3 minutes, to soften inside; dredge with fine sugar; serve

immediately on a plate with a spoonful of quince jelly.

CRULLERS.—¾ lb. granulated sugar; ½ lb. butter; 1 cupful milk; 5 eggs; a pinch of salt; teaspoonful vanilla extract; nutmeg to taste; 3 lbs. sifted flour; mix butter, sugar and part of the milk to a very creamy batter; then the eggs, rest of milk and flavoring; then some of the flour; beat till very light, adding the flour till very stiff; with the hands knead in nearly all the flour, reserving a little for flouring the pastry board; cut off a lump; roll out ½ in. thick; cut in pieces 3 in. long and 2 wide; twist in fancy shapes; drop a few at a time in boiling hot lard; sift powdered sugar over them; when cool slip on a large meat dish.

CRUMPETS.—Beat 2 eggs very well; put to them 1 qt. of warm milk and water, and 1 large spoonful of yeast; beat in as much fine flour as will make them rather thicker than a common batter pudding; make the pan hot, and rub it with a little butter wrapped in a clean linen cloth; pour a large spoonful of the batter upon the iron; let it run to a circle the size of a saucer; turn them with the elastic blade of an old knife; when wanted for use, toast them quickly and butter.

CURD FRITTERS.—1 qt. sweet milk; 2 glasses white wine; 1 teaspoonful liquid rennet; 5 eggs whipped light; 4 tablespoonfuls prepared flour; 2 tablespoonfuls powdered sugar; nutmeg to taste; scald the milk; pour in the wine and rennet; take from the fire; cover and let stand until curd and whey are separated; drain off the latter; dry the curd upon a cloth; beat yolks and sugar together; whip in the curd until mixed; then the flour, nutmeg and whites; have ready some butter in a frying pan; fry quickly; drain upon a warm sieve; lay within a dish lined with a clean napkin; sift on powdered sugar; eat with jelly sauce.

CUSTARD Fritters. — Boil ½ pt. of milk with cinnamon, lemon and bay leaves; add 2 oz. of sugar, 1 oz. of flour, a little salt and 3 eggs; beat all together and steam the custard in a plain mold or basin previously spread inside with butter; when done firm and quite cold, cut into square pieces; dip in frying batter; drop separately into boiling fat; fry a light brown color, and dish them up on a napkin.

DOUGHNUTS. — 1. ½ lb. butter; ¾ lb. sugar; 1 pt. sweet milk; 4 eggs; ½ cup yeast; 1 teaspoonful each nutmeg and cinnamon; cream the butter and sugar; add the milk, yeast and 1 qt. of flour; set to rise over night; in the morning beat the eggs light; stir in the batter with the spice and rest of the flour; set to rise until night; roll in a thick sheet; cut out and fry in boiling lard.—2. 2 cups of sugar; 2½ cups of sour milk; 6 tablespoonfuls of melted lard; 1 teaspoonful of soda; try them; they may need just a little more lard; they can be made of sweet milk and baking powder if liked, but many think them better with sour milk.

FLAB-DABS.—3 well-beaten eggs; a saltspoon of salt; flour enough for a stiff paste; roll and cut into very thin cakes and fry in lard; when they rise to the surface they are done; put 2 together, with jam or jelly between.

FLANNEL CAKES. — Mix 3 tablespoonfuls of flour with ½ pt. of cream; add 2 eggs, and beat the whole well till quite smooth; add slowly ½ pt. of new milk; into which has been put a teaspoonful of baking powder; beat all well together; fry with lard, a little of which should be made hot for each cake; eat with powdered sugar; mix with cinnamon or grated nutmeg.

FRUIT FRITTERS. — Make a batter of 10 oz. of flour, ½ pt. of milk, and 2 oz. of butter; sweeten and flavor to taste; add a glass of brandy, rum, or sherry; stir in the whites of 2 eggs well beaten; mix any small fruit with the batter and fry.

GOOSEBERRY FRITTERS.—Make a thick batter, composed of 6 eggs well beaten, ¾ pt. of cream, 1 tablespoonful of yeast, 1 tablespoonful of orange flower water, and a little grated nutmeg; add as much flour as may be necessary to produce the proper consistence; stew some gooseberries till quite tender; mix them with the batter; drop it into boiling lard, and fry to a good color; strew sugar over them and serve.

GRAHAM GRIDDLE CAKES.—3 teaspoonfuls yeast; 2 cups Graham flour; 1 cup wheat flour; mix at bed time with warm water or milk; set where it will keep warm; bake on a griddle for breakfast.

HIGHLAND SCONES.—To 1 lb. of flour allow from 2 to 4 oz. of butter; add as much hot milk as will make a dough of the flour, and 2 beaten eggs; roll and cut into any shape; bake on a griddle; handle, serve and eat quickly.

HOMINY FRITTERS. — 2 teacupfuls of cold boiled hominy; stir in 1 teacupful of sweet milk and a little salt, 4 tablespoonfuls of sifted flour and 1 egg; beat the white separately and add last; have over the fire a pan of hot lard; drop the batter in by spoonfuls, and fry a nice brown.

LEMON FLAPJACKS.—1 pt. milk; 4 eggs; juice of 1 lemon; flour to make a light batter; a pinch of soda; fry in hot lard; serve with sugar and nutmeg.

MOLASSES CRULLERS. — 2 teaspoonfuls of molasses; 2 teacupfuls of cream; 2 eggs; 1 teaspoonful of saleratus; flour to mix and roll.

PEACH FRITTERS.—Make a smooth batter of ½ lb. of flour, ½ oz. of butter, ½ saltspoon of salt, 2 eggs, and enough warm milk to make it of a proper consistency; pare, halve and stone the peaches; dip them in the batter; fry in hot lard from 8 to 10 minutes.

PINE-APPLE FRITTERS.—1 pt. of flour; ½ pt. of milk; 3 eggs; ½ teaspoonful soda; ¾ teaspoonful cream tartar; 1 tablespoonful sugar; salt to taste; peel and slice 1 juicy pine-apple, and cover with sugar; let it stand over night; stir in the batter when ready to fry; eat while hot, with sugar.

RICE FRITTERS.—Boil 1 teaspoonful of rice until it is tender; strain upon it 1 qt. milk; let it boil 10 minutes; cool it; add flour enough to make a batter as thick as will fry easily on the griddle; 2 tablespoonfuls of yeast; let it rise 3 hours; add 2 well beaten eggs, and cook on a heated griddle.

RICE PANCAKES. — Boil rice until it is soft; while warm make into cakes or flat balls; dip the balls into a beaten egg; roll them in corn

meal till thoroughly coated; fry them in lard, which is better than butter for this purpose; serve with sauce, butter, or with cream and sugar.

RICE PUFFS.—To 1 pt. of rice flour add 1 teaspoonful of salt and 1 pt. of boiling water; beat up 4 eggs, the whites and yolks separately; stir them well together; add 1 spoonful of butter at the same time; have ready a skillet of boiling lard; drop in the batter, a spoonful at a time; send to table just as fritters; to be eaten with wine and sugar, or sauce.

RICE WAFFLES.—Beat together 1 pt. of milk, the yolks of 3 eggs, 2 oz. of butter and ½ teacup of thoroughly boiled rice; sprinkle a little salt and ½ teaspoonful of soda into 1 pt. of flour; then sift it in; beat thoroughly and bake in waffle irons.

RYE DROPS, Fried.— 1 cup sour milk or buttermilk; 3 tablespoonfuls sugar; 1 of butter, if buttermilk is not used; 1 egg; a scant teaspoonful soda; 1 of cinnamon; add rye flour sufficient to make a stiff batter; take it up by the tablespoonful and drop into boiling hot lard, first dipping in the spoon to prevent the dough sticking.

RYE GRIDDLE CAKES.— 1 qt. rye flour and 1 cup of wheat flour; wet it up with sour milk, or buttermilk, until the batter is thick enough to cook easily on a griddle; add a little salt and a scant teaspoonful of soda, dissolved in warm water, and 1 well beaten egg.

SHORT-CAKES.—Dissolve ½ lb. of fresh butter in as much milk as will make 1½ lbs. of flour into a paste; roll it out about ¼ in. thick; cut it into large round cakes; cook them in a frying pan; serve hot; eat with butter.

SNOWBALLS.—1 cup of sugar; 6 tablespoonfuls of melted butter; 2 eggs; 1 cup of sweet milk; 2 teaspoonfuls of cream tartar; 1 of soda; a very little nutmeg; 1 teaspoonful of salt; mix middling soft and roll out; cut with a small round cutter; fry in hot lard; have ready a small bowl with a little fine white sugar in it; as you take them from the lard drop them in the sugar and roll around quickly until the surface has a very thin coat of sugar all over it, then lay carefully on a plate; repeat with each cake separately; add a little fresh sugar occasionally.

SNOW CAKES.—Make a stiff batter with 4 oz. of flour, ¼ of a pt. of milk, or more if required, a little grated nutmeg, and a pinch of salt; divide the batter into any number of pancakes, and add 3 large spoonfuls of snow to each; fry them lightly, in very good butter, and serve quickly.

SNOW FRITTERS.—Cut some slices of bread into any shape you like; pour a very little brandy on each piece, mix 2 eggs with 2 spoonfuls of flour and a little milk; cover the pieces of bread with this batter; let them rest for ½ hour; then fry in lard or butter; serve hot with a little pepper on each fritter.

SPANISH PUFFS.—Put into a saucepan a teacupful of water, 1 teaspoonful of powdered sugar, ½ teaspoonful of salt, and 2 oz. of butter; while it is boiling add sufficient flour for it to leave the saucepan; stir in one by one the yolks of 4 eggs; drop a teaspoonful at a time into boiling lard; fry a light brown.

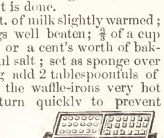
SPONGE CAKE FRITTERS.—6 or 8 small square sponge cakes; 1 cup cream, boiling hot, with a pinch of soda stirred in; 4 eggs, whipped light; 1 tablespoonful corn starch, wet up in cold milk; ½ lb. currants, washed and dried; pound the cakes fine; pour the cream over them; stir in the corn starch; cover for ½ hour; beat until cold; add the yolks, light and strained, and the whipped whites; then the currants thickly dredged with flour; beat all hard together; drop in spoonfuls into the boiling lard; fry quickly; drain upon a warmed sieve, and send to table hot.

VANITY CAKES.—Yolks of 8 eggs and 1 cup of sugar; knead with flour, and fry in hot fat; roll and cut in fancy shapes before frying.

VENETIAN FRITTERS.—Wash and drain 3 oz. of whole rice; put it into a full pt. of cold milk; bring it very slowly to a boil; stir it often and let it simmer gently until it is quite thick and dry; when about 3 parts done, add to it 2 oz. of pounded sugar, and 1 of fresh butter, a grain of salt, and the grated rind of ½ small lemon; let it cool in the saucepan; when only just warm, mix with it thoroughly 3 oz. of currants, 4 of apples, chopped fine, a teaspoonful of flour and 3 large, or 4 small well beaten eggs; drop the mixture in small fritters; fry them in butter from 5 to 7 minutes; let them become quite firm on one side before they are turned; do this with a slice; drain them as they are taken up, and sift white sugar over them after they are dished.

VICTORIAS.—1 cupful sugar; 1 egg; 1 teaspoonful of soda dissolved in 1 pt. of water; beat butter and sugar together; add the water; stir in enough flour to make a thin batter; bake on a hot griddle without turning over; butter each one the instant it is done.

WAFFLES.—1. 1 qt. of milk slightly warmed; 5 cups of flour; 3 eggs well beaten; ⅛ of a cup of home-made yeast, or a cent's worth of bakers', and ½ teaspoonful salt; set as sponge over night; in the morning add 2 tablespoonfuls of melted butter; have the waffle-irons very hot and well greased; turn quickly to prevent scorching.—2. Make a thin paste with 8 oz. of flour; 6 oz. of pulverized sugar; 2 eggs; a few drops of essence to flavor; ½ a liquor-glass of brandy or rum, and milk; warm and butter both sides of the mold; put some of the paste into it; close it gently; set it on the fire; turn it over to heat both sides equally; dust them with sugar when done; serve either warm or cold.



Waffle Irons.

FRUITS.

AMBROSIA.—Spread in a glass dish a layer of grated cocoanut and sugar; then a layer of peeled oranges, sliced thin; so on alternately until the bowl is full, having the top layer of cocoanut.

APPLE COMPOTE.—Pare and core 6 large apples of nearly the same size; drop them as they are done into cold water, with the juice of a lemon squeezed into it to prevent their turning brown; have ready a strong syrup (made with 1 lb. of sugar and 1 qt. of water) boiling hot; put the apples into this, with the thin rind of a lemon and 2 or 3 cloves; as soon as they are cooked take them out carefully and dispose them on a glass dish; pour the syrup over them and garnish with sliced citron. It is an improvement to quarter large apples.

Compote of Apples.

APPLE CREAM.—Peel and core 5 large apples; boil them in a little water till soft enough to press through a sieve; sweeten, and beat with them the whites of five eggs; serve with cream around them.

APPLE FOOL.—Peel and core some fruit; place it in a jar with moist sugar sufficient to render it palatable; add a very little cider; set the jar in a saucepan of water over the fire; continue the heat until the apples become quite soft; then pulp them through a colander; add a sufficient quantity of milk, a little cream and some sugar.

APPLE SAUCE.—Pare and core the apples; remove every particle of skin, core and dark-colored portion; cook well in only as much water as is needed; add sugar as desired.

APPLES, Baked.—Take a deep pie tin and scatter sugar liberally over the bottom; ½ in. of sugar if the apples are pretty sour. Pare the apples and cut into halves; remove the cores carefully; then lay them core side down into the sugar; add a small cupful of water; bake till perfectly tender, but do not let them stew to pieces; when cold take up in a deep dish; if any juice remains in the tin turn it over the apples; add a little sweet cream in dishing them out.

APPLES, Fried.—Slice juicy, thin skinned, and not very sour apples; leave the skins on; fry in melted butter; add a very little water as often as proves necessary to keep them from scorching; stir them quite often; when nearly done add a little salt and sugar to taste of company.

APPLES, Iced.—Pare, core and slice apples of a large tart kind; bake them till nearly done; put them away to get entirely cold; prepare some sugar icing; first pour off all the juice; lay the icing thickly on the tops and sides as much as you can; return them to the oven to just harden and set; serve with cream.

BANANA CREAM.—Procure 5 ripe bananas; take off the skins and pound the fruit in a mortar with 5 oz. of white sugar to a pulp; beat up ½ pt. of good cream to a stiff froth; add the pounded bananas, ½ glass of brandy and the juice of 1 lemon; mix well together; then add ½ oz. of isinglass dissolved in a little boiling water; gently whisk in and fill the mold; set in a cool place until wanted; when required dip the mold in warm water for a few seconds; wipe with a cloth and turn out into a glass or silver dish.

BANANAS AND ORANGES.—Slice the oranges as for ambrosia; slice the bananas; spread in the dish a layer of oranges; sprinkle them slightly with sugar; over this place a layer of banana slices; then oranges, sugar, and bananas in turn, until the dish is full; prepare an hour or so before serving.

BANANAS, Fried.—Peel and slice the bananas; sprinkle with salt; dip in thin batter; fry in butter; serve immediately.

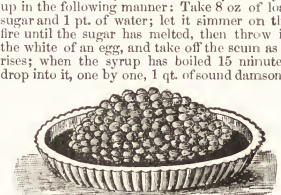
BLACKBERRY MUSH.—2 qts. of ripe berries; 1 qt. of boiling water; 2 cups of white sugar and a little salt; boil slowly for 5 minutes; thicken with Graham flour and cook a few minutes longer; put into a greased mold to cool; serve with cream.

CANTALOUPE.—Cut out carefully the end with the stem, making a hole large enough to admit an apple; with a spoon remove the seed; fill with ice, replace the round piece taken out, and place on end; eat with powdered sugar, salt and pepper, as preferred.

CRANBERRY SAUCE.—Pour hot water on the berries and let them stand until cold; to 1 qt. of them add 1 pt. of sugar and 1 pt. of water; let boil 20 minutes; add sugar and boil 15 minutes more; stir the berries often and mash evenly; when done strain the sauce in a bowl; when cold, serve in slices.

CURRANT SAUCE.—Heat the currants slowly almost to a boil; turn into a colander; allow all the juice possible to drain off without pressing; measure the fruit; to each quart add 1 lb. of sugar, 1 cupful of raisins, and water to thin the sauce.

DAMSONS, Compote of.—Make a pint of syrup in the following manner: Take 8 oz. of loaf sugar and 1 pt. of water; let it simmer on the fire until the sugar has melted, then throw in the white of an egg, and take off the scum as it rises; when the syrup has boiled 15 minutes, drop into it, one by one, 1 qt. of sound damsons,



Compote of Damsons.

and simmer until soft, without breaking them; remove them from the syrup, and boil it again

until rather thick; let it cool, and pour it over the damsons, which should have been previously arranged in a glass dish; a glass of whipped cream is a nice accompaniment to this dish; time to boil syrup, 15 minutes; damsons, about 5 minutes.

FRUIT GLACE.—Boil together for ½ hour 1 cupful of granulated sugar, 1 of water, and the juice of 1 lemon; dip the point of a skewer in the syrup after it has been boiling the given time, and then in water; if the thread formed breaks off brittle the syrup is done; have oranges pared, divided into eighths and wiped free of moisture; pour part of the hot syrup into a small cup, which keep in boiling water; take the pieces of oranges on the point of a large needle or skewer and dip them in the syrup; place them on a dish that has been slightly buttered.

GOOSEBERRY FOOL.—Put green gooseberries into a jar with 2 tablespoonfuls of water and a little moist sugar; place the jar in boiling water and let it boil till the berries are soft enough to mash; then beat it to a pulp; to every pint of pulp add 1 pt. of milk, and add plenty of sugar; serve in glass dishes.

GOOSEBERRY SAUCE.—Wash some sorrel; put it into a cloth and press out the juice; melt a piece of butter with flour; use this juice instead of water; let it be very thick; scald green gooseberries until they are very tender and add them to the sauce.

ORANGE CREAM.—Squeeze the juice from 6 large oranges and 1 lemon; strain and put in a saucepan with 1 oz. of isinglass and sufficient water to make in all about 1½ pts.; put the sugar on the orange and lemon rinds; add to it the other ingredients; boil all together for about 10 minutes; strain through a muslin bag, and when cold beat up with it ½ pt. of thick cream; wet a mold; pour in the cream; put in a cool place to set.

ORANGES AND JELLY.—When a large variety of dishes is required, orange skins are sometimes emptied entirely of the fruit, cut out in the shape desired and filled with bright, clear jelly of different colors; they look pretty; very great care and a sharp knife, however, are required to make them appear an ornamental dish.

Oranges Filled with Jelly.

ORANGE SAUCE.—Place on the fire in a porcelain saucepan ¼ lb. of white sugar, ½ pt. of water, juice of 1 large orange, and the rind cut off exceedingly thin; boil 5 minutes; strain; add 1 glass of white wine.

ORANGES, To Cut.—Make 2 cuts around it, just through the rind; locate them as if the orange was the globe, the stem and the blossom ends being the poles, and the tropic lines on each side of the torrid zone were being laid off; remove the rind from the ends, leaving that portion of it representing the torrid zone undisturbed; cut this across immediately over one of the division lines between the sections of the pulp, and open it, leaving the back of each section of pulp adhering to the strips of rind.

PEACHES, Stewed.—Make a syrup of 6 oz. of sugar to ½ pt. of water; add a tablespoonful of lemon juice and the kernels of 3 peaches, blanched and split; peel 6 or 7 peaches; put them whole into the syrup; stew gently for 20 minutes; arrange them on a dessert dish; turn the syrup and kernels out upon them; leave them to get thoroughly cold before using.

PEARS, Boiled.—Wash ½ peck of tart pears; cut the stems so as to leave only 1 in. in length; put them in an iron pot over the fire, with ½ pt. of water and 1 pt. of molasses to them; cover the pot or kettle; let them boil rather gently until the pears are soft and the syrup rich, almost like candy; take care not to scorch it.

PEARS, Stewed.—Pare them after scalding thoroughly; cut in halves and core; or, if small, leave them whole, as in preserving; put them in a porcelain kettle and let them stew slowly until tender; add only enough water to keep them from burning; when nearly stewed enough add a coffeecupful of sugar; stew until cooked sufficiently; add grated or sliced lemon and a glass of claret wine just before they are done.

PINE-APPLE, To Eat.—Do not peel; cut off the bottom; insert a fork over one of the lower eyes, press downward, and thus pull off a little cone; the cones gradually torn off are much softer than slices of pine-apple bit across the grain.

PRUNES, Stewed.—Use 1 lb. of prunes; wash well; boil in 2 qts. of water until the water boils down over ½; they should simmer slowly an hour or longer; use 4 tablespoonfuls of white sugar or more, and cut in slices 1 large lemon; put the sugar, prunes, lemon, and cold water all on to cook at the same time.

GAME AND POULTRY.

REMARKS.—Kill the fowl (no matter what kind it may be) by cutting off the head; hang up by the feet till free from blood; carefully remove all the entrails and crop; use no water in the operation, save upon your hands before commencing. Begin to bone any bird by taking out the breast bone; then there will be sufficient space to remove the back with a sharp knife, and then the leg bones; the skin must not be broken, but the meat of the legs must be pushed inwards. To roast fowls the fire must be quick and clear. If smoky it will spoil both taste and looks. Baste frequently and keep a white paper pinned on the breast till it is near done. Among the edible birds are found the grouse, partridge, pheasant, quail and prairie chicken. These terms are sometimes used synonymously, although they are distinct varieties

of birds. The ruffled grouse is sometimes called the pheasant in New England; in the Middle States it is called the partridge; and in the Western States the prairie chicken. There is no bird of the partridge genus in America, the name being applied to both grouse and quail. The quail is also loosely called a grouse, and the grouse a quail. The hare may be considered as an English dish; but receipts for cooking it are given, as they may be applied as well to the American rabbit.

BREAD SAUCE.—Cut in slices the crumb of a French roll; add a few peppercorns, 1 whole onion, a little salt, and boiling milk enough to cover it; let it simmer gently by the side of the fire till the bread soaks up the milk; add a little thick cream; take out the onion and rub the whole through a sieve; make it very hot, and serve with game or fowls.

CHICKEN, A l' Italienne.—½ lb. of macaroni; boil it in water with a lump of butter; when it has boiled ½ hour, drain off the water and cover the macaroni with milk; add salt and pepper and a whole onion, stuck with a few cloves; boil until the macaroni is tender but unbroken; boil a chicken in the usual manner; cut it up and lay it on a hot dish; pour the macaroni over it; remove the onion; grate ¼ lb. of Parmesan cheese over the dish; brown it in the oven or with a salamander.

CHICKEN, Boiled.—Take a young fowl; fill the inside with oysters; put it into a jar; plunge the jar in a kettle or saucepan of water; make the gravy from the juices of the fowl and oysters left in the jar, into a sauce, with the addition of egg, cream, and a little flour and butter; add oysters to it, or serve up plain with the fowl.

CHICKEN, Braised.—Take out all the bones except those of the wings and legs; do this by splitting the chicken down the back with a sharp knife and then scrape the flesh down the sides; stuff with cold lamb finely minced and richly seasoned with powdered herbs, a little minced pork and mushrooms, and some lemon juice; stew up the chicken, lard and breast; put it into a stewpan on a layer of herbs, minced onion and parsley, and a few slices of bacon; pour around it some good stock and sherry; cover the pan and let it cook slowly for two hours; then take up the chicken; strain the liquor; put it back on the range and let it boil quickly to a glaze; brush the chicken over with this, and serve on a platter surrounded with mushrooms cooked in a brown gravy.

CHICKEN, Broiled.—Boil a chicken gently for 5 or 10 minutes; leave it to become cold; divide it, and dip into egg and well seasoned bread crumbs; plentifully sprinkle with clarified butter; dip again into the crumbs; broil over a clear and gentle fire from ½ to ¾ hour; serve very hot, with mushroom sauce or with plain gravy thickened and flavored.

CHICKEN CHEESE.—Boil 2 chickens till tender; take out all the bones and chop the meat fine; season to taste with salt, pepper and butter; pour in enough of the liquor they are boiled in to make moist; mold it any shape you choose; when cold turn out and cut into slices.

CHICKEN CROQUETTES.—To 1 chicken and 1 lb. of cold veal chopped very fine, almost to a paste, add ½ chopped onion, 1 tablespoonful parsley (chopped), 1 saltspoonful mace and 1 egg; take the same quantity of stale bread crumbs as there is of chopped meat; if you have any gravy or stock, heat and gradually stir in bread crumbs until the bread absorbs all the gravy; add that to the meat; if the mixture is not thin enough, add a little cream or milk; roll the croquettes egg-shaped or cone-shaped in an egg beaten with a tablespoonful of milk, then in bread crumbs dried in the oven; fry in boiling grease in a deep pan; when done, put on brown paper to absorb the grease.

CHICKEN CUTLETS.—Skin and cut into joints 1 or 2 young chickens; remove the bones with care from the breast, merrythoughts and thighs, which separate from the legs. Mix well together a teaspoonful of salt, nearly ¼ as much of mace, a little grated nutmeg and some cayenne; flatten and form into good shape the boned joints of chicken and the flesh of the wings; rub a little of the seasoning over them in every part; dip them into beaten egg; then into very fine bread crumbs, and fry them gently in fresh butter until of a delicate brown; boil some of the bones and trimmings down in ½ pt. of water, with a roll of lemon peel and a little salt and pepper to make gravy; after straining and clearing from fat, pour hot to some thickening made in the pan with a slice of fresh butter and a dessertspoonful of flour; pile the cutlets high in the centre of the dish; serve the sauce under them, or separately in a tureen.

CHICKEN, Fricasseed.—Take the remains of a cold chicken, cut it into joints; make a gravy by simmering the trimmings in stock enough to cover them, with 1 onion stuck with three cloves, a bouquet of herbs, salt and pepper; simmer the gravy for 1 hour; strain and thicken a cupful of it with a teaspoonful of flour; let this boil, then put in the chicken; draw the saucepan from the fire a few minutes; mix a little of the sauce with the beaten yolks of 2 eggs and a cupful of cream; add this last mixture to the saucepan; let it get hot, but on no account allow it to boil, or the eggs will curdle; serve with the sauce poured over the chicken; sprinkle a little chopped parsley on top.

CHICKEN, Fried.—Take a nice, tender chicken; open it down the back; after cleaning it well pound all the bones flat; wash, and wipe it dry on a clean towel; season with pepper and salt; fry slowly in sweet lard until tender, and a fine brown on both sides; put it on a dish where it will keep warm; pour off the lard in the pan and any brown particles that may remain; add ½ pt. of hot water and flour enough to make the gravy of the proper consistency; to this can be added, if desired, about 25 large oysters, which remove from their liquor and put into the pan with the gravy; let them simmer until their gills begin to shrivel; stir them all the time; when done, pour them over the chicken and send to the table hot.

CHICKEN FRITTERS.—Cut into neat pieces some tender cold chicken; let it stand awhile in a mixture of lemon juice, salt and pepper; make

a batter of milk, egg, flour and salt; stir the chicken into it and fry in hot lard, a bit of chicken in each spoonful of batter; serve very hot; first drain off all the fat; garnish with parsley.

CHICKEN LIVERS.—½ doz. of chicken livers; ½ lb. of fat bacon; 1 saltspoonful of pepper; 1 saltspoonful of salt; place the livers into a saucepan; cover them with cold water; throw in the salt; bring the water quickly to the boiling point; let the livers boil for 5 minutes; when done, remove the livers from the water; slice them lengthwise carefully in order not to break them; cut the bacon in very thin slices, and of a size similar to the slices of liver; thread alternate slices of liver and bacon upon a spit; broil all over a bright fire 5 minutes; turn them constantly in order that they may brown easily; when broiled sprinkle over all the pepper, and send them to the table on spit.

CHICKEN PIE.—Line the sides of a pie dish with a good puff paste; have your chicken cooked as for a fricassee, seasoned with salt and pepper and a little chopped parsley; when nearly cooked lay them in a pie dish with ½ lb. of salt pork cut into 1 in. squares, and some of the paste cut into 1½ in. pieces; pour in a part of the chicken gravy; thicken with a little flour; cover the dish with the paste cover; cut a hole the size of a dollar in the cover; cover it with a piece of dough twice the size of the hole; when baked, remove this piece occasionally and examine the interior; brush egg over the pie, and bake in a quick oven.

CHICKEN, Potted.—Take a roast fowl and carve off all the meat; take 2 slices of cold ham and chop it with chicken; add to this ¼ lb. of the best butter; add salt and pepper to taste; pound this all together to a paste; put the mixture into a jam pot; cover closely.

CHICKEN, Roasted. — Having picked and drawn them, wash out well in two or three waters, adding a little soda to the last but one; prepare a stuffing of bread crumbs, butter, pepper, salt, etc.; fill the bodies and crops of the chickens, sew them up, and roast 1 hour or more, in proportion to their size; baste 2 or 3 times with butter and water, afterward with their own gravy; if laid flat within the dripping pan, put in at first a little water to prevent burning; stew the giblets and necks in enough hot water to cover them, and when you have removed the fowls to a hot dish, pour this into the drippings; boil up once; add the giblets, chopped fine; thicken with browned flour; boil again, and send to table in a gravy boat; serve with crab apple jelly or tomato sauce.

CHICKEN, Steamed.—Rub the chicken on the inside with pepper and ½ teaspoonful of salt; place in a steamer in a kettle that will keep it as near the water as possible; cover, and steam 1½ hours; when done, keep hot while dressing is prepared; cut them up; arrange on the platter; serve with the dressing over them. Dressing: 1 pt. of gravy from the kettle without the fat; add cayenne pepper and ½ teaspoonful of salt; stir 6 tablespoonfuls of flour into 1 gill of cream until smooth, and add to the gravy.

CHICKEN STEW.—Peel 2 onions, 1 turnip, 1 scraped carrot in 2 qts. of boiling water, with 6 cloves, 1 doz. allspice, the same of whole white peppers, a leaf of mace, a pinch of cayenne pepper, 1 tablespoonful of salt, 3 bay leaves, the same of sage, and a sprig of thyme; let them boil for 2 hours; have the chickens cut up; stew for 2 hours steadily, but not too fast; if the chickens are tough, give them 1 hour longer cooking; take the chicken out on the dish it is to be served on; keep it warm; strain the sauce, and put it back into the stewpan; rub 1 tablespoonful of flour and butter smoothly together; add the yolks of 2 eggs and 1 tablespoonful of finely chopped parsley; stir gradually in a cup of boiling water; pour the whole into the chicken sauce; boil for 5 minutes; stir continually, to keep it from curdling; pour over the chicken and serve.

DUCK, Boiled.—Clean and pluck; take care that the skin be preserved from rents while plucking; salt for about 30 hours previous to cooking; flour a clean white cloth and boil in it; a moderate sized duck will take about 1 hour's boiling; make a rich onion sauce with milk, and send it to the table with the duck. When the duck is boiled fresh, stuff as for roasting, and serve with the same description of gravy.

DUCK, Roasted.—Clean, wash and wipe the ducks very carefully; to the usual dressing add a little sage (powdered or green), and a minced shallot; stuff and sew up as usual, reserving the giblets for the gravy; if they are tender they will not require more than 1 hour to roast; baste well; skim the gravy before putting in the giblets and thickening; the giblets should be stewed in a very little water, then chopped fine and added to the gravy in the dripping pan, with a chopped shallot and a spoonful of browned flour; accompany with currant or grape jelly.

DUCK, Salmi of.—Cut up a couple of cold roast ducks and heat the pieces in a saucepan with a rich brown sauce, into which has been put a glass of wine; season to taste; add some stoned olives; arrange on a hot dish, placing about the meat *croutons* of fried bread; cut the bread for these into small slices of any shape and fry in boiling lard.

DUCK, Stewed.—The ducks should be cut into joints; lay in a stewpan with 1 pt. of good gravy; let it come to a boil; as the scum rises remove it; season with salt and cayenne; let them stew gently ¾ hour; mix smoothly 2 teaspoonfuls of fine ground rice, with a glass of port, which stir into the gravy; let it have 7 or 8 minutes to amalgamate with it; dish and send to table very hot.

FORCEMEAT.—1. 6 eggs boiled hard; 1 cupful of minced chicken, veal, ham or tongue; 1 cupful rich gravy; ½ cupful bread crumbs; 2 tablespoonfuls of mixed parsley, onion, summer savory, or sweet marjoram, chopped fine; juice of ½ lemon; 1 egg beaten light; while the eggs are boiling, make the forcemeat by mixing the minced meat, bread crumbs, herbs, pepper and salt together, and work well into this the beaten raw eggs; when the eggs are boiled hard, drop for a minute into cold water, to loosen the shells; break these away carefully; divide each egg into halves; cut a piece of white off at each end, that they may stand firmly when dished;

coat them thickly with the forcemeat; brown them by setting them in a tin plate on the upper grating of a very hot oven, and heap neatly upon a hot dish; pour the boiling gravy, in which a little lemon juice has been squeezed at the last, over them. 2. Soak a cupful of stale bread in cold water for 5 minutes; squeeze it as dry as possible in a clean cloth; while the bread is soaking chop fine 1 tablespoonful of parsley, or any green savory herb, or ½ that quantity of any dried herb; chop also 1 teaspoonful of onion; put these ingredients with the bread into a frying pan containing 1 tablespoonful of melted drippings or butter; season highly with salt and pepper; stir over the fire until they are scalding hot, when the forcemeat is ready for use.

GAME HASH.—Take underdressed or half roasted game; strip the skin from the thighs, wings and breast; arrange the joints evenly in a clean stewpan; keep them covered till wanted; cut into cubes 4 oz. of the lean of an unboiled ham; put it, with 2 oz. butter, into a thick well turned saucepan or stewpan; add 3 or 4 shallots minced, 1 carrot sliced, 4 cloves, 2 bay leaves, 1 doz. peppercorns, 1 blade of mace, 1 small sprig of thyme, and 2 or 3 of parsley; stew them over a gentle fire; stir them frequently, until the sides of the saucepan appear of a reddish brown; mix well with them a dessertspoonful of flour; let it take a little color; add by degrees, making the sauce boil as each portion is thrown in, ¾ pt. of strong veal stock or gravy, and ½ pt. sherry or Madeira; put in the bodies of the birds, well bruised; boil them for from 1 to 1½ hours; strain, and clear the sauce from fat; pour it on the joints of the game; heat them in it slowly; when they are near the point of boiling, dish them immediately with sippets of toast arranged round the dish.

GAME, To Keep Fresh.—Game can be kept by placing finely pulverized charcoal in a thin muslin bag inside; change the charcoal every day, and wash the meat clean before cooking. Pare a fresh lemon very carefully, without breaking the thin white inside skin; put it inside a wild duck and keep it there for 48 hours, and all of the fishy taste so disagreeable in wild fowls will be removed. The lemon should be removed and a fresh one put in its place every 12 hours.

GIBLETS.—Cut the pinions into two and the neck into four pieces; slice the gizzard and wash it well; clean the head and liver; fry all these a golden brown, in either butter or lard; flour each piece separately; put them into a stewpan with some clear beef stock, a bunch of savory herbs, a few peppercorns and cloves, 2 grated raw potatoes, and 1 onion cut into slices; salt and pepper to taste; let these all stew gently together; take 3 or 4 large turnips; quarter them and fry a golden brown color in butter; put them into another saucepan with the butter in which they have been fried, and a little beef stock; let these stew until quite tender; about ½ hour before the giblets are served add the turnips to them.

GOOSE, Boiled.—Dress and singe; put into a deep dish; cover with boiling milk and leave over night; in the morning wash off the milk; put the goose into cold water on the fire; when boiling hot take it off; wash it in warm water and dry with a cloth; fill the body with a dressing of bread crumbs, seasoned with pepper, salt, butter, 2 chopped onions and a little sage; put the goose into cold water and boil gently until tender; serve with giblet sauce, and with pickles, or acid jellies.

GOOSE, Roasted.—Singe, draw, and truss the goose; if an old one parboil it; the best stuffing is a sage-and-onion stuffing; boil the onions in 1 or 2 waters; mix with bread crumbs, powdered sage, salt and pepper, nutmeg, and 2 small apples chopped fine; fill the bird with the stuffing; sew it up with coarse thread; sprinkle salt over it; set it in a pan with a little warm water; baste frequently; do not take it from the oven until thoroughly cooked.

GROUSE, Broiled.—Carefully pluck the birds; remove the first joints of the wings, the heads, and the legs at the knees; split the grouse evenly in half; pepper them; dip them in butter made liquid, and sprinkle them with bread crumbs; repeat this process; make a gridiron hot over a clear fire; rub it with suet; lay upon it the grouse; be careful to do the insides first, or the gravy will get too quickly drawn, and you will not be able to turn the birds; when done enough, and nicely browned, dish them up on a poivrade or tomato sauce rendered rather piquant.

GROUSE, Larded.—Wash the grouse; be careful to pick out the shot; lard the breast with pork, cut in narrow strips; truss and rub over with butter; sprinkle with salt and pepper, and very thickly with flour; bake 20 minutes in a very quick oven; baste twice with butter and water; dredge the bird with flour; serve on toast with bread sauce.

GROUSE, Roasted.—Split them; fry until brown; stew them gently in good, well-seasoned beef gravy with the giblets of the birds and a spoonful of tarragon vinegar; when the grouse are tender strain the gravy and take off all fat; cut slices of fillet steak ¼ in. thick, perfectly free from skin and fat; lay them at the bottom of a pie dish; mince the stewed heart, liver, and gizzard of the birds; mix them with the yolks of 2 hard-boiled eggs; bind them into a paste with the yolk of a raw egg; season with cayenne pepper and salt; draw a knife twice over a clove of garlic, and stir the paste with it; roll into balls the size of marbles; place between the slices of steak, on the top of which put the grouse; season with salt and pepper; pour in the gravy; cover up with good puff paste; bake for an hour, or until done.

HARE, Jugged.—1 hare; a bunch of sweet herbs; 2 onions, each stuck with 3 cloves; 6 whole allspice; ½ teaspoonful of black pepper; a strip of lemon peel; thickening of butter and flour; 2 tablespoonfuls of mushroom ketchup; ½ pt. of port wine; wash the hare nicely; cut it up into joints not too large; flour and brown them; put them into a stewpan with the herbs, onions, cloves, allspice, pepper, and lemon peel; cover them with hot water; when it boils carefully remove all the scum; let it simmer gently till tender, which will be about 1¾ hours, or longer

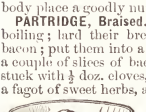
should the hare be very old; take out the pieces of hare; thicken the gravy with flour and butter; add the ketchup and port wine; let it boil for about 10 minutes; strain it through a sieve over the hare and serve; add a few fried forcemeat balls at the moment of serving, or, instead of frying them, stew in the gravy, about 10 minutes before the hare is wanted for use; serve red currant jelly with it.

HARE. Stewed.—Skin the hare; cut it up; do not wash or wipe it; toss it in butter for about 5 minutes; add 1 qt. of brown stock nicely flavored; stew all together very slowly till the meat is sufficiently tender; add some port wine, flour and butter; serve it with small sippets of fried bread.

MOCK DUCK.—Take a round of beef steak; salt and pepper either side; prepare bread or crackers with oysters or without, as for stuffing a turkey; lay the stuffing on the meat; sew up and roast about an hour.

OPOSSUM.—Boil the 'possum in salt and red-pepper water until quite tender; brown well in an old-fashioned oven or skillet; around his body place a goodly number of potatoes.

PARTRIDGE, Braised.—Truss 2 birds as for boiling; lard their breasts very finely with fat bacon; put them into a small braising pan over a couple of slices of bacon; add 2 small onions stuck with ½ doz. cloves, 2 carrots cut in pieces, a fagot of sweet herbs, and pepper and salt to taste; add a cupful of stock and 1 of white wine; place a buttered paper over all and braise them gently for 2 hours; keep a few hot embers on the lid of the pan; serve with their own liquor, strained and free from fat, or with truffle sauce.



Braising Pot.

PARTRIDGE, Broiled.—Divide the birds into 2 pieces; flatten them; wipe them dry all over with a soft cloth; prepare a very clear, brisk fire, sprinkle the birds over with salt and cayenne; broil them; lay them on a hot dish, and directly they are cooked, stick them over with lumps of fresh butter; pour mushrooms, stewed in a good, brown gravy, on top.

PARTRIDGE, CROQUETTES.—Pick out from remnants of partridges a quantity of meat from the breasts; mince it all finely; put it into a saucepan, with a piece of butter previously melted and amalgamated with a pinch of flour; add pepper and salt and a grate of nutmeg; stir well; add, off the fire, the yolk of an egg beaten up with the juice of a lemon and strained; spread out this mince when it is nearly cold, fashion it into small portions in the shape of balls or corks; dip each in a beaten-up egg; roll it in very fine baked bread crumbs; let the croquettes rest awhile; fry them in hot lard to a golden color; serve on a napkin with plenty of fried parsley.

PARTRIDGE. Stewed.—Fix the wings over the back, and skewer the legs; take a piece of bacon and put it with a small piece of butter in a stewpan; fry it brown; put in the partridges so that the bacon covers the breast; let them be very brown; add ½ pt. of gravy; boil a cabbage so that it is ready by the time the partridges are fried brown; chop it with pepper and salt, and a lump of butter; add it with gravy to the partridges; stew slowly for an hour; when dishing place the bacon in the center of the dish; lay the partridges upon it; make a wall of the cabbage round.

PATE DE FOIE GRAS.—These pasties are prepared from the livers of geese, which have been tied down for 3 or 4 weeks to prevent them from moving, and forcibly compelled to swallow, at intervals, a certain amount of fattening food; when they have become so fat that they would die in a short time, they are killed, and their livers, which have become very rich, fat, and pale during the process, are made into pies.

PATE DE FOIE GRAS, Imitation.—The livers of 4 fowls and as many gizzards; 3 tablespoonfuls melted butter; a chopped onion; 1 tablespoonful pungent sauce; salt and white pepper to taste; boil livers until quite done; drain and wipe dry; when cold, rub to a paste; let butter and chopped onion simmer together slowly for 10 minutes; strain through thin muslin, pressing the bag hard; turn into a larger vessel; mix with the rest of the seasoning; work all together for a long while; butter a small earthen jar or cup; press the mixture hard down, interspersing with square bits of the boiled gizzards to represent truffles; cover all with melted butter, and set in a cool, dry place.

PHEASANT, Roasted.—Let it hang as many days as possible without becoming tainted; pluck off the feathers carefully; cut a slit in the back of the neck to remove crop; then draw the bird in the usual way, and either wipe the inside very clean with a damp cloth or pour water through it; wipe the outside also, but with a dry cloth; cut off the toes; turn the head of the bird under the wing, with the bill laid straight along the breast; skewer the legs, which must not be crossed; flour the pheasant well; lay it to a brisk fire; baste it constantly and plentifully with well-flavored butter; send bread sauce and good brown gravy to table with it.

PHEASANT, Stewed.—Truss the pheasant as for boiling; put it into a saucepan which is just large enough to hold it; pour in enough veal gravy, and stew it slowly, till sufficiently done; add about a score of chestnuts, previously boiled and blanched, 1 or 2 sliced artichoke bottoms, already dressed, pepper, salt, a glass of white wine, and a little butter rolled in flour; make all hot; squeeze into it the juice of ½ lemon; put the pheasant in a dish and pour the sauce over it.

PIGEONS, Boiled.—Boil about 15 minutes by themselves; then boil a piece of bacon; serve with slices of bacon and melted butter.

PIGEONS, Broiled.—Split the backs; season them highly; lay them over a clear, brisk fire; serve with mushroom sauce.

PIGEONS, Potted.—Season well with pepper, cayenne, a little mace and salt; pack them closely in a pan; cover them with butter, and bake them; let them get cold; take off the fat; put the pigeons into pots; pour melted butter over them.

PIGEONS, Stewed.—Take a white cabbage; cut it as if for pickling; rinse in clear cold water; drain well; put it into a saucepan with equal quantities of milk and water; boil and strain off the milk; take a portion of the cabbage and lay it in a stewpan; soak the pigeons for ½ hour in cold milk and water; season well with salt and pepper, adding a little cayenne; place them in the stewpan with the cabbage; cover them over with what remains; add some white broth; stew slowly until the pigeons are tender; thicken with a little cream, flour and butter; let it boil, and serve with a *puree* of the cabbage.

PLOVERS.—These birds must not be drawn; roast them before a brisk fire, but at a distance; serve on toast with melted butter.

PRAIRIE CHICKEN, Fried.—Cut in pieces of good shape; pepper and salt them; dip in batter made of beaten egg with milk, flour and salt added; fry in hot lard; serve piled upon a hot dish and garnished with parsley; serve lettuce mayonnaise at table with the chicken.

PRAIRIE CHICKEN, Roasted.—This bird being a little strong, and its flesh when cooked a little dry, lard or place wide strips of bacon or pork over its breast; use mild seasoned stuffing; dust a little flour over it; baste occasionally, and serve.

QUAIL, Broiled.—Carefully pick, cut open down the back, and pound slightly with the steak-pounder, to break the bones, so they will lie flat on the gridiron; salt and pepper them; broil to a nice brown; have a pan of melted butter ready to dip each piece in as soon as cooked; have ready slices of bread, toasted to a light brown, and well buttered; lay a quail on each slice of the toast; then pour the butter which they were dipped in over the whole; serve hot.

QUAIL PIE.—Cut the quail in pieces, and stew them about 10 minutes, or till tender; line your baking dish with a nice paste; put in the birds with a little of the water in which they were stewed, thickened with a little flour; shake in pepper and salt and bits of butter; cover with a nice crust and bake a delicate brown.

QUAIL, Roasted.—Clean, truss and stuff as usual; cover the entire bird with thin slices of ham or salt pork, binding all with buttered packthread; roast ¾ hour; baste with butter and water 3 times, then with the dripping; when done dish with the ham laid about the body of the bird; skim the gravy; thicken with browned flour mixed in a little cold water, pepper and salt; boil up once and pour over the bird.

RABBIT, Boiled.—After skinning the rabbit wash it in cold water; put it into warm water for about 20 minutes to soak out the blood; draw the head round to the side; secure it with a thin skewer run through that and the body; put the rabbit into a stewpan of hot water; let it boil gently until tender; when done, place it on a dish; either smother with onion sauce, or with parsley and butter.

RABBIT CUTLETS.—Prepare the rabbits as for a stew; cut the different limbs into the size of cutlets—such as the shoulders cut in half; also the legs with the ends of the bones chopped off, and pieces of the back, even to the half of the head; have ready some bread crumbs and the yolk of an egg beat up; drop each cutlet into the egg and then cover with bread crumbs, as for veal cutlets; fry them a nice brown; when you dish them pour round them some rich brown gravy, which flavor with tomato sauce, if approved; put round them rolls of fried bacon.

RABBIT, Fricasseed.—Clean; cut into joints; soak for 1 hour in salt water; do not use head or neck; season each piece with pepper and salt; dredge with a little flour; fry in butter until brown; remove the rabbit from the pan; leave the grease; place it in a saucepan; pour over enough lamb or veal broth to cover the joints; add a finely chopped onion, 1 tablespoonful of walnut catsup, a bunch of sweet herbs, 1 pinch of cloves, same of allspice, and a little cayenne pepper; cover closely; let simmer for 25 minutes; lay the joints in order upon a heated dish; strain the gravy; return it to the pan; thicken with flour; add a lump of butter and the juice of ½ lemon; pour the gravy over the joints; serve hot.

RABBIT PIE.—Cut up two young rabbits; season with white pepper, salt, a little mace and nutmeg, all in fine powder; add also a little cayenne; pack the rabbit with slices of ham, forcemeat balls, and hard eggs, by turns in layers; bake in a dish; add a little water; omit the water if it is to be raised in a crust; by the time it is taken out of the oven have ready a gravy of knuckle of veal, or a bit of the scrag, with some shank bones of mutton, seasoned with herbs, onions, mace, and white pepper; if the pie is to be eaten hot, add truffles, morels or mushrooms, but not if intended to be eaten cold; if it be made in a dish put as much gravy as will fill the dish, but in raised crusts the gravy must be carefully strained, and then put in cold as jelly.

RABBIT, Roasted.—After cleaning and washing well, let it soak in cold water for an hour or more; have the water a little salty and change it once or twice; parboil the heart and liver; chop up fine with one slice of fat salt pork; make your dressing of bread-crumbs; mix in the chopped heart, liver and pork; season well with pepper and salt; moisten with a little of the water in which the heart, etc., were boiled; stuff the rabbit with this dressing; sew it up; spread or rub butter all over it, and roast; occasionally baste with melted butter and water; when the gravy flows freely enough, baste with that; a few moments before removing from the oven sift a little flour over; place it on a heated dish; take the dripping-pan containing the gravy and place it on the top of the range; have prepared a small onion chopped very fine; add it to the gravy; also a small lump of butter; thicken with a little flour; let it boil up; just before removing from the fire add the juice of ½ lemon; serve the gravy in a sauceboat; garnish the rabbit with sliced lemon; cut off the head just before sending to the table; serve with currant jelly.

RABBIT, Stewed.—Wash a rabbit thoroughly; let it lie for 2 or 3 hours in cold water; cut it into joints; dry them upon a cloth; dredge

them with flour; fry them of a light brown with butter; stew them in the following sauce: Brown 3 oz. of butter in a stewpan, with a tablespoonful of flour, a minced onion, some pepper and salt; add a pint of gravy and the rabbits; stew them till they are tender; just previous to serving, stir in a tablespoonful of ketchup. When the rabbit is to be dressed with a white sauce, it should not be fried, but stewed in the white stock, which is seasoned with white pepper and salt; thicken with a piece of butter mixed with flour; a few minutes before serving add a little cream, and a tablespoonful of lemon pickle.

REED BIRDS.—Pluck, draw, and arrange nicely in a dripping pan with bits of fresh butter between them; allow them to cook for a few minutes on one side; then turn them over to brown on the other side; add a little salt; place them on a hot platter and pour gravy over them; serve with Saratoga chips.

SNIPE HASH.—Cut the meat from the bones and roughly mince it; stew down the bones and insides together with herbs, shallots, champagne, and stock; when this is pretty thick strain it; add to it the flesh of the snipes; make all thoroughly hot, by which time the birds will be sufficiently done; serve it in a dish garnished round the margin with sippets of bread fried in butter; decorate each sippet with an egg nicely poached and trimmed.

SNIPE, Roasted.—Pluck and draw the snipe; preserve the trail and head; tie a thin strip of bacon over the breast; chop up the trail and spread it on buttered toast, one slice for each bird; lay the birds in the pan with the toast between them; roast 20 minutes; remove the bacon, place the birds on the toast and serve.

TURKEY, Boiled.—Take a plump hen turkey, singe, draw, and truss as you would to roast; make a stuffing of herbs, salt, pepper, bread crumbs, a little mace and grated lemon peel, with a few oysters chopped up, a spoonful of butter and a raw egg; mix your dressing well together; fill the bird; sew it up; tie up the turkey in a floured cloth to make it white; simmer until tender.

TURKEY, Boned.—Buy a turkey, one that has not been drawn, so as to have no openings in it, if possible; if drawn sew up openings firmly before boning; take 2 chickens, 1 beef tongue, 1 can oysters, 1 lb. fresh, lean side pork; have the turkey frozen and thawed, the tongue boiled and skinned, the pork roasted, the oysters taken out of the liquor, and the chickens cut in small pieces; put on to boil with just water enough to cover; lay the turkey on its breast; cut off the legs and wings at first joint; cut down the whole length of the back; with a sharp knife scrape the meat at each side from the bones; throw the bones in with the chickens to boil. For the filling: Lay the whole tongue to form the breast; clear all the chicken meat from the bones; cut the pork in small pieces; fill up your turkey, legs, wings and all, after tying ends of legs and wings tight, with chicken, pork and oysters, and a little dressing; have the chicken liquor well boiled and seasoned; strain it into the turkey, which will form a jelly; sew up the turkey firmly; turn it over and shape it nicely with the hands; tie a cord tightly to the neck, and draw it round and tie it to the right wing close to the body; tie down legs and wings, inserting skewers if you have them; sew around it a piece of strong cloth, and steam or roast; leave the cloth on till cold; carve cold in round, thin slices, commencing at the neck.

TURKEY, Deviled.—Place the legs and wings on a gridiron; broil slowly; have ready a sauce made of 1 tablespoonful each of pepper, vinegar, made mustard, celery sauce, and acid fruit jelly with a little salt; lay the broiled turkey on a hot dish; pour the dressing over it and sift cracker dust over the whole.

TURKEY, Roasted.—Draw the turkey; rinse out with several waters; and in next to the last mix a teaspoonful of soda; prepare a dressing of bread crumbs mixed with butter, pepper, salt, thyme, or sweet marjoram, and wet with hot water or milk; add the beaten yolks of 2 eggs; mince a dozen oysters and stir into the dressing; if desirable, wet the bread crumbs with the oyster liquor; stuff the craw with this, and tie a string tightly about the neck to prevent the escape of the stuffing; then fill the body of the turkey and sew it up with strong thread. In roasting, if the fire is brisk, allow about 10 minutes to 1 lb.; but it depends much upon the turkey's age if this holds good in all cases. Dredge it with flour before roasting, and baste often; at first with butter and water, afterward with the gravy in the dripping pan. Lay the turkey in the pan with a teacupful of hot water. Roast to a good brown, and if it threatens to darken too rapidly, lay a sheet of white paper over it until the lower part is also done. Stew the chopped giblets in just enough water to cover them, and when the turkey is lifted from the pan add these with the water in which they were boiled, to the drippings; thicken with a spoonful of browned flour, wet with water to prevent lumping; boil up once more, and pour into the gravy boat. If the turkey is very fat, skim the drippings well before putting in the giblets. Serve with cranberry sauce; some lay fried oysters in the dish around the turkey.

TURKEY, Steamed.—Let it, after dressing, remain in cold water from 20 minutes to ½ hour, to extract the blood; hang in a cool place for 24 hours, in winter even longer. See that every pin feather is taken out; rinse in cold water; wipe dry; rub the inside with pepper and salt; fill with oysters carefully washed in their own liquor to remove bits of shells; sew up the turkey, place in a large dish, and set it in a steamer over boiling water; lay a clean cloth over the steamer and shut the cover on tight; steam till tender, 2½ hours, or, if large, 3 hours; run a fork into the breast to see if done; if it seems tender and no reddish juice flows out, it is ready to take up; strain the gravy and put in the oyster sauce (which should be ready while the turkey is cooking), made like stewed oysters, and thickened with farina or butter and flour; let it just boil up, and add a little boiled cream; pour this over the steamed turkey, and serve hot. Or stuff, as for a common baked

turkey, and steam; stuff with good plump chestnuts after the skins are removed, and the gravy made with giblets chopped fine; add a little flour as you chop, and the gravy from the dish stirred to it; set over the fire to boil up; while the gravy is being made, rub a little butter over and sprinkle the turkey with flour very slightly; set in a hot oven to brown delicately.

TURKEY, Stewed.—An old turkey is more tender stewed than when cooked in any other way. Put into a large pot ½ lb. bacon cut in slices, ¼ lb. of knuckle veal, 3 sprigs of parsley, 2 of thyme, 6 small onions, 1 carrot cut in small pieces, 3 cloves, salt and pepper, and then the turkey; add 1 pt. each of broth and white wine, cover as closely as possible, and simmer gently about 2½ hours; then turn the turkey over and put it back on the fire for 2½ hours; dish the turkey; strain the sauce; put it back on the fire, and after reducing it to a glaze, spread it over the turkey and serve. Some prefer stewed turkey when cold.

VENISON, Boiled.—Boil till tender with sufficient water to keep from burning; when done put in some butter, pepper and salt; let it brown in the kettle.

VENISON CHOPS.—Cut the chops as nearly one size as possible; flatten them nicely; lard them with slips of fat bacon; soak them for a day in a marinade; drain them; toss them in scalding hot olive oil; do them quickly over a brisk fire; when they are nicely browned arrange them in a dish; serve with tomato sauce.

VENISON HASH.—Cut into small square pieces; put into a saucepan with about 2 tablespoonfuls of sweet oil; when they are well rendered, add 2 tablespoonfuls of flour; a little bacon cut in small squares, and a few shallots; let the whole simmer until of a nice color; add about 1 pt. of claret wine, the tenth part of stock, and a bunch of parsley, thyme and sage tied together; let it simmer on a slow fire about 1 hour; before serving, you must be careful to remove all the grease; serve with toast, fried in butter, around the dish.

VENISON, Roasted.—Hang the venison for 10 days or a fortnight in a cool dry place; at the end of that time wash and wipe it; then beat it well; flay off the skin; take bacon strips rather more than 2 in. long and lard all over the fleshy parts; roast or bake the meat, basting constantly; use sour cream or butter and milk for the purpose; send to table with a sauce made by adding water to the bastings, skimming and straining, and adding pepper, salt and lemon juice.

VENISON STEAK.—From a small neck of venison neatly cut 4 or 5 steaks; remove a portion of the bone from each, and divest them of all superfluous parts; give each steak a good blow with the blade of the chopper, so as to flatten the steaks evenly; rub a gridiron with a bit of the fat; place the venison upon it; broil it over a clear charcoal fire until the steaks are done; serve with a sauce made by simmering together red wine and currant jelly until they form a syrup.

VENISON STEAK SAUCE.—Put a cup of stock, a small teaspoonful of salt, ½ teaspoonful of pepper, and a very little cayenne, 2 or 3 cloves and a few allspice in a saucepan; let all boil up; then stir in a piece of butter, half the size of an egg, in which a teaspoonful of flour has been well mixed; 1 teaspoonful of currant jelly; 1 wineglass of claret; heat it once more; pour it through a strainer, so as to remove the pieces of spice.

WOODCOCK, Boiled.—Pluck and draw the birds; truss and boil them for 10 minutes in nice clear savory beef stock; while they are doing, chop the trails, etc., and the livers; mix these in a saucepan with a few tablespoonfuls of the liquor in which you boil the birds; add a piece of butter rolled in flour and 2 tablespoonfuls of port wine; when the butter is melted, put in a teacupful of fried bread crumbs; as soon as these are hot, place the woodcocks in a dish; mask them with the sauce; garnish with thin slices of fresh lemon.

WOODCOCK, Roasted.—Carefully pluck the birds; omit drawing them; they should not be spitted, but suspended with the vent downwards; place a nice round of toast underneath to catch the trail; about 20 minutes roasting will be enough; baste simply with fresh butter, and send the birds to table as hot as possible; they should be laid upon the toast in a dish, and slices of orange employed as a garnish.

MEATS.

REMARKS.—All meats and game are the better for slight cooking, with the exception of veal and pork. Have a hot oven for whatever is to be roasted; a bed of very hot coals for broiling; and fat that is hot enough to send up blue smoke for frying. For roasts have a very hot oven at first; and do not season until the meat browns; these precautions keep the juices intact. But the joints must not be suffered to burn, and the oven must be cooled off a little as soon as the outside is well coated. After this, the old rule of 15 minutes to a lb. can be varied to suit the taste. The meat must be elastic to the pressure of the finger, or it is done to death. Keep a basin or cup of water in the oven; the steam generated prevents scorching. When the joint is to be boiled, if the juices are to be retained in the meat itself, put the meat into fast boiling water, and let it boil for 10 minutes to make the outside hard and thus prevent the juice escaping, then add cold water equal in quantity to about ½ of the boiling water, and then boil till done. Remove the scum when the water is on the point of boiling, or it will quickly sink and spoil the appearance of the meat. If it is desired to extract the juice from raw meat, cover it with cold water and simmer slowly. Soak dried and smoked meat for some hours before putting into the water. Place the meat in a saucepan sufficiently large to

contain the joint easily, and just cover with water —no more. To lard a piece of meat, get a larding needle—that is a piece of steel from 6 to 9 in. long, pointed at one end and having 4 slits at the other, to hold a small strip of bacon when put between them; cut the bacon in pieces 2 or 3 inches long and ¼ to ½ in. square; put each, one after the other, in the pin; insert it in the meat; leave only about ½ in. out, using 8 pieces to each lb.

BACON, Boiled.—Boil some fine streaked parts of bacon with a little stock; add the ends of 8 or 10 sausages; boil in same stock some white cabbages for 2 hours; add salt and spice; serve very hot; place sausages and cabbages around the dish, and the bacon in the middle.

BACON, Steamed.—Scrape the outer rind or skin well; wash the bacon; put it into a steamer over a pot of boiling water; steam it as long as required by the weight; serve with veal or fowl, or by itself with greens.

BEEF, A la Mode.—1. Take 8 or 10 lbs. of beef (the rump or buttock), or the same weight of a breast of veal; divide it into neat pieces of 3 or 4 oz. in weight; put it into a large stewpan with 4 oz. of good beef dripping; but first make the dripping hot, and flour the meat; add 2 large onions minced fine, dredge with flour, and stir with a wooden spoon for about 10 minutes, or until the contents of the pan be thick; then pour in about 1 gal. of water; do this gradually, stirring all together; bring it to a boil; then skim, and add 1 dr. of ground black pepper, 2 of allspice and 2 bay leaves; set the pan where it will stew gently for about 3 hours; when the meat is tender serve.—2. Rump, sirloin or rib of beef; lard through with 10 or 12 long pieces of fat bacon; put it into an earthen pan with a calf's foot, 4 onions, 2 carrots sliced, a bunch of parsley, 2 bay leaves, 2 sprigs of thyme, 2 cloves, ½ teaspoonful of pepper, 1 teaspoonful of salt, 4 wineglassfuls of sherry, 4 wineglassfuls of water, and 1 lb. of streaky bacon.

BEEF, Au Gratin.—Take cold beef, either boiled or roast; cut it in thin slices; grease a tin pan; dust with bread crumbs; put in a little chopped parsley and lay on the slices of beef; put salt, pepper and parsley on top; dust with bread crumbs; drop on lemon juice and a little broth, just to cover the bottom of the pan, and place it in the oven.

BEEF, Boiled.—Melt about 3 oz. butter, over a slow fire, into 1 tablespoonful of flour; when they have simmered a little, add some chopped onion and a dessertspoonful of shred parsley; when the whole is browned, season with pepper; add ½ or ¾ pt. of good stock or gravy; mince the meat finely; put it in with the rest; let it heat gradually; when near boiling, thicken with a small tablespoonful of flour; just before serving, add a tablespoonful of catsup.

BEEF, Curried.—Cut your beef into pieces 1 in square; put some butter in a saucepan along with 2 onions; fry until brown; add sufficient curry powder, and mix thoroughly; add ½ pt. of milk and the beef; let it stew gently for 1 hour; stir it occasionally to prevent burning; serve with rice.

BEEF, Dried.—Heat milk and water; thicken with a beaten egg and a little flour; when nicely boiled, add the beef sliced as thin as possible; immediately remove from the fire, as the less it is cooked the better; if very salty, freshen in a little hot water before going into the gravy.

BEEF, Fillet of.—Slice a tenderloin of beef; salt and pepper it; let it lay 1 hour in melted butter; brown it quickly on both sides in this same butter; take out the beef; add to the butter a spoonful of flour, soup, gravy, or meat juice, as convenient, and mushrooms to taste; put back the slices of tenderloin; cover the spider and stew slowly until sufficiently cooked; put the slices of meat on a platter with the mushrooms around it; add the juice of a lemon and a glass of Madeira wine to the sauce.

BEEF, FRICASSEED.—Take any piece of beef from the forequarter, such as is generally used for corning; cook it tender in just sufficient water to have it all evaporate in cooking; when about half done put in salt enough to season it well; add ½ teaspoonful of pepper; if the water should not be done out soon enough, turn it off and let the beef dry 15 minutes, turning it often; make the gravy of the water turned off, or add water from the tea-kettle, and 1 or 2 tablespoonfuls of flour; serve with vegetables and salad, or apple sauce.

BEEF GRAVY.—Take 3 lbs. of beefsteak, a knuckle of veal, 5 carrots, 6 onions, 2 cloves, 2 bay leaves, a bunch of parsley, and scallions; put all these into a stewpan with two ladlefuls of broth; set them over a good fire to reduce them; cover the stove; let the stewpan stand over it until the meat begins to give out the gravy and adheres slightly; when the jelly at the bottom of the stewpan is nearly black, take it from the stove; let it stand for 10 minutes; fill the stewpan with good broth or water; if the latter, not so large a quantity; let this simmer for 3 hours; skim and season well; if water is used instead of broth, strain the gravy first.

BEEF, Grenadins of.—Cut some beef fillet in slices ½ in. thick; trim them all to the same size in the shape of cutlets; lard them finely and thickly with fat bacon; lay them, larded side uppermost, into a baking dish; add as much rich stock or gravy as will come up to, but not cover the larding; cover the dish and put in the oven to cook gently for ½ hour; take off the cover; baste the grenadins with the gravy; let them remain in the oven for the larding to brown; cut equal quantities of carrots and potatoes into the shape of small olives; boil them so that they remain whole; make a sauce of butter and flour in a saucepan; add as much of the grenadin gravy as will make a nice sauce; stir well; put in the vegetables, and when very hot, arrange the grenadins around a dish with the vegetables and gravy in the centre.

BEEF, Potted.—Take a piece of lean beef weighing 5 lbs.; free it from the skin and gristle; put in a covered stone jar with ½ teacupful of water; stand the jar in a kettle of boiling water to boil from 5 to 6 hours; see that the water does not boil into the jar; when done, take it up and cut into shreds; pound in a mortar with a

seasoning of pepper, salt, and ground cloves; when smooth and like paste, mix with 10 oz. of clarified butter; press into little jars; pour butter over the top, and tie down for use.

BEEF, Ragout of. — Take equal quantities of good gravy and boiling water, a pint in all; pour it into a stewpan, in which 2 lbs. of cold roast beef, sliced, have been put; add 5 or 6 small onions, some mixed spices, pepper and salt to taste, and let the whole stew very gently until tender, which will be in about 2 hours; before serving, add capers and pickled walnuts to the gravy.

BEEF, Roasted. — Prepare for the oven by dredging lightly with flour; season with salt and pepper; place in the oven; baste frequently while roasting; allow ¼ hour per lb. of meat, if you like it rare; longer, if you like it well done; if wanted part rare and part well done, let the outside be well done, but take care that the inside is not well done through; serve with a sauce, made from the drippings in the pan, to which has been added a tablespoonful of Harvey or Worcestershire sauce, and a tablespoonful of tomato catsup; thicken with browned flour, and serve in a gravy boat.

BEEF, Spiced. — Mix in a jar or bowl that can be covered, 2 lbs. common salt, 1 lb. dark brown sugar, ¼ lb. ground allspice, 1 oz. ground cloves, 2 oz. black pepper, 1 teaspoonful cayenne; use a wooden bowl or unpainted tub that will just hold the round; fill the hole from which the marrow bone was taken with marrow or nice fat; bind into nice shape with strips of cotton and skewers; rub with a tablespoonful of powdered saltpetre on both sides and in all crevices; leave for 24 hours in a cool, dry place, that will not freeze; rub daily with some of the above mixture for 2 or 3 weeks, turning every 2 days and ladling its own liquor over it; when ready to cook the round, provide a tin dish that will just hold it; place small pieces of hard wood to keep the meat from sticking to the tin underneath; also chopped vegetables, carrots, onions, celery tops, and suet or drippings; strew some of these thickly on the top; cover all with a coarse paste rolled to keep moist and retain their flavor; bake 6 hours in a moderate oven; when done, take off the paste cover; remove the vegetables, etc.; put on the round heavy weights until quite cold; slice thinly.

BEEFSTEAK, Broiled. — A rump steak; 1 oz. of butter; pepper and salt; have the steak cut about ¼ or ½ in. in thickness; place the gridiron over a clear fire; rub the bars with fat; place the steak on it and broil it; turn frequently; carefully prick the fork through the fat; have ready a hot dish on which you have placed a lump of butter the size of a large walnut, the ketchup, and pepper and salt; lay the steak, rubbing it lightly over with butter, on the dish; serve as quickly as possible.

BEEFSTEAK, Fried. — Pound, but do not hack it; have your pan very hot; put a small piece of butter in it; let it brown; season the steak on both sides with salt and pepper; place in the pan and turn constantly; let it cook quickly; when done and nicely browned, turn a plate over it and stand where it will cook slowly a few minutes; add a spoonful of mushroom or tomato catsup to the gravy, to give it piquancy.

BEEFSTEAK PUDDING. — 1 lb. of flour; 6 oz. of chopped suet; a little salt; 1½ lbs. of steak; pepper and salt to taste; water; make a paste of the flour, suet, and salt; butter a round-bottomed basin; line it with paste, turning a little over the edge; cut up the steak into small pieces with a little fat; flour them lightly; season highly with pepper and salt; lay them in the basin; pour over them ½ cupful of water; cover the top of the basin with paste, pressing it down with the thumb; tie the basin in a floured pudding cloth; put it into a saucepan of boiling water; keep it boiling for 2 hours, occasionally adding a little water; when done, untie the cloth, turn the pudding over on a dish, and take the basin carefully from it.

BEEF STEW. — Take a 3 lb. piece of rump of beef; remove the bone; bind it up tight; put it in a pot or stewpan that will just hold it; season with ground spices; fry 2 large onions sliced; add them to it, with 2 carrots, 2 turnips, a few cloves, a blade of mace, a head of celery, and a potato quartered; add stock enough to cover the meat; simmer as gently as possible until quite tender; remove the fat; take out the meat; add ½ pt. of port, a wineglassful of vinegar, and a tablespoonful of Worcestershire sauce to the gravy; strain over the meat; serve with a garnish of assorted vegetables arranged neatly around the dish.

BLOOD GRAVY. — Put a few slices of ham into a thick stewpan; lay over it some slices of lean veal; half cover the meat with jelly stock; stew it over a brisk fire; take care that it does not burn; when the broth is reduced, thrust a knife into the meat so that the gravy may run out; stew it more gently till brown; turn the meat frequently; when of dark red color, moisten with hot stock; season with shred mushrooms, parsley and green onions; when it has boiled an hour, skim and strain it through a tammy to clarify for use.

BROWN GRAVY. — Take 2 or 3 onions; fry them in butter until they are a very nice brown, be careful not to let them burn; take a slice of bread and slowly toast it till it is quite hard and brown; take a stewpan and put them into it along with some bones, pieces of meat, some thyme, etc.; add water enough and stew until the ingredients form a thick gravy; add pepper and salt; then strain it and keep in a cool place until wanted.

BUBBLE AND SQUEAK. — Slices of cold boiled beef; chopped potatoes; chopped up cabbage; both previously boiled; pepper, salt and a little butter; chop up and fry the cold potatoes and cabbage with a little pepper, salt, and a good large piece of butter; set it aside to keep hot; lightly fry some slices of cold boiled beef; put them in a hot dish with alternate layers of the vegetables, piling high in the middle.

CALF'S HEAD, Baked. — Butter the head; powder with seasoning composed of very fine bread crumbs, a few sweet herbs and sage, chopped very fine, and cayenne, white pepper, and salt; divide the brains into several pieces not too small; sprinkle them with bread crumbs; lay them in the dish with the head; strew a quantity of

small pieces of butter over the head and in the eyes; throw crumbs over all; pour in $\frac{3}{4}$ of the dish full of water; bake in a fast oven 2 hours.

CALF'S HEAD, Boiled. — $\frac{1}{2}$ calf's head; $\frac{1}{2}$ pt. of melted butter; parsley; 1 lemon; a pinch of pepper and salt; soak the calf's head in cold water for $1\frac{1}{2}$ hours; then for 10 minutes in hot water before it is dressed; put it into a saucepan with plenty of cold water, enough for the head to swim; let it boil gently; when the scum rises skim it very carefully; after the head boils let it simmer gently for $1\frac{1}{2}$ hours; serve it with melted butter and parsley over it; garnish with slices of lemon and tiny heaps of fried parsley.

CALF'S HEAD, Boned.—Remove the brains; throw them into cold water for an hour; drain; then boil them in salt and water for 20 minutes, and set aside; put the head into cold water and wash it well; leave it there to draw out the blood for an hour; take it out and dry it well with a towel; place the calf's head on the table with the front part of the head facing you; draw the sharp point of a knife from the back part of the head right down to the nose, making an incision down to the bone of the skull; with the knife clear the scalp and cheeks from the bones right and left; always keep the point of the knife close to the bone; when the head has been boned wash it well; wipe it with a clean cloth; season the inside with salt and pepper; roll it up with the tongue; tie it, and blanch in hot water for 10 minutes; put it into cold water a few minutes; wipe it dry and set it aside until wanted.

CALF'S HEAD, Broiled.—Cut a prepared calf's head into pieces quite 3 in. wide; place them in a saucepan; cover with water; add a wineglassful of vinegar; simmer $\frac{1}{2}$ hour; place them in cold water a few minutes; dry them on a towel; rub a little sweet oil over each piece; broil; when done brush melted butter over them with the juice of $\frac{1}{2}$ lemon.

CALF'S HEAD, Collared.—Bone a calf's head carefully; wash it well; wipe it dry; lay the head on the table; spread on it a forcemeat made of the brain and tongue, and a very little ham mixed with 1 tablespoonful of chopped parsley, 1 teaspoonful of thyme, 1 teaspoonful of marjoram, the minced yolks of 3 hard boiled eggs, 1 wineglassful brandy, and a little salt, pepper and nutmeg; roll the head as tightly as possible; tie it in a cloth; bind it with tape; put it into a saucepan with stock enough to cover it; add a carrot, a parsnip, an onion, a sliced lemon, a few bay leaves, salt, and a doz. bruised peppers; let it boil gently 3 hours; take it out of the cloth and pour round it a sauce made of 1 pt. of the liquid in which it was boiled, with a little lemon juice, 2 small pickles, and 4 button mushrooms chopped fine.

CALF'S HEAD, Fried.—Cut the prepared calf's head into pieces 2 in. wide; lay them for 3 hours in a pickle made of 2 tablespoonfuls of lemon juice, 1 wineglassful of Rhine wine, salt and pepper, and a pinch of mace; take them out; drain them; dip each piece in egg batter; roll in cracker dust; fry in hot fat; send to table with some hot condiment.

CALVES' BRAINS, Fried.—Lay 4 pieces of calves' brains in cold water and salt for 1 hour, to draw out the blood; remove the outer skin without breaking the brains; put them over the fire in enough cold water to cover them, with $\frac{1}{2}$ gill of vinegar, 2 bay leaves, a sprig of parsley, and an onion stuck with 3 cloves; bring them to a boil, and simmer slowly for 10 minutes; take them up carefully and lay them in cold water and salt to cool; when cold cut each one in 2 pieces; roll them first in cracker dust, then in 1 raw egg beaten with a tablespoonful of cold water, then again in cracker dust; fry them in plenty of smoking hot fat; as soon as they are golden brown take them up on a skimmer; lay them on a soft paper or napkin to absorb the fat; arrange on a platter, containing $\frac{1}{2}$ pt. tonato sauce.

CALVES' BRAINS, Stewed.—Take the strings from $\frac{1}{2}$ doz. calves' brains; let them drain in cold water for about 1 hour; render a little bacon in a saucepan with a few sliced carrots and onions mixed, some parsley, thyme, bay leaves, etc.; when they have simmered a little while, add $\frac{1}{2}$ a bottle of claret wine, with a little salt and a whole pepper; as soon as it commences to boil, add the brains; let them boil about 20 minutes on a slow fire; then take them out; bind the liquid with a little flour and butter mixed, and already cooked; let it reduce until only about $\frac{1}{2}$ the quantity is left; strain through a sieve; put it into a saucepan with some bacon cut in small squares, about 2 doz. small onions, a few mushrooms and the brains; let them simmer about 12 or 15 minutes; serve them on a dish garnished with toast fried in butter; dress with chopped pickles.

CALVES' FEET, Stewed.—Wash them clean; divide without entirely separating them; lay them open in the stewpan; cover them with veal broth; cut into pieces a slice of tender beef; add to the stew; when it boils throw in a little salt; clear the scum as it rises; throw in a fagot of parsley, a small head of celery, an onion stuck with cloves, 3 small ones plain, 1 good size carrot, 2 blades of mace, and 2 doz. peppercorns; stew until the flesh separates from the bones; take it off carefully; strain off $\frac{1}{2}$ the gravy, or so much as you require; put in 2 spoonfuls of Harvey sauce; thicken with flour and butter; when it is very hot, return the feet; pour in a glass of wine and serve.

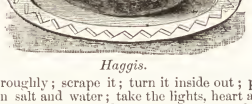
CLEAR GRAVY.—Slice some beef thinly; broil a part of it over a clear, quick fire, just enough to give color to the gravy, but not to dress it; put this with the raw remainder into a tinned stewpan with a couple of onions, 1 or 2 cloves, a whole black pepper, berries of allspice, and a few sweet herbs; cover it with hot water; give it one boil; skim it 2 or 3 times; then cover it; let it simmer till quite strong.

CORNED BEEF, Boiled.—Choose either a solid cut from the round, with a little fat, or a brisket piece; remove the bones from the latter; then roll it and tie securely; allow 20 minutes for every pound of meat; put it over the fire in cold water; let it gradually reach the boiling point; boil slowly; if the water is changed as soon as it boils, vegetables may be cooked with the meat, time being allowed according to the season.

CORNED BEEF, Stuffed.—Take a piece of well corned rump or round, 9 or 10 lbs.; make several deep cuts in it; fill with a stuffing of a handful of soaked bread, squeezed dry, a little fat or butter, a good pinch of cloves, allspice, pepper, a little finely chopped onion, and a little marjoram or thyme; tie it up tightly in a cloth and saturate with vinegar; boil about 3 hours.

DELMONICO STEW.—Cut cold cooked fresh meat of any kind into small thin slices; put them into a stewpan with a little hot water; season with mace, pepper and salt to taste; use partly cayenne pepper; should there be any cold gravy left use this, and butter enough to make the stew rich; put all in the stewpan, cover it, and let the meat simmer 10 or 15 minutes; cut up a lemon and remove the seed; add this to the stew; grate the yolks of 2 hard boiled eggs; mix with it 2 teaspoonfuls of good English mustard; put in a small bowl; pour the gravy to this slowly, making it to a smooth paste; put this over the meat; remove it from the fire and serve immediately.

HAGGIS.—Take a sheep's stomach; clean it



Haggis.

thoroughly; scrape it; turn it inside out; put it in salt and water; take the lights, heart and liver of the sheep and mince them quite fine; add to them a lb. of shredded suet, which also divide finely; bake into sconces a lb. of oatmeal; to do this, mix the oatmeal with a little salt and water; spread the paste thin on a baking tin and bake it crisp; pound up fine these sconces; if not dry enough, toast them; add 1 chopped onion, and season with salt and pepper; add to this a teacupful of good strong stock; put it all in the stomach, and sew it up tight; put it into a pot of boiling water with a plate on top of it; prick the bag in a good many places to prevent bursting; cook 5 hours.

HAM, Baked.—If the ham be hard and salty, soak it for several hours; if a fresh cured ham, do not soak; trim and cut away all the rusty parts; completely cover it with a coarse paste of flour and water ½ in. thick to prevent the juice escaping; bake until done; remove the paste and skin while the ham is hot; cover the fat with a sugar paste, moistened with port (see *Boiled Ham*); return it to the oven a few minutes to brown.

HAM, Boiled. — Soak the ham over night; scrape off the rusty spots; put into a pot; cover with plenty of cold water; add a bouquet of herbs and a few cloves to the water; boil very slowly until done; remove the pot from the fire; when cold, take out the ham; take off the skin; trim the fat off around the edge; take ½ cupful of brown sugar, a teaspoonful of prepared browned flour, and moisten with port wine; cover this paste over the fat of the ham; set it in a very hot oven until the mixture froths;

Boiled Ham.

send to the table with dots of pepper or dry mustard on the top, a tuft of fringed paper twisted about the shank, and garnished with parsley; cut very thin in carving. If the ham is not glazed, the rind while warm may be carved in any ornamental device, then garnished as before.

HAM, Broiled.—Should the ham be very salty, soak the slice to be used in warm water; let it remain about 20 minutes before broiling; take out; wipe dry; broil on a gridiron; turn often; season with pepper and butter.

HAM CROQUETTES. — Take ¼ lb. of grated ham; mix with it 2 oz. of mashed potatoes; melt a piece of butter in a saucepan; add the mince; season with a little powdered sweet herbs and chopped parsley; stir until quite hot; add, off the fire, the yolks of 2 eggs; lay the mince on a plate to cool; make it into croquettes; roll them in egg and then in baked bread crumbs; fry in hot lard; serve with fried parsley.

HAM, Fried.—Soak as for broiling; cook in a hot frying pan, turning often until done; serve with or without gravy, as you please; after taking the meat from the pan cream may be added to the gravy; thicken with flour; boil up once and pour over the ham; add a little chopped parsley to its gravy.

HAM OMELET.—Chop up fine ½ lb. of cold boiled ham; add to it 4 eggs, well beaten, with a little salt and pepper; place in a pan a small piece of butter; turn in the eggs and ham, and brown.

HAM, Potted.—Take the remains of a boiled ham; cut it in small pieces; pound it, little by little, in a mortar; soften it during the process with a little melted butter; add cayenne pepper to taste; put it in small bowls, glasses, or potting jars; press it down very smooth; over the surface pour a little more melted butter; cover tight, and set away.

HAM, Steamed.—Lay the ham in cold water for 12 hours; wash very thoroughly; rub with a stiff brush to dislodge the salt and smoke on the outside; put it into a steamer; cover closely; set it over a pot of boiling water; allow 20 minutes to the pound; keep the water at a hard boil; if it is served hot, skin, and immediately strew thickly with bread or cracker crumbs to prevent the waste of the flavor; put a frill of paper about the knuckle.

HASH.—Cut some beef in nice little slices from the bone; remove all the hard parts and skin; put the gravy in a saucepan with 1 pt. of water, 3 tablespoonfuls of catsup, 1 dessertspoonful of minced savory herbs, 1 onion chopped fine, ½ teaspoonful of salt and ⅛ of cayenne; let these stew together for 15 minutes; take a cupful of flour; stir it well into the stewpan and stew for 10 minutes longer; strain it through a sieve; return it to the pan; place the slices of beef in it and keep the saucepan on the side of the range until the meat is heated through—not boiled, or it will become hard; a few minutes before serving add ½ wineglass of tarragon vinegar; arrange some toasted sippets round a very hot dish, and serve the hash immediately after it is cooked.

HEAD CHEESE.—Have the head and feet of a pig nicely cleaned and boiled until tender; chop it very fine; season with salt, pepper and sage while hot; put in a deep dish and cover with a plate smaller than the dish, that it may rest on the meat; place on the plate a heavy weight and let it stand 24 hours.

IRISH STEW.—Take about 2 lbs. of scrag or neck of mutton; divide it into 10 or 12 pieces; lay them in the pan; add 8 large potatoes and 4 onions cut into slices; season with 1½ teaspoonfuls of pepper, 3 teaspoonfuls of salt; cover all with water; put it into a slow oven or on a stove for 2 hours; stir it all up well; serve it in deep dishes.

KIDNEY PUDDING.—Slice an ox kidney on 8 mutton kidneys in thin slices; lay them on a dish; season well with black pepper and salt; shake 1 oz. of flour over; mix all well together; line a pudding dish with paste; put in the sliced kidney; pour a gill of water over; cover with paste; tie the basin in a cloth; put it into a pot of boiling water and boil 2 hours; add boiling water to supply that which wastes; serve hot.

KIDNEY, Fried.—Cut your kidneys lengthways, but not through; put 4 or 5 on a skewer; lay them on a gridiron, over clear, lively coals; pour the red gravy into a bowl each time they are turned; 5 minutes on the gridiron will do; take them up; cut them in pieces; put them into a pan with the gravy you have saved, a large lump of butter, with pepper, salt, a pinch of flour, and a glass of Madeira or champagne; fry the whole for 2 minutes, and serve very hot.

LAMB, Baked.—Lay a hind quarter of lamb in a baking pan; sprinkle with pepper and salt; add a little cold water; baste frequently; remove the fat from the gravy; thicken with browned flour, and season with a little Worcestershire sauce; serve the lamb on a bed of spinach that has been boiled, drained and heated with a little butter, pepper, salt, and stock or brown gravy. If peas are in season, substitute them for the spinach.

LAMB, Boiled.—Put in sufficient clear, cold water to cover it; let it remain ½ hour; a tablespoonful of vinegar, or a half handful of salt may be thrown in; put it into a thin white cloth which has been floured; boil it in enough water to cover it; a good-sized bundle of sweet herbs may be thrown into the saucepan; if 6 lbs., it will be done in 1½ hours; serve with spinach or French beans; if sent to the table cold, lay handsome sprigs of parsley about it tastefully; if hot, garnish with parsley, with thin slices of lemon laid round the dish.

LAMB CHOPS, Broiled.—Trim off the flap from a fine loin of lamb; cut into chops about ¾ inch in thickness; have ready a bright, clear fire; lay the chops on a gridiron or toaster, and broil them a nice pale brown, turning when required; season them with pepper and salt; serve very hot and quickly; garnish with crisp parsley, or place them on mashed potatoes.

Toaster.

LAMB, Forced.—Carefully take out all the meat with a sharp knife; leave the skin whole with the fat on it; convert the lean which has been cut into a forcemeat, thus: To 2 lbs. of meat add 2 lbs. of beef suet chopped small; beat it in a marble mortar till it is very fine; take all the skin off the meat and suet; mix it with 4 spoonfuls of grated bread, 8 or 10 cloves, 4 or 5 blades of mace dried and beaten fine, ½ nutmeg grated, a little pepper and salt, some lemon peel cut fine, a small portion of thyme and parsley, and 4 eggs; mix all together; put it into the skin, so that it may assume its original form; sew it up; roast it; baste it with butter, and serve with stock cut from the loin and fried in gravy.

LAMB, Saddle of.—Sprinkle a little salt over it; set it in the dripping pan with a few small pieces of butter on the meat; baste it occasionally with tried out lamb fat; dredge a little flour over it a few minutes before taking from the oven; serve with the very best of currant jelly; send to table with a few choice early vegetables. Mint sauce may be served with the joint, but in a very mild form.

LAMB SAUCE.—Roll a piece of butter in bread crumbs; shred parsley and shallots; boil it in a little stock and white wine, equal quantities; a few minutes are sufficient; squeeze in a little lemon or orange juice.

LIVER CHEESE.—Boil a beef's liver, heart and tongue; remove all the hard and sinewy parts, and chop the remainder fine; add to this ½ lb. of boiled pork also chopped fine; season it with sweet herbs, some grated nutmeg, a bay leaf, the flavor of an onion, pepper and salt; put it in a pan and press upon it a heavy weight; in a few hours turn it out in a solid cake for the table on a platter, accompanied by a knife to cut it with.

LIVER, Fried.—Cut the liver in slices about ⅜ in. in thickness; soak in cold water about ½ hour; have ready some butter in the spider; when hot, put in liver; season with salt, pepper, and an onion chopped fine; dust a little flour over the top; cover tight to keep steam in as much as possible; add a little water while cooking, to keep it from getting dry; do not

let it burn; when brown, turn on the other side; put on a little more salt, pepper, and flour; when done, take the liver out on a platter; put in about a teacup of sweet milk; if not thick enough, add a little more flour, wet in milk, until you get it about the thickness of beef gravy; pour over the liver and serve.

LIVER HASH.— Boil the liver until thoroughly tender; mince it finely with a chopping knife; heat the mince very hot in a sauce of butter and browned flour; season with pepper, salt, a dash of lemon, or a little piquant sauce, such as mushroom catsup.

LIVER, Roasted.— Wash thoroughly, and wipe dry; cut a long, deep hole in the side; stuff with crumbs, bacon and onions chopped; salt and pepper to taste; bit of butter and 1 egg; sew or tie together the liver; lard it over; bake in the oven; baste frequently; serve with gravy and currant jelly.

LIVER, Smothered.— Lard the liver with strips of pork; brown nearly ½ lb. of butter in a stewing pot; roll the liver all over in it; add salt, pepper, onions, carrots, and herbs, with some wine; cook slowly for 2½ hours very tightly covered; frequently shake the pot so that the liver may not stick to the bottom; ½ hour before serving add some carrots, cut into long square strips; add a few little onions; when served, the liquor and vegetables are to be poured over the liver as sauce.

LIVER STEW.—Cut a long strip of pork 1 in. wide; inclose it in the middle of the liver; lay the 2 sides completely lapped over; tie it around in 2 or 3 places; take sauce, gravy, or any drippings from roast meat and put it in a saucepan with a short handle; when the sauce is hot place the liver in the pan and cover tight; let it stew over the fire about 1½ hours; then place in the oven for ½ hour, and it is browned a little and very tender.

MARROW BONES.— Saw the bones any size you may prefer; cover the ends with a common paste of flour and water; tie a cloth over them; place them in a small stewpan with sufficient boiling water to cover; when sufficiently boiled, serve them upright on a napkin; or, when boiled, take out the marrow and spread it on toasted bread; cut into small square slices; season it with a little pepper and salt, and send it to table very hot on a napkin or toast.

MEAT BALLS.—Chop fresh meat very fine— beef, veal, mutton or chicken; roll dried bread very fine; add salt, pepper, cloves and mace, and 1 egg; mix this with the meat; pound all well together and make into balls a little larger than a hen's egg; roll in bread crumbs and egg; fry in hot lard; dish with a nice gravy flavored with walnut ketchup.

MEAT RISSOLES.—Chop fine the cold meat; carefully exclude every particle of fat, skin and outside; pound in a mortar with a small piece of butter, adding pepper, salt and powdered fine herbs; moisten with stock; put this into a pan on the fire, and take off as soon as hot; stir in the yolk of an egg beaten up with a little lemon juice and put the mixture by to cool; make a paste of 6 oz. of flour, 2 oz. of butter, a pinch of salt, the yolks of 2 eggs, and a little water; roll it out and cut into small squares; put the meat in the centre and paste the corners over, pressing them well down; fry in hot lard, and serve with parsley.

MUTTON, Breast of.—Bone it; score it; season well with cayenne, black pepper and salt; boil it, and while cooking skim the fat from the gravy in which it has been stewed; slice a few gherkins; add with a dessertspoonful of mushroom ketchup; boil it, and pour over the mutton when dished.

MUTTON, Curry of.— Put 6 button onions, cut fine, and 1 oz. of butter into a saucepan, with 1 oz. of curry powder, a teaspoonful of salt, a tablespoonful of flour, and ½ pt. of cream; stir until smooth. Remove the bones from 2 lbs. of mutton; cut it into neat pieces; fry a light brown; put the meat into a saucepan; pour the sauce over it; boil gently 1½ hours; place the meat on a hot dish, and arrange a border of broiled rice neatly round it.

MUTTON, Leg of, Boiled.—Soak for 1½ hours in salt water; wipe, and boil in a floured cloth; serve with mashed potatoes, turnips, greens and caper sauce.

MUTTON, Leg of, Roasted.—Take a leg of well kept mutton; rub it lightly with salt; put it into a dripping pan with a very little water; cut a potato in two lengthwise and set it under the leg; baste with a little good dripping at first; when within 20 minutes of being done, dredge it with flour to get it frothed; turn the joint two or three times while cooking.

MUTTON, Loin of.—Follow the directions given for roast leg of mutton, but trim off all unnecessary fat; cover the joint with paper until within 20 minutes of its being done; then remove, baste and flour slightly; serve with currant jelly.

MUTTON, Pish Pash of.—Take any lean mutton; cut it in small pieces without any fat or gristle; boil it down into a nice broth; take out the meat; wash a teacup of rice nicely and boil it for a little while in the broth, until it begins to look transparent; skim all grease off; take a mutton chop or two; take out the bone; cut in dice; boil the whole together with a whole onion and a little pepper and salt for ½ hour; serve without straining.

MUTTON, Ragout of.—Slice 2 turnips, 2 carrots and 2 onions; put them in a saucepan with 2 oz. butter, and brown them; dust in a little flour, and stir the whole to prevent browning too quickly; turn them out upon a hot dish until wanted. Cut up cold roast mutton into square pieces; brown them on each side in the same pan in which you browned your vegetables; add ½ pt. of hot water, salt and pepper, a few sprigs of parsley, and the sliced vegetables; stew gently until the vegetables are tender; arrange the vegetables in the center of the dish, with the meat as a border; pour the sauce over all, and serve.

MUTTON STEW.—Take 3 lbs. of breast or neck of mutton; cut in pieces; put in a stew pan with just enough water to cover; add a pinch of salt; let it stew gently for 1 hour; skim off all the fat; peel and slice 6 potatoes and 4 onions; sprinkle and put all the ingredients into

another stewpan in layers, first a layer of vegetables, then one of meat, and sprinkle seasoning of pepper and salt and savory between each layer; cover closely; let the whole stew very slowly for one hour; shake it frequently to prevent its burning.

OX HEAD.—$\frac{1}{2}$ an ox head; a bunch of sweet herbs; 1 head of celery; 1 small onion; 4 cloves; pepper and salt; 3$\frac{1}{2}$ pts. water; well wash the ox head; let it soak in cold water for several hours; then put it into a stewpan, with a bunch of herbs, 1 onion, the celery cut into slices, 4 cloves, and pepper and salt; pour in about 3$\frac{1}{2}$ pts. of water, or rather more; set it over a gentle fire to simmer slowly; when tender take out the head, and cut the meat from it in rather small pieces; strain the gravy, and put about the third part of it into a stewpan with the pieces of head; make all very hot, and serve it up quickly.

PIG, Baked.—Take a pig about 6 weeks old, nicely prepared; score in squares; rub lard all over it; make a dressing of 2 qts. of corn meal; salt as if for bread; mix to a stiff bread with boiling water; make into pans and bake; after this is baked brown, break it up; add to it $\frac{1}{4}$ lb. butter, pepper to taste, and thyme; fill the pig till plump; sew it up; place it on its knees in the pan, which fill with as much water as will cook it; baste it very frequently with the gravy, also 2 red pepper pods; turn while baking, same as a turkey; continue to baste till done.

PIG'S FEET, Boiled.—Take the forefeet; cut off the hock; clean and scrape them well; place two feet together and roll them up tightly in common muslin; tie and sew them so they will keep in perfect shape; boil them 7 hours on a moderate fire; lift them out carefully and let them cool off; remove the muslin and you will find them like jelly; serve with vinegar, or split them and roll in bread crumbs or cracker dust; and fry or broil them; serve with a little tart sauce.

PIG'S HEAD, Baked.—Clean and wash it well; pare and slice 1 qt. of onions; chop $\frac{1}{4}$ lb. suet; grate $\frac{1}{2}$ loaf of stale bread; put into a dripping pan 1 oz. of drippings, 1 gill of vinegar, then the onions, next the head, skin up; then add the bread, suet and seasoning, well mixed; bake in a moderate oven for about 1$\frac{1}{2}$ hours.

PORK CHEESE.—Chop, not very fine, 2 lbs. lean pork with 1 lb. inside fat; strew over and mix thoroughly with them 3 teaspoonfuls of salt, nearly half as much pepper, $\frac{1}{2}$ teaspoonful of mixed parsley, thyme and sage (and sweet basil, if it can be procured), all mixed, extremely small; press the meat closely and evenly into a shallow tin; bake it in a very gentle oven from 1 to 1$\frac{1}{2}$ hours; serve cold in slices.

PORK CHOPS.—1. Broil 3 nice pork chops; when well done sprinkle them with pepper and salt; place on a hot dish; serve with tomato sauce poured around them.—2. Cut the chops about $\frac{1}{4}$ in. thick; trim them neatly and beat them flat; put a piece of butter into the frying pan; as soon as it is hot, lay in the chops; turn them frequently; they will be well browned in $\frac{1}{2}$ hour; take 1 upon a plate and try it; if done, season it with a little finely minced onion, powdered sage, pepper and salt.—3. Prepare some sweet herbs, sage and onion chopped fine, and put all into a stewpan with a bit of butter; give them one fry; beat two eggs on a plate with a little salt, and the minced herbs; mix it all thoroughly together; dip the chops in, one at a time; cover them with bread crumbs, and fry them in hot lard or dripping till they are of a light brown.

PORK, Leg of, Boiled.—Salt and wash in clean cold water; scrape thoroughly white and clean preparatory to cooking; then put into a floured cloth, and into cold water on the fire; when the rind is quite tender the pork is done; let the water be well skimmed; serve with such vegetables as are in season; should the joint be large, allow $\frac{1}{4}$ hour to each lb., with an additional 20 minutes from the time it boils.

PORK, Leg of, Roasted.—The pork should be young and dairy fed; score the skin with a sharp penknife; rub a little fresh butter over the skin to make it brown and crisp without blistering; chop some sage that has been scalded very fine; add to it an onion parboiled; mix some bread crumbs and a small portion of finely chopped apple, mix all together; season with pepper and salt; make an incision by separating the skin from the fat in the under and fillet end of the leg; place the stuffing there; serve with apple sauce.

PORK, Loin of, Roasted.—1. Score before roasting; joint to make the chops separate easily; then roast as a loin of mutton.—2. Put into enough water to cover it; simmer until it is nearly done; then take it out; strip the skin off; coat it well with yolk of egg and bread crumbs; roast until it is thoroughly done.

PORK, Scrambled.—Freshen nice salt pork; cut it in mouthfuls; partly fry it; just before it is done, break into the pan with the pork from 6 to 12 eggs; break and mix the yolks with the whites; stir them quickly with the pork; if the pork is fried brown before the egg is added, there may be too much fat for the egg; if so, put it in a gravy boat if needed for the table, or save it for shortening.

PORK TENDERLOINS, Baked.—Cut a slit in the sides of 2 quite large tenderloins; fill them with forcemeats; sew them up; lay them in a dripping pan; bake them slowly for 1$\frac{1}{2}$ hours; remove the strings, and serve them hot.

PORK TENDERLOINS, Fried.—Cut the tenderloin open; stew in water till nearly done; then, with a little butter hissing in a spider, fry to a light brown, not too hard; have a small piece of toast buttered for each piece of meat; place the meat on the toast; pepper and salt; then throw a thin milk gravy over all.

ROLICHES.—Take fresh tripe; cut it into square pieces; and also cut into small bits pieces of flank of beef large enough to fill the tripe; add a little fat with the lean beef; season with salt, pepper, and sweet herbs; sew up in the pieces of tripe in little round balls; put them into a pot of boiling water and boil slowly till you can pierce them with a straw; skim off the fat; put a press on them while in the water; let them stand till the next morning. Make a mixture of half the pot liquor and half

vinegar; cover them with it, and put them away in a stone jar, and when needed take from the liquor and cut in slices for supper.

SAMP.—Soak 1 qt. of cracked Indian corn over night; put it on the fire the first thing after breakfast, with 3 lbs. of beef, not too salt, and 1 of pork; cover with water; let it cook slowly 5 hours, being very careful not to let it burn.

SAUSAGE, Baked.—Place them in a baking pan in a single layer; bake in a moderate oven; turn them over when they are half done, that they be equally browned all over; send to table with pieces of toast between each sausage; cut the toast about the same size as the sausage, and moisten it with a very little of the sausage fat.

SAUSAGE, Fried.—6 lbs. lean fresh pork; 3 lbs. fat fresh pork; 12 teaspoons powdered sage; 6 teaspoons black pepper; 6 teaspoons salt; 2 teaspoons powdered mace; 2 teaspoons powdered cloves; 1 grated nutmeg; chop the meat fine; mix the seasoning in with your hands; pack down in stone jars; pour a layer of melted lard on top; when wanted, take enough for a meal; form into small cakes and fry; put no other grease but their own in the pan.

SHEEP'S BRAINS, Baked. — Prepare the brains as for stewing; procure as many slices of bacon as there are brains; after they have been boiled and thrown into cold water, drain and dry them perfectly; brush over with oil; roll them in highly seasoned bread crumbs; bake in a well heated oven, turning them about that they may be equally cooked; baste occasionally; when nicely browned, take them up; lay the slices of bacon on toast; put the brains upon them; serve with sharp sauce or tomato sauce in a separate tureen.

SHEEP'S HEAD.—1 head; 2 onions; 2 carrots; 2 turnips; a piece of celery; 5 cloves; a sprig or two of thyme; 1 bay leaf; ¼ oz. of pepper; 3 qts. of water; salt to taste. Put the head into a gallon of water; let it soak for 2 hours; wash thoroughly; saw it in two from the top; take out the brain; cut away part of the uncovered portions of the skull and the ends of the jaws; wash it well once more; put the onions, carrots, turnips, celery, thyme, bay leaf and seasoning, into a stewpan, with 3 qts. of water; let it simmer very gently; take out the vegetables and bunch of herbs; skim off the fat; lay the head on a dish; have the brain ready boiled; chop it up fine; warm it in parsley and butter; put under the head, and serve.

SMOKED MEAT.—Take a smoked tongue or ham that has been well boiled; grate it with a coarse grater and mince it fine; mix it with cream and beaten yolk of egg; let it simmer over the fire. Prepare some nice slices of toast; butter them rather slightly; lay them in a flat dish that has been heated over the fire; cover each slice with the meat mixture, that should be spread on hot; place on the table in a covered dish.

SWEETBREADS, A la Financiere.—Put your sweetbread in cold water and put it on the fire; when it boils take it off; let cold water run over it until it is thoroughly cold; press tightly for a few minutes and then lard it; take some spare lard and put it in a saucepan with some sliced onions, carrots, thyme, whole pepper and cloves; put your sweetbread in with a little *consommé*; put it on the fire until it boils; keep it closely covered all the time; when it comes to a boil put it in a hot oven for half to three quarters of an hour; half-bake some chicken livers; take a small piece of sweetbread, some truffles and olives; put all in a saucepan with brown sauce; dish up the sweetbread; put the garniture around the dish and serve.

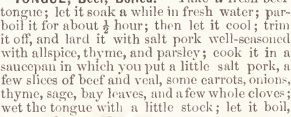
SWEETBREADS, Braised. — Soak the sweetbreads an hour in cold water; then lard them; line the bottom of a covered pan with slices of bacon with a very little finely-chopped parsley and onion scattered over them; lay the sweetbreads on the bacon, and pour on some nice meat stock so that it shall not cover the sweetbreads; let it cook gently for nearly ¾ hour; add a little stock from time to time, if that in the pan gets low; brown the tops of the sweetbreads by holding a hot stove lid over them.

SWEETBREADS, Broiled.—Parboil them; put them on a clean gridiron for broiling; when delicately browned, take them off; roll in melted butter to prevent their being dry and hard.

SWEETBREADS, Fricasseed.—Procure 4 nice sweetbreads; wash them carefully; remove the skin and gristle; cover with boiling water; boil 15 minutes; then plunge into ice-cold water, to which you have added a little salt; leave them in this 20 minutes; take out and cut into crosswise slices ½ in. thick; have ready 3 or 4 tablespoonfuls of butter heated in a frying pan and fry the slices until nicely browned, but not burnt; into a saucepan turn 2 cups of strong broth; season well with salt, pepper, a dash of cayenne, cloves, a little chopped onion boiled in it and strained out; thicken with browned flour; put in the sweetbreads; cover and simmer 15 minutes longer.

SWEETBREADS, Fried. — Take 3 doz. sweetbreads; put them into hot water and let them boil 10 or 12 minutes; when cold skin, but do not break them; take 6 eggs and beat them well; season well with pepper and salt; roll in bread crumbs; fry them in salt pork to a nice brown; serve hot with butter and parsley sauce.

TONGUE, Beef, Boiled. — Take a fresh beef tongue; let it soak a while in fresh water; parboil it for about ½ hour; then let it cool; trim it off, and lard it with salt pork well-seasoned with allspice, thyme, and parsley; cook it in a saucepan in which you put a little salt pork, a few slices of beef and veal, some carrots, onions, thyme, sage, bay leaves, and a few whole cloves; wet the tongue with a little stock; let it boil,



Boiled Beef Tongue.

and reduce during 4 or 5 hours, according to

the softness of the tongue; when it is cooked, take it out; skin it and split it so as to form a kind of a heart on the dish; then add a sauce piquant, which is composed of pickles, onions, and vinegar, and a good thickened sauce. Dress the dish with a few sliced pickles, and serve the tongue with its own sauce; or, garnish it with a frill of paper and parsley.

TONGUE. Calf's, Fricasseed.—Boil the tongue 1 hour; pare and cut into thick slices; roll them in flour and fry in drippings 5 minutes; put the tongues into a saucepan; add sliced onion, thyme, and parsley; cover with a cupful of your soup or other gravy; simmer ½ hour; cover lightly; take up the tongues and keep them warm; strain the gravy; thicken; put in 4 or 5 thin slices of lemon from which the peel has been taken; boil 1 minute and pour over the fricassee.

TONGUE. Potted.—Procure a beef tongue; rub it over with 1 oz. of saltpetre and 4 oz. of moist sugar; let it remain for 2 days; then boil it until it is quite tender; cut off the quantity required for potting; remove the skin; then weigh the meat; cut it up into small pieces; pound it as fine as possible; add a few oz. of cold fowl or veal, or any other roasted meat or game which may be at hand, minced and pounded likewise; to every pound of meat add ½ lb. of clarified butter, or a little ground mace, pounded cloves, and cayenne pepper; beat the spices well into the meat, in a marble mortar, and taste it if sufficiently seasoned; press it closely down into small pots; pour clarified butter on the top; keep in a cool larder until wanted.

TRIPE. Boiled.—Take 2 lbs. tripe; wash it thoroughly; cut it in small pieces; put it in a stewpan with plenty of water; let it simmer for 2 hours; take 8 large onions, put them in a saucepan and boil until they are done; strain the onions and cut them up, and strain the tripe; put them both together; add 1 qt. of milk, some pepper and salt; let it come to a boil; take 2 tablespoonfuls of flour, mix it with a little milk and stir it in; let it boil fast for 10 minutes, stirring all the time, to prevent burning.

TRIPE. Broiled.—Cut up honeycomb tripe into pieces of 3 or 4 in. wide; rub a little oil or melted butter over them; dredge them in flour; broil over a charcoal fire; squeeze a little lemon juice over each piece and serve.

TRIPE, Fried.—Cut the tripe into pieces about 3 in. square; dip into a batter made of 6 oz. of flour, 1 tablespoonful of oil, or 1 oz. of butter, and ¼ pt. of tepid water; mix the oil with the flour; add the water by degrees; whip the whites of 2 eggs to a stiff froth; stir into the batter; dip the tripe in; throw it into a saucepan of boiling fat; let it fry 3 or 4 minutes; take it out and drain.

TRIPE, Lyonnaise.—Take 1 lb. of cold boiled tripe and cut it into pieces 1 in. square; dissolve 2 oz. of butter in a frying pan; add a sliced onion to it; fry until it is tender; put the pieces of tripe with the onion, 1 tablespoonful of chopped parsley, 1 tablespoonful of vinegar, salt and a little cayenne; heat all gently together; cover the bottom of a platter with tomato sauce; add the tripe and serve.

VEAL. Broiled.—Cut steaks from the round, or take the chops, which are preferable; broil them handsomely; butter them well and serve very hot.

VEAL COLLOPS.—Cut part of a leg of veal into pieces 3 or 4 in. broad; sprinkle flour on them; fry in butter until brown; then turn in water enough to cover the veal; when it boils take off the scum; put in 2 or 3 onions, a blade of mace, a little salt and pepper; stew until tender; then take up the meat; thicken the gravy with flour and water mixed smoothly together; squeeze in the juice of a lemon, or a very good substitute is a teaspoonful of catsup; turn the mixture over the brown collops; garnish with thin slices of lemon.

VEAL CROQUETTES.—Remove the gristle, skin and sinews from 1 lb. of cold veal; mince it finely with 4 oz. of cold boiled beef or calf's tongue; season with salt, pepper and nutmeg; put into a saucepan 1 oz. of butter rolled in flour and 1 wineglassful of cream; add the minced meat, and stir for 20 minutes over a slow fire; if too dry moisten with stock; turn the preparation upon a round pie board; spread it to a smooth layer about 1 in. thick; set it in the ice box to get cold and stiff; divide into about 2 doz. pieces, each piece rolled into the form of a cork or round ball over bread crumbs; then dip in beaten egg and roll again in crumbs; handle carefully so as not to break them; fry in boiling fat.

VEAL CUTLETS, Braised.—Lard some veal cutlets on one side; place them on a layer of minced onion and carrot in the bottom of a stewpan; add rich stock enough to cover them completely, and then let them cook; serve them with a nice brown gravy made with the stock strained.

VEAL CUTLETS, Fried.—Make a batter of 1 cup of milk, 1 beaten egg, a pinch of salt and flour, with ½ teaspoonful of baking powder mixed in; fry the veal a nice brown in drippings or butter; then dip into the batter and fry again brown; any batter that may be left drop by the small spoonful into the hot fat; turn, and when browned place on the meat.

VEAL HASH.—Take a teacup of boiling water in a saucepan; stir in an even teaspoon flour wet in a tablespoon cold water; let it boil 5 minutes; add ½ teaspoon black pepper, as much salt, and 2 tablespoons butter, and let it keep hot, but not boil; chop the veal fine; mix with it half as much stale bread crumbs; put it in a pan and pour the gravy on it; then let it simmer 10 minutes; serve this on buttered toast.

VEAL, Leg of, Boiled.—Let the water boil before putting the meat in; boil a few slices of salt pork with it, but no vegetables; when done, make a gravy of drawn butter.

VEAL, Leg of, Roasted.—Take out the bone and stuff the hollow with highly seasoned stuffing; baste often.

VEAL LOAF, or CAKE.—Take a cold fillet of veal, mince as fine as possible; mix with ¼ lb. of fat ham chopped fine, 1 teacup of grated bread crumbs, 1 grated nutmeg, 2 beaten eggs, a little salt and a very little cayenne; mix in form of a loaf; glaze over with the yolk of an egg; strew on pounded cracker; bake 1 hour; make a gravy of the trimmings of veal; thicken

with the yolk of an egg dropped in just before taken up; serve the loaf with gravy poured over it.

VEAL, Loin of, Boiled.—Take a loin of about 8 lbs.; skewer down the flap without disturbing the kidney; put the loin in the kettle with enough cold water to cover it; let it come gradually to a boil; continue for 2½ hours; remove the scum as it rises; send it to the table in white broth, thickened with cream; or with parsley and melted butter.

VEAL, Loin of, Browned.—Put a piece of butter in a covered pan; place into it about 3 lbs. of veal; choose the thick end of a shoulder or loin; brown well for at least twenty minutes; sprinkle over a little flour; add also some warm water, just to make a little gravy; add also 4 slices of lemon, some mace, a little nutmeg, salt, and whole peppercorns; place 2 pieces of bacon on top of the meat; close up tight; let it gently simmer for ¾ hour more; do not boil it fast; take out the meat and strain the gravy over it; trim with lemon.

VEAL, Loin of, Roasted.—Make an incision in the flank or skirt of the loin of veal; into the cavity thus made, just over the end of the bone, put a well flavored veal forcemeat; roll in the flank to cover the kidney fat; bind it firmly with string or tape; place a few small veal bones with a few assorted vegetables; cut up in a dripping pan; put the loin upon this bed; add ½ pt. of stock or water; set it in the oven for 20 minutes; in the meantime work together 1 tablespoonful of flour with 2 tablespoonfuls of melted butter; draw the joint from the oven; baste it with the flour and butter; return it to the oven again; baste occasionally until done.

VEAL, Neck of, Braised.—Lard with bacon; roll in chopped parsley, pepper, salt and nutmeg, placed with the scrag in a tosser, in which place lean bacon, celery, carrots, 1 onion, 1 glass sherry or Madeira, with sufficient water to cover it all; stew over a quick fire until it is sufficiently tender; remove the veal; strain the gravy; place the veal in a stewpan, in which some butter and flour has been browned; let the bones be uppermost; when the veal is nicely colored it is enough; boil as much of the liquor as may be required; skim it clear; squeeze a lemon into it; pour it over the meat and serve.

VEAL QUENELLES.—Mix in a saucepan on the fire 1 oz. of butter and a handful of flour; add enough water to make a thick paste; let it come to boiling point; put it by to get cold; take 1 lb. of uncooked veal cutlet; cut it up small and pound it to a pulp in a mortar; take of paste half the quantity there is of meat pulp; of butter half the quantity there is of paste; mix the whole thoroughly in the mortar; then pass the mixture through a sieve; return it to a clean mortar; add pepper, salt and spices to taste; work into it with the pestle the whites of 1 or 2 and the yolks of 4 or 5 eggs; poach a piece of the mixture, to try it as to taste and consisteney; alter it by adding more condiments or whites of eggs; shape the quenelles neatly with two tablespoons; dispose them in a well buttered saucepan; leave a clear space on one side in which to put a pinch of salt; pour in sufficient boiling water to cover the quenelles; leave them to poach for 10 minutes; drain and arrange them neatly on a bed of tomato sauce.

VEAL RAGOUT.—Place a breast of veal in a pan with a pint of water, a little pepper, salt and mace; stew this 1½ hours, turning once or twice; make forcemeat balls with a little veal chopped fine, crumbs, herbs, spices, a little butter and 1 egg; mix these together; make into small balls; put them on the meat; baste with butter; dredge on a little flour; put in the oven 20 minutes; add a little batter and flour to the gravy; let it boil; pour over the meat.

VEAL RISSOLES.—Mince some veal; pound it in a mortar; grate some cooked ham into it; mix well with white sauce; flavor with mushrooms; make them into balls; inclose in pastry; fry brown in butter; if fried without pastry, bind them together with egg and bread crumbs.

VEAL, Scalloped.—Chop cold cooked veal fine; put a layer in a baking dish; alternate with a layer of powdered crackers, salt, pepper and butter, until you fill the dish; beat up 2 eggs; add a pint of milk; pour it over the veal and crackers; cover with a plate and let the top brown.

VEAL, Shoulder of, Roasted.—Remove the knuckle; roast what remains; it may or may not be stuffed; if not stuffed, serve with oyster or mushroom sauce; if stuffed, with melted butter.

VEAL, Shoulder of, Stewed.—Bone the shoulder, and lay in the orifice a veal forcemeat; roll and bind the shoulder; roast it 1 hour; then put it into a stewpan with good white or brown gravy; stew 4 or 5 hours, regulating the time to the size of the joint; when done, strain the gravy to clear it of fat; serve with forcemeat balls.

VEAL STEW.—Cut 4 lbs. of veal into strips 3 in. long and 1 in. thick; peel 12 large potatoes; cut them into slices 1 in. thick; spread a layer of veal on the bottom of the pot; sprinkle in a little salt and pepper; then a layer of potatoes; then a layer of veal seasoned as before; over the last layer of veal put a layer of slices of salt pork; over the whole a layer of potatoes; pour in water till it rises an inch over the whole; cover it close; heat 15 minutes, and simmer 1 hour.

YORKSHIRE PUDDING.—Make a thin batter, as for frying, with 1 pt. of milk and some flour; season with salt, pepper and a little nutmeg grated fine; beat up the yolks of 4 eggs and the whites of 2 with 1 or 2 teaspoonfuls of brandy; strain them into the batter; beat it well with a fork for some minutes; pour the mixture to the thickness of 1 in. into a tin buttered freely, and put it into the oven; when the pudding is set lay it in the tin, slanting in front of the fire under the beef which is roasting; when the top is well browned, take the pudding out of the tin and expose the under side of it to the action of the fire; when done, cut it up in diamond shaped pieces and garnish the joint with them.

MISCELLANEOUS DESSERTS.

ALMOND CREAM.—Sweet almonds, 2 oz.; 4 bitter almonds; blanch and beat in a mortar to a smooth paste; add a teaspoonful of water to prevent oiling; afterwards a pt. of cream, and enough powdered lump sugar to sweeten; then whisk to a froth; fill the glasses with the liquor, and place some of the froth on the top of each.

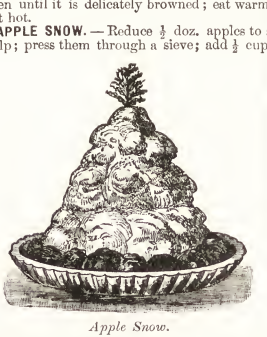
APPLE FLOAT.—Stew 1 qt. of dried apples until perfectly tender; flavor with extract of lemon and sweeten; spread it on a flat dish to cool; mash fine with a silver fork; beat the whites of 8 eggs very light; add to the apples; after thoroughly mixing, turn into a glass dish, and eat with cream.

APPLE FOLLY.—Whites of 2 eggs, 1 cup of sugar, 3 sour baked apples, vanilla; beat together a little the whites of the eggs and sugar; flavor the inside of the baked apples; put to the eggs; beat till quite stiff; serve with cake.

APPLE ISLAND.—Pare carefully 8 large apples; core them; chop fine with the beaten whites of 8 eggs, ½ lb. of white sugar, and a little lemon flavoring; drop on cream as for floating island.

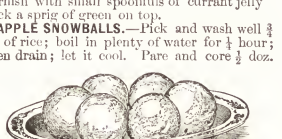
APPLE OMELET.—6 large pippins or other tart apples; 1 tablespoonful of butter; 3 eggs; 6 tablespoonfuls of white sugar; nutmeg to taste; 1 teaspoon of rose water. Pare, core and stew the apples as for sauce; beat them very smooth while hot; add butter, sugar and flavoring; when quite cold add the eggs, beaten separately very light; put in the whites last, and pour into a deep bake dish, previously warmed and well buttered; bake in a moderate oven until it is delicately browned; eat warm, not hot.

APPLE SNOW.—Reduce ½ doz. apples to a pulp; press them through a sieve; add ½ cupful powdered sugar and a teaspoonful of extract of lemon; take the whites of 6 eggs; whip them for several minutes; sprinkle 2 tablespoonfuls of powdered sugar over them; beat the apple pulp to a froth; add the beaten egg; whip the mixture until it looks like stiff snow; pile it high in rough portions on a glass dish; garnish with small spoonfuls of currant jelly stick a sprig of green on top.



Apple Snow.

APPLE SNOWBALLS.—Pick and wash well ¾ lb. of rice; boil in plenty of water for ½ hour; then drain; let it cool. Pare and core ½ doz. large apples; inclose them in the rice separately; boil them for 1 hour; when eaten, add a little butter and sugar, with powdered nutmeg or cinnamon.



Apple Snowballs.

APPLE SOUFFLE.—12 large apples; ½ lb. sugar; 6 eggs; 1 pt. milk; 1 lemon; 1 tablespoonful powdered sugar. Pare and core the apples; stew them with the lemon peel till quite soft; press through a sieve; make a custard with the yolks of the eggs and the milk; half fill a pie dish with the apples; cover with the custard; beat the whites of the eggs to a stiff froth and lay on the custard; sift the loaf sugar over all; bake in a moderate oven for 10 minutes.

Ornamental Soufflé Dish.

APRICOT CREAM.—8 ripe apricots or 1 doz. clear stone soft peaches; 8 oz. powdered white sugar; 1 oz. isinglass; put the fruit into a stewpan with 1 gill of water and 4 oz. of sugar; let them cook; when cooked let get cold; whisk up ½ pt. of cream very stiff; add the fruit, passed through a metal strainer, and 4 oz. powdered white sugar; dissolve 1 oz. isinglass in a little hot water; mix it with the cream; stir well together and pour in a mold; stand it in ice water to get cold; when required for the table dip the mold in warm water for a few seconds; wipe with a cloth and turn out on to a silver dish; garnish with white flowers and green leaves.

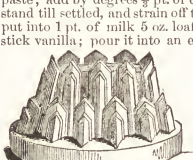
ARROWROOT BLANC MANGE.—Mix 1 teacupful of arrowroot with a little cold milk; rub it smooth; boil 1 pt. of milk with 10 sweet and 4 bitter almonds, having pounded and blanched them; sweeten this milk to taste with pulverized sugar; strain carefully; pour the milk gradually into the arrowroot; stir all the time; boil for 5 minutes, and pour into a mold to cool.

BAVARIAN CREAM.—Whip 1 pt. of cream to a stiff froth; set in a colander 1 minute, to allow the unwhipped portion to drip away; boil 1 pt. of milk with 1 stick of vanilla and ½ cupful of sugar till flavor is extracted; take out the stick of vanilla; remove saucepan from fire; add ½ box

of gelatine that has been soaked in water; add the well beaten whites of 4 eggs; when the mixture has become quite cold, add the whipped cream gradually until it is well mixed; put into individual molds 1 teaspoonful of some bright jelly or jam; pour in the mixture and place in ice box until wanted.

BLANCHED CREAM.—Take 1 qt. of the thickest cream that can be got; sweeten it with fine sugar and orange flower water; boil it and beat the whites of 20 eggs with a little cold cream; strain it, and when the cream is upon the boil, pour in the eggs; stir it well till it comes to a thick curd; take it up and strain again through a hair sieve; beat well with a spoon till it is cold, and put into a dish.

BLANC MANGE.—Blanch 10 bitter almonds with 2 oz. of sweet almonds; pound them to a paste; add by degrees ½ pt. of cold water; let it stand till settled, and strain off the almond milk; put into 1 pt. of milk 5 oz. loaf sugar and 3 in. stick vanilla; pour it into an enamelled saucepan; boil slowly till the sugar is dissolved; stir in 1 oz. of well soaked isinglass; strain into a basin; add the milk of almonds with 1 gill of cream; remove the sticks of vanilla; when cold pour the mixture into a mold, or into individual molds, and place in an ice box till wanted.



Blanc Mange Mold.

CALEDONIAN CREAM.—2 oz. of raspberry jam or jelly; 2 oz. of red currant jelly; 2 oz. of sifted loaf sugar; the whites of 2 eggs put into a bowl and beaten with a spoon for ¾ hour.

CHARLOTTE RUSSE.—Take 1-5 package of gelatine and ½ cupful cold milk; place in a farina boiler; stir gently over the fire until the gelatine is dissolved; pour into a dish; place in a cool room; take 1 pt. of rich cream and whisk it with a tin egg beater until it is thick; flavor the cream with either vanilla or wine; sweeten to taste; when the gelatine is cool, strain carefully into the prepared cream; line a mold with lady-fingers; pour the cream in carefully until it is filled; cover with lady-fingers.

CHESTNUTS, Boiled.—Make a slight incision in the outer skin only of the chestnuts, to prevent bursting; when all are done, throw them into plenty of boiling water, with about 1 dessertspoonful of salt to the ½ gal.; as soon as they are soft through, drain them; wipe them in a coarse cloth, and send them to table quickly in a hot napkin.

CHOCOLATE BLANC MANGE.—Take 3 pts. of warm milk and soak in it 1 package of gelatine; allow it to remain for 2 hours; sweeten with 4 tablespoonfuls of sugar, after the gelatine is softened or melted; scrape a square of sweet chocolate; put in a small saucepan with 2 spoonfuls of hot water; if you use unsweetened chocolate, add to the water 2 tablespoonfuls of sugar; stir this all the time, until perfectly smooth; then, having your milk and gelatine on the fire, watching it closely so that it will not burn, add by degrees your chocolate mixture; have molds ready in which to put your blanc mange.

CHOCOLATE CHARLOTTE RUSSE.—½ box gelatine; 1 qt. milk; yolks of 2 eggs; 1 small teacupful of sugar; 1 large tablespoonful of vanilla; 7 squares of Baker's chocolate; dissolve the gelatine in about 1 gill of cold water; let it stand for 2 hours; grate the chocolate fine; dissolve it in a little of the milk, slightly warmed; scald the remainder of the milk; beat the yolks of the eggs and sugar together until very light; when the milk is well scalded, add the gelatine, chocolate, eggs and sugar; let this simmer gently for 15 minutes; strain the mixture into a mold; put it on ice.

CHOCOLATE WHIP.— Take 1 oz. of cocoa paste, or the same quantity of sweet chocolate scraped fine; add it to 1 qt. of rich cream and ½ lb. of pulverized sugar; place on the fire and bring to the boiling point; stir constantly with a whisk; then remove it; when it is thoroughly cold, add to it the whites of 4 eggs; whisk briskly, and remove the froth as it forms with a perforated skimmer; lay it on a hair sieve to drain; when you have a sufficient quantity to whip, fill your glasses or cups ¾ full of the cream; pile the whip on top of them; sprinkle a little vanilla sugar or powdered cinnamon on the whip, and serve.

COFFEE CREAM. — Sweeten 1 pt. of rich cream rather liberally; roast 2 oz. coffee beans; when they are lightly browned throw them into the cream at once and let the dish stand 1 hour before using; strain and whip the cream to a firm froth; add 1 teaspoonful of powdered gum Arabic, dissolved in a little orange flower water, to give the cream more firmness, if desired.

CORN STARCH BLANC MANGE. — Take ½ gal. milk, 8 eggs, 1 pt. of sugar, 2 tablespoonfuls of corn starch; boil the milk; add the eggs, sugar and corn starch; let it thicken; use the whites of the eggs, with 6 tablespoonfuls of sugar; season to taste and put on the top of the custard.

CRACKER DESSERT. — Choose whole soda crackers; lay each upon a separate small plate; pour upon it enough boiling water to soak it well; leave none upon the plate; cover with a dressing of sweetened cream, with a spoonful of jelly in the centre if you choose, or dip upon it a portion of nice fruit, canned, stewed, or fresh, as is convenient.

FLOATING ISLAND.—1. Into ¾ pt. of cream put sugar to make it very sweet, and the juice and rind of a lemon grated; beat it for 10 minutes. Cut French rolls into thin slices, and lay them on a round dish on the top of the cream; on this put a layer of apricot or currant jam, and some more slices of roll; pile up on this, very high, a whip made of damson jam and the whites of 4 eggs. It should be rough, to imitate a rock. Garnish with fruit or sweetmeats.—2. Beat the yolks of 3 eggs until very light; sweeten and flavor to taste; stir into 1 qt. of boiling milk; cook till it thickens; when

cool, pour into a low glass dish; whip the whites of the eggs to a stiff froth; sweeten and pour over a dish of boiling water to cook; take a tablespoon and drop the whites on top of the

Floating Island.

cream, far enough apart so that the little white islands will not touch each other; drop little specks of bright jelly on each island.

FLUMMERY.—1 pt. cream; 1 oz. gelatine, soaked 1 hour in 1 cup cold water; 1 cup milk; ½ cup sugar; heat the milk to boiling; put in the gelatine and sugar and stir 5 minutes, or until they are thoroughly dissolved; strain through thin muslin, pressing the cloth well; when cool, beat in the cream, a little at a time, with an egg whip, or churn in a syllabub churn until thick and stiff; wet your mold; put in the mixture; let it stand 7 or 8 hours in a cold place; flavor with vanilla.

FRIAR'S OMELET.—Stew 6 or 7 good-sized apples, as for apple sauce; stir in, when cooked and still warm, butter the size of a pigeon's egg and 1 cupful of sugar; when cold, stir in 3 well beaten eggs and a little lemon juice; put a small piece of butter into a pan; when hot, throw in a cupful of bread crumbs; stir them over the fire until they assume a light brown color; butter a mold, and sprinkle crumbs on the bottom and sides; fill in with apple preparation; sprinkle the top with bread crumbs; bake it for 15 or 20 minutes, and turn it out on a good-sized platter.

FRUIT TRIFLE.—Put 1 qt. of strawberries, or any other fresh fruit, in the bottom of a glass dish; sugar the fruit; cover it with a layer of macaroons; pour over it a custard made with 1 qt. of milk and the yolks of 5 eggs well beaten; sweeten to taste; when cold, place on the top the whites of the eggs, beaten to a stiff froth with a little sugar.

HARLEQUIN.—Wet a jelly mold thoroughly with white of egg; melt a little currant jelly; pour it into the mold and let it cool; when cold, melt some plum jelly; pour it in, and let this cool; melt apple jelly, and add that, alternating the colors until the mold is full; make the jellies only warm enough to run; if they are hot and thin they will mix and spoil the effect; when cold and stiff, turn out on a glass dish.

HEDGE.—Bake sponge cake in thin sheets or cakes; make a custard of 1 qt. of milk and the yolks of 6 eggs; sweeten and flavor to taste; put in a pan, which set in a kettle of hot water, and stir until it boils; when it thickens, pour over the cake; before sending to table, beat the whites of the eggs to a froth and place on the top; then add a quantity of blanched almonds.

IRISH MOSS.—Soak a scant handful of Irish moss in strong soda water until it swells; squeeze the moss until it is free from water; put it in a tin bucket which contains 6 pts. of sweet milk; set the bucket in a large iron pot which holds several pts. of hot water; stir seldom; let it remain until it will jell slightly by dropping on a cold plate; strain through a sieve; sweeten and flavor to taste; rinse a mold or a crock with tepid water; pour in the mixture; set it away to cool; eat with cream and sugar; some add jelly.

ITALIAN CREAM.—Put 1 oz. of soaked isinglass, 6 oz. of loaf sugar, ½ stick of vanilla, and 1 pt. milk into a saucepan; boil slowly; stir all the time till the isinglass is dissolved; strain the mixture; when a little cool, mix it with 1 pt. of thick cream; beat thoroughly until it thickens; pour into a large or individual molds; put into an ice-box until wanted.

LEMON BLANC MANGE.—Pour 1 pt. of hot water upon ½ oz. of isinglass; when it is dissolved, add the juice of 3 lemons, the peel of 2 lemons grated, 6 yolks of eggs beaten, with about one good wineglass of Madeira wine; sweeten to your taste; let it boil; then strain it and put it in your molds.

LEMON CREAM.—Take 1 pt. of thick cream; put to it the yolks of 2 eggs well beaten, 4 oz. of fine sugar and the thin rind of 1 lemon; boil it up; then stir till almost cold; put the juice of a lemon in a dish or bowl and pour the cream upon it; stir till quite cold.

MOONSHINE.—Beat the whites of 6 eggs into a very stiff froth; then add gradually 6 tablespoonfuls of powdered sugar, beating for not less than 15 minutes; then beat in 1 heaping tablespoonful of preserved peaches, eat in tiny bits; serve; pour in each saucer some rich cream sweetened and flavored with vanilla; on the cream place a liberal portion of the moonshine.

ORANGE FLOAT.—1 qt. of water; juice of 2 lemons; 1 cup sugar; when boiled, add 4 tablespoonfuls of corn starch, mixed in a little water; let it boil; stir 15 minutes; when cool, place it over 4 or 5 sliced oranges; over the top spread the beaten whites of 3 eggs, sweetened; flavor the whole with vanilla; eat with cream.

PEACH BAVARIAN CREAM.—1 qt. canned peaches; 1 large cupful of sugar; 1 pt. of cream; ½ box of gelatine; ½ cupful cold water; mash the peaches; rub them and the juice through a sieve; add the sugar; soak the gelatine 2 hours in the cold water; whip the cream to a froth; put the peaches in a saucepan and let them simmer 20 minutes; stir often; add the gelatine to the hot peaches and remove from the fire immediately; place the saucepan in a pan of ice water and beat till the mixture begins to thicken; then stir in the cream; mix thoroughly and pour into the mold; set away to harden; serve with whipped cream or custard flavored with peach kernels or almond extract.

PERSIAN CREAM.—Dissolve gently 1 oz. of isinglass in 1 pt. of new milk, and strain; then put it in a clean saucepan with 3 oz. of sugar broken small; when it boils, stir into it ½ pt. of

good cream; add this liquid, at first by spoonfuls only, to 8 oz. of apricot or raspberry jam; mix them very smoothly; stir the whole until it is nearly cold, that the jam may not sink to the bottom of the mold; when the liquid is put to the fruit, and has been stirred until nearly cold, whisk them briskly together; last of all, throw in by very small portions at a time the strained juice of a good lemon; put it into a mold; let it stand at least 12 hours in a cold place before turning out.

RASPBERRY CHARLOTTE.—Take 1 doz. of the square or oblong sponge cakes that are commonly called Naples biscuits; they should be quite fresh; spread over each a thick layer of raspberry jam, and place them in the bottom and around the sides of a glass bowl; take the whites of 6 eggs and mix with them 6 tablespoonfuls of raspberry or currant jelly; beat the eggs and jelly very light; then fill up the bowl with it; for this purpose cream is better than white of eggs.

ROCK CREAM.—Boil 1 teacupful of the best rice till quite soft in new milk; sweeten with powdered loaf sugar; pile it upon a dish; lay on it in different places square lumps of either currant jelly, or preserved fruit of any kind; beat up the whites of 5 eggs to a stiff froth, with a little powdered sugar; flavor with either orange flower water or vanilla; add to this when beaten very stiff, about 1 teaspoonful of rich cream; drop it over the rice, giving it the form of a rock of snow.

ROCKY MOUNTAIN PUFFS.—3 eggs well beaten; 1 cup sweet milk; 1½ cups flour; a pinch of salt; fill buttered cups half full and bake in a hot oven 20 minutes; serve hot with brandy sauce, made as follows: Melt 1 cup sugar; add to it ½ cup butter and ¼ cup brandy, and ½ nutmeg; serve hot.

RUSSIAN CREAM.—4 eggs; 1 cup sugar; 1 qt. of milk; ½ box gelatine, dissolved in ½ pt. of warm water; beat the yolks of the eggs and sugar together; cook with the milk, like custard; take this off the stove; add the well beaten whites of the eggs; stir rapidly for a few moments; now add the gelatine, and then a teaspoonful of lemon; pour it into a pretty shaped dish to harden, turn it out on a platter, and cut off in blocks (as ice cream).

SPANISH CREAM.—Boil in ½ pt. water ½ oz. of isinglass until dissolved; strain; mix with it 1 qt. of cream or good milk; stir it until it comes to a boil; when a little cooked, add the beaten yolks of 6 eggs, with a glass of white wine; pour in a dish; sweeten to taste; stir until cold; flavor with lemon or vanilla; put in a form, and set in a cool place.

STRAWBERRY BAVARIAN CREAM.—1 qt. of ripe strawberries; 1 heaping cup of sugar; ½ box of gelatine; 1 pt. of cream; ½ cup of hot water; pick the strawberries and wash them in a colander; mash them, and add the sugar; let them stand a little while—½ an hour or more; soak the gelatine in cold water enough to cover it, for 1 hour or more; whip the cream to a froth; strain the strawberries and sugar through a rather coarse strainer; dissolve the gelatine; add it to the strawberries; place a basin in another of ice water; stir the mixture until it begins to thicken; when it begins to thicken, add the whipped cream; turn into the mold and set away to harden; serve with whipped cream around or in the centre.

SWISS CREAM.—½ lb. soft macaroons, or 6 sponge cakes; sherry; 1 pt. of cream; 5 oz. of sugar; 2 large spoonfuls of arrowroot; juice of half a lemon; rind of 1 lemon; 3 tablespoonfuls milk. Lay macaroons in a glass dish; pour over enough sherry to soak them; put the cream into a lined saucepan, with sugar and lemon rind; let it remain by the side of the fire until the cream is well flavored; take out the rind; mix smoothly with cold milk and arrowroot; add to the cream; boil gently for 3 minutes; stir it well; take it off the fire; stir till nearly cold; add lemon juice and pour over cake; garnish with strips of candied fruit, ginger or citron, or preserve.

VELVET BLANC MANGE.—2 cups of sweet cream; ½ oz. gelatine, soaked in a very little cold water 1 hour; ½ cup white powdered sugar; 1 teaspoonful extract of bitter almonds; 1 glass of white wine. Heat the cream to boiling; stir in the gelatine and sugar; as soon as they are dissolved take from the fire; beat 10 minutes until very light; flavor and add the wine by degrees; mix it well; put into molds wet with clear water.

WIGWAM.—1 lb. of lady fingers; open and spread on a dish; cover them with currant jelly; on the jelly spread meringue; then another layer of lady fingers, jelly and meringue; and so on for several layers, making each layer smaller in order to have it pyramidal in form; cover the whole with meringue; put it in the oven a few minutes to brown. The meringue is made of whites of eggs with sugar beaten in; do not make it too stiff; 2 oz. of sugar to each white is suffieient; beat the whites very light, then stir the sugar in gently without beating.

PASTRY.

REMARKS.—Before making paste, wash the hands in hot water. Touch and roll the paste but little. Keep all utensils very clean. Choose the coolest part of the day and house to make the pies. Sift and pound the flour and sugar before using them. Lightly flour both sides of paste when you roll it, in order to prevent its turning gray in baking; but if much flour is sprinkled on it the paste will not be clear. If too light, roll out once or twice more than directed, as the folding mainly causes it to rise high and even. Invariably roll puff paste from you. Those who are not practiced in making puff paste work the butter in by breaking it into small pieces, and covering the paste rolled out; dredge it lightly with flour; fold over the sides and ends; roll it out very thin; add the remainder of the butter; fold and roll as before.

After the pies are filled and the upper crust is rolled out, set the pie on the crust and cut it out around just a little larger than the bottom of the pie tin; spread it over the top and it will barely cover the filling and just reach the under crust without lapping any upon it. Do not pinch it down, but leave the edge open, thus giving vent for the steam; it may boil furiously, but it will not overflow. The edges of the pie and top can be ornamented according to the taste of the operator. The following are a few good receipts for making the pastes: 1. When boiling beef, before you put in vegetables, skim the grease into a dish, and set aside to cool; when cold, scrape off the under side; take 1 teacup of melted beef fat, 2 cups of sour milk, 2 teaspoonfuls of saleratus; mix quickly; flour your board well when you roll it out.—2. Take 3 cups of sifted flour, 1 cup of lard, a little salt, and ½ a cupful of cold water; handle as little as possible.—3. 1 lb. of flour; ½ lb. of butter; ½ lb. of lard; with a little water make a dough of the flour and lard; roll it; spread a portion of the butter over it; fold and roll again; add more butter, and so on until you have used the ½ lb. all up.—4. (*Puff Paste.*) Put 1 lb. of flour into a bowl, and rub lightly into it ½ lb. of fresh butter; add ½ a teaspoonful of salt, and make the mixture up into a smooth stiff paste, by stirring into it 2 fresh eggs which have been beaten up with rather less than ½ pt. of water; roll the pastry out, give it 2 or 3 turns, and bake as soon as possible; time, 10 minutes to prepare.

Pie Crimper.

ACID TARTS.—Take 1 egg, 1 cup of sugar, 1 cup of water, 1½ teaspoonfuls tartaric acid, 1 teaspoonful flour, 1 teaspoonful extract of lemon, a piece of butter the size of a walnut; cook over steam; fill the paste and bake moderately; put the lemon in just before baking; ice them if you wish.

ALMOND CHEESE CAKES.—Take 3 or 4 bitter and 1 oz. of sweet almonds; boil and skin them; put them into a mortar with 2 oz. of loaf sugar and the yolks of 2 eggs; pound them fine; then rub 2 oz. of butter to a cream; mix all together; put puff paste in the patties; fill it three parts full with the butter; lay a few cut almonds over the top; sugar over, and bake them in a steady oven.

ALMOND CROQUETTES.—Blanch and dry 1 lb. almonds; pound in a mortar with 1 lb. powdered sugar; rub through a wire sieve; then rub in ¾ lb. butter, grated rind of ½ lemon and yolks of 3 eggs; make into a paste; cut in shapes; bake in a quick oven; when done, dip them in sugar boiled to a syrup.

AMBER PIES.—1 cup each of butter, sugar and jelly; add the yolks of 8 eggs, well beaten, and bake. Frosting: Beat whites of 8 eggs to a froth, add 1 cup of white sugar and bake quickly.

APPLE CHEESE CAKES.—Take 1 lb. of apples, boiled and pulped through a sieve, 1 lb. powdered white sugar, the juice and grated rinds of 3 large fresh lemons, and 4 eggs well beaten; mix these ingredients carefully; put them into a saucepan in which you have ½ lb. of fresh butter melted; stir it constantly over a slow fire for ½ hour, and let it cool; line pie dishes with fine puff paste; pour in the apple mixture; bake, without upper crust, in a quick oven; sprinkle with powdered sugar, and serve when perfectly cold.

APPLE CUSTARD PIE.—Beat up 6 eggs with a cupful of sugar; add them to 3 cupfuls of stewed apples, cold; add gradually 1 qt. of milk to the mixture; season with nutmeg; cover the pie plate with a good crust, with the edge neatly arranged; fill the pie with the custard, and bake.

APPLE LEMON PIE.—Rind and juice of 1 lemon, piece of butter size of a walnut, 2 apples chopped fine, 1 egg, 1 cup of sugar; bake with upper crust.

APPLE PIE.—Make a good light crust; wet the edge of the pie dish, and lay a thin strip all round; pare, core and slice the apples, and lay them in the dish with a little sugar and any flavoring that may be preferred; lay a crust over the top, and ornament with pastry cut into leaves. If the apples are dry, the parings and cores may be boiled with a little sugar and flavoring, and the strained juice added to the fruit; bake the pie in a quick oven; it may be served hot or cold; a little custard or cream is an improvement; time, ¾ hour to bake.

APPLE TARTS.—Take about 2 lbs. of apples; peel them; cut each into 4 pieces; remove the cores; then let each of the quarters be subdivided into 2 or 3 pieces, according to the size of the apple; having done this, put half the pieces into a pie dish; press them evenly down; sprinkle over them 2 oz. of brown sugar; add the remaining apples; afterwards another 2 oz. of sugar, so that the apples shall form a kind of dome, the center of which is about 2 in. above the sides; add a wineglassful of water; cover the top over with short paste; let bake in a moderately heated oven from ½ to ¾ hour.

CHEESE CAKES.—Put 4 well beaten eggs into a saucepan containing 1 pt. of boiling milk, and let it remain on the fire until it curdles; pour off the whey, and put the curd on an inverted sieve to drain; when it is quite dry, add 2 tablespoonfuls of sugar, a little salt, 6 oz. of carefully washed currants, a piece of butter about the size of an egg melted, 2 spoonfuls rose water or cream, and ½ teaspoonful of pounded cinnamon; line the tartlet tins with good puff paste; three parts fill them with the mixture, and bake them in a good oven; if a little vinegar or lemon juice is mixed with milk, then placed on the fire, it will curdle; time to bake, 20 minutes.

CHOCOLATE TARTS.—Mix 2 spoonfuls of rice flour in a little milk; add 10 raw eggs; beat up in 1 qt. of cream and some salt; simmer the cream, but do not curdle it; remove from the fire and add some powdered chocolate; take care to mix it thoroughly with the cream; cover the inside of a tart pan with some thin paste; pour the chocolate cream into it and bake; as soon as the tart is done, cover its surface with powdered loaf sugar.

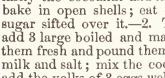
CIDER PIE.—Take 4 tablespoonfuls of boiled

cider, 3 tablespoonfuls each of sugar and water, 2 tablespoonfuls of flour, and 1 egg; beat all together; bake in a deep plate with upper and under crusts.

CINNAMON PIE.—1 lb. brown sugar; 2 oz. cinnamon; ½ cupful butter; divide in 3 parts; mix 2 eggs and 1½ cupfuls milk together; for the crust take 4 cupfuls flour, 1½ cupfuls lard or butter, 2 heaping teaspoonfuls baking powder, and salt to taste; mix with milk sufficient to make soft dough; divide in 3 parts and roll thin; put 1 layer of crust in a deep pie dish; cover it with sugar, then cinnamon, and a small piece of butter; wet with the mixture of milk and egg; save enough for the other 2 parts; lay the 2d and 3d crusts on, and do the same as with the 1st; there should be no crust on top; bake in a quick oven.

COCOANUT PIE.—1. 1 lb. grated cocoanut; ½ lb. butter; ½ lb. powdered sugar; 1 glass brandy; 2 teaspoonfuls lemon juice; 4 eggs, whites and yolks separated; 2 teaspoonfuls vanilla; rub the butter and sugar together; beat light with the brandy and lemon juice; stir in the beaten yolks; lastly the cocoanut and the whites alternately; bake in open shells; eat cold with powdered sugar sifted over it.—2. To 1 grated cocoanut add 3 large boiled and mashed potatoes; boil them fresh and pound them; add a little butter, milk and salt; mix the cocoanut and potatoes; add the yolks of 3 eggs well beaten; put in only an under crust; when the pie is baked, beat the whites of 3 eggs very light; add a little white sugar and put it on the top while hot.

CRANBERRY PIE.—Do not stew the berries, but slit each one with a knife; bake as usual; sift a little flour over the fruit to give a thicker consistence; add a small teacupful of water; bake this without an upper crust, or place strips of paste across.



Cranberry Pie.

CREAM PIE.—Bake a crust in a large pie pan; lift it out on a plate; for filling, take 1 pt. of very rich milk; boil ¾ of it; with the remaining ¼ stir 2 tablespoonfuls of corn starch; add to the boiling milk; stir all the time; then add ½ teacup of sugar; then the yolks of 2 eggs, well beaten and thinned with a little milk; remove from the fire; flavor with vanilla and nutmeg, and pour into the crust; whip the whites; add ½ teacup sugar; frost the pie; place in the oven to brown slightly; serve cold.

CREAM TARTLETS.—Make a short paste with 1 white and 3 yolks of eggs, 1 oz. of sugar, 1 oz. of butter, a pinch of salt, and flour; work it lightly; roll it out to the thickness of ¼ of an inch; line some patty pans with it; fill them with uncooked rice to keep their shape; bake them in a moderate oven till done. Remove the rice; fill the tartlets with jam, or with stewed fruit; on the top put a heaped-up spoonful of whipped cream.

CUSTARD PIE.—Line a well buttered pie plate with a good paste; arrange a thick pie rim round the edge of the plate; beat up 4 eggs with 1 cupful of sugar; gradually add 1½ pts. of milk; fill the pies while in the oven; grate a little nutmeg over them; bake about 20 minutes.

DRIED APPLE PIE.—Put in 2 or 3 pieces of lemon or orange peel, previously dried and saved for cooking purposes; flavor with a very little spice of any kind; sweeten and season before putting into the pie pan; stir in a beaten egg; bake with two crusts rolled thin, and warm slightly before eating.

GRAPE TART.—Take a tart dish; line the bottom and sides with a paste, and bake it; if the dish has been well greased, the crust will turn out easily of the same form. Make a syrup of ½ pt. of water and ¾ lb. of white sugar; bring it to the boil; have the grapes ready picked from the stalks and washed; put them into the hot syrup for ½ minute; allow all to cool in a bowl; when wanted, put the syrup and grapes into the crust wall and serve.

GREEN TOMATO PIE.—Select nice smooth ones; pare them very thin; slice them into a pie dish lined with a nice paste; put about ½ cup of sugar to a pie; a few bits of butter; a little flour sifted on; and sliced lemon, lemon essence, or nutmeg, for flavoring; put on the upper crust carefully so that the juice will not escape in baking.

JAM TURNOVERS.—Roll out some short paste about ⅛ in. thick; cut it in pieces about 4 in. in length, and between 2 and 3 in. in breadth. Lay on each a little apple jam, or any other preserved fruit, without syrup; turn the edges over; wet them as little as possible with water; press them lightly together, also the ends; lay them on tins; bake in a moderately hot oven; ice them very perfectly, and return them to the oven for a few minutes, or set them in a Dutch or American oven before the fire.

LEMON BUTTER TARTS.—1 lb. white sugar; whites of 6 eggs and yolks of 2; grated rind and juice of 3 lemons; cook 20 minutes over a slow fire, stirring all the time; line pans with puff paste; fill and bake.

LEMON CREAM PIE.—Boil 1½ pts. of milk; add 3 tablespoonfuls of corn starch dissolved in a little cold milk; return the milk to the fire; take the juice of 2 lemons, 4 eggs, 1 cupful of sugar, and 2 tablespoonfuls of butter; beat these ingredients together; add to the milk; flavor with 1 teaspoonful of extract of lemon and grated nutmeg; pour the mixture into the pies and bake; when done remove from the oven and set it aside; whip up the whites of 4 eggs to a froth; add gradually a cupful of powdered sugar; spread ⅔ of the mixture on the pie; put the other ⅓ into a cornucopia, and by squeezing it decorate the pie according to fancy; return it to the oven a few minutes to set the meringue.

LEMON PIE.—1. Boil in 1½ qts. of water, the juice, pulp, and grated peel of 2 lemons; when it boils, add 3 heaping tablespoonfuls of flour; mix smooth with cold water; before it cools add 2 teacupfuls of sugar, 3 well beaten eggs, a piece of butter half the size of an egg, and a little salt; this will keep all winter; bake with upper and under crusts.—2. Line your pie dish with a good crust; roll your lemons to soften

them; grate the rind of 1 large or 2 small lemons; cut the lemons in thin slices; pick out the seeds; spread evenly one layer over the crust; spread 1 cup of sugar over the lemon; add 1 cup of paste, made by taking 4 tablespoons of flour, wet with cold water the same as in making starch; turn boiling water on it; stir while cooking on the stove a few minutes; add a pinch of salt with the grated rind of the lemons; when thickened enough, pour it over the sugar and lemon; cover with a crust; cut slits in to let out the air; bake slowly.

MAIDS OF HONOR.—1 cup each of sour and sweet milk; 1 small cup of pounded white sugar candy; 1 tablespoonful of melted butter; the yolks of 4 eggs; the juice and rind of 1 lemon. Put both kinds of milk together in a double saucepan; let it become sufficiently heated to set the curd; strain off the milk; rub the curd through a strainer; add butter to the curd; also the sugar-candy, well-beaten eggs, and lemon; line the little pans with the richest of paste; fill with the mixture; bake until firm in the centre.

MAPLE SYRUP PIE. — Take 1 cup of thick maple syrup, and juice of 1 lemon (the rind grated); bake with under crust and narrow strips laid in a network over the top.

MINCE PIES.—1. Chop 1 lb. of beef suet very fine; 2 lbs. of apples pared, cored and minced; stoned raisins, 1 lb., minced; and 1 lb. currants; add of mixed spice, in powder, ½ oz., 1 lb. of powdered sugar, 1 teaspoonful of salt, the juice of ½ lemon; cut small 3 oz. of candied orange peel, 1 oz. of citron, and 1 oz. of lemon; mix all well together with ½ pt. brandy; tie down close in a jar, and keep for use. A large quantity may be made in these proportions. Make the pies with rich, flaky crusts.—2. 4 lbs. meat; 3 lbs. suet; 3 lbs. raisins; 3 lbs. currants; 1 lb. citron; 3 lbs. brown sugar; 1 pt. syrup or molasses; grated rind and juice of 8 lemons; 2 oz. ground cinnamon; 1 oz. of cloves; 1 oz. of nutmeg; boil the meat very tender; pick out all bits of fat and gristle; chop the suet fine; remove all strings and threads; mix thoroughly together; season with salt and black pepper; wash many times the currants; let them well dry; then add to the mixture; seed the raisins, and chop—not fine; add the syrup and spices; slice the citron thin; to 1 qt. of the above add 1 pt. of chopped apples; wet with sweet cider till the mixture is juicy; when ready to bake, take mince meat, just enough for the number of pies wanted; place it on the stove in a crock or jar and let it get heated through; taste and add whatever you think it needs; make rich pastry; place the mince meat in the pie, not too full; add some little bits of butter, a few whole raisins, and a few slices of citron; keep the mince meat well covered, and in a cool place.

MOCK APPLE PIE.—Take 1½ cupfuls of soda crackers, 1 cupful of water, 1 cupful of sugar, 1 teaspoonful of tartaric acid, and 1½ teaspoonfuls of soda; break the crackers fine; flavor with lemon, and bake with 2 rich crusts.

MOCK LEMON PIE.—1 cup of sugar; 1 heaping tablespoonful of flour; the yolks of 2 eggs; 1 teaspoonful of extract of lemon; ⅔ cup of stewed pie plant; mix the sugar, flour, eggs and extract together; pour on the water, then the pie plant; bake with one crust; when done, beat the whites to a stiff froth; spread it over the pie; set it back in the oven for 4 minutes.

MOLASSES LEMON PIE.—Peel and take the juice of 6 lemons; 4 cups molasses; 2 cups sugar; 4 tablespoonfuls flour; 2 cups water, boiling; take the peel of 3 of the lemons; put in cold water; set it on the fire till it comes to a boil; change the water 3 times; chop this peel with the pulp of the 6 lemons after they have been squeezed; put all together.

OPEN TARTS.—Make a nice paste of flour, lard and dripping; place it in a flat dish, cutting the edge round neatly and ornamenting it in a flat style; bake the paste before spreading on the preserve; when the preserve or marmalade is spread, lay ornamental bars of pastry prettily across it; place it for a few minutes more in the oven to heat.

ORANGE PIE.—1. Take the juice and grated rind of 1 orange; 1 small cup of sugar; yolks of 3 eggs; 1 tablespoon of corn starch, made smooth with milk; piece of butter as large as a chestnut, and 1 cup of milk; beat the whites of 3 eggs with sugar; place on the top after the pie is baked; leave in the oven until browned.—2. Grate the rind of a large, sweet orange; squeeze the juice and press off the pulp; pick out the seeds; cream, ½ cup, or butter; ½ cup of sugar; 1 egg beaten light; 1 tablespoon of flour rubbed smooth in ½ cup of water; stir in the orange, and bake with 2 crusts.

ORANGE TARTS.—Take 6 or 7 fine, large oranges; roll them under your hand on a table to increase the juice; squeeze them through a strainer over ½ lb. or more of crushed sugar; mix the orange juice and the sugar thoroughly together; break 12 eggs into a large, shallow pan and beat them till thick and smooth; stir in gradually the orange juice and sugar; line some patty pans with good puff paste, having first buttered them inside; then fill with the orange mixture; set them immediately into a brisk oven; bake the tarts a light brown; when done set them to cool; when quite cold, take them out of the patty pans; put them on a large dish and grate sugar over their tops.

PASTIES, PATTIES, or TARTS.—1. Rub a full ½ lb. of lard into 2 lbs. of flour; beat the whites of 2 eggs light; mix in 1 pt. of water; wet the flour; leave out some to work the crust with; take 1 lb. of butter; roll out the crust 4 times, each time putting in with a knife ½ of the butter; use flour freely when rolling out; cut it round; lay in your preserve or apple, which must be dry; turn over the paste to join a half circle; nip the edge with the thumb and forefinger to confine the preserve; dip the hand in water; pass it lightly over the paste; then sift sugar thick upon them; bake in a quick oven.—2. Roll out your dough to a thickness of ¼ in., and in a square shape; cut out the patties with a tin cutter, round or oval as wished; place them on a cake pan, which must not be too thin, and must be wetted with water; take 1 egg, well whipped, and a few drops of milk; with a brush color the tops, without touching the sides; then, with a

smaller tin cutter (half the size of the first), mark the patties, but not too deeply, in the centre, and push in an oven hot enough to roast a chicken; when cooked, take out the centres with a small pointed knife, and use them as covers.—3. Sift ½ lb. of flour; beat to a froth 3 eggs; add to it 3 tablespoonfuls of powdered sugar; take ¼ lb. of butter and mix all together, as for puff paste; roll and fold it alternately for 20 minutes; then roll it out into a circle ½ in. in thickness; trim the outside edge into an exact circle; crimp the outer edge; slip a tin plate under it; bake in a brisk oven; when well browned, take it out; when cool, spread it over with raspberry or strawberry jam, or stripe it with apricot and raspberry jam, put on in rows.

PEACH COBBLER.—Make a rich biscuit crust; put it, rolled thick, around the dish; put in a layer of peaches, then butter and sugar, and a very little flour; then peaches, and so on till the dish is full; cover with a thick crust; cut a slit in the centre; pour in boiling water till full; bake in a moderate oven.

PEACH CUSTARD PIE.—Use 1 crust; peel peaches and halve them; turn the hollow side upward; sweeten as you would a peach pie; take 1 egg, a pinch of salt, 1 tablespoonful of sugar; beat; add milk enough to cover the peaches; bake; eat when partly cool.

PEACH PIE.—Stew and sweeten your peaches; mash smooth; season with a very little nutmeg; stew with them a little lemon peel, and remove when cold; fill your crust and bake till just done; spread over the peaches a thick meringue, made by whipping to a stiff froth the whites of 3 eggs for each pie; sweeten with 1 tablespoonful of powdered sugar for each egg; flavor this with rose water or vanilla; beat until it will stand alone; cover the pie ¾ in. thick; set back in the oven until the meringue is well "set;" should it color too darkly, sift powdered sugar over it when cold; eat cold.

PRUNE PIES.—Take 1 lb. prunes and soak them over night, so that the stones will slip out easily; stew in some water with as many raisins as you wish; sweeten; use less water than for sauce; when both are soft grate in the rind of 2 lemons and fill the pie, allowing 2 crusts.

PUMPKIN PIE.—(See *Squash Pie.*)

QUINCE TART.—Take a few preserved quinces; put an equal weight of syrup, made with sugar and water and preserve, into a preserving pan; boil; skim; put in the fruit; when somewhat clear, place the quinces in a tart dish with puff paste as usual; cover; bake; when done, lift top gently; put in the syrup; ice it, and serve.

RAISIN PIE.—Take 1 lb. raisins; turn over them 1 qt. of boiling water; keep adding, so there will be 1 qt. when done; grate the rind of 1 lemon into 1 cup of sugar; add 3 tablespoonfuls of flour and 1 egg; mix well together; turn the raisins over the mixture, stirring the while.

RAISIN TURNOVERS.—1 cup of raisins chopped fine; butter the size of ½ egg; ½ cup sugar and a little nutmeg, with a very little water to mix the ingredients together; make the crust the same as for pies; roll out thin, and cut in small, square pieces; put a spoonful of the raisins in each square; wet the edges of the crust with water and fold one-half over on the other.

RASPBERRY TART.—Roll out some thin puff paste and lap it in a patty pan of what size you choose; put in raspberries; strew over them fine sugar; cover with a thin lid; then bake; cut it open; have ready the following mixture, warm; ½ pt. of cream, the yolks of 2 or 3 eggs well beaten, and a little sugar; when this is added to the tart, return it to the oven for 5 or 6 minutes.

RHUBARB PIES.—Take the tender stalks of the rhubarb; strip off the skin; cut the stalks into thin slices; line deep plates with pie crust; then put in the rhubarb, with a thick layer of sugar to each layer of rhubarb; add a little grated lemon peel; cover the pie with a crust; press it down tight round the edge of the plate; prick the crust with a fork; bake about 1 hour in a slow oven.

RHUBARB TARTLET.—Make a short paste with 1 white and 3 yolks of eggs, 1 oz. of sugar, 1 oz. of butter, a pinch of salt, and flour of sufficient quantity; work it lightly; roll it out to the thickness of ¼ in.; line some patty pans with it; fill them with uncooked rice to keep their shape; bake them in a moderate oven till done; remove the rice and fill the tartlets with rhubarb; stew with plenty of sugar and a dash of lemon juice; at the top put a heaped spoonful of whipped cream.

SILVER PIE.—Peel and grate 1 large white potato; the juice and grated rind of 1 lemon; the beaten white of 1 egg; 1 teacupful of white sugar; 1 of cold water; bake with only an under crust; when done, beat the whites of 3 eggs to a stiff froth; mix with 3 heaping tablespoonfuls of white sugar; spread this over the top of the pie; brown in the oven; when cold, lay a few pieces of jelly on the top.

SQUASH PIE.—1. Stew the squash or pumpkin with a little salt; rub it through a colander; have it perfectly smooth; mix the squash with sweet milk; if you have cream all the better; make it about as thick as batter; add the yolks of 2 eggs; sweeten with pulverized sugar to taste; line a pie dish with crust; fill with squash and bake for ½ hour.—2. Steam the squash or pumpkin over a pot of corn beef until it is well done; mash fine; add 2 eggs well beaten to each pie; add sugar; season with pepper, salt and ginger; thin with milk and cream mixed together, or milk alone; bake without top crust, quite brown.

STRAWBERRY TARTS.—Make some short paste with 2 oz. of sugar, 2 oz. of butter, the yolks of 4 eggs, a little water, a pinch of salt, and flour just enough; work it lightly and roll out to the thickness of ¼ in.; line some patty pans with it; fill them with uncooked rice to keep their shape; bake in a moderate oven till done; when brown remove the rice from each tartlet; fill it with strawberries which have been previously heated through in an oven in a covered dish, with sugar, but no water; serve cold.

SUGAR PIE.—1. ½ cup brown sugar; ½ cup butter; yolks of 3 eggs; nutmeg; bake; frost with whites of 3 eggs; ½ cup or more of white sugar; flavor with lemon; set in the oven to brown.—2. Flour; sugar; butter; 1 tablespoon-

ful vinegar; lemon, and warm water. Make a rich crust; line the bottom of the pie pan and sprinkle flour over the bottom of the crust until about ½ in. thick; same amount of sugar; mix this together thoroughly; add small lumps of butter; then the vinegar; flavor with lemon; lastly enough warm water to fill the pie pan over ½ full; stir carefully without breaking the crust; bake quickly.

SWEET POTATO PIE.—1. Boil the potatoes; peel and slice them; put a layer in the baking dish, either with or without pastry; dot it over with butter; sprinkle with sugar and a little allspice, or any other seasoning; proceed in this way until the dish is full; pour over the top milk or cream until the pieces are well soaked; bake slowly and regularly until done.—2. Wash the potatoes and boil them until they are cooked; take off the skins and mash them; to 1 large teacupful of the potato take 1 qt. of milk, 3 eggs, sugar to the taste, a pinch of ginger or a little nutmeg; before mixing all the milk with the potato, pour about 1 teacupful of the milk in the potato; rub them together until they will run through a colander; take out the lumps and woody fibres; bake with 1 crust; when done they should be light and soft like a pumpkin pie; if they are hard and heavy they have too much potato in them.

VINEGAR PIE.—4 eggs; ¼ lb. of butter; 2 cups molasses; 2 cups vinegar; 4 tablespoonfuls of flour; put your molasses, vinegar and butter into a porcelain or tin kettle; set it on the stove and let it come to a boil; after beating the eggs and flour together, stir in and boil 2 minutes; grate your nutmeg on the top of the pies and bake without tops.

WASHINGTON PIE.—1. Rub together 1 lb. butter and 1½ lbs. powdered sugar; add 1 pt. of eggs, a little at a time; beat up well; add ½ oz. soda dissolved in ½ pt. milk; flavor with extract lemon; stir up; add 2 lbs. flour and 1 oz. cream tartar; mix together; put on pans ¼ in. thick, and bake in a quick oven.—2. 1 cup of sugar; 1 tablespoonful of butter; 4 tablespoonfuls sweet milk; ½ teaspoonful of soda; 1 teaspoonful cream tartar; 1 cup flour; bake in 2 layers, with jelly, fruit or cream between.

WHIPPED CREAM PIE.—Sweeten 1 teacupful of very thick, sweet cream; make as cold as possible without freezing; line 2 small pie tins with moderately rich crusts, pricked in several places to prevent blistering, and bake in a quick oven; flavor the cold cream, and whip as you would eggs for frosting; when the crusts are cold, spread on the cream; put bits of jelly on top.

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SALADS.

ALLIGATOR PEAR.—Cut the pear in two; remove the large seed; cut away the outer rind; cut the fruit into strips, and season with a saltspoon of salt, 2 tablespoonfuls best olive oil, and 1 teaspoonful of tarragon vinegar.

ANCHOVY EGGS, With Endive.—Boil ½ doz. eggs quite hard; shell them carefully; then cut the white with a sharp knife carefully across the middle of the egg; take care not to break it; remove it like a case from the yolk; mix the yolk with a little anchovy sauce; form it again into a ball; replace it within the white; close the latter carefully; when the eggs are thus prepared place them in a pile upon a nest of endive, the points of the leaves toward the edge of the dish, which should be round.

BEAN.—Cover the bottom of your salad dish with cold boiled potatoes, sliced thin; over this spread a layer of cold baked (or boiled) beans; above this a layer of onions, sliced very thin; salt and pepper each layer; heat a piece of butter the size of a walnut in sufficient vinegar to cover the salad, and pour over it while hot.

BEEF.—Cut in very thin small slices and put on a dish with chopped parsley; mix in a bowl one part vinegar to two of sweet oil, pepper, salt and mustard; beat together and pour over the meat.

CABBAGE, or SLAW. — 1. Cut a head of hard white cabbage into very fine shavings; for a quart of cabbage take the yolks of 3 eggs; beat them well; stir into 1½ tumblers of vinegar, 2 spoons of loaf sugar, 1 teaspoon of olive oil, 1 of thick sweet cream, or a piece of butter as large as a walnut and a heaped tablespoon of mustard; salt and pepper to suit the taste; mix with the egg; put this sauce into a stewpan; when hot add the cabbage; stew until thoroughly hot, which will only require 4 or 5 minutes; toss it from the bottom with a silver or wooden fork; take it up and set it where it will become perfectly cold.—2. One small, firm head of cabbage, shred fine; 1 cup of vinegar; 1 tablespoonful of butter; 2 tablespoonfuls of sugar; 2 tablespoonfuls of sour cream; ½ teaspoonful of made mustard; 1 saltspoonful of pepper and the same of salt; put the vinegar and all the other ingredients for the dressing, except the cream, in a saucepan and heat to a boil; pour scalding hot over the cabbage; return to the saucepan and stir and toss until all is smoking again; take from the fire; stir in the cream; turn into a covered dish and set in hot water 10 minutes before sending it to the table.

CARROT.—Select very tender, rich colored carrots; scrape and boil in fast boiling water till tender; cut into very thin slices; put them into a glass salad bowl; sprinkle with sifted loaf sugar; add the juice of a large, fresh lemon, and 1 wineglassful of olive oil; place round the margin of the dish an onion cut in exceedingly thin slices, and small bunches of any fresh, green salad leaves.

CAULIFLOWER.—Boil a cauliflower in salted water till tender; when cold, cut it up neatly in small sprigs; beat together 3 tablespoonfuls of oil and 1 teaspoonful of tarragon vinegar; pepper and salt to taste; rub the dish very lightly with garlic; arrange the pieces of cauliflower on it; strew over them some capers, a little tarragon, chervil and parsley, all finely minced, and the least bit of dried thyme and marjoram;

pour the oil and vinegar over all, and serve.

CELERY.—Take the inner and tenderest heads of 3 stalks of celery; cut them into strips 1 in. long and about the thickness of young French beans; rub the salad bowl lightly with shallot; mix the yolks of 2 hard boiled eggs with 3 tablespoonfuls of salad oil, 1 of tarragon vinegar and a little flour of mustard; pepper and salt to taste; add the celery to this sauce; turn it well over; garnish with the hard boiled whites of eggs.

CHICKEN. — 1. Take the meat from a pair of boiled chickens; chicken, as well as celery, should be cut as large as a cranberry; have equal quantities of chopped chicken and celery; take a level teaspoonful of dry mustard and rub it very smooth with the yolks of 4 hard boiled eggs, and the yolks of 2 raw eggs; pour on very slowly ½ of a large bottle of salad oil, alternating with the juice of 1 large lemon, or 2 smaller ones; stir all the time; add a large tablespoonful of salt and 2 or 3 tablespoonfuls of rich cream; just before serving, mix the chicken well through the dressing; then add the celery.—2. One chicken chopped fine; 4 eggs, boiled hard and chopped or mashed fine; 2 tablespoons mixed mustard; ½ teaspoon cayenne pepper; ½ spoon salt; ½ teacup melted butter; ½ tumbler of vinegar; 1 teacup cabbage; and ½ cup celery chopped fine; mix well together.

CHICKEN MAYONNAISE.—Cut up some chickens and fry them nicely in butter; let them get cold; then trim into good shape; put them in a covered dish with salt, pepper, oil and vinegar as for salad; add a few pieces of onion and a little parsley; let them stand thus 2 or 3 hours; then drain the pieces of chicken; place them on the lettuce in your salad dish; spread a nice mayonnaise dressing over all.

CUCUMBER.—Peel and slice the cucumbers as thin as possible; put the slices in salted water 5 minutes; draw off the water; cover them with vinegar; a little pepper and salt if necessary.

FISH.- This consists of cold fish of any kind, mixed with well dried salad, pickled gherkins or any other green pickle; oysters or shrimps may be added to the other fish, which should be separated neatly into flakes, and the whole should be moistened with a salad cream; garnish with slices of lemon and some parsley.

FRENCH.—Any cold meat—veal, ham, beef or mutton; cut into small morsels, with an equal quantity of cold boiled potatoes, chopped or sliced; lettuce in proportion; dress with whites of 3 raw eggs, beaten stiff; mustard, oil or cream, well mixed with yolks of 3 eggs; add a little sugar, salt, pepper and vinegar carefully.

HAM.—Take the fragments of cold boiled ham left after slicing; remove all the dark and dry portions, also all the fat; mince evenly and fine; take enough rich, sweet cream to set the mince; a saltspoon of strong ground mustard; the same of fine sugar and a good pinch of cayenne pepper; mix thoroughly with the meat; garnish with sprigs of parsley.

HERRING.—Soak 4 Holland herrings in water or milk for 3 hours; then cut them up into neat, square pieces and set them aside; cut up into slices nearly 3 qts. of boiled potatoes while they are hot; pour over them Rhine wine enough to moisten them; cover close; when cold add the herrings and the yolks of 4 hard boiled eggs chopped fine; crush 1 doz. whole peppers in a napkin; add to the salad and mix.

LETTUCE.—Take a good sized head of lettuce and pull the leaves apart; wash them a moment in a little water; shake off the water and dry the leaves in a napkin by taking hold of the four corners and shaking it; examine them carefully; wipe off all grit; reject all bruised leaves; place them in a salad bowl large enough to dress them in nicely without scattering a part of them over the table; mix 1 saltspoonful of salt, 1 saltspoonful of fresh ground pepper, and a dust of cayenne with 1 tablespoonful of oil in a salad spoon; pour this over the lettuce; add 2 more tablespoonfuls of oil; next toss the salad lightly with a salad spoon and fork; add 1 tablespoonful of vinegar; toss it gently once or twice, and send to table; eat at once.

LOBSTER.—1. Plunge into boiling water 2 live lobsters; allow them to boil, say at least 30 minutes, according to their size; take the hearts of 6 heads of lettuce; boil 3 eggs hard; stone 24 olives; cut some beets into nice, even shapes; break off the shells of the lobsters; take out the solid flesh and cut into cubes; place in a deep dish and season with salt, pepper, oil and vinegar; wash the lettuce well; put it into a salad bowl; turn in the lobster; cover it with mayonnaise dressing, as directed for chicken salad.—2. Have the bowl half filled with any kind of salad herb desired; break a lobster in two; open the tail; extract the meat in one piece; break the claws; cut the meat of both in small slices, about ½ in. thick; arrange these tastefully on the salad; next take out all the soft part from the belly; mix it in a basin with 1 teaspoonful of salt, ½ do. of pepper, 4 do. of vinegar, and 4 do. of oil; stir these well together; pour the mixture on the salad; cover it with 2 hard eggs, cut into slices, and a few slices of cucumber.

ORANGE.—Oranges, thinly sliced and freed from seeds, dressed with lemon juice and salad oil—¼ of lemon juice to ¾ of oil, with a dust of cayenne pepper, make a good salad.

OYSTER.—Cut the oysters into thirds; pull the hearts out of nice lettuce heads, and shred up ½ as much as there are oysters; make a dressing in the proportion of 2 tablespoonfuls of best oil to 4 of vinegar; 1 teaspoonful of salt and the same of sugar; half as much pepper and made mustard; stir all up well, and pour over oysters and lettuce just before serving.

PARTRIDGE.—Carve a cold roasted partridge; place the members in a dish; add lettuce hearts in quarters, pickles, pieces of clear jelly, hard boiled yolks of eggs in slices, celery, tomatoes, or anything likely to give effect to the dish; pour over it a mayonnaise sauce, or add a salad dressing at table.

PEA.—Mix well together in the salad bowl 1 cup of shred lettuce, ½ cup tender shelled green peas, half grown, and 1 tablespoonful of finely cut nasturtium stems; with a silver spoon cut up ½ cup of rather ripe strawberries; mix well

with ½ cup of strawberry juice; pour it over the salad in the bowl; let it stand 15 minutes and serve.

POTATO.—Cut up 3 qts. of boiled potatoes, while hot, into neat pieces; add to them 1 tablespoonful of chopped parsley, 1 tablespoonful of chopped onion, 1 teaspoonful of pepper, and 1 of salt; add 1 cupful of oil, and mix; add 1 cupful of warm stock, 1 wineglassful of vinegar (from the mixed pickle bottle); mix the ingredients together carefully; do not break the potato any more than is absolutely necessary; set it in the ice box; when cold serve by placing a leaf of lettuce on a side dish; put 2 spoonfuls of the salad upon the lettuce.

RADISHES.—Let them lie in cold water before serving; cut off all their leaves, and almost all their stalk; serve them in glasses ½ full of water on a plate.

RUSSIAN.—Cut up raw apples and every kind of available vegetables into small slices; lay them into a shallow dish with salt, a little vinegar and pepper and the best oil; let the dressing thoroughly saturate the mixture for at least 12 hours.

SALMON.—If canned salmon be used, drain it dry and pick it into flakes with a silver fork; mince some celery and boiled beet root together in equal quantities; mix with salad dressing 1 hour before required; cut a crisp lettuce finely; add it the last thing; garnish with slices of hard boiled eggs.

SPINACH.—Take an equal quantity of young tender spinach and of lettuce leaves and chop 2 hard boiled eggs with them; dress with oil, vinegar, salt and pepper.

STRAWBERRY.—Pick, wash, drain and toss crisp, tender lettuce leaves; shred them up fine in a salad bowl; pour over them some strawberry juice and serve at once.

TOMATO.—1 can of tomatoes; same quantity of chopped celery; 3 eggs beaten light; season with salt and pepper; boil tomatoes and celery together until they are thick; take off the fire and stir in the eggs; when nearly cold add 1 tablespoonful of mixed English mustard.

TURNIP TOP.—Place a bushel of turnips in a dark, warm cellar to sprout; when the sprouts are 3 or 4 in. long cut them off; pick the leaves from the stems; pour hot water over them; let them remain in the hot water a moment; plunge them into cold water; place the sprouts in the colander to drain off all the water; send to table with a plain dressing or bacon dressing poured over them

VEAL.—Boil a nice lean piece of veal with a chicken or turkey; save the water in which they are boiled to make a soup; serve the fowl for dinner with egg or oyster sauce; when cold cut it up into neat strips; mix it with celery or lettuce; pour mayonnaise over it and serve.

WATER-CRESS.—1. Serve the cress with a sauce of lemon juice and olive oil poured over it in a salad bowl.—2. Pick out a quantity of nice sprigs of water-cress; turn them over in a mixture of 3 parts olive oil and 2 parts tarragon vinegar with salt, and serve in a bowl.

SOUPS.

REMARKS.—All soups are better made with fresh uncooked meat, as that which has been cooked once has lost much of its flavor and nearly all of its juices. The fat does not impart much flavor, and is not palatable. Soup may be kept until the next day; before it is heated over again skim off the cake of fat which congeals at the top. Soft water should always be used in making soups. To get the full value out of bones that are boiled for soup, break them into small pieces, roughly bruise, place them in an earthenware pot and cover with hot water. Boil the vegetables separately from the meat; strain both meat and vegetable water, and mince the vegetables before putting them with the strained liquors.

ASPARAGUS.—Take 50 stalks of asparagus; throw away the hard, woody part; boil the remainder in a saucepan with 3 pts. of stock free from fat; when done remove the asparagus; pound it in a mortar and pass it through a sieve; melt about 1½ oz. of butter in a saucepan on the fire; mix with it 2 tablespoonfuls of flour; add a little sugar, pepper, salt, the asparagus pulp, and all the stock in which the asparagus was boiled; let the whole boil up; add as much more stock as will make the soup of the right consistency; put in a little spinach greening, and a small pat of fresh butter, or stir in ½ gill of cream.

BARLEY.—Wash and steep 4 oz. of barley in 1 pt. of water, in which a little soda has been dissolved, for about 12 hours; when ready to prepare the soup, pour off all the water; place in a soup pot; add 3 qts. boiling water, 1 oz. of grated stale bread, ½ oz. salt, and 2 tablespoonfuls of chopped parsley; set the pot on the fire and boil it gently for 4 hours; keep it closely covered; when about to serve add a tablespoonful of good butter.

BEAN.—1 pt. of beans put to soak over night; in the morning put in a pot with 4 qts. of water, 3 lbs. of beef, 2 onions, 2 carrots, some parsley and celery tops; let it cook slowly all day, and stand over night to get cool; in the morning take off the fat and strain through a colander; put a pinch of cayenne pepper and salt, 2 hard boiled eggs chopped fine, a glass of sherry wine, ½ doz. forcemeat balls the size of a hickory nut, and a lemon cut thin, in the soup tureen; make the soup boiling hot; pour into the tureen and serve immediately.

BEEF.—Boil shank 4 or 5 hours in water enough to cover it; ½ hour before the soup is put on the table, take up the meat; thicken the soup with scorched flour, mixed with cold water; season with salt, pepper, cloves, mace, and a little walnut or tomato catsup; put in sweet herbs, or herb spirit if liked; make forcemeat balls of part of the beef and pork; season them with mace, cloves, pepper and salt; boil them in the soup 15 minutes.

BOUILLON.—Take a soup pot that will hold about 3 pts. of water; put in a fowl of about 4 lbs., a knuckle of veal, 3 lbs. of lean beef, any roast beef or beefsteak bone you may have; put it on the range; let it come to boiling very slowly; skim all the rising matter; add a carrot, 2 leeks, some celery, a few corns of white pepper, and some salt; move the pot where it will only cook very slowly, but steady, for 6 hours; strain it into a stone pot; let it cool; next day take off all the fat; heat the soup shortly before you want it; serve in cups with a slice of dry toast.

BROWN.—Take cold roast beef or fowl; cover it with cold water; let this simmer for 2 hours; take out the meat and strain the liquid; have chopped fine equal parts of celery root and cabbage; add to each quart of liquid 1 cupful, 2 tablespoonfuls of pearl barley, 1 tablespoonful of chopped parsley, 1 small carrot cut fine, 2 small potatoes sliced thin; let this boil ½ hour; add 1 well beaten egg and 2 tablespoonfuls of sweet milk thickened with browned flour; make this into small dumplings and drop in; boil 5 minutes more; when ready to serve, add 1 onion fried brown in butter, and 2 tablespoonfuls of tomato catsup.

CALF'S HEAD.—Parboil a calf's head; take off the skin and cut it into pieces of about 1½ in. square; mince the fleshy part into smaller pieces; take out the back part of the eyes, and cut the remainder into rings; skin the tongue; cut it into slices; turn the whole into 3 qts. of good stock; season with cayenne pepper, 2 or 3 blades of mace, and salt; add the peel of ½ lemon, ½ pt. white wine, and 1 doz. forcemeat balls; stew the whole for 1½ hours; rub down 2 tablespoonfuls of flour with a little cold water; mix it well with ½ pt. of the soup; then stir it into the pot; add the juice of ½ lemon and the yolks of 8 eggs hard boiled; let it simmer for 10 minutes, and serve in a turcen.

CELERY.—9 heads of celery; 1 teaspoonful of salt; nutmeg to taste; 1 lump of sugar; ½ pt. of strong stock; 1 pt. of cream; 2 qts. of boiling water; cut the celery into small pieces; throw it into the water; season with the nutmeg, salt and sugar; boil it till sufficiently tender; pass it through a sieve; add the stock and simmer it for ½ hour; put in the cream; bring it to the boiling point, and serve immediately.

CHICKEN.—Take a fowl and, having drawn it, scald the legs and remove the tough skin from them; cut up the fowl into small pieces, bones and all; put them into a saucepan with about 1 qt. water, 2 teaspoonfuls rice, a blade of mace, and pepper and salt to taste; boil very gently for 1 hour; remove all scum as it rises; take out the white meat; simmer the rest for 3 or 4 hours more; strain the liquor through a napkin; free it from fat, and serve.

CLAM.—To the liquor of 50 clams allow 3 qts. of water; put it on with a knuckle of veal, the bone chopped; simmer 3 hours; put in a bunch of sweet herbs, nutmeg, mace, and 1 tablespoonful of whole pepper; stew 1 hour longer; then strain, and add 4 oz. of butter rubbed in flour, and the clams chopped in pieces; boil ¼ hour, and serve.

CLEAR.—Put in a large saucepan 4 oz. of butter; when melted place in it 3 lbs. of lean, fresh beef and 3 lbs. of veal, cut in pieces, with the bones broken; cover the pan tightly and set over a quick fire; when the meat begins to stick to the pan turn it, and when a brown glaze begins to form cover the meat just evenly with cold water; watch carefully; when it is just coming to a boil, pour in 1 pt. of water and skim; add another pint of water and skim again; be careful not to stir up the soup; put in the soup, cut in small pieces, 4 large white onions, 2 large turnips, 2 good sized carrots, 3 heads of celery; add 2 qts. of water; place it where it will simmer steadily for 4 hours; then strain through a linen bag; do not put the meat and vegetables in, nor stir it; if not quite clear, beat up the whites of 2 fresh eggs; stir into it; return it to the fire until it just comes to a boil; then strain again.

CONSOMME.—6 lbs. of lean beef; an old fowl, with the giblets, and any pieces of bone that you may have; 2 large carrots, 2 large onions, 2 leeks, 1 turnip, 3 cloves; make a bouquet of parsley, celery and a very little bay leaf, thyme and hyssop, tied together with a thread; put the beef, fowl, etc., on the fire, in cold water, with a little salt; do not let it boil hard at any time, but be particularly careful that it does not boil much until it has been well skimmed, which must be done 2 or 3 times before it will be quite clear; boil slowly; keep the kettle covered from 6 to 8 hours; put the vegetables in as soon as it has been thoroughly skimmed; strain the soup and remove the grease; then serve.

CORN.—Cover the trimmings and bones from the shoulder of veal with 1 quart of cold water; add an onion, sliced, a small carrot or part of one, and some parsley; simmer for 2 hours and strain; boil very slowly a can of corn in a qt. of water; wash through a fine colander that will not allow the skins of the kernels to pass through; return the saucepan to the fire; melt in it a large tablespoonful of butter; and mix with 2 tablespoonfuls of flour; add, gradually stirring meanwhile, the corn pulp and then the veal stock; draw to the back of the range for fifteen minutes; first add a teaspoonful of finely minced parsley; put a small teacupful of hot milk or cream in the butter and pour in the soup.

COTTAGE.—Take 2 lbs. of lean beef, cut into small pieces, with ¼ lb. of bacon, 2 lbs. of mealy potatoes, 3 oz. rice, carrots, turnips and onions sliced, or leeks and cabbage; fry the meat, cabbage and onions in butter or dripping; put them in a gallon of water; stew gently over a slow fire for 3 hours; put in the carrots at the same time; add the turnips and rice only in time to allow of their being well done; mash the potatoes; pass them through a colander; season only with pepper and salt; keep the vessel closely covered.

CREAM OF BARLEY, A la Jardiniere.—Rub in the hands and wash a lb. of barley until the water comes clear; parboil, drain and put in a saucepan with 2 qts. of veal broth; boil, cover and simmer 4 hours; rub through a fine sieve; return to the saucepan; dilute to about 3 qts.

with more broth ; boil again ; skim ; put in a little sugar and a cup of cream ; tint slightly with 3 oz. of butter mingled with a little spinach green ; add cooked carrots, turnips, small flowers of cauliflowers and ½ pt. green peas ; boil no more, and serve.

CREAM OF RICE.—Have 1 qt. of rice ; wash it well ; put into a stewpan with 1 oz. of butter, a little salt and 2 qts. of boiled milk; grate in some nutmeg; set on the fire; heat slowly; stir occasionally ; when it boils, cover it; let it simmer gently for an hour; when done, pass through a fine wire sieve by rubbing vigorously with a wooden spoon; if the soup is not rich enough, put the residue back into the saucepan with a ladle of soup, and after standing some time steam again ; finish with ½ pt. of boiling cream, and 2 oz. of table butter; season ; serve with it fine lozenge shaped pieces of bread, fried in clarified butter.

CREAM.—Take a qt. of good mutton or veal stock ; cut an onion in quarters ; slice 3 potatoes very thin and put them into the stock, with a small piece of mace; boil gently for an hour, then strain ; add 1 pt. of rich milk with enough corn starch in it to make the soup almost as thick as cream; add also a piece of nice fresh butter ; just before serving add a little finely chopped parsley.

CURRY.—Cut the meat from an ox cheek; soak it well ; put it in a stewpan, with 4 onions cut in slices, and a bunch of pot-herbs; add 3 qts. of water; remove the scum frequently; strain ; add also ½ lb. of soaked rice; 1 teaspoonful of curry powder; a little pepper and salt ; stew 4 hours.

DAUPHINE. — Take ½ pt. of strong *consommé* of fowl; pour it gradually into a stewpan containing 8 yolks of eggs beaten up with a little salt, nutmeg and pepper; when the egg is well mixed with the *consommé*, strain it through a sieve into a round plain mould previously buttered carefully for that purpose; put the mold holding the preparation into a large stewpan containing water to the depth of about an inch ; cover the stewpan with the lid; let the water in it simmer, or gently boil on the corner of the stove fire; when the custard is set, take it out of the water; allow it time to cool; cut it into shapes resembling thick wafers; put these into 2 qts. strong *consommé* of fowl, together with 1 pt. of green asparagus heads, previously boiled for that purpose, a small piece of sugar, and a few tarragon leaves; allow the soup to boil very gently by the side of the stove fire for about 3 minutes, and then send to the table.

EEL.—Take any number of pounds of eels according to the quantity required; add two-thirds water; if about 3 or 4 pounds of eels, add 1 onion, a small quantity of mace, a little pepper whole, sweet herbs, a crust of the top side of bread; cover down close; stew till the fish separates; then strain; toast slices of bread deep brown, but not to burn ; cut into triangular pieces or squares a piece of carrot two inches long, cut into 4 slices lengthways ; put into a tureen with the toast, and pour the soup on; add boiling cream thickened with a little flour.

EGG BALLS, For Soup.—Boil 4 eggs 10 minutes ; drop into cold water; when cool remove the yolks; pound these in a mortar until reduced to a paste; then beat them with a teaspoonful of salt, a speck of pepper and the white of one raw egg; form in balls about the size of a walnut; roll in flour; fry in butter or chicken fat, being careful not to burn.

EGG.—The yolks of 2 eggs, a pt. of water, ½ oz. or so of butter, and sugar to taste; beat up together over a slow fire; add the water gradually ; when it begins to boil, pour backward and forward between the jug and saucepan till quite smooth and frothy.

FORCEMEAT BALLS, For Soup.—Soak the crumbs of ½ French roll in milk; squeeze it as dry as possible; put it into a stewpan with a piece of butter the size of a walnut; work it over the fire until it becomes stiff paste; add an egg, and continue stirring the paste until it is again dry; take it off the fire and thoroughly incorporate with it 2 oz. of pounded, potted or sausage meat; add a pinch of parsley, chopped very fine, and a few leaves of thyme; taste to see if it is highly seasoned; set aside until cold; flour your hands, and roll up as directed for egg balls; fry them quickly in a little butter until light brown.

FRENCH.—Clean nicely a sheep's head; put it in 4 quarts of boiling water, which reduce to 2 quarts; add 1 small cup of pearl barley, 6 large onions cut up fine, 1 sliced carrot, 1 sliced turnip, a few cloves, 1 bunch of sweet herbs, pepper, salt, a little catchup of any kind; cook one hour longer after adding these ingredients; strain all off; cut the head into pieces and serve in the soup.

GAME.—Break the bones of cold cooked game; cut the meat in pieces; boil the bones and meat in broth for an hour or more; thicken the soup with the yolks of eggs and with boiled cream ; season according to taste.

GRAHAM.—Three onions, 3 carrots, 3 turnips, 1 small cabbage; 1 bunch of celery ; and 1 pt. of stewed tomatoes; chop all the vegetables very finely ; set over the fire in 4 or 5 qts. of water; when thoroughly boiled, strain and add to the soup about 2 teaspoons of Graham flour wet in cold water ; a small piece of butter, pepper and salt; boil again about 20 minutes.

GROUSE.—In some good well seasoned stock, stew a brace of grouse until they are tender; take them up ; cut off the primest flesh ; beat this in a mortar until it is a smooth paste ; press it through a sieve ; simmer down the bones in the stock until the latter is well reduced; strain it into another saucepan; add the *purée*; give all a good warm up, but do not allow it to reach boiling point; serve it in a tureen into which you have put 2 glasses of port wine and 1 dessert-spoonful of beaten loaf sugar.

GUMBO, or OKRA.—One chicken, 2 slices of cooked ham, 3 large onions ; cut the chicken in pieces; slice the onions and put them and the ham into a skillet ; fry in a tablespoon of butter until brown; boil ½ gal. young okra and 1 qt. ripe tomatoes; put these in 3 qts. of water ; add ham, chicken and onions ; boil 4 hours ; season with pepper and salt.

HERB.—Slice 3 large but young cucumbers; a handful of spring onions and six lettuces; cut the last small; put into a stewpan 8 oz. of butter, and with it the above vegetables; when the butter has melted, cover; let it stand over a slow fire 1 hour and 20 minutes; add as much stock as may be required for the quantity of soup intended to be served; let it boil and simmer for 1 hour; thicken with flour and butter, or 3 tablespoonfuls of cream.

JULIENNE.—½ pt. each of carrots, turnips and onions; 2 or 3 leeks; ½ head of celery; 1 lettuce; a little sorrel and chervil; 2 oz. butter; 2 qts. of medium stock; cut the vegetables into strips about 1¼ in. long; be particular they are all the same size; cut the lettuce, sorrel and chervil into larger pieces; fry the carrots in the butter; pour the stock boiling to them; when this is done, add all the other vegetables; stew gently for nearly an hour; skim off all the fat; pour the soup over thin slices of bread cut round, about the size of a shilling, and serve.

LENTIL.—Take ½ lb. of lentils; pick, wash and set on the fire with cold water, just enough to cover; do not cook in an earthen pot, as they will not get soft; clean a head of celery and cut in quarters; cut up an onion very fine; put in both with the lentils; take 1½ lbs. of pork; ½ lb. of beef and 1 onion; have this chopped fine; put in a dish with 1 egg and some pepper and salt; mix this thoroughly and make a dumpling of it; put in the lentils and fill up with as much boiling water as you want soup; cut up a leek and some sprigs of celery; put in at the same time with the dumpling; after ½ hour put in 6 potatoes, peeled and cut in quarters; whenever the lentils get dry add boiling water; do not salt till they are soft; cook lentils 3 hours, dumpling 1 hour.

LOBSTER.—Parboil 2 lobsters; remove the flesh; skim the water carefully and keep it; when you have removed your lobsters, allow the water to remain on the fire so as to reduce it; take the lobsters and chop them fine; bray them in a mortar; put all back into the water save 2 tablespoonfuls, which retain for the making of balls; in the water and lobster place an onion, salt to taste, and white pepper with a bouquet of herbs and a teaspoonful of anchovy paste, or 1 anchovy beaten with the lobster will do; when the water is reduced somewhat, add to it 1 qt. of cream; stir frequently; remove the onion and bouquet of herbs, which make into balls with crumbs of stale bread, the yolk of 1 egg, your chopped lobster and mace; salt and pepper and a little flour; 5 minutes before serving put in the balls; serve very hot.

MACARONI. or VERMICELLI.—Throw 4 oz. of fine, fresh, mellow macaroni (or vermicelli) into a pan of fast boiling water, with about 1 oz. of fresh butter, and a small onion stuck with 3 or 4 cloves; when it has swelled to its full size, and become tender, drain it well; cut it into 2 in. lengths; slip it into 2 qts. of clear gravy soup; let it simmer for a few minutes, when it will be ready for table; serve with grated Parmesan cheese.

MILK.—Wash, pare, slice and parboil 1 lb. of potatoes; pour away the water; skin and scald 2 onions; chop them; place the potatoes, onions, 1 teaspoonful of salt, and ½ teaspoonful of pepper in a stewpan, with 1 qt. of cold water; bring to a boil, and boil till quite soft; crush the potatoes and onions with a spoon till smooth; add 1 qt. of new milk and 1 oz. of crushed sago; stir continually till it boils; then boil for ten minutes; add the beaten yolks of 2 eggs, gradually.

MOCK TURTLE.—1. Take ½ a calf's head, ¼ lb. of butter, ¼ lb. of lean ham, 2 tablespoonfuls of minced parsley, a little minced lemon thyme, a little sweet marjoram and basil, 2 onions, a few chopped mushrooms, 2 shallots, 2 tablespoonfuls of flour, 1½ dozen of forcemeat balls about the size of a nutmeg, and cayenne and salt to suit your taste; the juice of 1 lemon, a Seville orange, 1 dessertspoonful of pounded sugar, and 3 qts. of best stock.—2. Take some stock made from bones or the liquor in which meat has been boiled; boil it with fresh vegetables, herbs and spices till it is pleasantly flavored, and strain carefully; procure a tin of mock turtle soup; boil this up with a little more than an equal quantity of the flavored stock; when it is quite hot throw a claretglassful of Madeira or good sherry into it, and serve very hot with 1 or 2 cut lemons on a dish; the mixture of the stock made from fresh vegetables, with the preserved soup, will correct the slight taste of the tin, which is the only objection which can be urged against it; and when a small quantity only of soup is required it will save time, trouble and expense to make it in this way, rather than to prepare it at home; when there is no stock in the house, the vegetables and seasoning may be boiled in water, but of course the soup will not be so good as if stock were used; time, 1 hour to flavor the stock.

MUTTON.—Take a shoulder of good heavy mutton, weighing about 4 lbs.; remove the skin and fat; put it in about 4 qts. of cold water; let it simmer for 2 hours; boil 1 yellow turnip, and 1 medium sized carrot 1 hour; also 4 potatoes, 2 bulbs of soup celery, ½ hour; when cooked put them in cold water; peel and chop fine; remove the meat; add the vegetables and 1 cup of boiled rice or barley; let the soup simmer 10 minutes more; add 1 tablespoonful of chopped onion and 1 of parsley; let it cook 10 minutes more.

NOODLE.—Break 2 eggs into a bowl; beat until light; add a pinch of salt; work in flour with the hand until you have a very stiff dough; turn it out on the molding board; work until it is smooth as glass; pinch off a piece the size of a walnut; roll it as thin as paper; with a sharp knife cut off very narrow strips; proceed in the same way until all the dough is cut; have prepared some good veal, chicken, or any other kind of broth, well seasoned, ½ hour before dinner is served; drop in the noodles; be sure the soup is boiling; add a little parsley.

ONION.—Take 3 large onions; slice them very thin; fry to a light brown in a large spoonful of either butter or stock fat, the latter answering equally as well; when brown, add ½ teacupful of flour; stir constantly until red; pour in slowly 1 pt. of boiling water; stir steadily until it is all

in; boil and mash 4 fine large potatoes; stir into 1 qt. of boiling milk; take care that there are no lumps; add this to the fried onions, with 1 teaspoonful of salt and ½ teaspoonful of white pepper; let all boil for 5 minutes; then serve with toasted or fried bread.

OX TAIL.—3 ox tails; cut them through the joints; wash carefully and dry with a towel; heat 2 oz. of clarified drippings and brown the ox tails with a finely chopped onion; add 1 heaping tablespoonful of flour; rub gradually in through the sifter and brown; put the ox tail, onion and browned flour with 3 qts. of cold water in the soup pot; 1 carrot cut in inch slices; 1 turnip cut in the same way; 2 or 3 pieces of celery cut up; 4 bay leaves; the same of sage, and 1 sprig of thyme; ½ doz. allspice; 4 cloves; 1 tablespoonful of salt; a pinch of cayenne pepper, and ½ saltspoonful of white pepper; let it come to a boil; put the pot back; cover it on the stove to simmer steadily for 3 hours; just before serving, add 1 tablespoonful of finely chopped parsley, and take out the herbs and spices.

OYSTER.—Strain the liquor from 2 qts. of oysters; put the liquor on the back of the stove in a farina kettle; pick over the oysters carefully; remove every particle of shell; if possible, do this without washing them; heat 3 pts. of rich milk, or, if you have it, half that quantity of milk, the other half rich cream; season with salt, pepper and, if liked, a little mace; rub together 3 oz. of butter with 1½ oz. of flour, corn starch or farina; stir this into the milk when scalding hot; as soon as it begins to thicken add the liquor from the oysters, which must not boil; stir well and add the drained oysters; as soon as they puff out and the edges are "curled" or "ruffled" they are done.

PEA.—Wash well 1 qt. of good split peas; float off such as remain on the surface of the water; soak them for 1 night; boil them with a bit of soda the size of a filbert, in just sufficient water to allow them to break to a mash; put them into from 3 to 4 qts. of good beef broth; stew them in it gently for 1 hour; work the whole through a sieve; heat afresh as much as may be required for table; season it with salt, cayenne or common pepper; clear it perfectly from scum; send it to table with fried or toasted bread; add celery sliced and stewed in it.

PEPPER POT.—Put 4 cows' feet and 4 lbs. of tripe to boil with water to cover them, and a little salt; when simmered to pieces take them out and skim and strain the liquor; cut up the tripe; put it in the pot and pour the liquor over it; add sliced onions and potatoes and herbs, also small dumplings made with flour and butter; season with pepper and salt; add a little butter rolled in flour; when done, serve in a tureen.

POTATO.—Pare and chop fine 6 good sized potatoes; put them into a soup "digester" or kettle with 3 pts. of water; boil until just tender, not soft; season with pepper and salt; just before ready to serve break into the soup 3 or 4 raw eggs; stir briskly to break the eggs before they are cooked; serve hot and immediately after the eggs are well stirred in.

PUMPKIN.—For 6 persons use 3 lbs. of pumpkin; take off the rind; cut it in pieces and put it in a saucepan with a little salt and cover with water; let it boil until it is soft; pass through a colander; it must have no water in it; put about 3 pts. of milk in a casserole; add the strained pumpkin and let it come to a boil; add a very little white sugar, some salt and pepper.

RABBIT.—Take 2 full grown or 3 young rabbits; cut them into joints; flour and fry them lightly; add to them 3 onions of moderate size, also fried to a clear brown; on these pour gradually 7 pts. of boiling water; throw in 1 large teaspoonful of salt; clear off all the scum carefully as it rises; put to the soup a bunch of parsley, 4 medium sized carrots, and 1 small teaspoonful of peppercorns; boil the whole very gently for 5 or 5½ hours; add more salt if needed; strain off the soup; let it cool sufficiently for the fat to be skimmed clear from it; heat it afresh; send it to table with sippets of fried bread; add a thickening of rice flour or of wheaten flour browned in the oven and mixed with a spoonful or two of ketchup.

RICE.—Pick and wash a handful of rice; boil in salt water till the grains just burst; drain the water off; leave the saucepan at the side of the fire; cover with a damp cloth; at the time of serving, put as much rice as is wanted into the saucepan in which the soup is being made hot; as soon as it boils send it up to table.

SAGO.—Take 3 lbs. of lean beef, and a slice of lean ham; lay in a stewpan with a lump of butter; draw the gravy gently; add 2 qts. of water, and a sliced onion which has been browned by frying in fresh butter; also add a bunch of sweet herbs, 6 cloves, 1 blade of mace, 1 teaspoonful of allspice, and 1 of black pepper whole; stew until the soup is rich and brown; remove the meat, and strain the soup clear; put it into a clean stewpan; thicken it to a good consistency with sago.

SCOTCH.—Take 4 lbs. of mutton; add 1 gal. of water, 1 teacupful of pearl barley, 2 carrots sliced, 2 turnips sliced, 2 onions cut small, 3 carrots grated, the white part of a large cabbage chopped very small, and a small quantity of parsley; season with salt and pepper; let this boil very gently for 3½ hours.

SCOTCH SAGO CREAM.—Make a strong stock by boiling an old fowl till all the strength is taken from the meat; while boiling, add some whole white pepper and a small piece of mace; strain and skim the stock; set it away to cool; when quite cold remove every particle of fat that has risen and hardened on top; for every 2 qts. of stock take 3 oz. sago or tapioca; wash in hot water; boil it in the stock 1 hour; break the yolks of 2 eggs in a basin; add to them ½ pt. of cream or milk; beat them together; while beating pour in gradually a little of the hot stock; turn all back into the stock or soup; let it heat after putting in the cold milk till just up to the boiling point; take care it does not boil, lest the soup curdle; dish and send to table.

STOCK.—In making soups from raw meats break the bones apart; place them in a pot; cover them with cold water; boil slowly for 5 or 6 hours; add salt to quicken the rising of the

scum, **which should be thoroughly** removed; cut up 3 carrots, 3 turnips, 2 heads of celery, and 2 onions; add to the stock, together with 6 or 8 cloves, a bouquet of herbs, and a teaspoonful of whole peppers; strain into a deep saucepan; clarify with white of egg.

TOMATO.— 1 qt. tomatoes; 3 pts. of boiling water; 1 even teaspoonful soda; pepper and salt; butter the size of an egg; 1 small onion, minced; 1 qt. of milk; put the tomatoes and onion over the fire with the hot water; strain and rub through a colander; boil the milk; stir in soda and butter; after one boil keep hot; put pepper and salt with the tomatoes; simmer 5 minutes; then stir in milk; serve at once.

TURKEY.—Put all the bones, the scraps of meat, and the dressing of the turkey in a kettle with enough water to cover them; let it boil for 2 hours; when nearly done add the tops of some celery chopped fine, and a teaspoonful of curry powder; when it is done strain and set on the table hot.

TURTLE.—3 or 4 green onions, a bunch of seasoning herbs, a sprig of basil, cayenne pepper and salt, 1 qt. very strong veal broth, 1 lb. of butter, flour, lemon juice, and Madeira wine; cut up the entrails; let the bones and other parts intended for the soup stew 6 hours with the onions and seasoning, chopped small; pepper, salt and cayenne to taste, and water enough; add the liquor in which the fins are boiled tender to the veal broth; put in the butter, rubbed down with as much flour as will sufficiently thicken the soup; stir it over the fire for ten minutes; add lemon juice and Madeira according to quantity; cut the green fat into pieces an inch and a half square and simmer in the soup one hour; serve forcemeat balls and the eggs in the soup; make these of the vealy part of the turtle minced fine with ½ a beaten anchovy, a piece of celery boiled tender, and the yolk of a hard-boiled egg; mix them well up with 2 tablespoonfuls of bread crumbs; season with cayenne pepper, more salt and white pepper; moisten with a little oyster liquor, a lump of butter warmed, and well beaten egg; roll them into balls and fry in butter.

VEGETABLE.—3 onions, 3 carrots, 3 turnips, 1 small cabbage, 1 pt. of tomatoes; chop all the vegetables, except the tomatoes, very fine; have ready in a porcelain kettle 3 qts. of boiling water; put in all except the cabbage and tomatoes; simmer for ½ hour; add the chopped cabbage and the stewed tomatoes; also a bunch of sweet herbs; let the soup boil for 20 minutes; strain through a sieve; rub all the vegetables through; take 2 tablespoonfuls of best butter and one of flour; beat them to cream; salt and pepper your soup to taste; add a teaspoonful of white sugar, and ½ cup cream if you have it; lastly, stir in the butter and flour; let it boil up, and it is ready for the table; serve with fried bread chips.

VENISON.—3 lbs. venison; 1 lb. corned ham or salt pork; 1 onion; 1 head of celery; cut up the meat; chop the vegetables and put on with just enough water to cover them; keep on the lid of the pot all the while; stew slowly for 1 hour; add 2 qts. of boiling water, with a few blades of mace and a doz. whole peppers; or, should you prefer, a little cayenne; boil 2 hours longer; salt and strain; return the liquor to the pot; stir in a tablespoonful of butter; thicken with a tablespoonful of browned flour wet into a smooth thin paste with cold water; add a tablespoonful of walnut or mushroom catsup, a tablespoonful of Worcestershire sauce, and a generous glass of Madeira or brown sherry.

VEGETABLES.

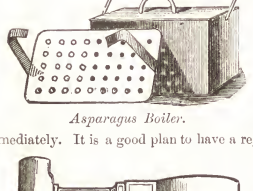
REMARKS.—Green vegetables should be thoroughly washed in cold water, and then dropped into water which has been salted and is beginning to boil. Use a tablespoonful salt for every 2 qts. of water. A great deal depends on the time vegetables are allowed to boil, and this depends upon the age of the vegetables. The following is a good table: Potatoes, boil, 30 minutes; bake, 45 minutes. Sweet potatoes, boil, 46 minutes; bake, 60 minutes. Squash, boil, 25 minutes; bake, 45 minutes. Green peas, boil, from 20 to 45 minutes. Shelled beans, boil, 60 minutes. String beans, boil, 1 to 2 hours. Asparagus, 15 to 30 minutes. Tomatoes, fresh, 1 hour; canned, ½ hour. Cabbage, ¾ to 2 hours. Beet greens, 1 hour. Onions, 1 to 2 hours. Beets, 1 to 2 hours. Turnips, white, 45 to 60 minutes; yellow, 1½ to 2 hours. Parsnips, 1 to 2 hours. Carrots, 1 to 2 hours. Nearly all these vegetables are dressed with salt, pepper and butter, but sometimes a small piece of lean pork boiled with them seasons them sufficiently. Put a lump of charcoal in the pot when either cabbage, onions or strongly flavored meat is being boiled, to prevent the scent from penetrating the house.

ARTICHOKES. Boiled.—1. Parboil the artichokes; remove the middle leaves; pare the choke; stuff the centre with forcemeat; put them in an oven until the meat is well done; serve up with melted butter.—2. Peel the artichokes; throw each root into cold water and vinegar immediately, to preserve the color; put them into boiling water, with a little salt, until sufficiently tender for a fork to pass through them easily; pile them on a dish; serve as hot as possible with melted butter or white sauce poured over.

ARTICHOKES, Fried.—Take boiled artichokes; when they are almost cold, dip them into beaten egg; roll them in sifted bread crumbs; fry them in plenty of butter till they are a nice brown; serve decorated with parsley.

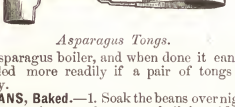
ASPARAGUS.—Scrape the lower part of the stalks; cut them of equal length; tie in small bunches, arranging the heads all one way; put these into boiling water with a little salt; use only sufficient water to cover; boil rapidly until tender; moisten some thin slices of toast in the asparagus liquor; butter and arrange them on a hot platter; over these put the asparagus, re-

move the strings and sprinkle the top with pepper; pour some melted butter over all and serve



Asparagus Boiler.

immediately. It is a good plan to have a regular asparagus boiler, and when done it can be handled more readily if a pair of tongs are handy.



Asparagus Tongs.

BEANS, Baked.—1. Soak the beans over night; in the morning put them on to boil in cold water, having first strained them; when boiled tender skim them out into your baking dish; stir in butter the size of an egg, a little salt and a tablespoonful of molasses; turn a cupful of rich milk over them, or enough to cover them. 2. Wash 1 qt. of beans thoroughly; cover them with cold water; let them soak over night; change the water in the morning once or twice; put them in a pot and simmer slowly for 3 hours, until they begin to crack open; pour them into a colander to drain off all the water; heat an earthen bean pot with hot water; wipe it dry; place a small piece of pork on the bottom of the pot and pour in the beans; cut the rind of another piece of pork into strips; sink it into the beans; leave only the rind of the pork exposed at the top; dissolve 1 tablespoonful of New Orleans molasses with 1 teaspoonful of salt in a pint of warm water; add it to the pot; set it in the oven and bake slowly for 3 or 4 hours; or place the pot in a baker's oven over night, instructing the baker to add a little water to the pot should the beans become dry.

BEANS, LIMA.—1. Boil in water in which a lump of butter has been placed; preserve them as white as you can; chop a few sweet herbs with some parsley very fine; stew them in a pint of the water in which the leaves have been boiled; to which add ½ pt. of cream; stew until quite tender; add the beans; stew 5 minutes, thickening with butter and flour.—2. 1 peck of beans; ½ gal. of water; 1 large spoonful of salt; shell the beans; put them into a saucepan of boiling salt and water; boil them quickly as above directed; when done, drain them; serve with parsley and butter in a separate tureen.

BEANS, String.—Cut off the tops and bottoms of the beans; remove the strings from each side; divide each bean into 3 or 4 pieces, cutting them lengthwise; as they are cut put them into cold water with a little salt; drain the beans; put them into a saucepan of boiling water; boil quickly with the saucepan uncovered; as soon as they are done drain them into a colander; dish and serve with a small piece of butter stirred into them.

BEETS, Boiled.—Wash, but do not cut them; put them on to boil in a sufficiency of water; let them boil from 2 to 3 hours, or until they are perfectly tender; take them up; peel and slice them; pour vinegar or melted butter over them.

BEETS, Stewed.—Wash 2 or 3 large beets without breaking the skin or removing the top-stalks or roots; boil them an hour in boiling water and salt; peel and slice them; stew them an hour in the following sauce: Mix together in a saucepan over the fire 1 tablespoonful each of butter, flour and vinegar; gradually stir in a pt. of boiling water; season the sauce with a saltspoonful of salt and ½ saltspoonful of pepper.

BEET TOPS.—Treat in the same way as spinach, but boil for ½ hour instead of 10 minutes; garnish with slices cut from the roots of large red and white beets, and season plentifully with pepper.

BROCCOLI.—2 or 3 heads of broccoli; 2 qts. of water; a little salt; strip off the dead outside leaves; cut the inside ones even with the flower; cut off the stalk close; put them into cold salt and water for an hour to cleanse from insects; put them into a large saucepan of boiling salt and water; boil quickly with the saucepan uncovered; when tender, take them carefully out; drain them dry; serve them with a little melted butter poured over them, and some in a separate tureen.

BRUSSELS SPROUTS.—Trim neatly and wash them; put them to boil in plenty of salted water; when almost done, strain them and dry them in a cloth; put them in a saucepan with a large piece of butter, pepper, salt and grated nutmeg to taste; toss them gently on the fire until they are quite cooked.

CABBAGE, Baked.—Boil a firm white cabbage for 15 minutes; change the water for more that is boiling; boil until tender; drain and set aside until cold; chop fine and add salt and pepper; 1 tablespoonful of butter; 2 eggs well beaten; 3 tablespoonfuls of rich milk or cream; mix well; bake in a buttered pudding dish in a moderate oven till brown; serve hot.

CABBAGE, Boiled.—Strip off the outside leaves; cut in quarters; lay for 1 hour in cold water; cover with boiling water and cook 15 minutes; turn off the water; cover with fresh boiling water; cook till tender, perhaps 1 hour; drain well; chop and stir in a tablespoonful of butter, pepper and salt; serve hot.

CABBAGE, Stuffed.—Take a large, fresh cabbage and cut out the heart; fill the place with stuffings made of cooked chickens or veal, chopped very fine and highly seasoned, rolled into balls with yolk of egg; tie the cabbage firmly together and boil in a covered kettle for 2 hours.

CARROT FRITTERS.—Beat 2 small boiled carrots to a pulp with a spoon; add 3 or 4 eggs and ½ handful of flour; moisten with cream, milk or a little white wine; sweeten to taste; beat all well together; fry in boiling lard; when

of a good color, take them off and serve; squeeze over them the juice of an orange, and strew them over with finely sifted sugar.

CARROTS, Mashed.—Wash, scrape and soak them in cold water for 1 hour; cook tender in boiling salted water; drain, mash and beat in a generous piece of butter; season to taste with salt; arrange them in a dish; sprinkle pepper over the top and serve hot.

CARROTS, Stewed.—Scrape and wash them thoroughly; boil in water which has a little salt in it, until they are quite tender; take them out and drain them over a hair sieve or colander; dissolve ½ lb. butter in a saucepan; add to it ½ teacupful of veal stock, and the same quantity of cream; stir in by degrees a tablespoonful of fine flour, seasoned with cayenne pepper and salt; stir these ingredients around to keep the flour from forming into lumps; put the carrots into this sauce; let them stew in it, at the side of the fire, from 7 to 10 minutes; serve in a vegetable dish.

CARROTS, With Cream.—Take a quantity of the smallest new carrots that can be obtained; boil them in salted water; when done, drain off the water; melt 1 oz. of butter in a saucepan; add to it a dessertspoonful of flour, pepper, salt, grated nutmeg, a pinch of powdered sugar and a small quantity of cream; put in the carrots; simmer gently a few minutes and serve.

CAULIFLOWER, Boiled.—Cut the stalk close to the bottom; pare away the tops of the leaves, leaving a circle of shortened leaf-stalks all around; put the cauliflower head downwards into a little vinegar and water for ½ hour; put it into a pan of boiling water or milk and water, with a tablespoonful of salt in it; remove the scum carefully as it rises or the cauliflower will be discolored; boil till tender; drain and serve; put a lump of butter the size of an egg into a saucepan with a cupful of cold water; add gradually 1 teaspoonful of flour; mix smoothly; boil and strain over the vegetable.

CAULIFLOWER, Scalloped.—Boil until tender; clip into neat clusters; pack the stem downward into a buttered puading dish; beat up a cupful of bread crumbs to a soft paste with 2 tablespoonfuls of melted butter and 6 of cream; season with pepper and salt; bind with a beaten egg; with this cover the cauliflower; cover the dish closely; bake 6 minutes in a quick oven; brown in 5 more; serve very hot in the dish in which they were baked.

CELERY FRITTERS.—Boil some thick but tender stalks of celery in salted water; when done dry them in a cloth; cut them in equal lengths about 1½ in.; dip them in a batter; fry to a golden color; sprinkle fine salt well over and serve.

CELERY, Stewed.—Break apart and wash very carefully 3 heads of good celery; cut off the green portions and leave the outside stalks to season soups; cut the celery into pieces 1 in. long; put just enough boiling water on to cover them; add salt to the water before putting in the celery; boil slowly; when tender, drain and place neatly on a vegetable dish; sprinkle over it some black pepper; pour off part of the water, but save it, in case of need, till the stew is completed; wet into a smooth paste a teaspoonful of corn starch; add the same quantity of flour, 2 tablespoonfuls of butter and the same of rich cream; stir this into the water, over the fire, till it thickens; then pour over the celery; if too thick add some of the water left over; if too thin use more corn starch, after making it into a thin paste.

COLCANNON.—Chop fine a whole cold boiled cabbage; mix it up thoroughly with 1 qt. well boiled potatoes; have a pan hot and put in it a tablespoonful of butter or good drippings; then put in the cabbage and potatoes, a saltspoonful of black pepper and a light pinch of cayenne.

CORN, Boiled.—Strip the ears; pick off the silk; put them in a pot of water with a little salt; boil ½ an hour; when done, cut off the corn from the cob, season it with butter, pepper and more salt if necessary, or serve on the ear.

CORN FRITTERS.—To the beaten yolks of 3 eggs add a teacup of milk; 1 pt. of boiled green corn grated; a little salt and as much flour as will form a batter thick enough to drop from a spoon; beat the whole very hard; stir in the beaten whites of the egg; drop the batter a spoonful at a time into hot lard.

CORN OYSTERS.—6 ears of sweet corn; with a sharp knife split each row of the corn in the centre of the kernel lengthwise; scrape out all the pulp and add to it 1 egg, well beaten, a little salt, 1 tablespoonful of sweet milk and flour enough to make a pretty stiff batter; drop in hot lard; fry a delicate brown; if the corn is quite young, omit the milk; use as little flour as possible.

CORN, Stewed.—Stew 1 qt. of canned corn in its own liquor; set the vessel containing it in an outer one of hot water; should the corn be very dry, add a little cold water; when tender, pour in enough milk to cover the corn; bring to a boil; put in a tablespoonful of butter rolled in flour; salt to taste; stew gently; stir well 3 or 4 minutes; turn into a deep dish; keep the vessel containing the corn closely covered while cooking.

CUCUMBERS, Fried.—Pare the cucumber; lay in ice ½ hour; cut it lengthwise and lay in ice water a few minutes longer; wipe it dry; sprinkle with pepper and salt; dredge it with flour; fry in lard to a light brown.

CUCUMBERS, Stewed.—Peel and quarter 2 cucumbers lengthwise; put them in a saucepan; add 1 teaspoonful of salt and 1 doz. whole peppers; when tender take them out; place them on toast, the edges of which have been dipped in water used in stewing; pour drawn butter over them, well seasoned with cayenne pepper, and serve.

DANDELION. — Gather a quantity of fresh dandelion; pick off all the withered tips and hard parts; shred them into strips; wash them free from grit; put the dandelion into a stewpan with a strip of bacon; add 1 tablespoonful of vinegar; cover it with a small quantity of boiling water; stew until tender; mash with a wooden spoon; stir in a lump of butter; flavor with pepper and salt; serve like spinach; or, it may be garnished either with hard-boiled eggs, sippets of fried bread, or slices of boiled carrot.

EGG-PLANT, Baked.—Boil a large egg-plant in plenty of water until it is perfectly tender, trying it with a straw; let it stand in the colander to drain until cold; then peel; cut it open, and take out the seed; mash carefully with a gill of milk, 2 eggs, a dessertspoonful of salt, a salt-poonful of white pepper, ½ grated nutmeg, a heaping tablespoonful of butter, and 2 table-poonfuls of very fine bread crumbs; bake ¾ hour in a quick oven; a slow oven spoils it.

EGG-PLANT, Fried.—Peel carefully; cut in slices ½ of an inch thick; put the slices in lightly-salted water; allow to remain for 2 hours; dry perfectly before cooking; take 2 eggs and mix cold in a pint of milk; have dried bread crumbs or powdered crackers; dip the egg-plant in the milk and egg; then into the bread or cracker crumbs; have in your frying-pan a piece of butter; when it is very hot, put in your slices and cook thoroughly.

EGG-PLANT, Stuffed.—Cut 2 egg plants in two lengthwise; slash the inner surfaces with the point of a knife, making a shallow incision; fry till they are soft, and drain on a cloth; prepare in a saucepan 2 oz. of butter, 2 oz. of fat salt pork chopped fine and 2 or 3 chopped shallots; cook a few minutes; add a pint of mushrooms, a little parsley, and 3 anchovies, all chopped fine; mix the fleshy parts of the egg plant with this; season to taste; put the stuffing thus made, back into the plants, with bread and cheese crumbs and little pieces of butter strewed on the top, and bake 20 minutes.

HORSERADISH, Boiled.—Cut each root into pieces 2 in. in length; then each piece into quarters; boil in water containing a little salt and 1 tablespoonful of vinegar; when tender, drain; place the strips on a napkin; send to table with drawn butter.

LEEKS, Boiled.—Wash them carefully; cut away all the green; slit each almost in two; tie them in bunches; boil them for 20 minutes in salted water; drain them, and serve upon moistened toast, and with any sauce preferred.

LEEKS, Fried.—Wash them thoroughly; cut away all the green; slice the white tender part as thin as possible; make a good deal of butter hot in a frying pan; put in the leeks; continue stirring till they are nicely browned; drain off the superfluous fat; add rasped bread crumbs, and serve.

LEEKS, Hashed.—After boiling, chop them up; toss them in some butter in a stewpan; add enough rich gravy; simmer till this is pretty thick; serve surrounded with sippets.

LENTILS, Boiled.—Wash 1 lb. or 1 full pt. of lentils well in cold water; put them over the fire, in 3 qts. of cold water, with 1 oz. of drippings, 1 tablespoonful of salt, and a saltspoonful of pepper; boil slowly until tender, that is about 3 hours; drain off the little water which remains; add to the lentils 1 oz. of butter, 1 tablespoonful of chopped parsley, a teaspoonful of sugar, and a little more salt and pepper, if required; serve hot.

LENTILS, Fried.—Fry 1 oz. of chopped onion brown in 2 oz. of drippings; add 1 pt. of plain boiled lentils; see if they are properly seasoned: brown them well; serve to the table hot.

LENTILS, Stewed.—Put 1 pt. of plain boiled lentils into a saucepan; cover them with any kind of pot liquor; add 1 oz. chopped onion; 2 oz. drippings; ½ oz. of chopped parsley; stew gently for 20 minutes; serve hot.

LETTUCE, Fried.—Chop lettuce very fine; if liked, the tops of 2 or 3 young onions; add 2 well beaten eggs and a little salt; put a piece of butter the size of an egg into a frying pan; when melted pour in the mixture; turn when a light brown and serve with or without vinegar.

LETTUCE, Stewed.—After washing and parboiling the lettuces, slightly toss them in fresh butter; finish by stewing them gently in thick cream; serve all together.

MUSHROOMS, Baked.—Place under a glass or basin on toast, along with scalded or clotted cream, or a little melted butter, with 1 clove, salt, pepper, etc., to taste; when they are taken up, do not remove the glass for a few minutes, by which time the vapor will have become condensed and gone into the bread.

MUSHROOMS, Broiled.—Choose them rather large; cut out the stalks and soak the mushrooms in a marinade of olive oil seasoned with a bruised clove of garlic, salt and pepper; let them stay in this 1 hour or so; place them on a gridiron, the stalk side downwards; before they begin to render any juice, turn them; place a small piece of butter in each, and when they look done, carefully, without upsetting them, place them in a dish.

MUSHROOMS, Stewed.—Put the mushrooms into a porcelain lined saucepan; add a little pepper, salt, a squeeze of lemon and a small piece of butter; cover the pan and let them stew for ½ hour; add flour enough to thicken them to the thickness of good cream; rub the flour in milk; remove any particles of butter floating on the top; add a little grated nutmeg; let them gently simmer until tender; serve in a vegetable dish.

OKRA, or GUMBO.—Cut off the hard stalk ends of the young pods; put them into boiling water; boil ½ hour until the seeds are red; strain off the water; add a little butter, black pepper, salt, and lemon juice.

ONIONS, Baked.—Boil in milk and water until just done; drain and place the onions in a buttered baking pan; put a bit of butter and some pepper and salt over each one; add a little of the water in which they were boiled; brown them quickly on the grating of the oven and serve hot.

ONIONS, Boiled.—Skin and trim the ends nicely; lay in cold water 1 hour or 2 before wanted; cover well with boiling water, which change once during the process of cooking; when thoroughly tender, drain carefully; butter and season; when in the dish for table use, pour over them drawn butter.

ONIONS, Fricasseed.—Peel 2 or 3 dozen of the very small, round, white onions; sprinkle them with salt; let them remain for ½ hour; roll them upon a cloth to dry them slightly; dredge with flour; throw them into a stewpan in which you have melted 2 oz. of fresh butter; toss them over a gentle fire for 5 minutes; drain the fat from

them; add 1 pt. of rich milk, minced lemon peel, white pepper, salt, and butter; simmer for 10 minutes and serve in the sauce.

ONIONS, Scalloped.—Boil till tender 6 large onions; separate them with a large spoon; place a layer of onions and a layer of grated bread crumbs alternately in a pudding dish; season with pepper and salt to taste; moisten with milk; put in the oven to brown.

ONIONS, Stewed.—Trim some small onions, such as are used for pickling; put them into a well buttered saucepan; sprinkle them freely with powdered loaf sugar; shake the pan gently; as soon as they begin to color moisten with a little stock; add salt; let them stew gently till well colored; shake the pan now and then, but carefully, lest the onions break.

ONION TURNOVERS.—Chop 6 or 8 onions into dice; boil for a few minutes in salt and water; drain and toss in butter until of a light brown; beat up 3 or 4 eggs and add them to the onions; just as they are going to set lay them on a piece of puff paste; pinch the edges together as in making an apple turnover and bake to a nice color.

OYSTER PLANT or SALSIFY, Boiled.—Scrape the roots lightly; either cut them into 3 in. lengths, or leave them whole; throw them into water with a little lemon till wanted; put them into boiling salt water; keep them boiling quickly till tender; drain them; arrange on toast upon a hot dish; pour over them good melted butter, white sauce, or sauce *maître d'hotel*.

OYSTER PLANT or SALSIFY CROQUETTES.—Wash, scrape and boil the oyster plant till tender; rub it through a colander; mix with the pulp a little butter, cream, salt, cayenne and lemon juice; mix the ingredients thoroughly together to a smooth paste; set the dish in the ice-box to get cold; shape it into small cones; dip them in beaten egg and roll in crumbs; fry crisp and brown.

OYSTER PLANT or SALSIFY FRITTERS.—Cook until soft enough to mash; add 2 eggs, 1 pt. milk, flour to make a batter, and salt; fry well brown in hot lard and butter.

PARSNIPS, Boiled.—Wash and brush them very carefully; either peel and quarter them or do them whole as they are, and peel afterwards; have plenty of water; send them to table simply quartered or sliced, or mashed and tossed in enough butter.

PARSNIPS, Fried.—Boil the parsnips until they are half done; lift them out; let them cool; slice them rather thickly; sprinkle with salt and pepper; fry them a pale brown in good butter; serve them with roast meat, and dish them under it.

PARSNIPS, Scalloped.—Mash 1 pt. of boiled parsnips; add 2 tablespoonfuls of butter; 1 teaspoonful of salt; a little pepper; 2 tablespoonfuls of cream or milk; mix the ingredients; stir on the fire until the mixture bubbles; turn into a buttered dish; cover with crumbs; dot with butter, and brown in the oven.

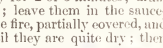
PEAS, Dried, Stewed.—Stew in meat liquor; allow 1 qt. of the latter to each ½ pt. peas; flavor to taste; thicken with yolks of eggs; add powdered dried mint as for pea soup; introduce small pieces of broiled bacon as a garnish.

PEAS, Green, Boiled.—Boil the peas in plenty of salted water, which should be boiling rapidly when they are put in; when tender, but not broken, drain off a part of it; throw into the remainder a sprig of mint, and butter and pepper to taste; add a little milk.

PEAS, Green, Stewed.—Put your peas into a stewpan; toss them into a little butter; when hot add sufficient veal or chicken stock to moisten them with; simmer slowly; thicken slightly with flour and butter; place fried sippets round a dish, and serve the peas in the middle.

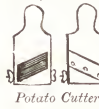
POTATOES, Baked.—1. Choose large potatoes of uniform size; wash them well in lukewarm water, and scrub the skins with a soft brush; put them in the oven, or in a Dutch oven, and bake until done enough; do not let them remain in the oven after they are cooked, or they will become hard and shrivelled; serve, neatly folded, on a hot napkin, and send pats of butter to table with them.—2. Pare and slice, very thin, potatoes to almost fill a 2 qt. dish; sprinkle on a large spoonful of salt and a little pepper; then turn on sweet milk until the dish is a little more than half full, that will wash the pepper and salt among the potatoes; cut 5 slices of pork; lay them around on the top of the potatoes; set it in the oven and bake 2 hours.

POTATOES, Boiled.—1. Choose potatoes of uniform size; wash them well, and scrub them with a soft brush, but do not touch them at all with a knife, even to remove the specks; put them in a saucepan; barely cover them with cold water; throw in a spoonful of salt, and let them simmer gently until they are done enough; then let them boil quickly for 2 or 3 minutes; drain the water from them; leave them in the saucepan by the side of the fire, partially covered, and let them remain until they are quite dry; then peel them quickly, and serve at once; leave the cover of the tureen a little on one side, that the steam may escape and not descend upon the potatoes.—2. Take 20 middle sized potatoes; peel, wash and drain them; put them into a 2 qt. stewpan with 1 qt. of water and a little salt; when they have boiled 15 minutes throw off the water; cover closely, and let them steam till done, which will be in about 5 minutes more.



Potato Peeler.

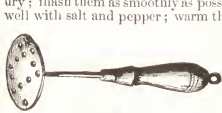
POTATOES, Fried.—1. (*Saratoga Chips.*) Wash and peel some potatoes, and cut them from the breadth (not the length) in slices as thin as a shilling; as they are sliced throw them into cold water, and keep them there until wanted; when they are to be dressed, dry them carefully in a napkin and throw them, a few at a time, into as much boiling fat as will cover them entirely; the fat may be known to be boiling when it ceases to hiss, and is still; move the potatoes about in the fat that they may be equally cooked, and when they are brightly browned on both sides and crisp, put them on a cloth or brown paper before the fire to drain the grease from them; sprinkle a little salt over them and serve very hot.—2. Peel some raw po-



Potato Cutter.

tatoes, and cut them in thin slices; fry them in butter over a hot fire, continually turning them, until they become sufficiently brown; let them drain; then arrange them on a hot dish; sprinkle salt over them and serve to the table as hot as possible.

POTATO BALLS. — Boil some potatoes very dry; mash them as smoothly as possible; season well with salt and pepper; warm them, with 1 oz. of butter to every lb. of potatoes, and a few spoonfuls of good cream; let them cool a little; roll them into balls; sprinkle over them some crushed vermicelli or macaroni; fry them a light brown.



Potato Masher.

POTATO CONES. — Take mashed potatoes; season with pepper and salt and a little minced shallot; beat into it a sufficient quantity of butter to bind it; divide and form into cones or croquettes; place them with roast beef or mutton to brown; sprinkle them slightly with the gravy.

POTATO CROQUETTES.—Take 6 boiled potatoes; pass them through a sieve; add 3 tablespoons of grated or finely minced ham; season with pepper and salt and chopped parsley; work into this mixture the yolks of 4 eggs; make with the hands into balls; roll in bread crumbs; fry in hot lard; serve with fried parsley.

Potato Croquettes.

POTATO CUTLETS.—Cut some small slices of cold mutton; spread mashed potatoes, nicely flavored with pepper and salt, on each side of them; fry a nice light brown; take some ripe tomatoes; remove their skins by plunging into boiling water; stew the tomatoes in a small saucepan; break into them 1 or 2 eggs; stir the mixture well, until it is of the consistency of scrambled eggs; pile up the tomatoes in the centre of the dish; arrange the potato cutlets round it.

POTATO DUMPLINGS.—Boil 5 or 6 good sized potatoes; let them get cold; peel and grate into a large dish; do not crush or mash them together; keep them light and flaky; peel about the same quantity of raw potatoes; grate and put into a cloth; press out all the water; put the potatoes in a dish; cut up an onion very fine; put in 2 or 3 eggs and a small handful of salt; cut some stale bread into small squares; fry in hot lard or butter until they are brown and crisp; thoroughly mix the raw potatoes, onions, eggs and salt; put in the bread, and lastly the boiled potatoes; handle as little as possible; roll the mixture into balls; put them in a pot of boiling water, into which you have thrown a handful of salt.

POTATOES, Gravy for. — Put a spoonful or more of butter, according to the quantity of potatoes you have, into a frying pan; set over the fire until brown, being careful not to scorch it; mix a spoonful of flour in a cup of thin sweet cream, or milk if one has no cream; pour into the browned butter; boil up; season with pepper and a little salt if necessary; turn over the boiled potatoes.

POTATOES, Mashed.—Peel 2 qts. potatoes; when they are cooked turn off every drop of water; put in a little salt, pepper and butter; take a carving fork and break them up a little; add a little more butter, and nearly a cup of nice milk or cream; take a silver fork; beat them briskly 5 minutes, or until light and creamy; carry immediately to the table.

POTATO PUFFS.—Take mashed potatoes and make them into a paste, with 1 or 2 eggs; roll it out with a dust of flour; cut round with a saucer; have ready some cold roast meat, free from gristle, and chop fine; season with salt, pepper, thyme, or pickles cut up fine; place them on the potato and fold it over like a puff; pinch it neatly around, and bake for a few minutes.

POTATO SNOW.—Peel and boil in a saucepan 6 large, mealy white potatoes; add a little salt to the water; take them out one by one; leave the saucepan on the fire; rub through a sieve into a deep dish, letting it fall in a mound.

PUMPKIN. Boiled.—Make a good syrup of brown sugar and water; strain it; peel and cut in thin slices some pumpkin; put in the syrup, and add grated lemon peel and juice; cook until nearly candied; use mace or spices instead of lemon if preferred; eat this hot with the meats; or it is equally as nice cold.

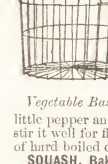
PUMPKIN. Fried. — Peel and slice a young pumpkin in pieces 2 or 3 inches square and ½ in. thick; let it stand for 1 hour in a deep earthen dish with a light sprinkling of salt between each layer; wipe the slices; pepper them; roll them in flour, or in a batter made with flour, milk, 1 egg and a little salt; fry them brown in smoking hot fat, enough to cover them; lay them for a moment on brown paper to free them from fat, and serve them hot.

RHUBARB, or PIE PLANT.—Wash; cut up into small pieces; boil in clear water until done; just before removing it from the fire, sweeten it to taste.

SALMAGUNDI.—Take an equal quantity of carrots and turnips; cut them the size of almonds; 12 small white onions; put all in a saucepan with a lump of butter; let them brown gently; add a little gravy and some mushrooms, French peas, haricots, tops of cauliflower, salt and pepper, and a teaspoonful of sugar; let them all boil gently; just before serving, thicken the sauce with a little flour.

SEA KALE.—Clean it thoroughly; tie it in medium sized bunches; cook exactly as you would asparagus; serve it masked with white sauce, or placed simply on moistened toast; or enveloped in a warm damask napkin.

SPINACH.—Take 2 pailfuls of spinach, young and freshly gathered; pick away the stalks; wash the leaves in several waters; lift them out with the hands that the sand or grit may remain at the bottom; drain them on a sieve or in a



Vegetable Basket.

wire vegetable basket; put them into a saucepan with as much boiling water, slightly salted, as will keep them from burning; let them boil until tender; take the spinach up; drain it; press it well; chop it small; put it into a clean saucepan with a little pepper and salt, and a slice of fresh butter; stir it well for five minutes; serve with the yolk of hard boiled egg.

SQUASH. Baked.—Cut in half; clean inside nicely; put into oven flesh side up, 1 hour before dinner; serve hot, with butter, pepper and salt.

SQUASH. Fried.—Slice them as you would cucumbers; dip in dry flour; fry to a brown, and imagine that you are eating fried oysters.

SQUASH. Scalloped. — Boil and mash the squash in the customary way, and let it cool; beat the yolks of 2 eggs, and when the squash is nearly cold whip these into it, with 3 tablespoonfuls of milk, 1 of butter rolled in flour, and melted into the milk; pepper and salt to taste; pour into a buttered bake dish; cover with fine crumbs; bake to a light brown in a quick oven; eat hot.

SQUASH, Stuffed. — Select a squash with a moderately hard shell; cut out a piece from the top large enough to insert the hand; clean out the seeds; place the squash and the piece in a moderately hot oven; boil onions, Brussels sprouts and potatoes; let these vegetables be cooked till each is done, lacking 10 minutes; make a stuffing of rice, or bread crumbs and tomatoes, having 1 part rice or 2 parts bread crumbs to 4 parts tomatoes; season to taste with finely minced chopped onion; cook the rice 40 minutes, the bread crumbs 10 minutes; have all ready and hot at the same time; take the half cooked squash from the oven; put in the stuffing and the vegetables in layers, not filling quite full; replace the piece cut out of the top; tie a string around the whole and return to the oven; bake until the squash is tender, but not broken down; serve hot, cutting the shell, if possible, with a sharp knife.

SUCCOTASH.—1. Take 1 qt. lima beans; ½ lb. pork; 1½ doz. ears sweet corn (green); boil the pork 1½ hours in 3 qts. of water, putting in the beans when the pork has boiled ½ hour; cut the corn off; put it in one dish; into another scrape the milk from the cobs; when the beans are nearly done put in the corn, and boil 15 minutes; add the milk from the cobs, boiling all 10 minutes longer; stir all the time after adding the milk, or it will burn.—2. Take 2 qts. of beans; string; cut fine; boil 2 hours with water enough to cover without boiling dry; cut the corn from 6 ears; boil with beans 20 minutes; season with butter, pepper and salt; just before dishing up, add 1 tablespoonful of flour; moisten with ½ cup of sweet milk; let it boil 10 minutes.

SWEET POTATOES. Baked.—1. Boil your potatoes until tender; slice several times the long way of the potato; place a layer of the slices on the bottom of an earthen dish; sprinkle lightly with white sugar, and heavily with lumps of butter; then another layer of potatoes, and so on, until you have the sugar and butter for a top layer; bake 30 or 40 minutes.—2. Wash; put in a hot oven; bake until well done.

SWEET POTATOES. Boiled. — Wash; peel; place in boiling water; let them boil until thoroughly done.

SWEET POTATOES, Fried.—1. Boil the potatoes; carefully mash them; boil 1 pt. of milk; put in some lemon peel, 2 small lumps of sugar, and a little salt; when the milk boils take it off the fire and add the potatoes, so as to form a paste, or, rather, a tolerably thick mush; when cool, make it into balls; cover these with crumbs of bread and yolk of egg; fry to a nice brown color, and serve with sugar strewed over them.—2. Boil, and, when cold, scrape off the skins; slice lengthwise and fry to a light brown in nice dripping or butter; drain, salt, pepper and serve hot.

TOMATOES, Baked.— 6 medium sized tomatoes sliced; 1 large onion sliced; 2 slices of bread cut into small pieces; cover the bottom of the pan with pieces of the bread; above this put a layer of the tomatoes and a few slices of onion; then again bread, tomatoes and onion, until all the material is used; over all spread 2 tablespoonfuls of butter and sprinkle salt and pepper; just before setting in oven add ½ cupful of boiling water; bake in a brisk oven 1 hour.

TOMATOES. Deviled.— 1 pt. tomatoes; 1 hard boiled egg, the yolk only; 2 tablespoonfuls melted butter; 1½ tablespoonfuls vinegar; 1 raw egg whipped light; 1 teaspoonful powdered sugar; salt, mustard and pepper; pound the boiled yolk; rub in butter and seasoning; beat light; add the vinegar; heat almost to a boil; stir in the beaten egg until the mixture thickens; set in hot water while you cut the tomatoes in thick slices; broil over a clear fire; lay on a hot chafing dish, and pour the hot sauce over them.

TOMATOES. Fried.—Take large green tomatoes; cut off both ends; then cut up in 3 slices; have some butter in the frying pan; let it get hot; roll the tomatoes in flour and lay them in the pan; salt, pepper, and sprinkle a little sugar on while frying; cook till they are done nice and brown, and you will have a most delicious article for breakfast.

TOMATOES, Roasted.—Select them nearly of the same size; roast them gently in a Dutch oven, or place them at the edge of the dripping pan; take care that no fat from the joint shall fall upon them; keep them turned, that they may be equally done.

TOMATOES, Scalloped.—Stew and season 1 qt. of tomatoes to your taste; add butter, a little chopped onion, and salt and pepper to the taste; then grated bread crumbs till a stiff butter; pour into a buttered pudding dish; strew the top thickly with crumbs, and bake 20 minutes.

TOMATOES. Stewed.—Wash ½ peck of tomatoes; put them in a saucepan with ½ pt. of boiling water; cover closely; put on the stove to boil; as soon as the water boils set the saucepan back to simmer for ½ hour; with the potato masher, pass the tomatoes through the colander; leave the skins and any unripe, lumpy parts; season with 1 dessertspoonful of salt, 1 saltspoon-

ful of white pepper, as much cayenne as you can take on the end of a penknife, finely chopped parsley, and 1 tablespoonful of butter.

TURNIPS. Boiled.—Serve the turnips whole, when they are very young, and then cover with white sauce; when they have reached any size, mash them; pare the turnips; wash them; if very young, a little of the green top may be left on; if very large, they should be divided into halves or even quarters; throw them into slightly salted water; let them boil gently till tender; drain and serve them.

TURNIPS. Stewed.—Pare and wash 6 white turnips; cut them in dice ½ in. square; lay them in cold water as they are cut; meantime heat 1 pt. of any kind of cold gravy; when all the turnips are cut put them into the gravy with 1 teaspoonful of sugar, and sufficient pepper and salt to make them palatable; stew gently for about 1 hour; serve hot in the gravy.

WATER-CRESS. Stewed.—Pick them over and wash them carefully; blanch them in boiling water; drain and press them; stew in either gravy or cream; thicken the sauce with yolks of eggs; garnish the dish with slices of orange.

COOKING FOR THE SICK.

REMARKS.—Endeavor to tempt the appetite of the patient by attention to little things. Give the distasteful food the semblance of something that is particularly palatable. Cover the tray in a dainty manner with the freshest of cloths; render it bright by a vase of flowers. Do not set a plate before an invalid containing the exact quantity of meat, fish or pudding you want him to eat. Serve every thing on small dishes, and allow the patient to help himself. Very often the effort to lift the head, even if persons are not dangerously ill, disinclines them to take refreshing or nourishing drink. Do not disturb such sufferers by propping them up with pillows and making them lift their heads and change their position. Secure a bent glass tube, and the patient need not be disturbed, in a sick headache or extreme fatigue, but can take the beverage provided without a change of position. As the system feels the need of the very thing that the taste demands, satisfy that desire as far as possible; but the greatest care is necessary with regard to the food; therefore give no new article of diet without the express permission of the doctor.

ABERNETHY BISCUITS.—(See same in BISCUITS, CRACKERS, ETC.)

AERATED BREAD.—(See same in BREAD.)

ALUM WHEY.—Boil together 1 teaspoonful of powdered alum and 1 pt. of sweet milk; strain to separate the curd.

APPLE TEA.—Roast 8 fine apples in the oven or before the fire; put them in a jug with 2 spoonfuls of sugar; pour over them 1 qt. of boiling water; let the whole stand 1 hour near the fire.

ARROWROOT GRUEL.—Mix 1 dessertspoonful of arrowroot with sufficient cold water to form a soft paste; rub it till quite smooth; add ½ pt. of boiling water; stir it briskly; boil it for a minute or two; when removed from the fire add 1 teaspoonful of sherry or other white wine with a little grated nutmeg or lemon peel, and sugar to the taste. For children use milk instead of water, omitting the wine and lemon or nutmeg.

ASSES' MILK. Imitation of.—Eringo root, pearl barley, sago, rice, of each 1 oz.; wash them with cold water; boil them with 3 pts. of water to 1½ pts., and strain; put 1 teaspoonful to 1 cup of boiling water, and sweeten to the taste.

AUSTRALIAN MOSS.—Soak ½ oz. of the moss in water for 1 or 2 hours; pour away the water; boil the moss in 1 qt. of fresh water until dissolved; strain through a hair sieve; sweeten and flavor to the taste.

BARLEY WATER.—Boil 2 oz. of barley in 2 qts. of water till soft; pearl barley is the best, but the common barley answers very well; when soft, strain and mix it with a little currant jelly, to give it a pleasant, acid taste; if the jelly is not liked turn it, when boiled soft, on to 2 oz. of figs or raisins; boil it again until reduced to 1 qt.; then strain it for use.

BARLEY WINE.—To 1 pt. of boiled barley water, nicely flavored, put ½ pt. sherry; boil it down till reduced one half; 1 wineglassful of this taken 3 or 4 times a day is both strengthening and nourishing to delicate people, or after an illness.

BEEF TEA.—Take 1 lb. of lean, fleshy beef; put it into a basin containing 1 qt. of cold water, first cutting it into very small bits; let it soak in this water an hour or more; then put both water and beef into a clean saucepan, and bring it to a boil; put in a little salt, and take off the scum as it appears; simmer very gently, and strain for use in little less than an hour. When warmed up again it should not be put into a saucepan, but heated by setting the cup of tea into boiling water.

BEEF TOAST.—Cut ½ lb. lean, juicy beef from the round into slices over ½ in. thick; lay them for a moment upon a very hot frying pan, which is perfectly free from grease; turn them quickly; when they are heated through, salt them and squeeze the juice from them in a lemon squeezer—those made of iron are the best; have a piece of toast, made from baker's bread, placed upon a very hot plate; pour the beef juice upon it and serve instantly; do not butter the toast, and add a dash of peppe , if not condemned by the physician.

BRANDY, EGG AND MILK.—Take a fresh egg; break it; separate the yolk from the white; whip each with a fork until it becomes a froth; thoroughly mix them together; add enough good milk or ordinary cream, well sweetened with finely ground loaf sugar, to make a tumblerful; pour in 1 tablespoonful of good brandy; if this is not convenient, a proportionate quantity of the best whisky may be used instead; mix with a fork, when it will be ready for the sick person.

CAUDLE.—Beat up 1 egg to a froth; add 1 wineglassful of sherry and ½ pt. of gruel; flavor with lemon peel and nutmeg, and sweeten to taste.

CEYLON MOSS.—Boil Ceylon moss, ½ oz., in water, 1 qt., till the liquid jellies on cooling; strain and flavor.

CHEESE WHEY.—Put the milk, fresh from the cow, into the churn; let it stand for 10 minutes, then begin churning; as soon as the flakes of the butter begin to float and the milk looks thin and blue, strain it off; repeat this twice a day.

CHICKEN BROTH.—The best parts of a young fowl use for a fricassee or a grill, and the inferior parts for the broth; or if it is an old fowl stew it till all the bones are bare in 1 qt. of water, and add a little more liquid if necessary; season the broth with salt, pepper, mace or onion, according to the taste and the appetite of the invalid. When the fowl has simmered until it has parted with all its nutriment, strain the liquid through a sieve; cool it, and remove the fat before it is warmed for use.

CHICKEN PANADA. — Clean and cut up a chicken; boil it slowly, bones and all, in 1 qt. of water till nearly done; take off the skin; cut off the white meat; remove the fat if there is any; pound it to a smooth paste with some of the water it was boiled in; when quite smooth, flavor it with a little salt, and the least bit of grated nutmeg and fresh lemon peel; boil it again gently for a few minutes; make it the consistency you like by adding more or less of the water it was boiled in; stir all the time.

COD LIVER SAUCE.—Add ½ lb. of cod liver, previously boiled, and cut into large dice, to a little anchovy sauce and ½ pt. of melted butter.

COD ROE AND LIVER.—Take a cod's roe; cut open the skin which surrounds it; put the eggs in a basin; pour water over them; mash with the hand, to separate them; throw away the water; add ½ lb. salt and 1 teaspoonful of pepper; let them soak all night; wash well 2 or 3 times, leaving about 1 gill in the bottom; put over it now 2 lbs. of the liver, in 6 or 8 pieces; put the stewpan on a very slow fire or in an oven for 1 hour; then take out the liver, which serve; add about 1 gill of melted butter to the roe.

COFFEE AND EGG.—Make a strong cup of coffee; add boiling milk as usual; sweeten; take an egg; beat yolk and white together thoroughly; boil the coffee, milk and sugar together; pour it over the beaten egg in the cup you are going to serve it in.

CREAM BISCUIT.—Put a cracker of the large thin kind, called ship biscuit, in the oven till it is thoroughly dry and crisp; lay it upon a soup plate and pour salted boiling water upon it; let it stand for a few minutes; keep it warm in the oven or on the back of the stove; pour off the water; take care not to break the shape of the cracker; lay a few slices of canned peaches upon it; slightly sweeten a cup of milk and cream, previously warmed but not scalded; pour over the cracker; put a little whipped cream in the centre to partially cover the fruit. If bananas are in season, and are allowed by the physician, slice one over the cracker instead of the canned fruit; add 1 spoonful of wine, fine brandy, or of the juice from fresh or canned pine-apples.

CRUMB JELLY.—Take a small roll; pare off the crust; cut the crumb into thin slices; toast them lightly on both sides; put them in 1 qt. of spring water; let it simmer gently over the fire until the liquid becomes a jelly; strain it through a thin cloth; flavor it with a little lemon juice, and sugar added when hot.

CUSTARD POWDER.—Rub up together gum tragacanth, 2 oz., potato starch, 1 lb., powdered tumeric, 2½ dr., with oil of bitter almonds, ½ dr., and essence of lemons, 1 dr.; put up into 1 oz. packets; from 1 pt. of new milk take 2 tablespoonfuls to work up with the powder; boil the remaining milk with 2 oz. of lump sugar; pour it, while boiling, into the basin; stir quickly until thoroughly mixed; bake as a custard.

DYSPEPTIC BREAD.—(See *Brown* and *Graham Breads* in BREAD.)

EGG AND MILK.—Beat up 1 egg very well, say for 20 minutes; add fresh milk, 1 pt., water, 1 pt., sugar to make it palatable; boil, and let it cool; drink when cold.

EGG ROTH.—Put 1 egg in the refrigerator long enough before it is wanted to have it become ice cold; separate the white from the yolk; into the latter stir 1 tablespoonful of cream (also ice cold), and 2 teaspoonfuls of white sugar; whip them together with a fork until they are quite frothy; add 1 teaspoonful of brandy; beat the white of the egg to a stiff froth; mix all together as lightly as possible and pour into a tumbler. If liquor is not allowed, substitute a small teaspoonful of lemon juice; first make it thick with sugar.

EGG WINE.—Beat an egg up well in a tumbler with a wineglass of cold water, and a glass of sherry; add sifted sugar to your taste; drink when all is thoroughly beaten up and frothy.

FLAXSEED LEMONADE.—4 tablespoonfuls of flaxseed; 1 qt. boiling water; juice of 2 lemons; pour the boiling water upon the flaxseed; steep 3 hours in a covered vessel; sweeten to taste; if too thick, add cold water with the lemon juice; ice for drinking.

FRUIT DRINK.—Put a large dessertspoonful of black currant jelly or preserved tamarinds into a tumbler; fill it up with boiling water; when cold, it is fit to drink; if too sweet, add a large quantity of water.

GLUTEN BREAD. — Fresh moist gluten, 24 oz.; bicarbonate of ammonia, 3¼ drs.; common salt, 1½ drs.; powdered caraway, 48 grs.; wheaten flour, 4½ oz.; powdered bran, 1½ oz.; salt butter, 4 oz.

GRUEL. — 1. Mix 2 tablespoonfuls of corn meal with 1 of wheat flour, or oat meal alone, and sufficient cold water to make a thick batter if the gruel is liked thick, stir it into 1 pt. of boiling water; if liked thin, add more water or milk; season the gruel with salt, and let it boil 6 or 8 minutes; stir frequently; take it from the fire; put in a piece of butter the size of a walnut, and pepper to the taste; turn it on toasted bread, cut in small pieces, or serve in a breakfast cup. — 2. Take a large tablespoonful of rice flour and mix to a stiff paste, with cold water; then stir it into the remainder of a pt. of boiling water, and let it boil for 15 minutes

with a stick of cinnamon, and a little rasped dried orange peel; strain it off, sweeten with loaf sugar, and add ½ glass or more of brandy.

ICELAND MOSS.—Iceland moss, 2 oz.; soak for 1 or 2 days in cold water; boil for 1 hour in water, q. s. to yield a strong solution; strain, decant the clear after repose, and apply heat; dissolve in it 1 dr. of isinglass; evaporate the whole to a proper consistence; put it into pots, and set them in a cool place.

IRISH MOSS.—(See same in MISCELLANEOUS DESSERTS.)

LEMON AND EGG. — Equal parts of sugared water and lemon juice into which the beaten whites of 2 or 3 eggs have been stirred.

LEMON SPONGE.—Dissolve ½ oz. gelatine and ½ lb. sugar, with the juice of 1 large lemon, in ½ pt. water; stir into this the whites of 2 eggs beaten to a stiff froth; let it come not quite to a boil and put it to cool in the dish in which it is to be served.

LEMON WHEY. — Pour into boiling milk as much lemon juice as will make a small quantity quite clear; dilute with hot water to an agreeable smart acid; put in a bit or two of sugar.

MUSTARD WHEY.—Mustard seed, bruised, 1½ oz.; milk, 1 pt.; water, 1 pt.; sugar, either loaf or moist, 2 oz.; boil the milk; throw in the seed; let it continue to boil till the curd completely separates; strain, and add the water, which should be in a boiling state; sweeten, and boil up the whole together.

OATMEAL AND BEEF TEA. — Take 2 tablespoonfuls of fine oatmeal and make it perfectly smooth in 2 spoonfuls of cold water; pour into this 1 pt. of strong beef tea; boil it 8 minutes; stir it all the time; it should be very smooth; if lumpy pass through a sieve.

ORANGE WHEY.—Put the juice of an orange, with a portion of the peel, in 1 pt. of boiled sweet milk; let it stand till it forms a curd, and strain.

OYSTER SOUP.—Procure the largest oysters; remove 6 from the can, 1 at a time, to a plate; insert a fork into the solid flesh; with a sharp knife make a slit up and down and across the abdominal cavity; slip the point of the knife under the dark mass thus exposed and thoroughly remove it, being as nice about it as you would in dressing any other fish; put into stew-pan; pour out proper share of liquor, 1 pt. of water and ½ gill of cream; add salt; pepper, if there be no fever; 1 teaspoonful of lemon juice or 2 of pure cider vinegar; bring just to the boil and pour into a dish; break in cracker or nicely toasted thin slice of light bread; a little fresh butter makes it richer.

PANADA.—Take a slice of wheat bread; break into fragments; sprinkle over it 1 teaspoonful of ground cinnamon; put into a cup; pour on it 1 pt. of boiling water; boil a few minutes until well mixed; add some sugar with a little grated nutmeg; if desired a piece of butter may be put in, and also some wine or brandy.

RACAHOUT. — Chocolate, in powder, 1 oz.; rice flour, 3 oz.; potato arrowroot, 3 oz.; white sugar, 9 oz.; vanilla (pulverized with a part of the sugar), 1 dr.

RASPBERRY VINEGAR. — Pour 1 qt. of pure cider vinegar over 3 qts. of ripe raspberries in a dish; let it stand 24 hours; strain it; pour the liquor over 3 qts. of fresh raspberries; let it infuse again for a day and night; strain again, and add 1 lb. white sugar to each pt. of juice; boil 20 minutes; skim it well; bottle and seal when cold.

RENNET WHEY. — Heat 1 qt. of new milk; add a large tablespoonful of rennet; boil until the curd separates, which must be removed.

RENNET WINE.—Take the fresh rennet bag of a calf; cut off and throw away 3 in. of the upper or cardiac extremity; slit the rest longitudinally; wipe gently with a dry napkin; do not remove the clean mucus; cut it into small pieces, and put into a common wine bottle filled up with good sherry; let it remain corked for 3 weeks.

RICE CAKE. — Beat the yolks of 15 eggs for nearly ½ an hour with a whisk; mix with them well 10 oz. of finely sifted white sugar; put in ½ lb. ground rice, a little orange flower water or brandy, and the rinds of 2 lemons grated; add the whites of 7 eggs, well beaten up; stir the whole for ½ hour; put into a hoop and bake for ½ hour in a quick oven.

SAGO. — Wash 1 oz. of pearl sago in cold water; boil it very gently in 1 pt. of fresh water; stir it frequently till dissolved; flavor with wine, spices and sugar; for children and for consumptive and debilitated persons, substitute milk for water.

SAGO or TAPIOCA MILK.—Take 1 oz. of either of these; soak it in 1 pt. of cold water for 1 hour; pour off this water; add 1½ pts. of good milk; boil slowly until well incorporated.

SAGO POSSET.—Macerate a tablespoonful of sago in 1 pt. of water for 2 hours on the hob of a stove; boil for 15 minutes, assiduously stirring; add sugar with an aromatic, such as ginger or nutmeg, and a tablespoonful or more of white wine; if wine is not permitted, flavor with lemon juice.

TAPIOCA.—1. Boil ½ lb. of tapioca till soft in 2 qts. of water; drain in a colander; put it back in the pan; season with salt and pepper; add ½ pt. of milk; put over 1 lb. of fresh cod-liver, cut in 8 pieces; set the pan near the fire to simmer slowly for ½ an hour, or a little more, till the liver is quite cooked; press on it with a spoon to squeeze out the oil; take away the liver, and mix the tapioca; if too thick, add a little milk; boil for a few minutes; add a little more salt and pepper, and serve.—2. Put a large tablespoonful to soak overnight; boil 1 pt. of new milk the next morning; sweeten it; add the tapioca and the yolks of 2 eggs well beaten; flavor with extract of vanilla; put in a dish to cool; cover the top with the whites of the eggs beaten stiff with a little sugar and vanilla; place in the oven to brown slightly.

TOMATO SYRUP.—Express the juice of tomatoes and add 1 lb. sugar to each qt. juice and bottle; when needed, mix with enough water to make a pleasant drink.

VINEGAR WHEY.—Milk, 1 pt; vinegar ½ oz.; boil for a few minutes; separate the curd.

WHITE WINE WHEY.—Boil ½ pt. new milk; as soon as it boils up, pour in as much white wine as will turn and make it look clear; boil it

up; set the saucepan aside till the curd subsides, and do not stir it; pour the whey off; add to it ½ pt. of boiling water and a bit of white sugar.

MARKETING.

BUTTER.—A smooth unctuous feeling in rubbing a little between the finger and thumb, expresses its rich quality; a nutty smell and rich aroma indicate a similar taste; and a bright, golden, glittering, cream-colored surface shows its high state of cleanliness. It may be necessary to use the trier, until you become an expert in testing by taste, smell and rubbing. To test butter more thoroughly melt and render it free from all salt and water by filtration. Then put 10 gr. into a test tube and liquefy by placing the tube in hot water at 150° Fahr.; remove the tube when ready and add 30 minims of carbolic acid; shake the mixture and place it in the water bath until it is transparent. Set the tube aside for a time, and if the sample is pure the solution will be perfectly clear. If beef, mutton, or pork fat be in it, the mixture will resolve itself into 2 solutions of different densities, with a clear line of demarkation. Oleomargarine is detected by heating the sample, which will turn from clear yellow fat to black, and emit an odor of fat.

COFFEE.—Ground coffee is frequently adulterated with roasted grains, roots, acorns, sawdust, burnt sugar, and baked horses' and bullocks' livers. Roasted coffee is imitated by chicory molded into the form of coffee-berries. The presence of caramel or chicory in ground coffee may easily be detected as follows: Place a spoonful of coffee gently on the surface of a glass of cold water; if the coffee is pure it will float for some time and scarcely color the liquid; if the contrary is the case, it will rapidly absorb the water and sink to the bottom of the glass, communicating a deep reddish brown tint as it falls.—2. Shake a spoonful of coffee with a wineglassful of cold water, and then place the glass on the table; if it is pure it will rise to the surface and scarcely color the liquid, but if not it will sink to the bottom, and the water will be tinged red as before.

EGGS.—Hens' eggs are the best; but for some purposes those of turkey and pea-hens are desirable; those of ducks and geese are coarse and inferior. To test whether the eggs are fresh or not, the following are good methods: 1. Dissolve 120 grammes of common salt in a liter of water; put an egg in this solution on the day it is laid and it will sink to the bottom; 1 day old will not reach quite to the bottom of the vessel; one three days old will swim in the liquid; while one more than 3 days' old will swim on the surface.—2. With the hands or a piece of paper rolled in a funnel shape, hold an egg toward the light; if the egg is clear and golden in appearance, it is good; if it is dark or spotted, it is bad.—3. Make an egg tester by fitting a looking-glass in the bottom of a cigar box; cut round holes in the cover, just large enough for the eggs to fit in nicely and not drop through when set in large end downward; make a slit near the end of the cover, 1x2 in. to look through; with the eggs in place, hold the box in any strong light; peep down into the glass, and the fertile eggs will be dark and opaque, and the unfertile ones transparent.—4. When eggs shake they are stale.

FISH.—The finest flavored fish are sea fish, and those which live in both salt and fresh water, such as salmon, shad and smelts; in the choice of every kind of fish, the chief characteristics to be observed are stiffness, fullness of the eyeballs, brightness of the eyes, redness of the gills, and little or no permanent impression should be made by the ordinary pressure of the finger. Fresh fish, also, always lie in a curled position.

FLOUR.—This is easily tested as follows: 1. Squeeze a little in the hand, and if it is good it will hold together in a mass and show the impression of the fingers; if it works soft and sticky when kneaded between the fingers, it is poor.—2. Throw a little against a dry perpendicular surface and if it falls like powder it is bad.—3. It should have a white, yellowish colored tint.—4. Mix with the flour some juice of lemon or good vinegar; if the flour be pure, they will remain together at rest; if there be a mixture of whitening or chalk, a fermentation, or working like yeast, will ensue.—5. Dip the ends of the forefinger and thumb in sweet oil; take up a small quantity of flour between them; if it be pure it will turn nearly black; if whitening be in it, it will not change color.

FRUIT.—All fruit should be bought ripe and sound; it is poor economy to buy imperfect or decayed kinds, as they are neither satisfactory nor healthy eating; while the mature, full flavored sorts are invaluable as food.

GAME.—When hares and rabbits are young and fresh, the cleft in the lip is narrow, the body stiff, the ears tear easily, and the claws are smooth and sharp; the greater the depth of fat upon a haunch of venison the better the quality of the meat will be, if it is a clear white and the lean of a dark hue.

GAME BIRDS.—Fine game birds are always heavy for their size; the flesh of the breast is firm and plump, and the skin clear; if a few feathers be plucked from the inside of the leg and around the vent, the flesh of freshly killed birds will be fat and fresh colored; if it is dark, and discolored, the game has been hung a long time; the wings of good ducks, geese, pheasants, and woodcock are tender to the touch; the tips of the long wing feathers of partridges are pointed in young birds, and round in old ones; yellow legs and a dark bill are signs by which a young bird may be known, and a rigid vent when fresh; when this part is green the bird is stale; pigeons, when fresh, have supple feet, and the vent will be firm; if discolored and supple, they are stale; plovers, when fat, have hard

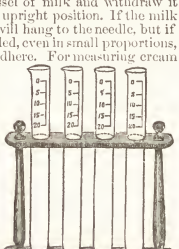
vents; but, like almost all other birds, may be chosen by the above rules; quail, snipe and small birds should have full, tender breasts; woodcock and snipe, when old, have the feet thick and hard; when these are soft and tender they are both young and fresh killed; when their bills become moist, and their throats muddy, they have been too long killed.

MEAT.—For the different parts of meat see SLAUGHTERING of the animals in LIVE-STOCK. The muscular part of beef, that is most used, while it is toughest, gives the most nourishment; but it needs to be cooked differently from the tender parts. When buying meat, remember that the tenderest parts come from that part of the animal where there is least muscular exertion. The tough parts of the meat, which would be unpalatable if broiled or roasted, may be with profit stewed, braised or made into soup. The pieces of beef generally used for roasting, some of them also being used for steaks, are the thirteen ribs, the hip and thick sirloin, the middle cut sirloin, the cross-rib pieces, the rump, the first cut of the round, and occasionally the tenderloin. The piece most prized is the third, fourth and fifth ribs, coming from the sirloin toward the neck; the next best piece is the first and second ribs; then the sixth and seventh, the eighth and ninth, etc. Some prefer the sirloin to the ribs, which is only a matter of taste. Steaks are cut from the following pieces: Tenderloin, sirloin, chuck, cross-rib, rump and neck. Butchers generally cut the steaks too thin. A steak should never be less than three-quarters of an inch in thickness. In selecting beef to roast, have some of the bone removed, then make the butcher skewer the beef. The best beef steak for broiling is porter-house. The best beef for *à la mode* is the round; have the bone removed and trim off all the gristle; for corned beef the round is also the best. For a mutton roast choose the shoulder, the saddle or the loin and haunch. The leg should be boiled. Small rib chops are best for broiling; those cut from the leg are generally tough. Mutton cutlets to bake are taken from the neck. For roast veal the loin, breast, or shoulder is good. Veal chops are best for frying; cutlets are apt to be tough. Never select a ham which is too lean. The joint should be well rounded and plump, and the skin thin and pliable. The color of any kind of meat should not be either a pale pink or a deep purple. It should have a marked appearance from the ramifications of little veins of fat among the muscles. It should have little or no odor. The smell of the knife is a good guide in testing meat by its odor, especially hams. Bacon should have a thin rind and the fat be firm and tinged red by curing; the flesh should be a clear red and firmly adhere to the bone. Liver, kidneys, etc., may be safely bought if they show a bright even color and are free from marks of bruises. The best kind of pork is fresh and pinkish in color, and the fat is firm and white. The second quality has rather hard, red flesh, and yellowish fat. The poorest kind has dark, coarse grained meat, soft fat, and discolored kidneys. The flesh of stale pork is moist and clammy, and its smell betrays its condition. Measly pork has little kernels in the fat, and is unhealthy and dangerous food. Prime veal has a light flesh color and an abundance of hard, semi-transparent fat.

MILK.—The removal of the cream and the addition of water are the commonest frauds practised by the milk dealer; potato starch is occasionally added to both milk and cream, to give them a richer appearance, and to increase their quantity. Sometimes milk is unwholesome, because the cow from which it was taken was unhealthy. Sometimes it is very injurious, because the vessels into which it was milked were rinsed with impure water. The purity of the milk may be tested by a lactometer, which consists of a glass tube with a bulb at its lower extremity, in which is a little mercury so adjusted as to make a mark on the scale float exactly level with the surface of the distilled water. When the jar accompanying it is nearly filled with the milk to be examined (taking care to shake up the cream just before doing this), the instrument rises in proportion to the density, and by casting the eye along the surface of the milk the number on the scale on a level with it will indicate the exact specific gravity. A polished knitting needle makes a good lactometer. Dip the needle into the vessel of milk and withdraw it immediately in an upright position. If the milk is pure some of it will hang to the needle, but if water has been added, even in small proportions, the fluid will not adhere.

Lactometer.

For measuring cream the best instrument is a creamometer, which consists of 3 or 4 glass tubes divided into 100 parts and graduated near their upper ends; these tubes are supported in a wooden stand. The cream is placed in these, and after standing 12 hours the cream will have risen to the surface, and the figure opposite its lower edge will mark the percentage of cream to milk. The presence of potato starch may be determined by boiling some of the milk with a little vinegar; after separating the coagulum by a strainer, and allowing the liquid to become cold, testing it with solution or tincture of iodine; if it turns blue, starch, flour, or some other amylaceous substance, has been used to adulterate it. A simple method of determining the quantity of cream in any sample of milk consists in agitating the milk in a graduated glass tube with its bulk of ether for 4 or 5 minutes; add alcohol in volume equal to that of the milk, and shake for 5 minutes; place the tube vertically and allow it to rest for a brief period, when


Creamometer.

the oily matter will rise to the surface, so that its amount may be read off on the scale and the percentage easily computed.

POULTRY.—Fresh poultry have full, bright eyes, pliable feet, and soft moist skin; the best is plump, fat, and nearly white, and the grain of the flesh is fine. The feet and neck of a young fowl are large in proportion to its size, and the tip of the breast bone is soft and easily bent between the fingers. The young cock has a smooth leg and a short spur; when fresh the vent is close and dark. Hens, when young, have smooth legs and combs; when old, these will be rough; a good capon has a thick belly and large rump, a poll comb, and a swelling breast. Young ducks and geese are plump, with light, semi-transparent fat, soft breast bone, tender flesh, leg joints which will break by the weight of the bird, fresh colored and brittle beaks, and windpipes that break when pressed between the thumb and forefinger. In selecting a goose or duck, take hold of the toes and pull them apart; if the web separates easily it is young. Young pigeons have light red flesh upon the breast and full, fresh colored legs; when the legs are thin, and the breast is very dark, the birds are old. Turkeys are good when white and plump, have full breasts and smooth legs, generally black, with soft loose spurs; hen turkeys are smaller, fatter and plumper, but of inferior flavor to gobblers; old turkeys have long hairs, and the flesh is purplish where it shows under the skin on the legs and back. Fresh killed, the eyes are full and clear, and the feet moist When they have been kept too long, the parts about the vent begin to wear a greenish discolored appearance.

SUGAR.—Sugar of the inferior kinds is sometimes adulterated with flour, gum, etc.; it is, however, more frequently impure than intentionally adulterated; sugar is frequently adulterated with glucose; its presence can be discovered as follows: Take a handful of the mixture and drop it into a glass of cold water; stir it a few minutes; the cane sugar will entirely dissolve, leaving the grape sugar undissolved at the bottom of the glass in the form of a white, sticky substance not at all unlike starch in looks, and quite bitter to taste; the impurities and adulterations may also be detected by the appearance; a pure sugar being light colored, highly crystalline and very dry; impure sugars are dark colored, imperfectly crystalline, small grained, often presenting an earthy appearance, damp and heavy; they may also be tested by the touch; a good sugar should be perfectly dry to the touch, and should not feel in the least sticky or clammy when pressed between the fingers; on the other hand, a bad sugar, when treated in the same way, feels moist and sticky.

TEA.—The only adulteration of tea which is practiced to any great extent, is that of mixing it with exhausted leaves which have been redried, gummed, curled and faced with coloring matters; the leaves of the sloe tree, ash tree, elder bush and white thorn, are often sold as tea; it is a practice among some grocers to give what they call "a bloom" to green teas, by shaking them up with a little calcined magnesia or finely powdered French chalk; black teas are faced in a similar manner with finely powdered black-lead; many of these substances may be detected by simply stirring the tea in a little cold water, when they will become detached, and either make the water turbid or sink to the bottom.

VEGETABLES. — In buying these, particular attention must be given to their appearance; even this is often deceiving, as the dealer will brighten up the stale vegetables by the use of water; if the out end of asparagus is brown and dry and the heads bent on one side, the asparagus is stale; to be sure that the mushrooms are genuine, sprinkle a little salt on the spongy part or gills of the sample to be tried; if they turn yellow they are poisonous; if black they are wholesome; allow the salt to act before you decide on the question; false mushrooms have a warty cap, or else fragments of membrane, adhering to the upper surface they are also heavy, and emerge from a vulva or bag; they grow in tufts or clusters in woods, on the stumps of trees, etc., whereas the true mushrooms grow in pastures; false mushrooms have an astringent, styptic and disagreeable taste; when cut they turn blue; they are moist on the surface, and generally a rose or orange color; the gills of the true mushroom are of a pinkish color; the flesh is white and the stem is white, solid and cylindrical; when peas are young the shells are green; when newly gathered they are crisp; when old they look yellow; and when plump the peas are fine and large. To test a potato take a sound one, paying no attention to its outward appearance and divide it into two pieces; then examine the exposed surfaces; if there is much water it will be soggy when boiled; in regard to color, a yellowish white indicates a good potato; if it is a deep yellow, it will not cook well; rub the 2 pieces together and a white froth will appear around the edges and upon the 2 surfaces; this signifies the presence of starch, and the more starch the better the potato; test the strength of the starchy element by releasing the hold upon one piece after rubbing it against the other; if it clings to the other it is a good sign. When watermelons are to be bought, look for small specks, scales or blisters on the outer cuticle or rind; these are multiplied and enlarged as the fruit matures; a ripe melon will show them thick over the surface; a partial development only indicates half ripened fruit; a full crop of blisters reveals its perfect ripeness.

VINEGAR. — This article is often adulterated by water, burnt sugar, sulphuric acid, chillies, etc.; that which is used for pickles is frequently contaminated with copper; this is caused by the imprudent use of copper vessels; in order to detect the presence of copper in the vinegar, put a few drops of nitric acid into the suspected fluid, and then place in it a piece of polished iron or steel; if copper be present it will at the end of 24 hours be deposited on the iron.

PRESERVING.

CANNED FRUIT.

REMARKS.—In canning, glass jars are in every way preferable, and, in the end, cheaper than tin cans, either for fruit or vegetables. With care they will last many years, though new rubber bands will be needed now and then. The fruit used for canning should be of the best quality and as freshly picked as possible. It is best to select well ripened fruit; not, however, dead ripe and soft. Coarse-grained varieties seldom can so well as the more highly flavored kinds. When the fruit has been peeled and pitted, place it in a preserving kettle and cook it properly; while it is still boiling hot, fill the cans full to the very brim, put on elastics, wipe the jar, screw the top down at once and tighten it several times afterwards. As simply pouring boiling water over fruit does not expel the air, fruit treated in this way will spoil. Partly filled jars will also spoil. If it is desired to cook berries in the jars in which they are to be canned, fill the jars with the fruit and set them in a wash boiler on wooden slats, so as not to touch the bottom. Pour in cold water until it reaches the rims of the jars and heat until the fruit is well cooked. The syrup in which all canned fruits are cooked should be composed of water and sugar, in the proportion of 4 oz. sugar to 1 pt. water. For a highly flavored syrup, express the juice by means of a press, freeing the fruit from the seeds, into bottles of convenient size, which cork, when filled, and set aside on ice till wanted. All fruits do not require the same degree or the same continued application of heat. Fruits of delicate texture, such as berries, should not be brought quite to the boiling point; while orchard fruits may be boiled, but not so rapidly as to soften or macerate them. The preservation of canned fruit depends a great deal on the place in which they are stored, and upon the manner in which they are made air tight. If you put them in a cellar, unless it is unexceptionally dry, they will gather mold and lose all the fine, fresh flavor it is so desirable to retain. If kept in too warm a spot, they will ferment and burst the cans. Severe cold does not injure them unless the weather is below zero; but a double walled closet in a fireless room on the second floor is one of the best places for storing canned fruit in winter; and in summer a cool milk room will be found safe. Metal covers should never be used on cans or jars. They must be sealed tightly to exclude the air. For sealing wax for fruit cans see *Sealing Wax* in CEMENTS, GLUES AND PASTES. For preserving dried fruits, etc., see same in CURING AND STORING.

APPLES.—Take 10 lbs. apples after they have been sliced, pared and cored, 5 lbs. sugar, 1 pt. vinegar, and spices to suit the taste; steam the apples till they are soft; put them in the sugar, vinegar and spices; let them cook a few minutes, and then seal them in jars.

APRICOTS.—Take 4 lbs. of fine apricots which are not fully ripe; let them be gathered, if possible, in the morning, when the sun is on them,

Family Paring, Slicing and Coring Machine.

as the flavor is then much the best; make a small slit with a knife at the end where the stalk has been, and push the stone gently out; if they are to be preserved in halves, the stone can be easily removed; throw them into cold water, and simmer them gently until they feel soft when a pin is pushed through them; take them out and put them in fresh cold water; put into a preserving pan 1 qt. of water and 4 lbs. of loaf sugar; put it on a moderate fire, and stir it until the sugar is dissolved; when it boils, put in 1 tablespoonful of cold water; when it boils up again, take it off the fire and let it stand for a few minutes to settle; take off the scum, and boil it again; drain the fruit, and put it into the syrup; let it boil up 4 or 5 times, every time taking it off to cool, when it must be well skimmed; the last time, let it remain until the fruit is quite clear, which will be in about 10 minutes; just before it is taken from the fire, blanch and slice a few of the kernels and add them to it; or they may be blanched and put into a little spirit until the jars are ready to be tied up, and then a few strewn at the top of each.

CRAB APPLES.—To 5 lbs. apples take 3 lbs. sugar; make a syrup; when boiling put in apples; boil until soft; seal immediately in heated cans. The apples must not be pared.

GRAPES.—Take the clusters of grapes; look them over carefully; cut out all the imperfect ones with a pair of scissors; lay them as closely as possible, without crushing, into the cans; take the wash boiler, lay a folded towel on the bottom, set the cans in, in water, as closely as they will stand; set the boiler on the stove; let it heat slowly; allow it to boil 20 minutes, then set it off; have boiling syrup of sugar and water ready; fill up the cans and seal them.

PEACHES.—Always use twice as much water as sugar; make the syrup; and at the same time peel, halve and drop the peaches into boil-

ng water; let them simmer until a silver fork can be passed through them easily; then lift each half out separately with a wire spoon and fill the can; pour in all the boiling syrup which the jar will hold; leave it a moment for the fruit to shrink while filling the next jar; add as much more boiling syrup as the jar will hold; cover and screw down tightly immediately; continue in this way, preparing and sealing only one jar at a time, until all is done.

PEARS.—Allow a pt. of water and ¼ lb. of sugar to a qt. of fruit; drop each pear, after it is pared, into a pan of clear water; when the syrup has come to a fast boil, put in the pears carefully, not to bruise them; boil them until they look clear and can be easily pierced with a fork; have the cans rolled in hot water; pack them with the pears and fill to overflowing with the scalding syrup, which must be kept on the fire until wanted, and seal.

PLUMS.—To 1 lb. of fruit, allow ½ lb. of sugar and 1½ gills of water; prick each end of the plums quite through with a darning needle; wash, and put them in a stone jar; make the syrup; skim and pour boiling over the plums; turn a plate over them to keep the plums under the syrup; let stand until the next day; pour the syrup from the plums and let boil again; then return to the plums; repeat this process 3 days; then put the syrup over the fire; when it comes to a boil add the plums; let it cook slowly ¼ of an hour; fill the cans as quickly as possible.

QUINCES.—Cut the quinces into thin slices like apples for pies; to a 1 qt. jarful of quinces take 1½ coffee-saucers of sugar and a coffee-cup of water; put the sugar and water on the fire; when boiling put in the quinces; have ready the jars with their fastenings; stand the jars in a pan of boiling water on the stove; when the quince is clear and tender put rapidly into the jars, fruit and syrup together; fill the jars so that the syrup overflows, and fasten up tight as quickly as possible.

STRAWBERRIES.—For every 2 boxes of fresh strawberries, take 1 coffeecupful of white sugar, add a tablespoonful or two of water to the fruit if there is no juice in the bottom, to prevent burning before the heat brings out the juice; as soon as the fruit boils, add the sugar; stir gently for a few minutes until it boils up again, and can immediately.

Canned Vegetables.

BEANS.—Prepare the beans as if for immediate use; put them on in a kettle of cold water; boil until tender; have ready the tin cans and the tea-kettle of boiling water; dip the beans out into the cans and fill up with the boiling water from the teakettle; seal immediately.

CORN.—Fill the cans with fresh corn, husked and cut from the cob; fasten them up; set them in a boiler containing enough water to cover, and surround them with straw to prevent their striking together; heat the water by degrees and allow it to boil 1½ hours; make a small opening in the top of the can for the escape of the gas and then seal immediately.

PUMPKIN.—Cut up the pumpkins; cook them thoroughly and strain the same as for immediate use; return the mass to the kettle; let it get hot; can it the same as any vegetable; pack down well, so there are no air bubbles.

RHUBARB or PIE PLANT.—Cut fresh rhubarb into inch pieces; place a layer in a large earthen dish; sprinkle liberally with sugar; when the dish is filled, turn a large dinner plate over it; place in the oven and bake until done; have the canning jars heated; fill at once, and screw on the covers; tighten them every ½ hour until they are absolutely air tight.

TOMATOES. — Select nice large fruit; pare carefully, without scalding; cut away all defective parts; place in a preserving kettle over a hot fire; have the cans thoroughly cleansed and rinsed; as soon as the tomatoes come to a boil, fill the cans, being careful to keep the fruit as whole as possible; press the fruit into the can; when full, put in hot juice until it will hold no more; seal; wipe off the can and set aside.

Jams.

REMARKS. — Let the jam be made on a dry day; wipe the fruit clean, but do not wash it; peel off the skin and coarse fibers; slice the fruit thin; to each lb. thus prepared allow 1 lb. of fine sugar in fine powder; put the fruit in a pan; strew a quarter of the sugar amongst it and over it; let it stand until the sugar is dissolved; boil it slowly to a smooth pulp; take it from the fire; stir in the remainder of the sugar by degrees; when it is dissolved, boil the preserve quickly until it becomes very thick, and leaves the bottom of the pan visible when stirred; the time required for jams depends on the kind of fruit used, and the time of year it is made; it will vary from 1 hour to 2½; the juice should be slowly drawn from it first.

APPLE BUTTER.—Boil 40 gal. cider just from the press; when boiled away ½ to ⅔, add 7 or 8 wooden pails of nicely prepared quarters of sweet apples; stir constantly until boiled down to 15 gal.; when almost done throw in pulverized allspice.

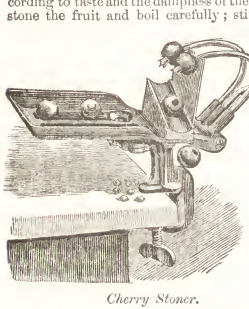
APPLE JAM. — Peel and core the apples; cut them in thin slices; then put them into a preserving pan or enameled saucepan; to every lb. of fruit add ¾ lbs. of white sugar, broken small; and put in tied up in coarse muslin, with a few cloves, a small piece of ginger and a rind of a lemon very thin; stir with a wooden spoon on a quick fire for 20 minutes or longer; when sufficiently boiled, the jam will cling to the spoon; remove the cloves, etc.; put the jam in-

to jam pots; when quite cold, tie them down with thick paper or bladder.

APRICOT JAM.—Pare the apricots as thinly as possible; break them in half; remove the stones; weigh the fruit; to every lb. allow the same proportion of loaf sugar; roll the sugar fine; strew it over the apricots, which should be placed on dishes; let them remain 12 hours; put the sugar and fruit into a preserving pan; let them simmer very gently until clear; take out the pieces of apricots singly as they become clear; as fast as the scum arises carefully remove it; put the apricots in small jars; pour over them the syrup; cover the jam with pieces of paper dipped in the purest salad oil; stretch over the top of the jars tissue paper cut about 2 in. larger and brushed over with the white of 1 egg; when dry it will be perfectly hard and air tight.

BLACKBERRY JAM. — Dry the berries with a towel if they are not picked in dry weather; to every lb. of fruit add ½ lb. of sugar; cook for 1 hour; stir all the time; no water; put in patent glass jars.

CHERRY JAM.—Take picked and stoned cherries; to every lb. allow ½ to ¾ lb. of sugar, according to taste and the dampness of the season; stone the fruit and boil carefully; stir for ½



Cherry Stoner.

hour; add the sugar; boil and skim for another ½ hour; just before it is done add some of the blanched and split kernels or a few drops of rutafia.

CURRANT JAM.—To every lb. of fruit allow 1 lb. of sugar; gather the currants on a fine day; pick them from the stalks; put them into a preserving pan with the sugar broken into small pieces; bring it gradually to a boil; then let it simmer; remove the scum as it rises, and stir the jam constantly; when done, put it into pots with brandy paper, or paper steeped in starch, over them; tie them down closely.

ELDERBERRY BUTTER. — 1 gal. of elderberries; 2 qts. of sugar and 1 pt. of vinegar; boil for 5 hours, stirring often.

GOOSEBERRY JAM.—Equal weights of fruit and sugar; top and tail the not very ripe gooseberries; simmer them in a syrup made by boiling ½ pt. of water with every lb. of sugar for ¼ hour; carefully skim till clear and firm; try a little of the juice on a plate; if it jellies when cold, it is done; pour it into pots; when cold, cover and set in a dry place.

GRAPE BUTTER.—Cook grapes until the skins are tender; rub through a colander fine enough to retain the seeds; to each pt. of pulp add ½ lb. of sugar, or more, if the butter is desired firmer and richer; boil down with great care to prevent burning, to the desired consistency; add spices, if liked.

GRAPE JAM.—Pinch the pulp from the grapes; lay the skins on one side; put the pulp over the fire with very little water; boil 20 minutes and then strain it through a sieve; put it back over the fire and add sugar and spices to taste; ½ cup of sugar to 1 lb. of the pulp will be enough; when it boils drop in the skins; boil 10 minutes; if it seems too thin, boil another 10 minutes.

LEMON BUTTER.—1 lb. of white sugar; ½ lb. of fresh butter; 6 eggs; juice and grated rind of 3 lemons; take out all the seeds; boil all together a few minutes, till thick as honey; stir constantly; put in small jars or tumblers, covered with paper dipped in white of egg.

PEACH BUTTER.—Pare ripe peaches and put them in a preserving kettle; use sufficient water to boil them soft; sift through a colander; remove the stone; to each qt. of peach put 1½ lbs. sugar; boil very slowly one hour; stir often and do not let them burn; put in stone or glass jars and keep in a cool place.

PLUM BUTTER.—Look over the plums carefully; discard any specked one; put into sufficient hot water to cover them; add 1 teaspoonful of soda to every ½ bu. of plums; boil until the skins crack; drain and rub through a colander; take pint for pint of the pulp and granulated sugar; heat in a porcelain kettle slowly 20 minutes; stir to keep from burning; store in a crock in any cool place.

RASPBERRY JAM.—Clean and crush the fruit thoroughly; boil 15 minutes before adding sugar; ¾ lb. sugar to 1 lb. fruit; then boil 30 minutes longer; stir constantly; for this purpose a small wooden paddle 6 in. wide, the lower end rounded to fit the bottom of the kettle, full of holes, and tapered to the handle, to which it is attached by a mortise and tenon at right angles, is a convenient article; the handle should be 1 yd. long.

RHUBARB, or PIE PLANT JAM.—Cut the plant into pieces about an inch long; to 1 lb. of rhubarb put 1 lb. of yellow sugar; cut it up the afternoon before it is to be cooked; scatter the sugar over it and let it stand all night; in the morning drain off the syrup which has formed; boil it until it thickens; add the rhubarb and a twig of green ginger sliced fine; boil it until it is perfectly tender.

STRAWBERRY JAM.—Same weights of strawberries and pounded white loaf sugar; mash up the berries well in preserving pan first; add sugar afterward; boil for 20 minutes; stir well and skim.

TOMATO JAM.—To 1 lb. of peeled and cut tomatoes allow ½ lb. of sugar; put together over

night in a stone jar; in the morning take off juice; strain, boil and skim it; put in the tomatoes with a handful of best stick cinnamon tied in a cloth; stir constantly, and boil until the jelly will not separate; about 10 minutes before removing from the fire take out the cinnamon; add 1 teacupful of good vinegar to each gallon of jam, seal.

JELLIES.

REMARKS.—Cook the fruit in a porcelain kettle, with or without water, according to its nature, until it is well softened; strain through a flannel bag previously rinsed in hot water; to every pint of juice allow 1 full rounded pint of sugar; boil the juice for 20 minutes, noting time from the instant it begins to boil; heat the sugar by placing in an oven on platters; after the juice has boiled 20 minutes skim and add the sugar; when this is dissolved and the juice is still boiling, pour it into the glasses. Add the beaten white of an egg to the juice to clarify it.

Jelly Mold.

ALMOND.—Rich almond milk, ½ pt.; thick hartshorn jelly, ½ pt.; sugar, 2 oz.; 2 or 3 bitter almonds, and a little lemon peel to flavor; heat together; strain and mold.

APPLE.—20 large, juicy apples; pare and chop; put into a jar with the rind of 4 large lemons, pared thin and cut in bits; cover the jar closely, and set it in a pot of boiling water; keep water boiling hard all around it until the apples are dissolved; strain through a jelly bag, and mix with the liquid the juice of the 4 lemons; put 1 pt. of mixed juice to every lb. of sugar in the kettle; when the sugar is melted set it on the fire; boil and skim about 20 minutes, or until it is thick, fine jelly.

BARBERRY.—Take some very ripe barberries; pick them from their stalks and weigh them; to every pound of fruit take ¾ lb. of loaf sugar; add sufficient water to make it into a syrup; put in the barberries; boil them until the syrup comes to the pearl; take off any scum which may rise; throw them into a fine hair or lawn sieve; press the berries with a spoon to extract as much juice as possible from them; receive the syrup and juice in a pan; put it again on the fire, and finish as apple jelly.

BLACKBERRY.—Gather the fruit when perfectly ripe, and in very dry weather; put the blackberries into a jar, and place the jar in hot water; keep it boiling until the juice is extracted from the fruit; pass it through a fine sieve or jelly bag without much pressure; for every pint of juice add 14 oz. of sugar; boil in a clean preserving pan about 25 minutes; carefully take off the scum as it rises to the surface; place it hot in small jars and cover it with thin tissue paper, dipped in brandy, and brown paper over it; keep in a cool, dry place.

CALF'S FOOT.—Wash and prepare 1 set of feet; place them in 4 qts. of water, and let them simmer gently 5 hours; at the expiration of this time, take them out and pour the liquid into a vessel to cool; when cold, remove every particle of fat; replace the jelly in the preserving kettle; add 1 lb. of loaf sugar, the rind and juice of 2 lemons; when the sugar has dissolved, beat 2 eggs with their shells in 1 gill of water; pour this into the kettle and boil until perfectly clear; add 1 gill of Madeira wine and strain through a flannel bag into any form desired.

CHAMPAGNE.—Take 2 oz. of good gelatine; dissolve it in 1 qt. of water; put this in a saucepan with the juice of 2 lemons and 3 oranges, 2 whole eggs, 2 whites of eggs, a few egg shells and ¾ lb. of sugar; mix well and add another quart of water; put the saucepan on the fire; stir occasionally to make clear; when it boils, put the pan on the side of the stove; let it remain without boiling for 15 minutes; remove it and run the jelly twice through a flannel strainer; add to it 1 pt. of champagne; pour into one or more molds and set on the ice to harden; turn out of the molds and serve on cold plates.

CHERRY.—Take the stalks and stones from 2 lbs. of dark red, fleshy cherries; put them in a basin; pound the kernels; squeeze the juice of 4 lemons through a tammy; mash the cherries; put first in ½ pot of currant jelly; then the kernels; lastly the lemon juice; mix these well together; boil and skim 1 pt. of clarified sugar and isinglass; put the cherries into a jelly bag; pour the sugar, etc., over them; run it through till quite clear; if not sufficiently sweet add more sugar; if the contrary, add more lemon juice; wet the mold; set in ice, and fill it with the jelly, but do not turn it out till the last minute.

CIDER.—Soak ½ box or 1 oz. of gelatine in 1 qt. of sweet cider for 10 minutes, and a small cupful quince or crab-apple jelly; chop fine; place the pan over the fire until all is dissolved; add a small cupful white sugar while hot; strain into metal molds, previously oiled to prevent its sticking.

CRAB APPLE.—Cut out the blossom ends and quarter the apples, but do not peel or core them; put into a stone jar; cover well, and set in a kettle of tepid water, with a block or small tin in the bottom; let it boil thus nearly all day; leave it in the covered jar until next morning; sift through a colander, and afterwards strain through a jelly bag; allow 1 lb. of sugar for 1 pt. of juice; boil the juice 20 minutes; add the hot sugar; stir well; let all boil up together 2 or 3 minutes.

CRANBERRY.—1 qt. cranberries and ½ lb. sugar; wash the berries and cut each in two; put on the fire with just enough water to cling to them; stir in the sugar gradually; when the sugar melts, let all simmer slowly 2 hours; stir

occasionally, and strain into molds that have been dipped in ice water.

CURRANT.—Use red currants fully ripe; put them into a preserving pan; mash them up; place them on the fire to get scalding hot; stir them all the time with a wooden spatula; remove from the fire; when cold enough, strain them through a coarse crash towel till all the juice has been extracted; measure the juice into a clean copper or porcelain pan; place it upon the fire and let it boil 5 minutes; add 1 lb. pulverized sugar to every pint of juice; stir constantly from the bottom while adding the sugar; continue to do so until the sugar is dissolved; remove scum and fill jelly glasses immediately.

GELATINE.—Obtain as good a quality of gelatine as possible, and do not use a larger quantity than is necessary for the firmness of the dish; soak the gelatine in water until it swells; this will be in about 1 hour; dissolve it in a little boiling water for a few minutes; add wine, lemon juice, sugar and flavoring according to taste, and pour into a damp mold; keep it in a cool place until firmly set; if very stiff, it may be turned out more easily if dipped in boiling water for a moment.

GOOSEBERRY.—Boil 6 lbs. of green, unripe gooseberries in 6 pts. of water; pour them into a basin; let them stand covered with a cloth for 24 hours; strain through a jelly bag, and to every pint of juice add 1 lb. of sugar; boil it for 1 hour; then skim it, and boil it for ½ hour longer with a sprig of vanilla.

GRAPE.—Put the fruit into a stone jar; set this in a kettle of tepid water and put on the fire; let it boil, closely covered, until the fruit is broken to pieces; strain; to each pint of juice allow 1 lb. of sugar; set the juice on alone to boil; while it is warming divide the sugar into several different portions and put into shallow pans that will fit in the ovens; heat in these; open the ovens now and then to stir and prevent burning; boil the juice just 20 minutes from the moment it begins fairly to boil; throw the sugar into the boiling juice; stir rapidly all the while; withdraw the spoon when it is dissolved; let the jelly just come to a boil; take the kettle instantly from the fire; roll the glasses or cups in hot water and fill with the scalding liquid.

ISINGLASS.—2 oz. of isinglass to 1 qt. of water; boil till it is dissolved; strain it into a basin upon a slice of lemon peel pared very thin, 6 cloves and 3 or 4 lumps of sugar; let this stand by the fire for 1 hour; take out the lemon and cloves; then add 4 tablespoonfuls of brandy.

JELLY STRAINERS. To Make. — 1. Nail pieces of lath together as indicated in the illustration; make the bag of white flannel and tie it to the corners, or fasten rings on the strings to go over the posts; after use, wash and dry the bag at once.—2. Make a conical bag of good white flannel, about 20 in. long and 15 in. broad at the top, when spread on a flat surface; sew to it four pieces of white tape at the large end and at equal distances, so that 2 sticks may be run into them; fasten ropes to the top stick at intervals, by which the bag is to be hung up.

Jelly Strainer.

LEMON.—Dissolve 1 box of gelatine in nearly 1 qt. of boiling water; add the juice of 5 lemons, and enough sugar to sweeten to taste; strain and set aside until nearly cool; beat the whites of 5 eggs and whip into the jelly; turn into a dish and let it set until cold; after it becomes solid decorate with pieces of red jelly.

Jelly Strainer.

ORANGE.—Whites of 2 eggs; 8 sweet oranges; 2 lemons; ¾ lb. sugar; 1 oz. gelatine and 1 gill cold water; grate the rinds of the oranges and lemons; melt the sugar in a small saucepan with ½ gill cold water; when melted, add the juice and rinds of the oranges and lemons; soak the gelatine for 10 minutes with ½ gill cold water; add to the other ingredients; whip the whites of eggs slightly and pour them into the saucepan; whisk all together until it boils; put on the lid of the saucepan and allow it to simmer for 20 minutes; pour through a flannel bag and then pour it into the molds.

PINE-APPLE. — Chop up 2 canfuls of fresh pine-apple; pour on it 2 qts. of boiling water; add 4 teacupfuls of white sugar and juice of 2 lemons; add a box of gelatine to every 3 qts. of water; strain through a flannel bag, and pour into jelly molds.

PLUM. — Boil the plums until soft in enough water to cover them; pour into a jelly bag, and drain over night; strain through a flannel bag; boil this juice 20 minutes; skim well; take off; measure it; to each pt. of juice add 1½ pts. of white sugar; boil 1 pt. of juice at a time 7 minutes; pour into cups; when cold paste paper over, and brush all over with white of egg.

PUNCH. — Isinglass, 2 oz.; sugar, 1¾ lbs.; water, 1 pt.; dissolve; add of lemon juice, ½ pt., the peels of 2 lemons, also of 2 oranges, and rum and brandy of each ½ pt.; keep it in a covered vessel until cold; liquefy it by a very gentle heat; strain and pour into molds.

QUINCE. — Pare and slice the quinces; add for every 5 lbs. of fruit 1 cupful water; put peelings, cores and all into a stone jar; set the jar into a pot of boiling water; let it boil until the fruit is soft and broken; strain through a stout, coarse bag or cloth; to each pt. of juice allow 1 lb. of white sugar; set the juice on alone to boil; while it is warming place the sugar on flat dishes to heat in the oven; have the sugar hot; do not let it burn; boil the juice just 20 minutes from the time it begins to boil; throw in the hot sugar; stir quickly all the time; as soon as the sugar is dissolved remove the kettle at once from the fire; fill your glasses with the scalding liquid.

RASPBERRY.—Take ripe raspberries, 3 parts, and ripe currants, 1 part; press out the juice and filter; to 1 pt. juice add 1 lb. loaf sugar;

finish in the same manner as other jellies.

RUM.—To 1 qt. bottle of common white wine, add 1 lb. of lump sugar reduced to syrup and clarified; take 1 oz. isinglass; dissolve it thoroughly; strain it through a sieve; mix it with the syrup milk warm; when this mixture is nearly cold, pour it into the white wine; mix it by stirring it well; add a spoonful, or more if desired of old Jamaica rum; stir it and pour it into molds or glasses.

STRAWBERRY. — Take the berries when ripe and in their prime; mash them; let them drain through a flannel bag, without squeezing it; to each pt. juice put 1 lb. of white sugar, and the beaten white of an egg to 3 lbs. of the sugar; set it on the fire; when it boils up well, take it from the fire; skim it clear; set it back on the fire; if any more scum rises, take it from the fire and skim it clear; boil it till it becomes a jelly.

WINE.—½ pt. sherry wine; ½ pt. cold water; ½ package gelatine; juice of 2 lemons and grated peel of 1; 1 orange and 1 pt. boiling water; soak gelatine in cold water ½ hour; add to this sugar to taste, and the lemons; pour over all the boiling water; stir until the gelatine is dissolved; put in the wine; strain through flannel bag into molds; peel and slice an orange, and drop slices into the mold also.

MARMALADES.

REMARKS.—Marmalades are made either by pounding the pulped fruit in a mortar with an equal or a rather larger quantity of powdered white sugar, or by mixing them together by heat, passing them through a hair sieve whilst hot, and then putting them into pots or glasses; when heat is employed in mixing the ingredients, the evaporation should be continued until the marmalade jellies on cooling.

APPLE. — Peel and core 2 lbs. of apples and put them into an enameled saucepan with ½ pt; of white wine and 1 lb. of powdered loaf sugar; stew them over a slow fire until the fruit is very soft; then squeeze it through a hair sieve; if not sufficiently sweetened add sugar to taste and put away in jars.

APRICOT. — Prepare the fruit by blanching and greening; when they are green, pulp them by rubbing them through a coarse hair sieve or colander; for each lb. of pulp clarify and boil to the blow 1 lb. of loaf sugar; mix it with the pulp and boil it until it will jelly; take off any scum which may arise with a skimmer.

BARBERRY.—Pick from their stalks 2 lbs. of the finest ripe barberries; put them into an enameled saucepan with 1 pt. of water; boil them for a few minutes; pour them out; mash them well, and strain the pulp through a sieve; place them upon the fire; slowly reduce it; when it is pretty stiff add sugar in the proportion of weight for weight of the fruit before being dressed; simmer it for a short time; put it by in glasses when it has grown sufficiently cool.

CHERRY.—Choose the finest ripe red cherries you can get; stone them; strew sugar over them; mash them well; pass them through a tammy; simmer them down with an equal weight of fine beaten and sifted loaf sugar; cook them over a slow fire; stir them constantly; when a beautiful stiff pulp is formed, turn it into glasses; keep them carefully covered.

CRAB APPLE. — When ripe, pare, core and quarter the crab apples; slice each quarter as thinly as possible; spread the apple slices upon a cloth, so as to shrivel them slightly; melt down ¾ their weight of clarified sugar; when this is boiling hot, add the apples; withdraw the saucepan from the fire; let it stand till its contents are cold; place it over the fire again; simmer very gently, but do not stir the apples; when they look nicely clear, pour them into pots, and cover as usual when the preserve is cold.

CRANBERRY.—Stew sweet and insipid apples and mix them with stewed cranberries, in the proportion of 1 part cranberries to 2 parts apples; strain through a colander and mix evenly.

GOOSEBERRY. — Pick the fruit clean; cook thoroughly; pass through a sieve; add equal weights of sugar and water, so that when the marmalade has been cooked for 1 hour and is cold it will spread as thinly as honey.

LEMON. — Have ready a quantity of lemons; take off the peel in quarters and remove the white skin and pips from the pulp; slice the fruit; cut the peel as thin as possible, but do not remove the white part; to every lb. of fruit after it is sliced, add 2 pts. of filtered water; leave it to steep for 24 hours; tie up the pips and the skin from the pulp in muslin; put it with the fruit and boil slowly for two hours or more until quite tender, without sugar; take out the muslin bag; weigh the fruit; to every lb. or pt. of boiled fruit add 1¼ lbs. of sugar; boil all for two hours or until perfectly clear.

NECTARINE.—Let the fruit be the best and ripest that can be obtained; with a very sharp knife halve the fruit; remove the stones; slice the nectarines (skins and all) as thin as possible; sprinkle with loaf-sugar, beaten and sifted; 12 hours later drain the juice rendered by the fruit, with 12 oz. of sugar to 1 lb. of nectarines; put it into a preserving pan; when the sugar is about boiling hot, add the sliced fruit; withdraw it from the fire; when cold simmer it for 10 minutes without stirring it, and put it into small jars for keeping.

ORANGES.—Boil the peels of the oranges in syrup until soft, pulping them through a sieve; add as much white sugar, and boil them with the former syrup and the juice of the fruit to a proper consistence.

PEACH.—Allow ¾ of a lb. of sugar to 1 lb. of fruit; cut the fruit in pieces and put in the preserving kettle, with layers of sugar, placing fruit at the bottom to prevent scorching of sugar; if the fruit is not very juicy, add a little water; let all boil slowly together for about 1½ hours, or until the whole begins to look clear and becomes thick by cooling a portion on a plate; when it is done put into jars or bowls.

PEAR.—To 6 lbs. of small pears, take 4 lbs. of sugar; put the pears into a saucepan with a little cold water; cover it and set it over the fire until the fruit becomes soft; put them into cold water; pare, quarter and core them; put to them 3 teacups of water; set them over the fire; boil the sugar fine; mash the fruit fine and smooth; stir it well together until it is thick like jelly; put it in tumblers or jars; when cold, secure it as jelly.

PINE-APPLE.—Select a ripe, sound pine-apple; halve it and scrape the flesh off it with a knife until it is quite a pulp; weigh this, and to each ½ lb. add the strained juice of a lemon and 6 oz. of loaf sugar, beaten and sifted; put all together into an enameled saucepan; stir it over a clear but not fierce fire; when it is well-stiffened, pour it into sweetmeat glasses for serving.

PLUM.—When the plums are thoroughly ripe, proceed to take off the skins; weigh and boil them quickly, without sugar, for 50 minutes; keep them well stirred; to every 4 pounds add 3 of good sugar reduced quite to powder; boil the preserve from 5 to 8 minutes longer; clear off the scum perfectly before it is poured to be put in the jars; when the flesh of the fruit will not separate easily from the stones, weigh and throw the plums whole into the preserving pan; boil them to a pulp; pass through a sieve; deduct the weight of the stones from them when apportioning the sugar to the jam.

QUINCE.—Pare, core and slice the quinces; stew skins, cores and seeds in a vessel by themselves, with just water enough to cover them; when this has simmered long enough to extract all the flavor, and the parings are broken to pieces, strain off the water through a thick cloth; put the quinces into the preserving kettle when this water is almost cold; pour it over them and boil; stir and mash the fruit with a wooden spoon as it becomes soft; when the whole is reduced to a smooth paste, stir in ¾ lb. of sugar for every lb. of fruit; boil 10 minutes more; stir constantly; take off, and when cool, put into small jars with brandied paper over them.

PICKLES.

REMARKS.—Pickles are divided into two varieties, the true or sour pickle, which is usually a vegetable preserved in salt and vinegar, and the sweet pickle, a sort of hybrid between a pickle and a preserve. A good quality of vegetables or fruit should be selected and either pure cider or wine vinegar should be used. Before using a brass kettle for pickling, see that it is carefully cleaned with salt and hot vinegar; rub it all over the inside, over the rim, and around the ears, where the handles fit in, till every part shines like pure gold; immediately after it used and taken from the fire, remove all the contents. After a kettle is thoroughly cleaned no harm comes from its use so long as it is kept over the fire; the mischief arises from letting anything stand in it and cool. In scalding any kind of pickle, as soon as that work is done, empty the contents into a wooden or earthen bowl, and immediately proceed to scour the kettle again, even though the same articles are to be returned to it as soon as changed into another water or more vinegar. Keep pickles in glass jars if possible; if not, in unglazed stone jars. Glazed jars are poisonous. Having once bought the glass or stone jars, never allow them to be used for anything else. As soon as one is emptied, wash, scald, set in the sun till well sweetened, then cover up and set away carefully for another year, saving all the covers and corks. If all kinds of pickles are not kept well covered with vinegar they will soon turn soft and mold and be ruined. If in a stone pot turn a saucer bottom up over them and then cover closely. If in glass have covers tightly screwed on. Examine the pickles every few weeks to see if they are keeping well, and if there is the least uncertainty pour out the vinegar, scald, skim, add a little sugar, then pour on the pickles again hot and cover closely. To color the pickles, dissolve 5 gr. saffron in ½ oz. distilled water; in another vessel dissolve 4 gr. indigo carmine in ½ oz. distilled water; shake each up thoroughly and allow to stand about 24 hours. Then mix them together and a mixture is obtained which will color 5 lbs. sugar.

SOUR PICKLES.

BEANS.—Procure young string beans, wash and boil them in slightly salted water till tender; drain through a colander or sieve; dry them with a cloth; pour boiling vinegar, spiced to taste, over them; repeat this two or three days, or till they are green.

BEETS.—Take beets while young and sweet and not too large; boil and slice them while they are hot; have ready a pan of hot vinegar, into which put the slices; cover them a few moments until thoroughly hot; then with a spoon place them carefully and closely in a glass can; fill up with vinegar and seal; if the slices are too large cut them in two.

BUTTERNUTS.—When a pin will go through them easily, they are young enough to pickle; soak them in salt and water a week; drain it off; rub them with a cloth to get off the roughness; to a gallon of vinegar put a teacup of salt, a tablespoonful of powdered cloves and mace, mixed together; ½ oz. allspice and peppercorns; boil the vinegar and spices; turn it while hot on to the nuts; in the course of a week scald the vinegar; turn it back on them while hot; they will be ready to eat in the course of a fortnight.

CABBAGE.—Shred or chop six or seven heads of white cabbage and five or six red peppers; pack in jar and pour over them a boiling brine made of a heaping tablespoonful of salt to 2 qts. water; after 24 hours drain off the brine and pour on boiling vinegar; if very sour it may be made half water; the next day pour into a colander; wash out the jars; repack the cabbage

with a little whole mustard seed; cover with cold vinegar; turn a plate over them. Black pepper and cloves added to this pickle spoil its bright clear color.

CATSNY.—To ½ pk. of ripe tomatoes, 3 green and 3 red peppers, and a large bunch of celery, all cut fine, add 3 pts. of vinegar, 1 teacup of salt, 1 teacup mustard seed, 1 teacup grated horseradish and 2 tablespoonfuls of black pepper; mix well and bottle.

CAULIFLOWER. — Cut a large cauliflower in branches; soak it for an hour in cold water enough to cover it, with a handful of salt added to the water for the purpose of removing all insects; then drain it; throw it into well-salted boiling water; boil it until just tender enough to be easily pierced with a sharp knife; drain, cool and place it in glass jars; beat 4 eggs smooth, but not to a froth; mix them with 1 pt. of vinegar; stir the mixture with a wooden spoon over the fire until it begins to thicken; remove it from the fire at once lest it curdle; stir for 2 minutes; next stir in 1 tablespoonful each of curry powder and ground mustard, 1 teaspoonful each of white pepper and salt, and 1 gill of good salad oil; pour this dressing over the cauliflower and seal the jars containing it.

CHICKEN.—Boil 2 chickens until the meat will fall from the bones; remove the meat as whole as possible and put into a stone jar; add to a pt. of the water in which they were boiled, enough vinegar to cover the meat; season with cloves, allspice, pepper and salt, and pour hot over the chicken.

CHOW CHOW. — This is also called higdon, mixed, and chopped pickles. 2 large cauliflowers, 2 qts. green peppers, 3 qts. green tomatoes, 3 qts. green cucumbers, and 3 qts. small onions; slice about ½ in. thick; sprinkle with salt; alternate with layers of tomatoes, onions and cucumbers; boil the cauliflower about 5 minutes; set over night; then strain all well and free from water; after this place in jars and make the seasoning as follows: 1 lb. mustard, ½ lb. mustard seed, ½ lb. whole allspice, ½ lb. whole black pepper, 1 pt. beef brine, 1 gal. vinegar, ½ stick curry powder; boil hard for 15 minutes; pour over the vegetables; if too thick add vinegar; mix the mustard with the vinegar; put the spices in a bag closely tied.

CUCUMBERS. — 1. Wipe small cucumbers clean with a dry cloth; put them into a jar; add boiling vinegar, containing a handful of salt; boil up the vinegar every 3 days; pour it on them until they become green; add ginger and pepper, and tie them up close for use.—2. 2 doz. large cucumbers, sliced and boiled, in vinegar enough to cover them, 1 hour; set aside in the hot vinegar; to each gallon of cold vinegar allow 1 lb. sugar, 1 tablespoonful of cinnamon, 1 tablespoonful ginger, 1 tablespoonful black pepper, 1 tablespoonful celery seed, 1 teaspoonful mace, 1 teaspoonful allspice, 1 teaspoonful cloves, 1 tablespoonful turmeric, 1 tablespoonful scraped horse-radish, 1 tablespoonful sliced garlic, and ½ teaspoonful Cayenne pepper; put in the cucumbers and stew 2 hours.—3. Take good-sized cucumbers; slice quite thin and pour a weak brine, boiling hot, over them; let it stand 24 hours; then to 1 gal. of vinegar add 1 oz. white mustard seed, 1 of celery seed, and ½ teaspoonful of pulverized alum; boil and turn over the pickles; put in pickle bottles and seal, or in a jar with a cloth cover, rinsing the cloth occasionally.

EELS.—Skin some eels; slit them up the middle; take out the bones; rub the flesh over with salt; let them lie 3 days; turn them every day; take them out of the brine; wash them in water; wipe them dry with a cloth; season them with nutmeg, cloves, mace, and a bay leaf; roll them up; tie them tightly in a cloth; boil them in an equal quantity of white wine and vinegar; when they are tender take them out of the liquor and set them to cool; when quite cold put them into the same liquor again; if there is not sufficient liquor, boil some more vinegar, white wine and spices; put by in jars.

EGGS.—Use a moderate size wide-mouthed earthen jar, sufficient to hold 1 doz. eggs; let the latter be boiled quite hard; when fully done place the same, after taking them up, into a pan of cold water; remove the shells from them; deposit them carefully in the jar; have on the fire 1 qt. or more of good white wine vinegar, into which put 1 oz. of raw ginger, 2 or 3 blades of sweet mace, 1 oz. of allspice, ½ oz. of whole black pepper and salt, ½ oz. of mustard seed, with 4 cloves of garlic; when it has simmered down, take it up and pour the contents into the jar; take care that the eggs are wholly covered; when quite cold, stopper it down for use.

GREEN GINGER.—Put ¼ lb. of salt, 2 tablespoonfuls of cayenne pepper, 1 oz. ginger, 1 oz. white pepper and 2 oz. shallots into 2 qts. of best cider vinegar; boil it a short time; cool, and then pour over any freshly gathered vegetables or fruits desired; cover closely, and set in a cool, dark place.

HORSERADISH. — To each coffeecupful of horseradish allow 1 tablespoonful of white sugar and 1½ pts. of good vinegar; bottle and seal.

LEMONS.—Wipe 6 lemons; cut each into 8 pieces; put on them 1 lb. of salt, 6 large cloves of garlic, 2 oz. of horseradish sliced thin, likewise of cloves, mace, nutmeg and cayenne ¼ oz. each, and 2 oz. of flour of mustard; to these add 2 qts. of vinegar; boil ½ hour, either in a well tinned saucepan or in a strong jar, in a kettle of boiling water; set the jar by; stir it daily for 6 weeks; keep the jar closely covered; then put it into small bottles.

LIMES.—Select small limes, with thin rinds; rub them with pieces of flannel; slit them half down in four quarters, but not through to the pulp; fill the slits with salt, hard pressed in; set them upright in a pan for 4 or 5 days until the salt melts; turn them 2 times a day in their own liquor until tender; make a sufficient quantity of pickle to cover them, of vinegar, the brine of the lemons, pepper and ginger; boil and skim it; when cold put it to the lemons, with 2 oz. of mustard seed, and 2 cloves of garlic to every 6 lemons.

MANGOES.—Large bell peppers or small green muskmelons are the best for stuffing; take a melon that is not quite ripe; cut off a slice from

the top, and carefully pick out all the seeds; shred finely 1 oz. of garlic; mix it with 2 oz. of mustard seed, and the seeds of the melon; now put this back as a stuffing; place the top on, and bind it down; boil in 2 qts. of best vinegar, 1 oz. of Jamaica peppers, 1 oz. of whole allspice, 1 oz. of bruised ginger, and 1 teaspoonful of salt; when boiling, pour it over the melon; the same vinegar must be put into a saucepan, boiled up again, and thrown over the melon for 3 successive days, or more if possible; then tie down with bladder to exclude the air.

MUSHROOMS.—To preserve the flavor, rub the buttons with a piece of flannel and salt; from the larger ones take out the red inside; throw a little salt over them; then put them into a stewpan with some mace and white pepper; as the liquor comes out, shake them well; simmer them over a gentle fire till all of it is dried into them again; put as much vinegar into the pan as will cover them; make it warm, and put all into glass jars or bottles, and tie down with a bladder.

NASTURTIUMS.—As soon as nasturtiums are gathered throw them into strong brine; let them remain for 2 days; boil together vinegar, whole pepper, whole cloves, salt and a small piece of ginger root; when boiling, pour this over the nasturtiums; drain them well; cover closely for 1 week, when they will be fit for use.

ONIONS.—Scald 1 gal. of small onions in salt water of the strength to bear an egg; just let them boil; strain them off; peel them after they are scalded; place them in a jar; cover them with the best cold vinegar; the next day pour the vinegar off; add 2 oz. of bruised ginger, 1 oz. of white pepper, 2 oz. of flour of mustard seed, ½ oz. chillies; boil them 20 minutes; turn all together, boiling hot, on the onions; let them remain 10 days; turn the vinegar out again; boil as before, and turn them hot on the onions again.

OYSTERS.—Take the oysters from the liquor; strain and boil it; rinse the oysters, if there are any bits of the shells attached to them; put them into the liquor while boiling; boil them 1 minute; then take them out of it; add to the liquor a few peppercorns, cloves, and a blade or two of mace; add a little salt, and the same quantity of vinegar as oyster juice; let the whole boil 15 minutes; then turn it on to the oysters.

PICCALILLI.—1 peck of green tomatoes, seeded; 2 large heads of cabbage; 3 green peppers; 1 small teacup of salt; chop and mix well; put in a colander to drain over night; in the morning cover it with good cider vinegar; let it boil until soft; drain off that vinegar and put in 1 tablespoonful of mustard, 1 of allspice, 1 of cloves ground, 2 lbs. of sugar, and about ½ teacup of horseradish, and 3 onions if you like; cover nicely with cider vinegar; let it boil a few minutes; put into a stone jar, and lay on the top a thin white cloth; put an old plate on to keep it under the vinegar.

SOUR-KROUT.—Take a large, strong wooden vessel, or cask resembling a salt beef cask, and capable of holding as much as is sufficient for the winter's consumption of a family; gradually break down or chop the cabbages in very small pieces; begin with one or two cabbages at the bottom of the cask; add others at intervals; press them by means of a wooden spade against the side of the cask, until it is full; then place a heavy weight upon the top of it, and allow it to stand near a warm place for from 4 to 5 days; then place the cask in a cool situation; keep it always covered up; strew anise seeds among the layers of the cabbages during its preparation.

TOMATO.—1 peck of green tomatoes sliced and sprinkled with 1 teacupful of salt; cover with cold water; let it stand over night; rinse in fresh water; put 3 onions and 3 green peppers to the tomatoes; hop all fine; scald in weak vinegar and drain; add 1 cupful of grated horseradish, 1 pt. of white mustard seed whole, 2 teaspoonfuls of ground cloves, 1 of good cinnamon, and 1 teacupful of brown sugar; pack in jars, after mixing the mass thoroughly; cover with cold, strong vinegar.

WALNUT.—Select full grown green walnuts or butternuts when they are soft enough to be pierced through with a needle; prick 100 nuts well through; lay them into a brine made of 4 lbs. of salt to each gallon of vinegar; let them remain 9 days; at the end of the third and sixth days change the brine for fresh; on the ninth day lay them in the sun; after they are well drained place them in the sun till they turn black; let them remain several days; boil 1 gal. of vinegar, 2 oz. of black pepper, ½ oz. of cloves, 1 oz. of mace, 1 oz. of allspice, and 1 oz. of root ginger sliced, 10 minutes; pour it over the walnuts, which have been packed in jars ¾ full; when the vinegar cools cover them up tight; they will be ready to use in 1 month.

Sweet Pickles.

APPLE.—Wash the apples and put them unpared into a steamer over a kettle of boiling water; cover it tightly; put them in not more than 2 deep; let them steam until you can stick a fork in them easily; while they are cooking, boil 1 qt. good vinegar, not too sharp, with 2 cups of sugar or good sorghum syrup; when it boils put in the apples from the steamer; let them boil 10 or 15 minutes; take them up in a pitcher or a stone jar and pour the vinegar hot over them.

BLACKBERRIES. Spiced.—To 5 lbs. of berries add 2 lbs. of sugar, 1 pt. of vinegar, 2 tablespoonfuls of cinnamon, 2 of cloves, and the same of allspice; heat all well together; skim out the fruit and boil 1 hour; return the fruit; boil 15 minutes; then put in jars and cover tight.

CHERRIES.—To 1 qt. of cherries allow 1 coffeecupful of vinegar, 2 tablespoonfuls of sugar, 1 doz. cloves, and ½ doz. blades of mace; boil these together for 5 minutes; turn into a covered stoneware vessel; fill small jars ¾ full with the fruit; strain the spices from the cold vinegar; pour it over them; then cover them tightly.

CHERRIES. Brandied.—Choose firm, fine fruit; wash; pick the stems off; stick the cherries in 2 or 3 places with a needle; pour over them a syr-

up made by boiling 1 lb. of sugar to every lb. of cherries in 1 gill of water; add 1 pt. of brandy for every 4 lbs. of sugar; pour the syrup hot over the cherries; cork and tie up carefully when cold; they will be ready for use in 1 week.

CITRON MELON. Spiced.—Prepare the fruit, cover with vinegar and let it stand over night; in the morning pour the vinegar off, and to every 7 lbs. of fruit allow 3½ lbs. of white sugar and 1 pt. of vinegar; tie in a muslin bag 1 tablespoonful of each of the different spices; make a syrup of the sugar; put in the fruit; cook for ½ hour; when all the fruit is done add the vinegar; let the syrup boil thick; pour it over the fruit hot and let it get cold before sealing up the jars.

CRAB APPLES.—Pick the apples with the stems on; look them over carefully; cut off the spots of black fungus and other imperfections; wash thoroughly; scald in a weak brine, and then drain quite dry. For 1 peck of apples take 1 gal. of sharp vinegar, 1 lb. of sugar, 1 teaspoonful each of cinnamon, allspice, cloves and black pepper, and 1 tablespoonful of ground mustard; tie them loosely in a thin cloth or bag; put them with the vinegar and sugar in the preserving kettle; bring it to a boil; put in half the apples; let them boil till the skins begin to crack; skim them out into the jar in which they are to remain; put in the rest of the apples and serve in the same; turn the spiced vinegar over them; when cool, cover with grape leaves, and put a cloth on the jar, under the cover.

CUCUMBER.—Take a small crock of pickled cucumbers; make a good, rich syrup of molasses, pure cider vinegar and whole cloves; heat together, and turn it over the cucumbers; they will be ready in 2 days.

CURRANTS. Spiced.—Take 5 qts. of currants, picked from the stems; add to them, the night previous to cooking them, 6 lbs. of coffee crushed sugar, ½ teaspoonful of salt, 2 tablespoonfuls of ground cloves, 3 tablespoonfuls of ground cinnamon, and ½ pt. of vinegar; put the mixture into a preserving kettle; cook slowly for 1 hour and carefully remove all the scum which arises.

DAMSON.— 7 lbs. of damsons, 3 lbs. of brown sugar, 1 oz. of cloves, 1 oz. of cinnamon and 1 qt. of vinegar; pierce each damson through with a large needle, to prevent bursting; fill a stone jar with them; put alternately a layer of damsons and one of spices, not powdered; boil the sugar and vinegar together; pour it over the fruit; the next day boil all together; then put it away for use in a dry, airy closet.

GOOSEBERRIES. Spiced.— 6 qts. of gooseberries, 9 lbs. of sugar and 1 pt. of vinegar; if the vinegar is very strong dilute it with water; 1 tablespoonful each of cloves, allspice and cinnamon; after looking the berries over carefully and picking off the blow, put them in the porcelain kettle with a little water and part of the sugar; boil for 1½ hours; when almost done add the rest of the sugar and the spice and vinegar; put this into cans while hot and seal up, or in jelly tumblers and bowls; if in the latter, cut pieces of writing paper the size of the top of the bowl; dip them in alcohol; then tie or paste stout paper over the top

GRAPES.—Take ripe grapes; remove all imperfect and broken ones; divide the large bunches, as they will pack more closely; put in an earthen jar a layer of grapes and then one of grape leaves; to 4 qts. of vinegar take 2 pts. of white sugar; boil a few minutes and when quite cold pour it over the grapes.

GRAPES, Spiced. — To 8 lbs. fruit use 4 lbs. sugar and 1 qt. of vinegar; place the fruit in jars; boil and skim the syrup; pour over the grapes boiling hot; repeat this process 3 or 4 days; seal up and set in a cool, dry place; boil any kind of spices in the syrup that suits the taste.

PEACHES.—Take to 1 gal. of good cider vinegar 8 lbs. of cut sugar; let it dissolve in a large jar; stick a clove into each peach; put over the fire about 1 qt. of the vinegar with the sugar dissolved; drop in while cold 16 peaches, sufficient to fill a qt. jar; allow the peaches to boil slowly until a fork will stick easily through them; first put in a stick of cinnamon and a little allspice and cloves tied up in a rag; take out the peaches and carefully place them in a jar, 1 by 1; fill with the liquid and screw on the top.

PEACHES. Brandied.—Dip the peaches in hot lye, and rub the fur off with a cloth or pare them nicely; allow to 1 lb. of fruit ¾ of a lb. of sugar; add as much water as will make syrup enough to cover the fruit; boil awhile; put in the peaches; scald until they become tender, lay them on dishes to cool; continue to boil the syrup until it is rich and thick; when it is quite done, and has cooled a little, add pale peach or apple brandy; put the fruit in jars, and pour on the syrup.

PEARS. — 10 lbs. of pears; 3 lbs. of light brown sugar; 1 qt. vinegar; 1 oz. cinnamon and 1 oz. ground cloves; put all together and boil till the pears are tender; skim the pears out; let the syrup boil ½ hour longer.

PEARS, Brandied.—4 lbs. fruit; 4 lbs. sugar; 1 pt. best white brandy; make a syrup of the sugar and enough water to dissolve it; let this come to a boil; put the fruit in and boil 5 minutes; remove the fruit carefully; reboil the syrup until it thickens well; add the brandy; take the kettle at once from the fire; pour the hot syrup over the fruit and seal; if, after the fruit is taken from the fire, a reddish liquor oozes from it, drain this off before adding the clear syrup; put up in glass jars.

PEARS, Spiced.— To every 10 lbs. of good flavored pears take 5 lbs. of white sugar, 1 qt. of strong cider vinegar, 1 oz. of stick cinnamon and 1 oz. whole allspice; boil the sugar and vinegar; skim thoroughly; add the spices and the pears; let the latter boil slowly until tender.

PLUMS.—7 lbs. fruit, pared; 4 lbs. white sugar; 1 pt. strong vinegar; mace, cinnamon and cloves; pare peaches and pears; prick plums and damsons, tomatoes, "globes" or husk tomatoes; put into the kettle with alternate layers of sugar; heat slowly to a boil; add the vinegar and spice; boil 5 minutes; take out the fruit with a perforated skimmer; spread upon dishes to cool; boil the syrup thick; pack the fruit in glass jars; pour the syrup on boiling hot; examine every few days for the first month; should it show signs of fermenting set the jars

uncovered in a kettle of water; heat until the contents are scalding.

TOMATOES.—Gather large well-grown tomatoes that have turned white, but none that are beginning to soften or turn red; slice through the middle and put into a weak brine; let them lie in this over night; take out, rinse in cold water, and steam a few moments; put into clear cold vinegar, and cook till tender; drain and put into a pickle jar; throw out the vinegar in which the tomatoes have been cooked; take enough fresh to cover them; then add sugar; boil and turn hot over the fruit.

WATERMELON.—10 lbs. of pared rinds boiled in water till tender; make a syrup of 2 lbs. sugar and 1 qt. vinegar; ½ oz. cloves and 1 oz. cinnamon; pour this over the rinds boiling hot, three days in succession.

PRESERVES.

REMARKS.—Most of the fruits, to make preserves of them, should first be boiled in water; then drained and put into boiling syrup, where they should be left 1 day; then pour off the syrup and add more sugar to it; reboil and pour hot over the fruit; continue this until it is fully saturated with sugar, which may be known by the syrup being no longer weakened with the juice of the fruit; keep them in a dry but not warm place, as too much heat will cause them to ferment, more especially if they are not incorporated with sugar; nor in a damp place, or they will become moldy; when done, drain and put the fruit into jars; reboil the syrup and then pour it over the fruit; seal down the top with pasted paper, first putting a piece of paper soaked in brandy over the fruit; paper steeped in a solution of salicylic acid and tied over the mouths of the jars, will keep the preserves sweet and free from mold.

ANGELICA. — Cut some stalks of fine, tender angelica into small pieces; put them into a pan of water on the fire until they are soft, then put them into cold water; draw off the skin and strings with a knife; put them into cold water again, and boil them until they look whitish; let them cool; drain them from the water; put them in an earthen pan; pour boiling syrup over them till they float; the next day drain it off, without disturbing the angelica; boil with more sugar, if required; take off any scum which may rise; pour it over the stalks while it is hot; repeat this for 7 or 8 days.

APPLES. — Weigh equal quantities of good brown sugar and of apples; peel, core and mince the apples small; boil the sugar, allowing to every 3 lbs. a pt. of water; skim it well and boil it pretty thick; add the apples, the grated peel of 1 or 2 lemons, and 2 or 3 pieces of white ginger; boil till the apples fall and look clear and yellow.

APRICOTS. — Take the largest and cleanest apricots to be got; pick out the stones with a silver skewer; slit them down the sides with a silver knife; take nearly their weight in good lump sugar; dip each lump in water and put over the fire; let it just boil; skim and put by till cold; pour it over the fruit in the preserving pan; warm very gently; allow them to simmer only; put them by till next day; warm them again, continuing this till they look clear; then take the fruit from the syrup.

BARBERRIES. — Put into a *bain-marie* an equal weight of sugar and barberries picked from their stalks; when the fruit is soft enough, put them aside till the following day; simmer them in a preserving pan for a quarter of an hour and keep in small jars till wanted.

CHERRIES. — Stone the cherries; preserve every drop of juice; weigh them; allow 1 lb. sugar to every lb. fruit; put a layer of fruit for 1 of sugar until all is used up; pour over the juice and boil gently until the syrup begins to thicken.

CITRON MELON. — Pare and remove the seeds; reject all but the solid part of the melon; cut in such pieces as you choose; weigh the pieces; boil in water until they can be easily cut; remove the fruit; add sugar to make the syrup; allow 1 lb. sugar to each lb. of fruit; when it boils put in the fruit; boil slowly 1 hour; when cold add sliced lemon; allow 1 lemon for 2 lbs. of citron; 1 large teacup of water is sufficient for 1 lb. of fruit.

CRAB APPLE. — Take off the stems; core them with a sharp knife without cutting them open; weigh 1 lb. of white sugar for each lb. of apples; put a teacup of water to each lb. of sugar; put it over a slow fire; when the sugar is dissolved and hot, put the apples in; let them boil gently until they are clear; skim them; cut and spread them on flat dishes; boil the syrup until it is thick; put the syrup in whatever they are to be kept; when the syrup is cold and settled, pour it carefully over the fruit.

CUCUMBER. — Gather young cucumbers, about the length of the middle finger; lay in strong brine 1 week; wash and soak them a day and night in fair water, changing this 4 times; wipe, and with a small knife slit them down one side; dig out the seeds, stuff with a mixture of chopped raisins and citron; sew up the slit with a fine thread; weigh them and make a syrup, allowing 1 lb. of sugar to 1 lb. cucumber, and 1 pt. water; heat to a boil, skim, and drop in the fruit; simmer ½ hour; take them out and spread upon a dish in the sun, while syrup is being boiled down, with a few slices of ginger root added; when thick put in the cucumbers again; simmer 5 minutes, and put up in glass jars; tie them up when cold.

CURRANTS. — Take the currants when ripe and in their prime; let them remain on the stalks; pick off the bad ones; make a syrup of sugar and very little water; allow 1 lb. of sugar to 1 lb. of currants; clarify it; put in the currants and let them boil a few minutes; in the course of a few days turn the syrup from them, scald it, and turn it back, while hot, on to the currants.

DEWBERRIES. — Pick the berries early in the morning; weigh them; then spread them on

dishes; sprinkle them with sugar, lb. for lb.; when the juice settles from them in the dishes, pour it off; with it moisten the remainder of the sugar; simmer this over a slow fire; while simmering, drop in a portion of the berries; let them become clear; then return them to the dishes to cool while the remainder takes their place in the kettle; when all are clear, and the syrup is boiled down to a rich consistency, pour it over them; when cool enough transfer them to glass jars.

FRUIT. Frosted. — Select perfect fruit of any small variety, such as plums, cherries, grapes or small pears, leaving the stems on; dip them one by one in a beaten white of an egg or in a solution of gum Arabic, and from that into a cup of finely pulverized sugar; cover the bottom of the pan with a sheet of fine white paper; place the fruit in it; set in a stove or oven that is cooling; when the frosting on the fruit becomes firm, heap them on a dish and set in a cool place.

GINGER. — Take the root of green ginger and pare neatly with a sharp knife; throw it in a pan of cold water; boil till tender through, changing the water three times, each time putting in cold water; when boiled perfectly tender throw again in cold water, and let it lie an hour or more; for every 6 lbs. of ginger allow 8 lbs. of loaf sugar; add ½ pt. of water to each lb. of sugar; stir gradually the beaten whites of 4 eggs into it; boil and skim well; drain the ginger from the water, and when the syrup is cold pour over it; cover it; let it stand 2 days; then, having strained the syrup from the ginger, boil it again and pour cold over the ginger; let it stand three days; afterward boil the syrup and pour hot over the ginger; repeat the pouring of the hot syrup over the ginger until the syrup has thoroughly penetrated it; this can be learned by tasting it, by its appearance when cut, and by the syrup becoming very rich and thick.

GOOSEBERRIES. — Choose the large and unripe gooseberries; pick off the black eyes, but leave the stalks; put them into a cold syrup of sugar and water; let them slowly come to a boil; when tender enough, take them out; reduce the syrup until it is very stiff again; put the fruit into it, and do it gently until the syrup is quite ropy; keep them carefully covered from the air; instead of water being employed to form the syrup, a jelly may be made by boiling down some green gooseberries, and straining the liquor from them.

GRAPES. — Take out the stones from the grapes with a pin; break them as little as possible; boil some clarified sugar nearly to candy height; put in sufficient grapes to cover the bottom of the preserving-pan, without laying them on each other, and boil for 5 minutes, merely to extract all the juice; lay them in an earthen pan and pour the syrup over them; cover with paper; the next day boil the syrup, skimming it well for 5 minutes; put in the grapes; let them boil a minute or two; put them in pots, and pour the syrup over them, after which tie down.

GREEN GAGES. — Let the fruit be not quite ripe but sound; prick them with a fork or needle; throw them into cold water; scald and green them; when they are of a fine green, increase the heat; take them out with a skimmer when they swim, and throw them into cold water; drain them on sieves; put them in syrup that is boiling; give them two or three boils in it; pour them into an earthen pan; drain the syrup from them the next day; add more sugar and boil to the thread; take off any scum which may arise; pour the syrup over them boiling hot; repeat this for 5 or 6 days, and finish as for green apricots.

LEMON. — 1 lb. of pounded loaf sugar; ¾ lb. of butter; 6 eggs and the whites of 4 well beaten; the rind of 2 lemons grated, and the juice of 3; mix well together and let it simmer till of the consistency of honey; be careful to stir all the time or it will burn.

MULBERRIES. — Put into a preserving-pan sufficient mulberries to yield a pt. of juice; strain it; add to 3 lbs. of refined loaf-sugar in powder; boil and skim it; put into it 2 lbs. of first rate mulberries; when the syrup is nearly cold put it again upon the fire; bring it slowly to a boil; pour it over the fruit; let it stand till the next day, and again slowly boil it until it will stand in round drops, and the mulberries look beautifully clear; when cold put them into small pots for use.

ORANGE. — Take any number of oranges, with rather more than their weight in white sugar; slightly grate the oranges and score them round and round with a knife, but not cut very deep; put them in cold water for 3 days, changing the water 2 or 3 times a day; tie them up in a cloth; boil them until they are soft enough for the head of a pin to penetrate the skin; while they are boiling, place the sugar on the fire, with rather more than ½ pt. of water to each lb.; let it boil for a minute or two, then strain it through muslin; put the oranges into the syrup till it jellies and is of a yellow color; try the syrup by putting some to cool.

PEACH. — Weigh the fruit after it is pared and the stones extracted, and allow 1 lb. of sugar to every lb. of peaches; crack 1 qt. of the stones; extract the kernels; break them to pieces; boil in just enough water to cover them until soft; set aside to steep in a covered vessel; put a layer at the bottom of the kettle, then one of fruit, and so on till all of both have been used up; set it where it will warm slowly until the sugar is melted and the fruit hot through; strain the kernel water and add it; boil steadily until the peaches are tender and clear; take them out with a perforated skimmer and lay upon large flat dishes, crowding as little as possible; boil the syrup almost to a jelly; skim off the scum; fill your jars ⅞ full of the peaches; pour on the boiling syrup; when cold cover with brandy tissue paper, then with cloth, lastly with thick paper tied tightly over them.

PEARS. — Take some good baking or other pears; pare and cut them in half; take out the cores with a little scoop for the purpose; if they are first blanched a little they can be pared easier and better; boil them in water, with sugar sufficient to make it only just sweet, a little lemon juice, and a few allspice or cloves; put a

piece of pewter, or a pewter spoon, in the bottom of the pan, and boil them until they are quite tender and of a fine red; or prepared cochineal may be added instead, using sufficient to give the desired tint; take out the fruit and add enough sugar to the water they were boiled in to make a syrup; boil to the large thread; put in the pears and give them 2 or 3 boils in it; skim and put them in an earthen pan; boil the syrup twice more; pour it on them, raising it to the degree of the large pearl; keep them in dry pans for use.

PINE-APPLE.—Slice the pine-apple rather thinner to preserve than to eat; take 1 lb. loaf sugar to 1 lb. of fruit; powder the sugar, and place in the kettle alternately a layer of sugar and a layer of fruit; to each pound of sugar put 3 table-spoonfuls of water; let it remain over a slow fire until the sugar is all melted; boil it slowly until the fruit looks clear; take out the fruit piece by piece and lay them on a dish, until the syrup is boiled nearly to a jelly; put the fruit in jars; pour on the syrup hot; cover the jars carefully with paper, which has previously been dipped on both sides in white of egg.

PLUMS.—Plums should be wiped with a soft cloth or dusted, never washed; have the syrup all ready; prick each plum with a silver fork to prevent the skin from bursting; put them into the syrup; boil from 8 to 10 minutes, according to the size of the fruit; dip carefully into the hot jars; fill full, and screw on the cover immediately.

PUMPKIN.—Take 7 lbs. of pumpkin, 5 lbs. of sugar, 4 lemons and 2 oz. of green ginger root; cut the pumpkin in slices ½ in. thick in any desired form, square, round or diamond shape; boil in the syrup till tender; take up the pieces; slice the lemon and ginger root very thin and scald them in a little clear water, after which add them to the syrup; boil the latter down until it is clear enough to keep without fermenting; then add the pumpkin to it.

QUINCES.—Weigh your quinces after washing them and cutting out any imperfections; take 1 pt. of water to every pound of fruit; let the quinces boil in this water until they can be easily pierced with a fork; drop them in cold water; as soon as cold enough to handle, peel carefully, cut in two, cut out the cores, put the skins and ¼ the seeds back in the water the quinces were boiled in, and let them boil rapidly for ½ hour; then strain through a jelly bag; take ½ pt. of this water to 1 lb. of lump sugar and 1 lb. of fruit; let it all boil slowly together until the quinces are a bright pink, semi-transparent and perfectly tender; take each piece out carefully; put on a platter, and keep them in the sun while the syrup boils ½ hour longer; pour the hot syrup over the quinces and let them stand uncovered till quite cold; put in jars; over each one put a piece of letter paper dipped in whisky; cork tightly and keep in a cool place.

RASPBERRIES.—Strain equal quantities of ripe currants and raspberries to make a syrup to preserve the raspberries in; dissolve white sugar in the syrup by a gentle heat, using 1 lb. of sugar to each pound of syrup and raspberries; when the sugar has dissolved, set the syrup where it will boil about 10 minutes; then put it in the raspberries and let them boil 5 minutes; in the course of 4 or 5 days turn the syrup from the raspberries; boil it away, so that there will be just enough of it to cover the berries; turn it on them while hot; keep them in wide mouthed bottles, corked and sealed up tight.

STRAWBERRIES.—To 2 lbs. of fine, large strawberries add 2 lbs. of powdered sugar; put them in a preserving kettle over a slow fire till the sugar is melted; boil them precisely 20 minutes as fast as possible; have ready a number of small jars; put the fruit in boiling hot; cork and seal the jars immediately; keep them through the summer in a cool, dry place.

WATERMELON.—Cut a watermelon in two; take out all the soft inside, leaving only the firm white rind; scrape off the green outside; cut into any fancy shape desired; boil these bits in water enough to cover them, with fresh lemon skins to color them yellow; when the pieces are tender, take them out in dishes to cool; make a syrup of 1 lb. of sugar and a teacup of water to each pound of melon; when the sugar is dissolved, clarify the syrup with the white of an egg; put the watermelon into this; simmer it till done through and transparent; take out the melon and drain; reboil the syrup with the addition of a little sugar if necessary; put the fruit in jars and pour the syrup over it; then seal immediately.

WHORTLEBERRIES.—To 4 qts. of fruit allow 2 lbs. of sugar and ½ oz. of powdered cinnamon; moisten the sugar with wine and boil well; when the sugar boils in transparent bubbles throw in the fruit, and keep stirring till it is of a smooth consistency and no more thin juice collects on the top; sprinkle in the cinnamon just before it is done.

LIQUIDS.

CIDER.

REMARKS.—Cider apples may, for convenience, be classed under three heads—bitter, sweet, and sour. The first are the best; years of experience teaches that; their juice has the greatest specific gravity, is the richest in sugar, it ferments most freely, it clarifies spontaneously quickest, and it keeps the best of all after fermentation. They contain a minute quantity of extractive matter not present in other apples. The juice of sweet apples ferments tumultously, clears with difficulty, and cider does not keep so well as that produced from the first

variety. The juice of sour apples contains less sugar and more acid than the other two and produces the worst cider; it, however, fines well, although it stores. It is always better to core apples before grinding, as the cider will not only taste and look better, but keep better. The expression of the juice is the next step in the process. The apples are crushed or ground in mills. Next sprinkle the pulp with $\frac{1}{4}$ to $\frac{1}{3}$ its weight of spring or river water; then allow it to remain in tubs or wooden cisterns 12 or 14 hours, during which time fermentation com-

Cider Mill.

mences, breaking up the cells of the membrane, by which subsequent separation of the juice is facilitated. The pulp is now placed on a kind of wicker frame, or in hair-cloth or coarse canvas bags, and, after draining into suitable receivers, is subjected to pressure in the cider press. The liquor which runs off first, is the best, and is kept separate; while that which follows, especially the portion obtained by much pressure, tastes of the pips and skins. The expressed juice is next put into casks with large bung-holes, and freely exposed to the air and the shade, where they are placed on "stillions," with flat tubs under them to catch the waste. They are constantly attended to and kept full, in order that the yeast, as it forms, may froth over and be carried off from the surface. After 2 or 3 days for weak, and 8 or 10 days for strong cider, or as soon as the sediment has subsided, the liquor is racked off into clean casks, previously sulphured with a cooper's match. The casks containing the racked cider are stored in a cellar, or other cool place, where a regular temperature can be insured, and are left to mature. By spring the cider is fit for use, and may be re-racked for sale.

ARTIFICIAL.—1. Sugar, 1 lb.; tartaric acid, $\frac{1}{2}$ oz.; good yeast, 2 tablespoonfuls; water, 1 gal.; agitate to effect solution, and allow to ferment 12 hours or more. — 2. 18 gals. water; enough sulphuric acid to give the water an agreeable tartness; 25 lbs. sugar; 2 oz. alum; $2\frac{1}{2}$ oz. ginger; $2\frac{1}{2}$ oz. cloves; 3 oz. bitter almonds. Boil the last 4 ingredients in 1 gal. of the water for 2 hours; strain, and add it to the remaining water. If whisky be added, it will give more body. — 3. Put in a cask 5 gals. hot water; 15 lbs. brown sugar; 1 gal. molasses; $\frac{1}{2}$ gal. hop or brewer's yeast; good vinegar, 6 qts.; stir well; add 25 gals. cold water, and ferment. — 4. (*For Bottling.*) Put in a barrel 5 gals. hot water; 30 lbs. common sugar; $\frac{3}{4}$ lb. tartaric acid; 25 gals. cold water; 3 pts. hop or brewer's yeast, worked into a paste with 1 pt. water and 1 lb. flour. Let it work in the barrel 48 hours, the yeast running out of the bung-hole all the time, putting in a little sweetened water occasionally to keep it full; then bottle, putting in 3 or 4 broken raisins to each bottle, and it will nearly equal champagne.

CANNED.—Cider may be preserved for years by putting up in air-tight cans, after the manner of preserving fruit. The liquid should be first settled and racked off from the dregs, but fermentation should not be allowed to commence before canning.

CHAMPAGNE.—Cider, 18 gals.; spirit, 3 pts.; sugar, 5 lbs. Mix, and let them rest for a fortnight; then fine with skimmed milk, 1 pt.; bottle in champagne bottles; when opened, it will be found to approach near to champagne.

CHERRY.—30 gals. apple cider; 8 qts. dried black cherries; 2 qts. dried blueberries; 1 qt. elderberries; 75 lbs. brown sugar. To make smaller quantities use less of the ingredients.

CLEARING.—To clear and improve cider, take 4 pts. ground horseradish and nearly 1 lb. thick gray filtering paper to the barrel; shake or stir until the paper has separated into shreds, and let it stand 24 hours; then draw off with a siphon.

PRESERVING. — 1. Fermentation may be largely prevented by filtration of the juice when first expressed, by which much of the material on which fermentation works is removed. — 2. When the cider in the barrel is in lively fermentation, add white sugar equal to $\frac{1}{4}$ or $\frac{3}{4}$ lb. to each gal. of cider (according as the apples are sweet or sour; let the fermentation proceed until the liquid has the taste to suit; then add $\frac{1}{4}$ oz. sulphite (not sulphate) of lime to each gal. cider; shake well, and let it stand 3 days, and bottle for use. The sulphite should first be dissolved in 1 qt. or so of cider before introducing it into the barrel of cider. — 3. Cider may be kept good in large quantities, if 1 qt. pure refined linseed or olive oil be poured in at the bung. This, spreading over the top of the cider, will prevent the air from coming in contact with it, and keep it sweet. After the cider has mostly been drawn, the oil may be saved for another year, or used for other purposes. — 4. Scald, and just before the boiling point is reached, remove the scum that rises by skimming. By this means the fine tissues of the apple contained in the juice are brought to the surface, which is the most active cause of fermentation. Cider, so treated, will keep through winter and not become hard, without the addition of any hurtful drugs. — 5. For 40 gals. take 1 qt. alcohol, and add to it $\frac{1}{2}$ oz., each, oils of wintergreen, sassafras and cinnamon; shake up and pour into the

cider; bung, and shake the barrel gently, and let it stand to cure. Age adds to its quality. — 6. Take about 2 tablespoonfuls yellow mustard seed and place in a white linen bag, securely fastened, and then suspend in the barrel of cider. It will keep it sweet for a long time. — 7. Salicylic acid has been extensively used, and samples of cider that have been kept 6 months to 1 year, still have the peculiar flavor of sweet cider, and are sweet cider; 1 oz. is sufficient for 1 barrel of 32 gals. Put the acid in the cider, and mix it well; then bung. It will not ferment.

SOUR. To Sweeten. — If cider is long made, or souring when you get it, about 1 qt. hickory ashes (or a little more of other hard wood ashes) stirred into each barrel will sweeten and clarify; but if it is not rectified, it must be racked off to get clear of the pomace, as with this in it it will sour. Oil or whisky barrels are best to put cider in, or ½ pt. sweet oil to 1 barrel, or 1 gal. whisky to 1 barrel, or both, may be added with decidedly good effects; isinglass, 4 oz. to 1 barrel, helps to clarify and settle cider that is not to be rectified.

VINEGAR.

REMARKS. — Vinegar is made from cider, malt, wine, sugar, molasses, etc. Cider made late in the season, of mature apples, rich in sugar, yields a better article of vinegar than that produced earlier in the season. Filtering through animal charcoal will leave the vinegar nearly clear. The barrels in which the cider is placed, require attention. Cider tainted from impure or musty vessels, will not produce a first-class vinegar. Iron-bound whisky casks, well painted on the outside, are preferred. In manufacturing large quantities of vinegar, the barrels may be stored in an outhouse warmed by the sun, or placed in lofts of any outhouse. When stored for the winter in cellars, the barrels must be rolled out in the spring and placed under a shed with the open bungs exposed to the sun's rays, but the casks shaded. A large handful of sugar placed in vinegar will hasten the souring and improve the sharpness.

BEET. — 1 bush. sugar beets, mixed with 9 bush. apples, makes a cider richer than that made from apples alone. Sugar beet juice can be converted into vinegar, the same as cider; it makes a stronger article, equally good, but of a different flavor. 1 acre of beets will yield 5,000 gals. vinegar.

CELERY. — ½ lb. celery seed; 1 qt. best cider vinegar; 1 teaspoonful salt; 1 tablespoonful white sugar; pour the seed into a jar; scald the salt and vinegar, and pour over the celery seed; set to cool; cover tightly; let it stand 1 week, after which strain into small flasks for use. This will be nice for use when celery is out of season.

CHILI.—Take 50 peppers, cut or bruised, to 1 pt. best vinegar; let it stand 14 days; strain and keep in pt. bottles.

CIDER. — When cider has done fermenting, fill into a keg; then take strips of straw paper, and dip them into West India molasses and put them into the keg of cider; set in a warm place near the stove, and in a few weeks the contents will have turned to sharp vinegar. If desired in a shorter time, pour into the keg 1 pt. of the molasses, and 1 teacupful yeast for every gal. cider; fill a jug with the mixture and let it stand uncorked, back of the cook stove. In 24 hours it will commence fermenting, and not take over 2 weeks to make splendid vinegar. Then draw off into bottles and cork tight. The straw paper acts like mother, to which in a few days it bears a close resemblance.

CLOVER BLOSSOM. — To 1 gal. clear clover blossoms, add 1 qt. molasses and ½ lb. sugar; pour over these 1 gal. boiling water; when cold, add ½ pt. good yeast. If more water is needed, add as you please. It makes strong vinegar.

CORN. — Steep 1 pt. good, firm corn in 2½ gals. cold water, 2 or 3 hours, and then put it on the fire and boil until the corn shows signs of bursting; take it off before the grains burst, and strain the liquid, adding ½ lb. sugar to each gal.; place the jug containing it in the sun, and in 3 weeks or more the liquid will be good vinegar.

COWSLIP.—4 gals. water, with the chill taken off; 6 lbs. brown sugar; ½ pk. cowslips, flowers and stalks; put all in a cask with 3 tablespoonfuls yeast; lay a piece of glass or slate over the bung-hole, and set in a warm place till the vinegar grows sour; then fasten the bung down. This makes excellent vinegar. If kept in a warm place, the vinegar will be ready in 6 months; ¼ oz. isinglass will make it clear sooner.

ECONOMICAL.—A good article of vinegar is often made in a small barrel (with a faucet and bung-hole), placed in some warm spot in the kitchen; there should be strong stock to begin with in the form of good, sharp cider vinegar; to this is added from time to time as needed, a few gals. hard cider; or the parings and cores of sound fruit may be placed in a stone jar, covered with soft warm water and set in the sun or other warm place for 1 fortnight, when it can be strained and added to the stock in the barrel. The addition of molasses or sugar (1 tablespoonful of the former to 1 gal. of juice) is thought to expedite the conversion. Where much fruit is used, the refuse portions will make enough vinegar for a large family, free from the poisonous acids too often present in vinegar of commerce.

GERMAN. — Soft water, 7½ gals.; honey, or brown sugar, 2 lbs.; cream of tartar, 2 oz.; corn spirit, or whisky, 1 gal.

GOOSEBERRY.—To every gal. water put 1 qt. ripe gooseberries; boil the water first, and let it stand till cold; then crush the fruit with a wooden spoon, and add it to the water; let it stand covered 5 days, in a cool place, stirring it twice every day; strain through a hair sieve into a cask and to every gal. add 1½ lbs. moist sugar; when it has stood 6 months, bottle it.

GRAPE. — 1. Vinegar from grapes may be made as follows: The wine is stirred into a large tun which contains lees, and, when mixed, is squeezed through cloth sacks into an iron-

bound vat, whence, after standing some hours, it is drawn off into casks for fermenting. These casks have only a small opening at the top, and are kept at 77° to 86° Fahr. After 14 or more days, the vinegar is drawn off cautiously into barrels which contain birchwood chips. This clarifies it, and after standing a few days it may be siphoned off into casks. The residue, containing mother, is employed to ferment all the subsequent liquor, by simply pouring the latter into the cask used previously. — 2. Take full grown green grapes before they turn sweet; put them in a porcelain lined kettle, with water to cover them, and stew until tender; then pour into a hair sieve, and let it stand to drain, pressing slightly. Then sweeten slightly, and heat the juice to the boiling point, and can in bottles or vials. This will spoil if not canned in a little longer time than common stewed fruit; but it will not produce mother, nor breed vinegar eels. It can be used to acidify cabbage, and in place of lemon or lime juice. The strained grapes may be returned to the kettle and sweetened, and, with the addition of water, will prove sour enough for sauce.

GROCERS'.—1. Take 3 barrels; let one of them be a vinegar barrel; fill this last up before it is quite empty, with molasses, 2 gals.; soft water, 11 gals.; yeast, 1 qt.; keeping these proportions in filling up the whole 3 barrels; sell the vinegar out of your old vinegar barrel as soon as it is ready, which will be in a short time. When nearly empty, fill it up with the fluid as before, and pass on to sell out the next barrel. By the time it is disposed of, go on to the last; then go back to the first, filling up your barrels in every case when nearly empty, and you will always keep a stock of good vinegar on hand, unless your sales are large; in which case, follow the next process. Have the bung-holes open in the barrels to admit air. The free admission of warm air hastens the process. — 2. Take a quantity of maple, beech, or basswood chips, and soak them in good vinegar for 2 or 3 days; with these chips fill a barrel which has been pierced with a large number of inch holes all around the sides for the free admission of air among the chips; cut another barrel in halves; place ½ below the barrel with the chips, and the other ½ above it; pierce the bottom of the top tub with a number of gimlet holes, and place in the holes several threads of twine, to make the vinegar flow evenly over the chips. The liquid drains down slowly through the chips and out of a faucet near the bottom of the barrel into the lower tub. It should run through every 4 hours, and then be baled or pumped back. Leach any of the following preparations through the shavings: 1½ lbs. sugar to each gal. water; 2 lbs. dregs molasses barrels to each gal. water; reduce small beer, lager beer, ale etc., with water (small beer needs little water, lager beer as much water as beer); add ½ gal. water to 2 gals. cider. Use soft water, and use 2 qts. yeast to every barrel. This vinegar can be made in 3 days, and the process should be attended to during warm weather, or in a room where a high temperature is kept up.

MINT. — Procure fresh mint; pick the leaves from the stalk and fill a jar with them; add vinegar until the jar is full; cover to exclude the air, and let it infuse a fortnight; strain the liquor and put it into small bottles for use, of which the corks should be sealed.

MOTHER, To Prevent.—This is a thick, shiny substance, concreted in liquor, particularly in vinegar. To prevent this, add a few drops of sulphuric acid to each gal. vinegar, and it will thoroughly arrest vegetation of this kind.

RAISIN.—Made from the mare left from making raisin wine; 1 cwt. to every 12 or 15 gals. water, with a little yeast.

RHUBARB. — Drain off the first water from rhubarb, when it has stewed 5 minutes; evaporate it to the requisite sourness, and use it instead of vinegar for the table and cooking. It is an agreeable acid, and in many cases it can be used instead of lemon. It is a natural acid, and more wholesome than vinegar formed by the decay of sweets. It may be evaporated by a gentle heat to an intense degree of sourness, and kept in cans or in bottles for use, and reduced with water when wanted.

ROSE. — This is made by pouring the best white wine vinegar into a jar loosely filled with rose leaves, to the height first occupied by the leaves; after the mixture has thus remained 2 or 3 weeks in the sun or a warm situation, it may be strained; if not sufficiently fine for bottling, fine in the usual way, either with isinglass or a little alum water. It is best to keep the vinegar in large bottles, tightly corked, and put into each bottle 1 lump of refined sugar.

SUGAR.—To every qt. spring water put ½ lb. coarse sugar; boil them together, and skim the liquor as long as scum rises. After pouring it into a tub or vessel, let it stand until cool enough to work; then place in it a toast spread with yeast, of a size proportioned to the quantity made; let it ferment a day or two; then beat the yeast into it; put it into a keg or barrel, with a flat stone over the bung hole, and place it in a situation where it may receive the warmth of the sun. Make this vinegar in March or April, and it will be fit for use in July or August. If it is to be bottled, it should be previously drawn carefully from the first cask into another, and 1 handful of shred isinglass thrown into 1 barrel of vinegar, or less, in proportion to the quantity of liquid; then let it stand a few days to clear.

TARRAGON.—Gather full-grown shoots of tarragon the day before they are wanted; fill ½ gal. jar with as many as it will hold without pressing down; add 3 cloves and the thin rind of 1 lemon, and fill up the jar with white wine vinegar; leave it tightly corked, exposed to the sun for 2 or 3 weeks; then strain off the vinegar, wringing the tarragon in a cloth; filter through paper, and bottle.

TESTING. — 1. A method of testing vinegar, to ascertain whether it has been adulterated with sulphuric acid, consists in covering a vessel of boiling water with a wide saucer, placing a layer of a solution of sugar upon this, and after this has evaporated to dryness, and is still hot, laying upon the sugar a drop of the vinegar to be tested. Pure vinegar does not produce

blackening of sugar; but this result takes place if it has been fulsified with sulphuric acid. To determine the presence of a trifling percentage of sulphuric acid in any liquid, a similar experiment may be employed. A drop of water, hanging to a glass tube, which contains not over an 80.1000th part sulphuric acid, will produce action upon the heated layer of sugar. In this case there is no blackening, but the change is to green. Other acids, such as phosphoric acid, hydrochloric acid, nitric acid, etc., do not produce this alteration of sugar. — 2. Paper written on or smeared with pure vinegar; is not charred when strongly warmed before the fire; if it is, the sample contains fully 2 per cent. of oil of vitriol.

WHITE WINE.—Mash up 20 lbs. raisins; add 10 gals. water; let it stand in a warm place for 1 month, and you will have pure white wine vinegar. The raisins may be used a second time.

BEVERAGES.

AMBROSIAL, or NECTAR CREAM SODA.—Take 2 oz. tartaric acid; 2 oz. cream of tartar; 2½ lbs. white sugar; 1 qt. water; whites of 4 eggs, well beaten; 2 tablespoonfuls wheat flour; put all in a tin dish, and heat (but not to boiling point); add 2 drops fine oil of lemon, or other flavoring preferred, and that will complete the syrup. When ready to use, pour 3 tablespoonfuls of the syrup into a tumbler ⅔ full of water; add as much soda as can be held on a dime, and drink immediately. A cool, refreshing summer beverage.

ANTI-FERMENT.—A substance sold in the cider districts for the purpose of arresting fermentation.—1. It generally consists of sulphite of lime in powder, or a mixture of equal parts of the sulphite and powdered mustard. — 2. Mix together 14 lb. of mustard seed with 1 lb. cloves, and bruise them well without drying. Use.—A portion of either of the above added to cider or perry tends to allay the fermentation, when it has been renewed. The second may be used for wine and beer as well as cider. Caution.—In the above, the sulphite must be employed, not the sulphate, which is quite a different article.

BEER TONIC.— Plain syrup, 22° Baume, 5 gal.; oil of wintergreen, 2 dr.; oil of sassafras, 2 dr.; oil of allspice, ½ dr.; oil of sweet orange, 2 dr.; mix the oil with 12 oz. of alcohol, and add to the plain syrup; then add 35 gal. of water, at blood heat, and ferment with sufficient yeast; to this add 1 dr. of salicylic acid, dissolved with 1 dr. of baking soda in small glass water; after it has ceased effervescing, add to the fermenting beer. The object of using this minute quantity is to prevent putrefactive fermentation. The natural vinous ferments will not be obstructed by it.

BOMBA, An Italian Drink.—Blanch and pound 4 oz. of sweet almonds to a smooth paste, adding a few drops of fresh lemon juice during the process, to prevent their oiling, and an equal weight of fine white sugar; when perfectly smooth, add (very gradually) 2 qt. of warm water, stirring briskly all the time, and, when cold, strain carefully and use.

BOTTLED SODA WATER (Without Machine.)—In each gal. of water to be used, dissolve ¾ lb. crushed sugar and 1 oz. supercarbonate of soda; then fill pint bottles with this water; drop into each bottle ½ dr.; pulverized citric acid; immediately cork and tie down; handle the bottles carefully, and keep cool. More sugar may be added, if desired.

CENTENNIAL MEAD.—Mix 1 qt. boiling water with 2½ lb. brown sugar, 2 oz. tartaric acid, and ½ pt. mollasses; when cool, add ½ oz. any flavoring extract. Two fingers of this syrup in a glass of ice-water makes a refreshing summer drink; serve each glass with ¼ teaspoonful bicarbonate of soda.

CHAMPAGNE A LA MINUTE. — Put into a pitcher or bowl 2 teaspoonfuls of carbonate of soda and about 2 oz. of finely powdered sugar; pour upon these 1 qt. of sharp cider, and you have a very pleasant imitation of champagne.

CHERRY BOUNCE.—Crush 4 lb., each, sour and sweet cherries in a stone jar, breaking all the stones; add 2½ lb. white sugar, and 1 gal. best whisky; put into a jug, and shake every day for 1 month; then let it stand quiet another month; strain off and bottle.

CHOCOLATE SYRUP.—Selected chocolate, 1 lb.; water, 4 pt.; have the chocolate rubbed well to powder, or by means of a Keystone beater, or other suitable apparatus, thoroughly incorporate, adding 4 lb. sugar; bring to boiling point with constant stirring; remove from the source of heat; continue the use of the mechanical stirrer for 20 minutes; when cold, add extract vanilla, 1 oz.; essence cinnamon, ½ oz.; and enough thin sirup to make 1 gal. Much depends upon the selection of the chocolate. Avoid scorching, and this means constant attention and stirring.

CINNAMON SIRUP.—Oil of cinnamon, 8 min.; tincture of capsicum, 2 dr.; dissolve and add to a solution of sugar, 7 lb., in boiled water, 1 gal.

COCOANUT BEVERAGE.—To 2 grated cocoanuts with their milk, add 2 qt. pure water; place over the fire, and boil for 5 or 6 minutes, stirring constantly with a wooden spatula; then strain through a hair sieve. Add to the liquid 12 oz. of pulverized sugar; mix well together and ice. This is a delightfully cooling beverage.

COFFEE BEVERAGE, Iced.—Make 1 qt. of strong coffee, to which add 1 pt. of simple syrup; mix well and put into a freezer, and freeze just sufficiently to admit of its being poured into glasses for use.

COOLING FEVER DRINK.—Vinegar, 1 lb.; honey, 2 lb.; water, 6 lb.; mix.

CREAM-OF-TARTAR DRINK.—Put into a large pitcher, 1 oz. of cream of tartar; the rind and

juice of 2 large, fresh lemons; 4 oz. of loaf sugar; pour over these ingredients 2 qts. of boiling water; stir until the sugar dissolves; leave until quite cold; then stir again, strain and serve.

CURRANT ICE WATER.—Press the juice from ripe currants; strain it, and put 1 lb. sugar to each pt. juice; bottle, cork and seal, and keep in a cool, dry place. When wanted, mix with ice-water; or put water into it, make it very sweet, and freeze.

EFFERVESCING JELLY DRINK.—When jams or jellies are too old for table use, mix them with good vinegar, and use them with soda or saleratus.

EGG NOG.—1. (*For 20.*) Take 18 or 20 egg yolks; 15 tablespoonfuls pulverized sugar; beat together, and grate into them 1 nutmeg; add 1 pt. best brandy or Jamaica rum, and 3 or 4 glasses fine sherry; beat to a froth whites of the eggs; whip all together, and add 5 pts. rich milk. A pleasant and nutritious drink; sherry wine may be substituted for the stronger liquors, should they be objected to.—2. Mix yolks 12 eggs; 2 qts. brandy; 1 pt. Santa Cruz rum; 2 gal. milk; 1½ lb. white sugar; beat well; put the whites of the eggs on the top for ornament, first beating them to a stiff froth; serve cold.—3. Eggs, 5; sugar, 5 tablespoonfuls; milk, 1 qt.; best brandy, ½ pt.; nutmeg; stir the sugar and yolks of eggs together; add milk; then brandy; and, lastly, stir in the whites of 3 eggs, whipped up stiff. Flavor to taste.

FRUIT DRINKS.—These are delicious and extremely refreshing, and can be very easily manufactured. Put 3 large tablespoonfuls of any favorite preserve into a pitcher, pour over it a quart of boiling water; leave until cold; then strain and use. Those preserves with a tart flavor, such as black currant, quince, barberry, damson, etc., are the most suitable for this purpose.

GINGER BEER.—1. Put into a large earthenware pan the thin yellow rind and strained juice of 6 lemons, 3 oz. of bruised ginger, 3 lbs. of loaf sugar, and 1 oz. cream of tartar; pour over 3 gals. of boiling water, and when just warm, add 3 tablespoonfuls of fresh brewer's yeast; stir the preparation for a few minutes, and then leave it to ferment until next day; skim the yeast very carefully from the surface, strain the beer gently from the sediment at the bottom, and put it into proper bottles. Cork with perfectly sound corks, which should be dipped in boiling water immediately before using; secure tightly with wire, and store for 3 or 4 days previous to drinking.—2. Brown sugar, 2 lbs.; boiling water, 2 gals.; cream of tartar, 1 oz.; bruised ginger root, 2 oz.; infuse the ginger in the boiling water; add your sugar and cream of tartar; when lukewarm, strain; then add ½ pt. good yeast. Let it stand all night, then bottle; if you desire, you can add 1 lemon and the white of an egg to fine it.—3. (*English.*) 3 gals. water; 6 oz. pulverized ginger; 4 lb. sugar; 4 oz. cream tartar; boil, and when cold add 2 tablespoonfuls of yeast. Allow it to stand over night, then filter and bottle. A most pleasing beverage.

GINGER BEER POWDERS.—1. Ginger, bruised, ½ oz.; cream of tartar, ¾ oz.; essence of lemon, 4 drops; mix. Some sugar may be added, if it be thought desirable to make the packet look bigger. For use, this powder is to be added to 1 gal. of boiling water, in which dissolve 1 lb. of lump sugar; and when the mixture is nearly cool, 2 or 3 tablespoonfuls of yeast are to be added. The mixture should be set aside to work for 4 days, when it may be strained and bottled.—2. Jamaica ginger, powdered, 1 oz.; sodium bicarbonate, 7 oz.; sugar, 1¾ lb.; 1 fl. dr. oil of lemon. Make into powders.

GINGER LEMONADE.—½ cupful vinegar; 1 cupful sugar; 2 teaspoonfuls ginger; stir well; put in a qt. pitcher, and fill with ice-water. If wanted sweeter or sourer, more of the needed ingredients may be put in. It is almost as good as lemonade.

GINGER MEAD.—1 gal. water; 1 lb. loaf sugar; ½ oz. race ginger; 1 lemon, sliced, without seeds; 1 teacupful yeast; let it stand over night to ferment; then pour off without stirring; add to each bottle 1 raisin; cork tight.

GINGER POP.—1. 1 oz. tartaric acid; white sugar, 5 lbs.; 1½ lb. bruised ginger (root); 12 gal. of water; whites of 6 eggs, beaten to a froth; oil of lemon, 2 dr. The ginger root should be boiled for ½ hour in 2 gals. water; strain carefully and add the oil. After 24 hours, strain and bottle.—2. 5 lbs. of loaf sugar to 5 gals. of cold water, 4 lemons, 2 oz. white root ginger, 4 oz. cream tartar; boil the sugar and ginger (previously pound the latter); when it has boiled 15 minutes, strain it through a flannel cloth into a large crock; put in the cream tartar; slice also the lemon into it; let it stand until milk warm, then add a teacup of yeast; let it stand a little, then bottle it tightly in stone bottles; in three days it will be fit for use.—3. 5 lbs. of cream tartar; ginger, 8 oz.; sugar, 35 lbs.; essence of lemon, 5 dr.; water, 30 gals.; yeast, 2 qt.—4. Take 5½ gals. water; ginger root (bruised), ¾ lb.; tartaric acid, ¾ oz.; white sugar, 24 lbs.; whites of 3 eggs, well beaten; 1 small tenspoonful lemon oil; 1 gill yeast; boil the root for 30 minutes in 1 gal. water; strain, and put the oil in while hot; mix. Make overnight; in the morning skim and bottle.—5. (*Royal.*) To 3 gals. of water add ½ lb. cream tartar, ¾ oz. ginger, 3½ lb. white sugar, ½ dr. essence of lemon, ½ pt. yeast. The corks should be tied down.

GRAPE JUICE, Home-Made.—1. 1 qt. grape juice; 3 qts. water; 2½ lbs. brown sugar; keep in an open barrel 9 days, covering only with muslin, to exclude insects; then put in a close cask; fasten the bung, and set aside till spring; then rack off and bottle.—2. Let the grapes gathered be rather ripe, with all decayed ones removed; mash, strain and measure; to each gal. juice add 1 lb. white sugar; let stand for 2 or 3 days; skim, strain and measure as before, and to each gal. add 1 lb. sugar; let it stand again for 2 or 3 days; and add 1 lb. of sugar to each gal.; cork and put away. Do not add a drop of water to the juice if you want rich wine.—3. Stem, and press through a coarse cloth, 2 lbs. catawba grapes; add 3 tablespoonfuls loaf

sugar; when dissolved, add 1 cupful cold water; cool with ice, and drink.

HOME-MADE SODA.—40 gr., each, carbonate soda and fine loaf sugar; 50 gr. lemon or tartaric acid; mix these in 4 glasses water; stir, and drink. If a sliced lemon be substituted for the acid, this drink will be found more delicious; it is refreshing in hot weather or when one is feverish.

HOP BEER.—Water, 5 qts.; hops, 6 oz.; boil 3 hours; strain the liquor; add water, 5 qts.; bruised ginger, 4 oz.; and boil a little longer; strain, and add 4 lbs. sugar; and when milk warm, 1 pt. of yeast. Let it ferment; in 24 hours it is ready for bottling.

IMPERIAL BEVERAGE.—1. Pare off the yellow rind or zest from 1 fresh lemon; add it to 1 qt. of cream. Place upon the fire and bring it to the boiling point, stirring continually; now remove, and continue to stir until quite cold. Sweeten with powdered sugar to your taste. Strain the juice of 4 lemons into a china bowl; pour the cream slowly upon the juice, holding the vessel containing it 2 feet above the bowl; stir well together, and let it stand 2 hours before using it.—2. Cream of tartar, ½ oz.; fresh orange or lemon peel, 3 oz.; lump sugar, 4 oz.; boiling water, 3 pts.; digest in a close vessel until cold, then pour off the clear.—3. (*Collier.*) To the last add cream of tartar, ½ oz., and sweeten to palate. Refrigerant; a common drink in fevers and in hot weather.

IMPERIAL CREAM NECTAR SODA.—*Part 1st.* Water, 1 gal.; loaf sugar, 6 lbs.; tartaric acid, 6 oz.; gum Arabic, 1 oz. *Part 2d.* Flour, 4 teaspoonfuls; whites of 5 eggs, beat finely together; add ½ pt. water. When the first part is blood warm, put in the second; boil 3 minutes, and it is done; 3 tablespoonfuls of syrup to ⅜ glass of water; add ½ teaspoonful carbonate of soda, made fine; stir well and drink at leisure.

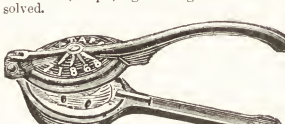
IMPERIAL POP.—Cream of tartar, 3 oz.; ginger, 1 oz.; white sugar, 24 oz.; lemon juice, 1 oz.; boiling water, 1½ gal.; when cool, strain and ferment with 1 oz. yeast, and bottle.

KING'S CUP.—Yellow peel of 1 lemon; lump sugar, 1½ oz.; cold water, 1 pt.; infuse 8 or 10 hours, and strain. The addition of 1 teaspoonful of orange flower water is an improvement. Used as a diluent in cases where acid liquors are inadmissible.

KOUMISS.—1. Into 1 qt. new milk put 1 gill fresh buttermilk and 3 or 4 lumps white sugar; mix well, and see that the sugar dissolves. Put in a warm place to stand 10 hours, when it will be thick. Pour from 1 vessel to another, until it becomes smooth and uniform in consistency; bottle and keep in a warm place 24 hours; it may take 36 in winter. The bottle must be tightly corked and the corks tied down. Shake well 5 minutes before opening.—2. Fill a qt. champagne bottle up to the neck with pure milk; add 2 tablespoonfuls of white sugar, after dissolving the same in a little water over a hot fire; add also ½ of a 2 cent cake of compressed yeast. Then tie the cork on the bottle securely, and shake the mixture well; place it in a room of the temperature of 50° to 95° Fahr. for 6 hours, and finally in the ice-box over night. Drink in such quantities as the stomach may require. Be sure that the milk is pure; that the bottle is sound; that the yeast is fresh; to open the mixture in the morning with great care, on account of its effervescing properties; not to drink it at all if there is any curdle or thickening part resembling cheese, as this indicates that the fermentation has been prolonged beyond the proper time.—3. To a qt. of new milk add a sixth part of water; and to this mixture add, as a ferment, an eighth part of the sourest buttermilk that can be got. In future preparations, a similar quantity of old koumiss will better answer the purpose of a ferment. Cover the vessel with a cloth, and stand in a place of moderate warmth for 24 hours, when a thick substance will be found collected at the top. Stir well until this substance is thoroughly mixed with liquid portion beneath, and stand for 24 hours more, when, having filled a bottle two-thirds full, and again thoroughly mixed by shaking, the preparation, now called koumiss, may be used at once, or the bottle tightly corked and kept in a cool place for future use. Always shake the bottle well before using.—4. Dilute the milk with one-sixth part of hot water, and, while still tepid, add one-eighth of very sour (but otherwise good) buttermilk; put it into a wide jug, cover with a clean cloth, and let it stand in a warmish place (about 75° Far.) for 24 hours; stir up well, and leave for another 24 hours; then beat thoroughly together, and pour from jug to jug till perfectly smooth and creamy. It is now koumiss, and may be drunk at once. To make it sparkling, which is generally preferred, put it into champagne or soda-water bottles; do not quite fill them, well secure the corks, and lay down in a cool cellar. It will then keep for 6 or 8 weeks, though it becomes increasingly acid. To mature some for drinking quickly, it is as well to keep a bottle or two to start with in some warmer place, and from time to time shake vigorously. With this treatment it should, in about 3 days, become sufficiently effervescent to spurt freely through a champagne tap, which must be used for drawing it off as required. Later on, when very frothy and acid, it is more pleasant to drink if a little sweetened water (or milk and water) is first put into the glass. Shake the bottle, and hold it inverted well into the tumbler before turning the tap. Having made one lot of koumiss as above, you can use some of that instead of buttermilk as a ferment for a second lot, and so on 5 or 6 times in succession; after which it will be found advisable to begin again as at first. Mare's milk is the best for koumiss; then ass' milk. Cow's milk may be made more like them by adding a little sugar of milk (or even loaf sugar) with the hot water before fermenting. But perhaps the chief drawback to cow's milk is that the cream separates permanently, whereas that of mare's milk will remix. Hence use partially skimmed milk, for if there is much cream it only forms little lumps of butter, which are apt to clog the tap, or are left behind in the bottle.

LEMONADE.—1. Peel off the yellow rinds from 1 dozen bright, fresh lemons, taking care

that none of the rind is detached but the yellow zest—that portion in which the cells are placed containing the essential oil of the fruit. Put these rinds into an earthen vessel, pour over them 1 pt. of boiling water, and set aside in a warm situation to infuse; express the juice from 2 dozen lemons; strain it into a porcelain bowl, and add 2 lbs. of fine white sugar, 3 qts. water, and the infusion from the peels; stir all well together, until the sugar is well dissolved; now sample, and if required add more acid or more sugar; take care not to have it too watery; make it rich with plenty of fruit juice and sugar.—2. To the juice of 6 lemons and the yellow rind of 2 lemons, add ½ lb. sugar and 1 qt. water; ice the lemonade. Water may be added according to taste afterward. —3. Take 2 lemons, divide them, and put each half into a lemon-squeezer; when all the juice is extracted, put the remainder of the lemons into a pitcher and pour boiling water on them; after they have stood a little, squeeze all the goodness from them; add the juice to some loaf sugar, to sweeten pleasantly; then pour on enough cold water to make the strength required. Ice must be added.—4. Citric acid, 1 to 1½ dr.; essence lemon, 10 drops; sugar, 2 oz.; cold water, 1 pt.; agitate together until dissolved.



Lemon Squeezer.

LEMONADE, Aerated.—Into each bottle put lemon syrup, 1 to 1½ oz; essence lemon, 3 drops; sesquicarbonate of soda, ½ dr.; water, q. s. to nearly fill the bottle; have the cork fitted and ready at hand; then add of tartaric acid, 1 dr.; instantly close the bottle, and wire down the cork; it should be kept inverted, in a cool place, and, preferably, immersed in a vessel of ice-cold water.

LEMONADE, Antimoniated.—Add tartar emetic, 1 gr., to each pt. of ordinary lemonade.

LEMONADE, Aperient.—Sugar, 1 oz.; lemon juice, ¾ fl. oz.; sulphate of soda, 3 dr.; water, 8 fl. oz.; put them into a soda-water bottle without shaking; have the cork ready fitted; add of sesquicarbonate of soda, ½ dr., and instantly cork the bottle; wire it down and keep in a cool place, inverted.

LEMONADE, Artificial.—Loaf sugar, 2 lbs.; tartaric acid, ½ oz.; essence of lemon, 30 drops; essence of almonds, 20 drops; dissolve the tartaric acid in 2 pts. hot water, add the sugar, and lastly the lemon and almond; stir well; cover with a cloth, and leave until cold; put 2 tablespoonfuls into a tumbler, and fill up with cold water. This drink, it is said, will be found much more refreshing and more palatable than either ginger beer or lemonade, and costs only 30 cents for 10 pts. The addition of a very little bicarbonate of potash to each tumblerful just before drinking will give a wholesome effervescing drink.

LEMONADE, Lactic.—Lactic acid, 1 to 4 dr.; syrup, 2 oz.; water, 1 pt.; mix.

LEMONADE, Milk.—Dissolve ¾ lb. loaf sugar in 1 pt. boiling water, and mix with 1 gill lemon juice and 1 gill sherry; then add 3 gills cold milk; stir the whole well together, and then strain it.—2. Take 4 lemons, pare the rind as thin as possible; squeeze them into 1 qt. water; add ½ lb. fine sugar; let it stand 2 or 3 hours, and pass it through a jelly bag.—3. (*Effervescing, without a Machine.*) Put into each bottle 2 dr. sugar, 2 drops essence lemon, ½ dr. bicarbonate potash, and water to fill the bottle; then drop in 35 or 40 gr. of citric or tartaric acid in crystals, and cork immediately, placing the bottles in a cool place, or preferably, in iced water.—4. 2 scruples sesquicarbonate of soda, 2 dr. sugar, 4 drops essence of lemon, and ½ pt. water; lastly, 8 dr. tartaric acid in crystals. Care must be taken to avoid accidents from the bursting of bottles.—5. Into a soda-water bottle, nearly filled with water, put 1 oz. sugar, 2 drops essence of lemon (dropped on the sugar), 20 gr. bicarbonate of potash in crystals; and, lastly, 30 to 40 gr. of citric acid, also in crystals. Cork immediately.

LEMONADE, Portable.—Mix strained lemon juice with loaf sugar, in the proportion of 4 large lemons to 1 lb.; grate the rind of the lemons into this, and preserve the mixture in a jar. If too sweet, add a little citric acid. Use 1 tablespoonful to a tumbler of water.

LEMONADE POWDERS.—1. Powdered citric or tartaric acid, 12 gr.; powdered white sugar, ½ oz.; essence of lemon, 1 drop (or a little of the yellow peel of a lemon rubbed off on a piece of sugar); mix. For 1 glass.—2. White sugar, 4 lb.; citric or tartaric acid, 1½ oz.; essence of lemon, ½ oz.; mix well, and preserve it in a bottle for use. 1 to 2 dessertspoonfuls make a glass of lemonade. It is also put up in papers containing about 2½ dr. each.—3. Take 1 oz. crystalized citric acid, rub in fine, and mix thoroughly with 1 lb. dry pulverized white sugar; put in a single drop of oil of lemon peel to flavor it, and mix well; preserve in bottles for future use. In place of citric acid, you may take tartaric acid.

LEMON BEER.—1. Boiling water, 1 gal.; lemon, sliced, 1; bruised ginger, 1 oz.; yeast, 1 teacupful; sugar, 1 lb.; let it stand 12 to 20 hours, and it is ready to bottled.—2. Put in a keg 1 gal. water; 1 sliced lemon; 1 tablespoonful ginger; 1 pt. syrup; ½ pt. yeast. Ready for use in 24 hours; if bottled, tie down the corks.

LEMON JUICE, Artificial.—1. Citric or tartaric acid, 2½ oz., gum, ½ oz.; pieces of fresh lemon peel, ¼ oz.; loaf sugar, 2 oz.; boiling water, 1 qt.; macerate, with occasional agitation, till cold, and strain. Excellent.—2. Water, 1 pt.; sugar, 1 oz.; essence of lemon, 30 drops; pure acetic acid to acidulate. Inferior. Both are used to make lemonade.

LEMON SUGAR.—Sugar, 4 lbs.; tartaric acid, 3 oz.; essence of lemon, ¼ oz. Used to make lemonade, etc.

LEMON SYRUP.—Rub the rind off 6 large, fresh lemons with 1 lb. of fine loaf sugar, broken into small pieces; moisten these with as much water as they will absorb; put them into a preserving pan and boil to a clear syrup; then add the strained juice of 12 fresh lemons; stir well—off the fire—for 5 minutes; then pour into small, perfectly dry bottles, and when quite cool cork, seal and store in the usual manner. A small quantity of this syrup put into a glass of pure filtered water immediately transforms the latter into the most delicious lemonade. Orange syrup is prepared exactly as described above, only substituting oranges for the lemons, and using a smaller proportion of sugar.

LIME-FRUIT SYRUP.—A very pleasant and cooling drink is made of citric acid, 3 oz.; sugar, 7 lbs.; boiling water, 1 gal.; coloring, q. s.; dissolve.

MAPLE BEER.—1. To 4 gals. boiling water, add 1 qt. maple syrup; ½ oz. of essence of spruce; add 1 pt. of yeast, and proceed as with ginger pop.—2. To 4 gals. of boiling water, add 1 qt. of maple syrup, ½ oz. of essence of spruce, and 1 pt. of yeast; let it ferment for 24 hours, and then strain and bottle it. In a week or more it will be ready for use.

MEAD.—Mead is an old-fashioned beverage, but a very pleasant one, if care be taken in making it. It is generally made over strong, too much honey being used to the proportion of water. The following is a good recipe: 1. On 30 lbs. honey (clarified) pour 13 gals. soft water, boiling hot; clarify with the whites of eggs, well beaten; boil again; remove all scum as it rises; add 1 oz. of best hops, and boil for 10 minutes; then pour the liquor into a tub to cool, spreading a slice of toast on both sides with yeast, and putting it into the tub when the liquor is nearly cold. The tub should stand in a warm room. When fermentation has thoroughly begun, pour the mixture into a cask, and as it works off, fill up the cask, keeping back some of the liquor for this purpose. Bung down closely when fermentation has ceased, leaving a peg hole, which can be closed up in a few days. Let it remain a year in the cask before bottling off.—2. To 15 lbs. honey add 6 gals. of water; clarify the honey with whites of eggs; boil for 10 minutes, and keep thoroughly skimmed; add a handful of mixed herbs, thyme, rosemary tops and bay leaves; boil for ½ hour more; strain the mixture into a tub, upon 5 pts. ground malt; stir well together, and, when lukewarm, strain through a cloth into another tub; work it with yeast, and when fermentation is set up, pour it into a cask; suspend in the cask a muslin bag containing sliced ginger, ½ oz.; ¼ oz., each, of cloves, nutmeg and mace, well bruised; bung up tightly when it has ceased working, letting the bag of spices remain. It should stand in the wood for a year, and then be bottled off.

METHEGLIN MEAD.—1. 50 lbs. clear honey; boiling water to fill a 16 gals. cask; stir them well for a day or two; add yeast, and ferment.—2. From honey, 1 cwt.; warm water, 24 gals.; stir well until dissolved; the next day add of yeast, 1 pt.; hops, 1 lb.; previously boiled in water, 1 gal., along with water, q. s. to make the whole measure 1 barrel; mix well, and ferment the whole with the usual precautions adopted for other liquors. It contains on the average from 7 to 8 per cent alcohol.

NECTAR.—This is a simple, pleasant drink, and, generally speaking, extremely popular. Dissolve 2 lbs. loaf sugar in 3 qts. boiling water, and when cool, add ½ oz. of tartaric or citric acid and the strained juice of 6 lemons; color according to fancy with cochineal, saffron or burnt sugar; strain and bottle. This beverage will keep good for 3 or 4 weeks, and should always be made a few days previous to being required.

OATMEAL WATER.—The method of manufacture is simple. Put a liberal lump of ice into a pail with a few handfuls of oatmeal; fill up with water; add the juice of a lemon and a little sugar, only just enough to give interest; and the result is a drink that any man will be grateful for on a sweltering dog day.

ORANGEADE.—1. Juice of 4 oranges; thin peel of 1 orange; lump sugar, 4 oz.; boiling water, 3 pt.—2. Juice and peel of 1 large orange; citric acid, 15 grains; sugar, 3 oz.; boiling water, 1 qt.—3. Pare off the thin, yellow rind of 4 oranges, and infuse in ½ pt. boiling water, express the juice of 12 Florida oranges, and strain through a hair sieve; add to this ¾ lb. fine white sugar, the infusion from the rinds and 1 qt. of water. Ice the orangeade.—4. Slice crosswise 4 oranges and 1 lemon; put them into an earthen jug, with 4 oz. loaf sugar; pour upon these 1 qt. of boiling water, and allow to stand covered for 1 hour. Decant and ice.—5. Simple syrup, ½ fl. oz.; tincture of orange peel, ½ dr.; citric acid, 1 sc.; fill the bottle with aerated water.—6. (*Effervescing or Aerated, or Sherbet.*) Mix 1 lb. syrup of orange peel, 1 gal. of water, and 1 oz. citric acid; charge strongly with carbonic acid gas, with a machine.—7. Syrup orange juice, ¾ oz.; aerated water, ½ pt.

ORANGEADE POWDERS.—Powdered sugar, 14½ oz.; powdered orange peel, 12 gr.; oil of orange peel, 60 drops; essence of cedrat, 12 drops; bicarbonate of soda, 3½ oz.; mix and put 145 gr. in each blue paper. In the white paper put 32 gr. tartaric acid, or 30 gr. citric acid. Or the alkaline and acid powders may be put into separate bottles, with a measure holding the proper proportions of each. The orange peel may be omitted.

ORGEAT BEVERAGE.—Blanch 1 lb. sweet and 1 oz. bitter almonds; put them into a stone mortar and pound them to a fine paste, with 1 wineglassful of orange flower water; then add and rub in by degrees, ½ pt. rose water and 1½ pt. pure water; strain through a hair sieve and add it to 3 pts. simple syrup; place it upon the fire and boil up for 1 minute; remove and bottle. A tablespoonful of this added to tumbler of ice-water, soda or seltzer, is a very pleasant and refreshing drink.

OXYMEL.—An acidulous syrup made of honey and vinegar. Clarified honey, 0·32 oz. (avoirdupois); acetic acid, 4 fl. oz.; distilled water, 4 fl. oz. Liquefy by heat (Br. Ph.).

PERRY.—A fermented liquid, prepared from pears, in the same way as cider is from apples. The reduced pulp must not be allowed to remain long without being pressed. In the cask, perry does not bear changes of temperature so well as cider. It is therefore advisable, if at the end of the succeeding summer it be in sound condition, to bottle it, when it will keep perfectly well. The red, rough tasted sorts of pears are principally used for making perry. They should be quite ripe, without, however, approaching to mellowness or decay. The best perry contains about 9 per cent of absolute alcohol; ordinary perry from 5 to 7 per cent. Perry is a very pleasant tasting and wholesome liquid. When bottled champagne fashion, it is said to frequently pass for champagne without the fraud being suspected.

PERUVIAN BEER.—(*Carbonated.*) To ½ gal. of syrup add 1 oz. of extract of cinchona or Peruvian bark. This may be flavored with 1 oz. essence sarsaparilla or root beer.

PHILADELPHIA SHERBET.—Boil in 6 pt. water, 10 to 12 stalks green rhubarb and 8 oz. raisins or figs. When the water has boiled ½ hour, strain, and mix it with 1 teaspoonful rosewater, and vanilla, orange or lemon syrup to suit taste. Drink it iced.

RASPBERRY VINEGAR.—The following makes a delicious summer drink by stirring 2 or 3 tablespoonfuls of it into a tumbler of ice-water: Fill a stone jar with ripe berries, and cover with pure, strong cider vinegar; let it stand 5 days; then strain through a sieve, pressing out all the juice; allow 1½ lb. white sugar to each pint of this juice, and boil until the sugar is dissolved, removing any scum that may arise; take from the fire; bottle and seal.

RHUBARB SHERBET.—Boil in 3 pts. water, 6 or 8 stalks green rhubarb and 4 oz. raisins or figs; when the water has boiled ½ hour, strain, and mix it with 1 teaspoonful rose water, and orange or lemon syrup to taste. Drink it cold.

ROOT BEER.—1. Take 3 gals. molasses; add 10 gals. water at 60° Fahr.; let this stand 2 hours; then pour into a barrel, and add powdered sassafras and wintergreen bark, each, ½ lb.; bruised sarsaparilla root, ½ lb.; yeast, 1 pt.; water to fill the barrel; ferment 12 hours, and bottle.—2. For 10 gals. beer, take 3 lbs. common burdock root, or 1 oz. essence of sassafras; ½ lb. good hops; 1 pt. corn, roasted brown; boil in 6 gals. pure water, till the strength is obtained; strain while hot into a keg, adding cold water to make 10 gals. When nearly cold, add molasses or syrup until palatable; add also as much fresh yeast as will raise a batch of 8 loaves of bread; place the keg in a cool place, and in 48 hours it will be first-rate root beer.—3. For each gal. water used, take hops, burdock, yellow dock, sarsaparilla, dandelion and spikenard roots (all bruised), of each, ½ oz.; boil 20 minutes; strain while hot; add 8 or 10 drops of oils of spruce and sassafras, mixed in equal proportions; when cool enough, put in 2 or 3 tablespoonfuls yeast; molasses, ⅔ pt., or white sugar, ½ lb., gives the right sweetness.

SARSAPARILLA BEER.—Sarsaparilla (sliced), 1 lb.; guaiacum bark (bruised small), ¼ lb.; guaiacum wood (rasped) and licorice root (sliced), of each, 4 oz.; aniseed (bruised), 1½ oz.; mezereon root bark, 1 oz.; cloves (cut small), ½ oz.; moist sugar, 3½ lbs.; hot water (not boiling), 9 qts.; mix in a clean stone jar; keep in a moderately warm room, shaking 2 or 3 times daily, until fermentation sets in; then let it repose a week, when it will be fit for use.

SARSAPARILLA MEAD.—1 lb. Spanish sarsaparilla; boil 5 hours, so as to strain off 2 gals.; add 16 lbs. sugar and 10 oz. tartaric acid; ½ wineglass of syrup to ½ pt. tumbler water, ½ teaspoonful soda powder, is a fair proportion for a drink.

SARATOGA PUNCH.—Grate the rind of 3 and squeeze the juice of 6 lemons; add water the same as for lemonade; sweeten to taste; then add 6 eggs, yolks and whites, beat separately, and serve. This makes a delicate frothy drink.

SASSAFRAS MEAD.—3½ lbs. nice brown sugar; 1½ pt. good molasses; 3 qts. boiling water; ½ qt. tartaric acid. When cool, strain into a jug, and mix with this ½ oz. essence of sassafras. Put in bottles, cork tight, and keep in a cool place. For a drink, put 2 spoonfuls of this syrup into ⅔ glass ice-water, and then add ½ teaspoonful soda.

SHERBET.—8 oz. carbonate of soda; 6 oz. tartaric acid; 2 lbs. powdered loaf sugar; 3 dr. essence lemon; mix thoroughly; keep corked and dry; stir in 2 teaspoonfuls to 1 pt. cold water, and drink.

SODA POWDERS.—1. Tartaric acid, 1 oz.; bicarbonate soda, 1 oz., 54 gr.; or bicarbonate of potassa, 1 oz., 2 dr., 40 gr.; reduce the acid and either bicarbonate separately to fine powder; divide each of these into 16 powders, and preserve the acid and alkaline powders in separate papers of different colors.—2. Citric acid, 9 dr.; bicarbonate of soda, 11 dr.; or bicarbonate of potassa, 13 dr.; proceed as last, dividing each into 18 parts.—3. Tartaric acid (in crystals), 10 dr.; bicarbonate of soda, 11 dr.; or bicarbonate of potassa, 13 dr. Reduce them to powder, and divide into 18 parts.

SOUR DRINK.—1 gal. water; 1 pt. cider vinegar; 1 lb. sugar; 2 spoonfuls ginger; stir well together, and add a lump of ice. A trifle of soda stirred into each glass will make it foam and sparkle.

SPANISH BEVERAGE.—1. To ¾ lb. sugar and 6 oz. pounded almonds, as for orgeat, add 1 pt. grape juice and 3 pts. water; mix well together and filter. It should then be iced.—2. To 3 pts. rich lemonade, add 1 bottle of claret and ½ a nutmeg, grated.

SPRUCE BEER.—1. Essence of spruce, ½ pt.; pimento and ginger (bruised), of each, 5 oz.; hops, ½ lb.; water, 3 gals.; boil the whole for 10 minutes; then add of moist sugar, 12 lbs.; warm water, 11 gals.; mix well, and when only lukewarm, further add of yeast, 1 pt.; after the liquid has fermented for 24 hours, bottle.—2. Cold water, 10 gals.; boiling water, 11 gals.; mix in a barrel; add molasses, 30 lbs., or brown sugar, 24 lbs.; oil of spruce, or any oil you wish, 1 oz.; add 1 pt. yeast; ferment; bottle in 2 or 3 days. If you wish white spruce beer, use lump sugar; for ginger flavor, use 17 oz. ginger root,

bruised, and a few hops; boil for 30 minutes in 3 gals. water; strain and mix well; let it stand 2 hours and bottle, using yeast.—3. Boil 1 handful hops and 2 handfuls of chips of sassafras root, in 10 gals. water; strain, and turn on, while hot, 1 gal. molasses, 2 spoonfuls essence spruce, 2 spoonfuls ginger, and 1 spoonful pounded allspice; put into a cask, and, when cold enough, add ½ pt. good yeast; stir well; stop it close; when clear, bottle and cork.

STRAWBERRY WATER.—Bruise 1 lb. of fresh strawberries with ½ lb. of finely sifted sugar and ½ pt. of cold spring water; filter this slowly through very fine muslin; add 1 qt. of cold water and the strained juice of a large lemon, and serve. Raspberry, currant or pineapple water may be prepared in the same manner, and will be found most delicious, especially if a small quantity of carbonate of soda and tartaric acid be stirred into each glass immediately before drinking, in order to make it effervesce.

STRAWBERRY SHERBET.—Crush 1 qt. ripe berries; add juice of 1 lemon, 2 teaspoonfuls of orange flower water, and 3 pts. water; let them stand several hours; then strain over ¾ lb. sugar; set in ice an hour or two before using.

TABLE BEER.—The same proportions will answer for a greater or less quantity, only proportioning the materials and utensils. Take 1 peck of good malt, ground; 1 lb. of hops; put them in 20 gals. of water, and boil them for ½ hour; then run them into a hair-cloth bag or sieve, so as to keep back the hops and malt from the wort, which, when cooled down to 60° by Fahrenheit's thermometer, add to it 2 gals. of molasses, with 1 pt., or a little less, of good yeast; mix these with your wort, and put the whole into a clean barrel, and fill it up with cold water to within 6 inches of the bung-hole (this space is requisite to leave room for fermentation), bung down tight. If brewed for family use, would recommend putting in the cock at the same time, as it will prevent the necessity of disturbing the cask afterward. In one fortnight this beer may be drawn, and will be found to improve.

MEDICINAL LIQUORS.

CORDIALS.

ALKERMES.—1. Bay leaves and mace, each, 1 lb.; nutmegs and cinnamon, each, 2 oz.; cloves, 1 oz. (all bruised); cognac brandy, 3½ gals.; macerate 3 weeks, frequently shaking; then distil over 3 gals.; and add clarified spirit of kermes, 18 lbs.; orange flower water, 1 pt.; mix well, and bottle.—2. Spice as last; British brandy, 4 gals.; water, 1 gal.; macerate as before, and draw over 4 gals., to which add of capillaire, 2 gals., and sweet spirit of nitre, ¼ pt. Inferior to the last.

ANISEED.—1. Aniseed, 2 oz. (or essential oil, 1½ dr.); sugar, 3 lbs. per gal.—2. Aniseed, 4 oz.; coriander and sweet fennel seeds (bruised), each, 1 oz.; rectified spirit, 1 gal.; water, 3 qts.; macerate 5 or 6 days; draw over 7 pts.; and add lump sugar, 2½ lbs.—3. Oil of aniseed, 15 drops; oils of cassia and caraway, each, 6 drops; rub them with a little sugar; then dissolve in spirit, 3 qts., by shaking together; filter and dissolve in the liquor, sugar, 1½ lb.

BALM OF MOLUCCA.—Mace, 1 dr.; cloves, ½ oz.; clean spirit, 1 gal.; infuse 1 week in a well-corked carboy, frequently shaking; color with burnt sugar; to the clear tincture add lump sugar, 4½ lbs., dissolved in pure soft water, ½ gal.

BLACKBERRY.—Wash and pick over the berries; mash with a wooden spoon in a preserving kettle; let them come to a boil; strain; to every pt. juice, add ½ pt. water; 1 lb. loaf sugar; 1 oz., each of cloves, mace and cinnamon; 1 grated nutmeg; 1 oz. pounded green ginger; boil ½ hour; strain; and, when cold, add to each pt. 1 gill brandy. To be kept in a cool, dry place.

CARAWAY.—Generally from the essential oil, with 2½ lbs. sugar per gal.; 1 fl. dr. of the oil is reckoned equal to ½ lb. seed. A little oil of cassia, and essence lemon or orange, improves it.—2. 8 gals spirit, 50 per cent.; 1 oz. oil of caraway; dissolve in 95 per cent spirit; 8 lbs., each, sugar and water; dissolve the sugar in the water; mix, stir, and filter.

CEDRAT.—Essence cedrat, ½ oz.; pure spirit (at proof), 1 gal.; dissolve; add water, 3 pts.; agitate well; distil 3 qts., and add an equal measure of clarified syrup.

CHERRY.—Macerate 30 lbs. red sour cherries, made into a pulp, with 4½ gals. 95 per cent alcohol; press, and add syrup of 42 lbs. sugar and 3½ gals. water; filter.

CINNAMON.—Seldom made with cinnamon (owing to its high price), but with essential oil or bark of cassia, with 2 lbs. sugar to gal. It is preferred colored, and may be prepared by simple digestion. The addition of 5 or 6 drops, each, essence of lemon and orange peel; with a spoonful essence of cardamoms, per gal., improves it. 1 oz. oil of cassia is considered equal to 8 lbs. buds or bark; 1 fl. dr. of oil is enough for 2½ gals. Color with burnt sugar.

CITRON.—Oil or peel, with 3 lbs. sugar per gal.

CITRONELLE.—1. Fresh orange peel, 2 oz.; fresh lemon peel, 4 oz.; cloves, ½ dr.; coriander and cinnamon, each, 1 dr.; proof spirit, 4 pts.; digest 10 days; add water, 1 qt., and distil ½ gal.; to the distilled essence add white sugar, 2 lbs., dissolved in water, 1 qt.—2. Ess. of orange, ½ dr.; essence of lemon, 1 dr.; oils of cloves and cassia, each, 10 drops; oil of coriander, 20 drops; spirit, 5 pts.; agitate until dissolved; then add distilled water, 3 pts.; mix and filter; lastly, add sufficient dissolved sugar.

CLAIRET.—Aniseed, fennel, coriander, caraway, dill and candy carrot seeds, each (bruised) 1 oz.; proof spirit, ½ gal.; digest a week; strain

and add loaf sugar, 1 lb., dissolved in water, q.s.

CLOVE.—Put into a stone jar, ½ lb. cloves; ½ oz., each, cinnamon, nutmeg and coriander seeds, ½ lb. red currant jelly; 10 oz. sugar candy; 1 oz., each, candied citron, orange and lemon peel sliced; 1½ oz. isinglass; 3 oz. preserved ginger sliced; 2 oz. sweet and 1 oz. bitter almonds, blanched and pounded; 9 oz. powdered loaf sugar; 1 pt. red cordial water; 1 gal. proof spirit of wine; stop up the jar, and shake well daily for 1 month; then put it away in a dry room and let stand 12 months; strain and filter into bottles; cork and seal them. Fit for use in 2 months; age will improve it.

CORIANDER.—To ½ gal. spirits, put ½ lb. coriander seeds, ¼ lb. caraway seeds, ½ lb. sugar, and 1 drop oil of orange; make up to 3 qts. with water. The coriander must be bruised and steeped in the spirit 10 or 12 days, and stirred 2 or 3 times a day.

CURACOA.—Curacoa orange peel, 2 lbs.; ½ lb. Ceylon cinnamon; soak in water; boil 5 minutes with juice of 32 oranges and 14 gals. plain white syrup; add 6 gals. alcohol, 95 per cent.; strain; filter; color dark yellow with sugar coloring.

GINGER.—1 lb. raisins; rind of 1 lemon; ¾ oz. bruised ginger; steepin 1 qt. best brandy; strain, and add 1 lb. powdered loaf sugar to every qt.

GODFREY.—1. Opium (sliced), ¼ oz.; sassafras chips, 1 oz.; brandy, 1 qt.; macerate 4 or 5 days; add water, 1 qt.; molasses, 3½ lbs.; simmer the whole a few minutes; next day decant the clear portion. — 2. Aniseed, caraways and corianders, each, bruised, 1 oz.; sassafras chips, 9 oz.; water, 6 pts.; simmer until reduced to 4 pts.; then add molasses, 6 lbs.; when nearly cold, add tinct. opium, 3 fl. oz.

GOLD.—Angelica root (sliced), 1 lb.; raisins, ½ lb.; coriander seeds, 2 oz.; caraway seeds and cassia, each, 1½ oz.; cloves, ½ oz.; figs and sliced liquorice root, each 4 oz.; proof spirit, 3 gals.; water, 1 gal.; digest 2 days, and distil 3 gals. by a gentle heat; add, sugar, 9 lbs., dissolved in rose water and clean soft water, each 1 qt.; lastly, color by steeping in it hay saffron, 1½ oz.

GRAPE.—Purple grapes, sugar, water; wash and bruise the fruit; add a little water, and let it stand over night; strain; and to each gal. juice add 2 lbs. sugar; let it stand a week; drain off and bottle. A very acceptable drink for invalids, with a little water.

LEMON.—Digest fresh and dried lemon peel, each, 2 oz., and fresh orange peel, 1 oz., in proof spirit, 1 gal., for a week; strain with expression; add clear soft water, q. s., to reduce it to desired strength, and lump sugar, 3 lbs. to the gal.; a little orange flower or rose water improves it.

LOVAGE.—Fresh roots lovage, 1 oz. per gal. ¼ this quantity fresh roots celery and sweet fennel are commonly added; sometimes a little fresh valerian root and oil of savine are added before distillation.

NECTAR.—Chopped raisins, 2 lbs.; loaf sugar, 4 lbs.; boiling water, 2 gals.; mix, and stir frequently until cold; add 2 lemons, sliced; proof spirit (brandy or rum), 3 pts.; macerate in a covered vessel, 6 or 7 days, occasionally shaking; strain with pressure, and let the liquid stand in a cold place a week to clear; decant the clear portion, and bottle it. — 2. Red ratafia, 3 gals.; oils cassia and caraway, each, 25 drops, dissolved in brandy, ½ pt.; orange wine, 1 gal.; 6 sliced oranges; lump sugar, 2 lbs.; macerate a week; decant and bottle.

PEACH.—Make a rich syrup of 1 qt. peach juice and 1 lb. white sugar; when cold, add ½ pt. best brandy; for a drink, dilute with water.

PEPPERMINT.—1. Pour 1 qt. boiling water upon ½ lb. loaf sugar; stir till sugar dissolves; add 24 drops oil peppermint; bottle while warm. — 2. Good whisky and water, each, 10 gals.; white sugar, 10 lbs.; oil peppermint, 1 oz., in 1 pt. alcohol; 1 lb. flour well worked in the fluid; ½ lb. burnt sugar to color; mix, and let it stand 1 week before using.

QUINCE. — Take the parings and cores of quinces, when preserving; cover with water, and boil 1 gal. down to ½ gal.; when reduced to a thick mucilage, add 2 lbs. white sugar; stir until dissolved; add 2 qts. best white brandy; pour into clean wine bottles, and into each bottle put 4 or 5 blanched bitter almonds; shake each bottle well, and cork tightly; in 1 week it is fit for use.

RASPBERRY. — Raspberry brandy, capillaire and water, equal parts.

ROYAL.—Take a stone bottle, and put into it 2 qts. best brandy; add 2 dr. angelica seeds, 1 oz. coriander seeds; 1 teaspoonful, each, fennel and anise seeds, previously bruised in a mortar; squeeze into the mixture the juice of 2 fresh lemons, putting in the rinds cut small; add 1 lb. loaf sugar, and, agitating the jug from time to time, let the whole infuse 5 days; after this pass it through filtering paper, and bottle it, corking tightly. 2 tablespoonfuls to a small wineglassful is taken.

SIGHS OF LOVE.—Sugar, 6 lbs.; soft water, q. s. to produce 1 gal. syrup; add eau de rose, 1 pt.; proof spirit, 7 pts. It is stained pale pink by powdered cochineal. A pleasant cordial. A drop or two of essence of ambergris or vanilla improves it.

STRAWBERRY. — 1 qt. strawberries, fully ripe; 1 lemon; 1 orange; 3 pts. water; 1 lb. sifted sugar. Mash the strawberries through a sieve; add juice of lemon and orange and the water, and work together; let stand 2 hours. Put the sugar into a bowl and strain the juice over it, stirring till sugar is dissolved. Stand on ice before serving. A delicious drink.

TENT.—Plain spirit and port wine, each, 1 qt.; sherry and soft water, each, 1 pt.; orange flower water and lemon juice, each, ¼ pt.; essence ambergris, 2 drops; sugar, 2 lbs.

MINERAL WATERS.

AERATED.—Sulphate of iron, 1 gr.; carbonate of soda, 4 gr.; water deprived of air, and charged with carbonic acid gas, 1 pt.

AIX-LA-CHAPELLE.—Bicarbonate of soda, 12 gr.; chloride of sodium, 25 gr.; chloride of calcium, 3 gr.; sulphate of soda, 8 gr.; simple sulphuretted water, 2½ oz.; water, slightly carbonated, 17½ oz.

BADEN.—Chloride of magnesium, 2 gr.; chlo

ride of calcium, 40 gr.; perchloride of iron, ¼ gr.; chloride of sodium, 30 gr.; sulphate of soda, 10 gr.; carbonate of soda, 1 gr.; water, 1 pt.; carbonic acid gas, 5 volumes.

BAREGES. — Crystallized hydrosulphate of soda, crystallized carbonate of soda, and chloride of sodium, each, 2 oz.; water, 10 oz.; dissolve. Add to a common bath at the time of using.

CARLSBAD. — Chloride of calcium, 8 gr.; tincture of chloride of iron, 1 drop; sulphate of soda, 50 gr.; carbonate of soda, 60 gr.; chloride of sodium, 8 gr.; carbonated water, 1 pt.

CHALYBEATE. — Water, freed from air by boiling, 1 pt.; sulphate of iron, ½ gr.

CITRATE OF MAGNESIUM. — Citric acid, 16 oz.; carbonate of magnesium, 16 oz.; essence of lemon, 8 oz. Dissolve the acid in 4 pts. hot water; add the magnesia; when effervescence ceases add the lemon, and make up sufficient to measure 1 gal.; charge with 9 gals. water.

CONGRESS. — Bicarbonate of soda, 314 gr.; precipitated chalk, 85 gr.; calcined magnesia, 24 gr.; nitrate of strontia, 1 gr.; sulphate of manganese, 2 gr.; sulphate of iron, 1 gr.; sulphate of potassium, 1½ gr.; nitric acid, 1 gr.; carbonate of potassium, 18 gr.; chloride of sodium, 44 gr.; bromide of sodium, 2 gr.; iodide of sodium, 3 gr.; alum, 2½ gr.; carbonate of lithia, 8 gr.; solution of silicate of soda, 3 gr.; muriatic acid and carbonic acid water, sufficient. As magnesia or the carbonate, as well as carbonate of lime, are nearly insoluble in carbonic acid water as found in commerce, they should be freshly precipitated, when they will dissolve by it. This is accomplished by dissolving in sufficient muriatic acid, thereby forming chlorides of magnesium and calcium. The 314 gr. of bicarbonate of soda having been dissolved in 12 fluid oz. water, is added to the solution of the chlorides, when freshly precipitated carbonates are formed. To this mixture is added sufficient carbonic acid water to make a clear solution, which would therefore contain both bicarbonate of magnesia and of lime, and chloride of sodium formed by double decomposition. It will be observed that there are 44 more gr. of chloride of sodium called for by the receipt.

HARROWGATE.—Chloride of sodium, 100 gr.; chloride of calcium, 10 gr.; chloride of magnesium, 6 gr.; bicarbonate of soda, 2 gr.; water, 18½ oz.; dissolve, and add simple sulphuretted water, 1½ oz., to the foregoing prepared solution.

HUNYADI JANOS.—Sulphate of lime, 1½ oz.; Glauber salts, 23 oz.; Epsom salts, 28 oz.; sulphate of potassium, 1 dr.; water, 10 gals.; mix, and charge with gas.

KISSENGEN. For Fountains.—Bicarbonate of soda, 1 dr.; carbonate of lime, 2 dr. and 2 sc.; precipitate carbonate of lime, 2 sc.; common salt, 8 oz.; muriate of ammonia, 4 gr.; sulphate of soda, 2 dr. and 2 sc.; sulphate of magnesia, 2 oz.; phosphate of soda, 13 gr.; phosphate of lime, 2 dr. and 2 sc. Mix; add water, ¾ gal.; let it stand 6 hours; filter; add carbonate magnesia, 3 dr. and 1 sc., and then charge with 10 gals. water.

MARIENBAD.—Carbonate of soda, 2 sc.; sulphate of soda, 96 gr.; sulphate of magnesia, 8 gr.; chloride of sodium, 15 gr.; chloride of calcium, 10 gr.; to this add carbonated water, 1 pt.

PULLNA.—Sulphate of soda, 4 dr.; sulphate of magnesia, 4 dr.; chloride of calcium, 15 gr.; chloride of magnesium, 1 sc.; chloride of sodium, 1 sc.; bicarbonate of soda, 10 gr.; water, slightly carbonated, 1 pt. One of the most active of the purgative saline waters.

PYRMONT. — Sulphate of magnesia, 20 gr.; chloride of magnesium, 4 gr.; chloride of sodium, 2 gr.; bicarbonate of soda, 16 gr.; sulphate of iron, 2 gr.; Carrara water, 1 pt.

SEIDLITZ.—Fill soda water bottles with clear water; add to each as below; cork and wire immediately; Rochelle salts, 3 drops; bicarbonate of soda, 35 gr.; sulphuric acid, 11 drops.

SEIDSCHUTZ.—Sulphate of magnesia, 3 dr.; chloride of calcium, nitrate of lime, bicarbonate of soda, each, 8 gr.; sulphate of potash, 5 gr.; aerated water, 1 pt.

SELTZER.—Chloride of calcium and chloride of magnesium, each, 4 gr.; dissolve these in a small quantity of water, and add to it a similar solution of 8 gr. bicarbonate of soda, 20 gr. chloride of sodium, and 2 gr. phosphate of soda; mix, and add a solution of ¼ gr. sulphate of iron; put the mixed solution into a 20 oz. bottle, and fill up with aerated water.

TUNBRIDGE WELLS.—Chloride of sodium, 5 grains; tinct. steel, 20 drops; distilled water, 1½ pts.

VICHY. — Bicarbonate of soda, 1 dr.; chloride of sodium, 2 gr.; sulphate of soda, 8 gr.; sulphate of magnesia, 3 gr.; tincture chloride of iron, 2 drops; aerated water, 1 pt.

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SYRUPS.

ACID FRUIT.—The juice of any acid fruit may be made into syrup by using 1 lb. white sugar for each pt. juice, and adding some peel; boil 10 minutes; strain, and cork.

AMBROSIA.—1. A mixture of equal parts vanilla and strawberry syrup. — 2. Raspberry syrup, 2 pts.; vanilla syrup, 2 pts.; hock wine, 3 oz.

APPLE. — Boil in clarified syrup an equal quantity of fruit, cut in small squares, but not washed or broken. The syrup extracts the flavor, and may be poured off, leaving the apples, which may afterwards be used as common preserve.

ARRACK PUNCH.—53⅓ lbs. sugar; 3⅓ gals. water; boil well; add 1⅔ gals. lemon juice to the boiling sugar, and stir till clear; pour in a clean tub, and, when nearly cool, add 5 gals. Batavia arrack; then filter.

BANANA.—Oil of banana, 2 dr.; tartaric acid, 1 dr.; simple syrup, 6 pts.

BLACKBERRY. — Make simple syrup of a lb. of sugar to each pt. of water; boil until thick;

add as many pts. of the expressed juice of ripe blackberries as there are lbs. of sugar; put ½ nutmeg grated to each qt. of syrup; boil 15 or 20 minutes; then add to it ½ gill fourth proof brandy for each qt. syrup; set it by to become cold; then bottle for use.

CANDYING, To Prevent. — The candying, or crystallization of syrup, unless it be over saturated with sugar, may be prevented by the addition of a little acetic or citric acid (2 or 3 dr. per gal.); confectioners add a little cream of tartar to the sugar to prevent granulation.

CATAWBA. — Simple syrup, 1 pt.; catawba wine, 1 pt.

CAYENNE.—Tincture of capsicum, 2 oz.; simple syrup, 1 gal.; mix; color pink with carmine.

CHAMPAGNE.—Rhine wine, 2 pts.; brandy, 2 oz.; sherry, 1 oz.; granulated sugar, 3 lbs.; dissolve the sugar without heat.

CHERRY.—Take sour cherries (a convenient quantity), bruise them in a mortar, to break the stones; express the juice; set aside 3 days to ferment, and proceed according to directions given for strawberry syrup.

CHOCOLATE.—Chocolate, 8 oz.; syrup sufficient; water, ½ pt.; white of 1 egg; grate the chocolate, and rub in a mortar with the egg; when mixed, add water gradually, and triturate till a uniform mixture is obtained; add syrup to 4 pts. and strain.

CINNAMON.—Oil of cinnamon, 30 min.; carbonate of magnesia, 60 gr.; water, 2 pts.; sugar, granulated, 56 oz.; rub the oil first with the carbonate of magnesia, then with the water gradually added, and filter through paper. In the filtrate dissolve the sugar without heat.

COFFEE.—Pure coffee, roasted and ground, ½ lb., is infused in boiling water, ½ gal.; enough is filtered to make ½ gal. infusion, in which dissolve 7 lbs. granulated sugar. The best utensil for making the coffee infusion is the French style of coffee pot, having a receptacle above for the ground coffee, upon which boiling water is poured, extracting the flavor without the bitter. This infusion drains through a sieve bottom into the lower half of the coffee pot. With care, however, a fair infusion of coffee may be made in any utensil, but continued boiling develops the bitter.

COFFEE CREAM.—Coffee syrup, 2 pts.; cream, 1 pt.

CREAM.—Fresh cream, 1 pt.; fresh milk, 1 pt.; powdered sugar, 1 lb.; mix by shaking, and keep in a cool place. The addition of a few gr. bicarbonate of soda will retard souring.

EXCELSIOR.—Simple syrup, 1 pt.; syrup of wild cherry bark, 4 oz.; port wine, 4 oz.

GINGER.—(See same in MEDICAL PREPARATIONS.)

GRAPE.—Brandy, ½ pt.; spirits of lemon, ½ oz.; tincture of red sanders, 2 oz.; simple syrup, 1 gal.

LEMON.—1. Havana sugar, 1 lb.; boil in water down to 1 qt.; drop in the white of 1 egg.; strain it.; add ½ oz. tartaric acid; let it stand 2 days; shake often; 12 drops essence of lemon will improve it.—2. Dissolve 6 dr. tartaric acid and 1 oz. gum Arabic, in pieces, in 1 gal. simple syrup; then add 1½ fl. dr. best oil of lemon.

MAPLE. — Dissolve 3½ lbs. maple sugar in 1 qt. water.

MULBERRY.—Mulberries, not entirely ripe, 6 lbs.; sugar powdered, 6 lbs.; place in a kettle, and boil, stirring, until the boiling syrup marks 30° Baume; throw on a strainer, and allow the marc to drain thoroughly.

NECTAR. — Vanilla syrup, 5 pts.; pine-apple syrup, 1 pt.; strawberry, raspberry, or lemon syrup, 2 pts.

ORANGE FLOWER.—Orange flower water, 1 pt.; granulated sugar, 28 oz.; dissolve without heat.

ORANGE.—Oil of orange, 30 drops; tartaric acid, 4 dr.; simple syrup, 1 gal.; rub the oil with the acid, and mix.

ORGEAL. — Cream syrup and vanilla syrup, each, 1 pt.; oil of bitter almonds, 4 mins.

RASPBERRY.—1. Raspberry juice, 1 pt.; simple syrup, 2 pts.; solution of citric acid, 2 dr. — 2. First make a syrup with 36 lbs. white sugar and 10 gals. water, and put it into a clean barrel; dissolve ¼ lb. tartaric acid in 1 qt. cold water, and add to the syrup; take ½ lb. orris root, and pour over it ½ gal. boiling water; let it infuse until cold; then filter, and put it into the barrel, stirring it well.

SARSAPARILLA. — Oils of wintergreen, anise and sassafras, each, 10 drops; fluid extract of sarsaparilla, 2 oz.; simple syrup, 5 pts.; powdered extract of liquorice, ½ oz.

SHERBET.—Mix equal parts of orange, pine-apple and vanilla.

SHERRY COBBLER.—Sherry wine, 1 pt.; simple syrup, 1 pt.; 1 lemon, cut in thin slices; macerate 12 hours, and strain.

STRAWBERRY.—1. Use strawberries of good flavor to obtain a syrup of fine flavor. Mash the fruit in a suitable vessel, and leave the pulp 12 or 24 hours at a temperature between 70° and 80°; stir occasionally; press; set the juice aside for 1 night; add for every lb. avoirdupois of juice, 1 oz. avoirdupois of cologne spirit, or deodorized alcohol; mix; set aside for a night, and filter. For 1 lb. filtered juice, take 10 lbs. sugar, and heat to the boiling point, taking care to remove from the fire as soon as the mixture begins to boil; remove scum; bottle in clean bottles, rinsed with cologne spirit. This syrup, as well as those made by the same process, is strong enough to be mixed with 2 or 3 times its weight of simple syrup for the soda fountain. — 2. Strawberry juice, 1 pt.; simple syrup, 3 pts.; solution of citric acid, 2 dr.

VANILLA CREAM.—1. Fluid extract vanilla, 1 oz.; simple syrup, 3 pts.; cream (or condensed milk), 1 pt. Color with carmine. — 2. Cream syrup, 1 pt.; vanilla syrup, 1 pt.; oil of bitter almonds, 4 drops.

VANILLA.—Fluid extract vanilla, 1 oz.; citric acid, ½ oz.; simple syrup, 1 gal.; rub the acid with some of the syrup; add the extract of vanilla, and mix.

WALNUT CREAM.—1 lb. hickory nuts or walnuts; remove the skin, which would give a bitter taste; pound the kernels in a mortar, adding from time to time a drop of lemon juice, not to flavor, but to prevent the nuts becoming oily; as fast as the nuts are reduced, put them in a

linen cloth, gathered around them, so that they may be squeezed through. Whatever is left in the cloth return to the mortar and pulverize. The result of this process is to be added to 2 qts. of the cream, and used in lieu of syrup in dispensing the soda.

ALMOND.—Blanch and peel 1 lb. Jordan almonds and ½ oz. of bitter almonds, and steep them in cold water for 4 hours. Pound the almonds to a smooth paste in a mortar, adding ½ lb. pounded sugar and moistening by degrees with 1 qt. water; press the almonds through a wet broth napkin, straining the almond milk into a basin. Boil 2 lbs. sugar to the ball; take it off the fire, and when it is nearly cold, add to it the almond oil and a tablespoonful of orange flower water; shake the sugar boiler, to mix the whole together; cover it up and put it by until the sugar is quite melted. Pour the syrup into bottles; cork them carefully, and keep them in a cool place. As almonds can be obtained all the year round, it will be better to prepare only small quantities of the syrup at a time.

ASPARAGUS.—Cut 3 lbs. of the green and tender part of some asparagus, and boil it in 2 qts. water until the water is reduced to 1 qt. Pour the whole through a filtering bag, and add 4 lbs. loaf sugar, broken in pieces, to the asparagus water. Boil the syrup in a covered vessel au bain marie—that is, by placing the vessel containing the syrup in a stew-pan half filled with boiling water—until it registers 32° on the saccharometer. When cold, bottle the syrup and keep it in a cool place.

CAPSICUM.—Tincture of capsicum, 1 oz.; simple syrup, 2 pts.; heat the syrup; add the tincture, and when the alcohol has evaporated, mix immediately.

EGG PHOSPHATE.—Lemon syrup, 2 pts.; orange syrup, 2 pts.; eggs, 32; phosphoric acid (U. S. P.), 1 to 2 fl. oz. Thoroughly incorporate this with a Keystone beater; draw 1½ to 2 fl. oz. in large tumbler, and fill with carbonated water.

FANCY.—Vanilla syrup, 2 pts.; pineapple syrup, 8 oz.; raspberry syrup, 8 oz.

FRAMBOISE.—Raspberry syrup, 1 pt.; currant syrup, 2 pts. The mixtures of the various fruit syrups give rise to many other names. We will not formulate them here.

FRUIT SYRUP, For Lemonade.—Raspberries, 1,000 grm.; blackberries, 500 grm.; bilberries, 500 grm.; lemon, 3 fruits; mash in stone mortar; add of cold water, 1,500 grm.; let it stand for 3 days, or until fermentation has finished. Express and filter. In every 2,500 grm. dissolve citric acid, 40 grm., and sugar, 4,500 grm.; boil up once in a copper kettle.

LICORICE.—To 45 parts water, add 7½ parts licorice root, cut in pieces; boil for 15 minutes; pour the liquid off and evaporate to 26 parts; add 30 parts white sugar, and 30 parts purified honey; boil up once.

MANNA.— 1. 4 parts white sugar; 1 part picked manna. Dissolve in boiling water, and let it boil up.—2. 12 parts mulberries, not quite ripe; 12 parts granulated sugar; boil, stirring constantly, until the juice shows 30° Baume. Strain.

MILK PUNCH.—1. Simple syrup, 1 pt.; brandy, 8 oz.; Jamaica rum, 8 oz.; cream, 1 pt.—2. To 1 pt. heavy syrup, add ½ pt., each, of brandy and Jamaica rum; flavor with 2 teaspoonfuls of an extract prepared by macerating 2 oz. of ground nutmegs in 8 oz. of alcohol. The syrup is first to be poured into the glass in the proper quantity; and ordinary cream syrup added before drawing the soda-water.

ROSE.—1 gal. simple syrup; 1 oz. essence rose; color pink with prepared cochineal, and acidulate lightly with a solution of citric acid. Very satisfactory.

SYRUP OF FIGS.—Senna leaves, 2 Tr. oz.; buckhorn bark, 128 gr.; jalap, 384 gr.; rhubarb, 256 gr.; cinnamon, 30 gr.; cloves, 30 gr.; nutmeg, 15 gr.; oil of peppermint, 20 min.; sugar, 12 Tr. oz.; diluted alcohol, enough for 16 fl. oz. Reduce the drugs to a moderately fine (No. 50) powder; add to it the oil of peppermint, and percolate it, in the usual manner, with diluted alcohol. Remove the first 8 fl. oz. of the percolate and dissolve in this the sugar, with the aid of a gentle heat, if necessary, but avoiding loss of alcohol by evaporation. Allow the solution to cool, collect a further portion of percolate and add it to the syrup, so as to make 16 fl. oz. This is excellent.

WILD CHERRY.—Wild cherry bark (in course powder), 5 oz.; moisten the bark with water, and let it stand 24 hours in a close vessel; then pack firmly in a percolator, and pour water upon it until 1 pt. fluid is obtained; add of sugar, 28 oz.

WINTERGREEN. — Oil of wintergreen, 25 drops; simple syrup, 5 pts.; add burnt sugar to color.

SERVING.

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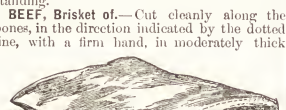
CARVING.

REMARKS.—The carving knife should be light, of middling size, and well sharpened. A long, thin blade is very necessary for large joints, for ham or turkey; a short, narrow, thin pointed knife should be used for chickens or wild fowl; let each one choose such as he can use with the best effect. Strength is less required than skill in the manner of using it; to facilitate this the butcher should be directed to divide the joints of the bones of all carcass joints of mutton, lamb and veal, such as neck, breast and loin, which then may easily be cut into thin slices.

If the whole of the meat belonging to each bone should be too thick, a small slice may be taken off between every two bones. If the carver is tall, or the chair at the head of the table is quite high, it is a more graceful and quiet way to keep seated while carving; but where there is a large piece of beef or mutton, a ham or turkey, or several chickens to be served, it is easier and more graceful to carve standing. One has freer movements of the arms, and therefore more strength and elasticity in their use. To serve out the meat carved before taking the seat is more expeditious, and in both operations one is less liable to soil the tablecloth around the platter if he serves out the various portions while standing.

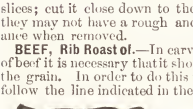
BEEF, Brisket of.—Cut cleanly along the bones, in the direction indicated by the dotted line, with a firm hand, in moderately thick



Brisket of Beef.

slices; cut it close down to the bones, so that they may not have a rough and jagged appearance when removed.

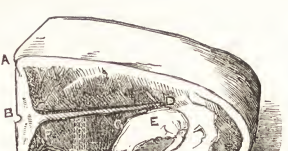
BEEF, Rib Roast of.—In carving the rib roast of beef it is necessary that it should be cut across the grain. In order to do this the knife should follow the line indicated in the illustration. It should be cut in slices of a medium thickness, and very evenly; the lean and the fat in one slice, and if more fat is desired it should be taken horizontally from the side. Before proceeding to serve, a slice of about ¼ in. in thickness should be cut from the top, so that the juicy part of the meat may be obtained at once.



Rib Roast of Beef.

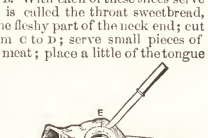
BEEF, Round of.—Cut in thin slices the entire size of the meat; a little of the fat cut thicker, and a trifle on the slant, is placed on each slice of the lean.

BEEF, Sirloin of.—Cut with one good firm stroke from end to end of the joint, at the upper portion, making the cut very clean and even from A to C; then disengage it from the bone by a horizontal cut exactly to the bone, B to D, using the tip of the knife; every slice should be clean and even, and the sirloin should be cut fairly to the very end. Many persons cut the under side whilst hot, not reckoning it so good cold. To carve this part, remove the fat E, which chops up well to make puddings, if not eaten at table; then the under part can be cut from end to end, F to G, or downwards, as shown by the marks at H.



Sirloin of Beef.

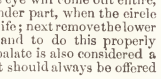
CALF'S HEAD.—Commence by making long slices from end to end of the cheek, cutting quite through to the bone, according to the dotted lines from A to B. With each of these slices serve a cut of what is called the throat sweetbread, which lies at the fleshy part of the neck end; cut also slices from C to D; serve small pieces of these with the meat; place a little of the tongue and a spoonful of the brains on each plate. Some persons prefer the eye; remove it by a circular cut marked by dotted lines at E; put the knife in slanting at F, inserting the point at the part of the dotted line, and driving it into the centre under the eye; then turn the hand round, keeping the circle of the dotted line with the blade of the knife, the point still in the centre; the eye will come out entire, cone shaped at the under part, when the circle is completed by the knife; next remove the lower jaw, beginning at G; and to do this properly turn the dish. The palate is also considered a dainty, and a little of it should always be offered to each guest.



Calf's Head.

CHICKEN.—(See *Fowl.*)

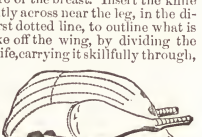
COD'S HEAD.—First cut slices across the marked *a b* and *c d*. Then sever the slices completely by a transverse stroke from *b* to *d*.



Cod's Head.

DUCK.—(See *Fowl.*)

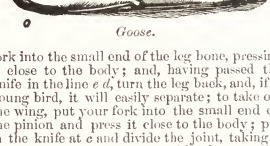
FOWL.—Hold the bird down firmly with the fork in the centre of the breast. Insert the knife and draw it lightly across near the leg, in the direction of the first dotted line, to outline what is being done; take off the wing, by dividing the joint with the knife, carrying it skillfully through, giving a slight jerk with the wrist, and at the same time turning the blade. Next slip the knife between the leg



Turkey.

and body and cut downwards, as indicated by the dotted line; then with the fork turn the leg back and the joint will separate; turn the fowl and take off the other wing and leg in the same manner. Next take off the merrythought; to do this, insert the knife in a straight line at that point and bend it back. The neck bones must be next divided from the part that adheres to the breast without breaking them; do this by putting the prongs of the fork through each and wrenching it up carefully. The next thing is to divide the breast from the back by cutting through the carcass, close to the breast, right down to the tail; then turn the back up and divide it by a straight line across the middle. The side bones are then readily separated from the rump. The thigh may be divided from the drumsticks by inserting the knife at the joint.

GOOSE.—Turn the neck end of the goose toward you; cut the whole breast in slices on each side of the bird, but only remove them as you help each person, unless the company is so large as to require the legs likewise; turn the goose on one side; then take off the leg by putting the



Goose.

fork into the small end of the leg bone, pressing it close to the body; and, having passed the knife in the line *e d*, turn the leg back, and, if a young bird, it will easily separate; to take off the wing, put your fork into the small end of the pinion and press it close to the body; put in the knife at *c* and divide the joint, taking it down in the direction *c d*; nothing but practice will enable people to hit the joint exactly at the first trial; when the leg and wing of one side are done go on to the other; cut off the apron in the line *f e g*, then take off the merrythought in the line *o i*; the neck bones are next to be separated as in a fowl, and all other parts divide the same.

HAM.—Commence cutting beyond the knuckle; cut it in the direction A B, leaning downwards; it may be carved also after 2 or 3 cuts have been made as above, by cutting the slices lengthwise.

Ham.

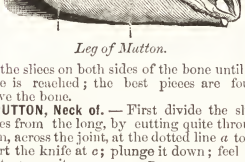
LAMB. Fore Quarter of.—Separate the shoulder from the breast and ribs by passing the knife under; keep it toward you horizontally to prevent cutting the meat too much off the bones; squeeze the juice of a lemon on the piece left and sprinkle it with pepper and salt; then separate the gristly part from the ribs and help to each person the portion preferred.

MUTTON. Haunch of.—Cut through the flesh between the leg and loin and then run the knife from this to the lower end of the loin, cutting

Fore Quarter of Lamb.

parallel slices in that direction; make these cuts in one sweep; carry the knife directly from the outside of the leg to the end of the loin, and thus get a beautiful long slice of lean, with the fat at the end; there is, also, a delicious mine of kidney fat in the loin of mutton, under the flank.

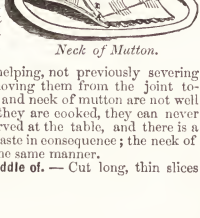
MUTTON. Leg of. — Lay it back down; cut the first slice across the lower part about ¼ of the distance between the knuckle and cramp bone;



Leg of Mutton.

cut the slices on both sides of the bone until the bone is reached; the best pieces are found above the bone.

MUTTON, Neck of. — First divide the short bones from the long, by cutting quite through them, across the joint, at the dotted line *a* to *b*; insert the knife at *c*; plunge it down; feel the joint; press it in; turn it over as you do the leg of a fowl, to snap it; then cut the chop off; cut one of the small bones and serve with each chop; it is usual to cut two chops, and add two small bones to each helping, not previously severing them, but removing them from the joint together; if loin and neck of mutton are not well jointed before they are cooked, they can never be properly carved at the table, and there is a great deal of waste in consequence; the neck of veal is cut in the same manner.



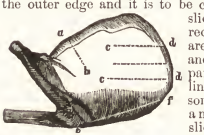
Neck of Mutton.

MUTTON, Saddle of. — Cut long, thin slices

Saddle of Mutton.

from the tail to the end, viz.; from *a* to *b*, beginning close to the back bone; if a large joint, the slice may be divided; cut some fat from the sides.

MUTTON, Shoulder of. — Cut in the hollow part, in the direction *a*, *b*,; then pass the knife deep to the bone; the best part of the fat lies on the outer edge and it is to be cut out in thin slices, in the direction *f*; if many are at the table, and the hollow part cut on the line *a*, *b*, is eaten, some very good and delicate slices may be cut out in each side of the ridge of the blade bone, in the direction of *c*, *d*; the line between these two dotted lines is that in the direction of which the edge or ridge of the blade bone lies, and cannot be cut across.



Shoulder of Mutton.

PARTRIDGE.—If very large this may be carved like a fowl; serve the merrythought with the breast, and the wing with a leg; when very small, divide the bird into two parts by cutting quite through from the breast to the tail.

PIGEON. — Divide the pigeon in half when laid flat on its back upon the dish by going boldly quite through the breast with sufficient weight of hand to divide the bones at once, or by cutting in the direction of the dotted lines *c*, *a*, *b*.

Pigeon.

PIG, Sucking. — Separate the shoulder from the carcass on one side, and then the leg, according to the direction given by the dotted line; then divide the ribs in about two helpings, and


Sucking Pig.

an ear or jaw presented with them, and plenty of sauce; the joints may either be divided into two each, or pieces may be cut from them; the ribs are reckoned the finest part, but some people prefer the neck and between the shoulders.

RABBIT. — Place the knife under the shoulders; cut clear down to the rump on the side of the back bone; the same on the other side; sever the head from the body by a circu-


Rabbit.

lar cut; then cut the back into four parts; the shoulder take off in a circular line; if the rabbit is an old one, place the knife between the leg and back giving it a little turn inwards near the joint, which endeavor to hit; then cut, and with fork turn completely back; both legs being off, divide the back into as many parts as necessary; hares are carved in the same way.

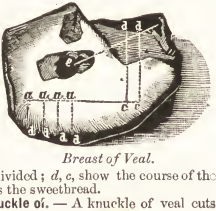
SPARERIB—Cut out first a slice from the fleshy portion, following the line *a*, *b*; this will give a due proportion of fat and lean; after this part is taken away, the bone lying in the direction *d*, *b*, *c*, should be separated, breaking it off at the joint *c*.

Spareribs.

TONGUE.—Cut a tongue across, not length wise; the middle and thick parts are the best; that near the tip is hard.

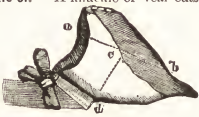
TURKEY.—(See *Fowl.*)

VEAL, Breast of.—Cut to the left on the first line *d*, *c*; then cross from *c* to the most distant *a*; the line *a*, *d*, *a*, *d*, etc., represent the directions in which the brisket or gristly part should be divided; *d*, *c*, show the course of the ribs, and *e* is the sweetbread.



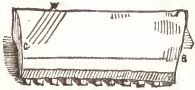
Breast of Veal.

VEAL, Knuckle of. — A knuckle of veal cuts in neat slices only in one direction, viz: from *a* to *b*; the line *d*, *c*, divides two bones, which it is necessary to separate in order to get at the best marrowy fat portion; also cut asunder the knuckle bones.



Knuckle of Veal.

VEAL, Loin of.—With a loin of veal a slice of toast is sent to table, on a small dish; turn over the loin, and cut out the kidney, with the surrounding fat, and place it on the dish upon the toast; turn back the veal to its former position and cut off slices from D to C.

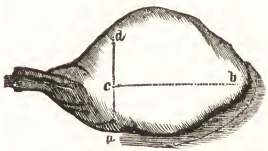


Loin of Veal.

VEAL, Neck of.—(See *Mutton, Neck of.*)

VEAL, Shoulder of.—This is carved like the shoulder of mutton by some; but the best plan is to begin on the under side, and cut slices from the thick edge opposite the bone and parallel with it. When stuffed, a portion of the forcemeat must be served on each plate.

VENISON, Haunch of. — First cut it down to the bone in the line *d, c, a*; then turn the dish with the end *a* towards you; put in the point of the knife at *c* and cut it down as deep as you can in the direction *c, b*; thus cut, you may take



Haunch of Venison.

out as many slices as you please, on right or left; as the fat lies deeper on the left, between *b* and *a*, to those who are fond of fat, as most venison eaters are, the best flavored and fattest slices will be found on the left of the line *c, b*, supposing the end a turned toward you; slices of venison should not be cut too thick nor too thin, and plenty of gravy given with them.

TABLE ARRANGEMENTS.

FLORAL DECORATIONS.—The ornamentation or decoration of the dinner table is a matter which should not be left to the servants; it should be the special business of the lady of the house; nothing imparts such a bright, pleasant appearance to a table as plenty of fresh flowers. When flowers can be readily obtained, not only should the centre ornaments be filled with them, but a small bouquet, also, should be placed before each guest. The best ornament for the centre of the table is a glass stand in which flowers and foliage are disposed on a foundation of clay and sand; or have a group of plants in a basket, the mold neatly covered with moss. In the disposition of the centre-piece care must be taken that it does not occupy too much space nor be too high. If the size of the table will allow, a couple of smaller baskets or glass stands may be added. Elaborate and costly epergnes are sold for this purpose. They are usually made either of silver, glass or alabaster, and some of them are exceedingly beautiful. Various designs in frosted silver, with glass vases and dishes attached, for the reception of fruit and flowers, are amongst the most elegant. Occasionally a plateau of looking-glass is annexed, which has a very good effect. Whatever the ornaments may be, place the largest one in the centre, and the smaller ones, of which there should be duplicates, at either side of it, with a greater or less distance between them. In arranging flowers and fruit, the color should be taken into account. Systematic coloring is rarely satisfactory; for even if good of its kind, it must fail because it will weary. Good mixtures should be the aim, but there must be symmetry in some sort, and the colors should have the relief of a sufficient amount of green. Bits of lycopodium and maiden-hair fern are sure to be appropriate. Small leaves of many kinds may be used with advantage. Variegated leaves are frequently useful, but beware of such as are coarse, or which have a sepulchral air by gaslight, as may happen with leaves of begonia, cissus, amaranthus and coleus.


Epergne.

GARNISHING.—The art of garnishing dishes is the art of ornamenting them, and making them look elegant, and thus satisfying the eye as well as the palate. Various materials are used for this purpose. Among the most popular are cocks' combs, plovers' and hens' eggs boiled hard, prawns and small crayfish, button mushrooms glazed, stamped pieces of vegetables, such as carrot, turnip, parsnip, beet root and truffles, stoned olives, gherkins, fried croûtons of bread, aspic jelly, horse radish, cut lemon and parsley. Everything depends upon the artistic arrangement of the ornamentation, determined by the taste of the garnisher. Where the taste has been cultivated, or where there is a natural faculty for decoration, the task of garnishing dishes effectively is an easy one. Where culture and natural taste are absent, observe and imitate the ways of others. A great deal depends upon the pleasing contrast of colors. Be particular not to overdo the work of decorating. A simple garnish adds

much to the appearance of a dish, but too much decoration injures it. Garnishes should be so arranged as not to interfere with serving. Potato balls and thin fried potatoes make a nice garnish for all kinds of fried and broiled meats, and fish. Whipped cream is a delicate garnish for all Bavarian creams, blanc manges, frozen puddings and ice creams. Arrange around jellies or creams a border of any kind of delicate green, like smilax or parsley, or of rose leaves, and dot it with bright colors, pinks, geraniums, verbenas or roses. Remember that the green should be dark and the flowers small and bright. A bunch of artificial rose leaves, for decorating dishes of fruit at evening parties, lasts for years. Natural leaves are preferable when they can be obtained. Wild roses, buttercups and nasturtiums, if not used too freely, are suitable for garnishing a salad. It is well to pour the sauce for cold puddings around the pudding, especially if there will be a contrast in color.

MENUS, or BILLS OF FARE.—These are generally placed by the side of each individual, so that he may know at once what is to be set before him, and may partake of that which he most approves. A small menu stand, containing the bill of fare, may be placed before each guest, and most beautiful and artistic cards are sold upon which the order of the dinner can be written. The task of drawing up the bill of fare is generally undertaken by the mistress of the house or by the experienced cook to whom she intrusts the execution of her orders. Knowledge, taste and judgment are called for in its accomplishment, and the crowning honor of a successful banquet certainly belongs to the person who conceived the idea of it. The order in which the viands are to be served is placed upon these, commencing with the lightest and advancing to the heaviest, then gradually ending with lighter articles of food. The order followed in general is as follows: Oysters, if eaten on the shell; soup; fish; entrees; meats, naming with each meat the accompanying vegetable; game; vegetables, if not mentioned in connection with the meats; salads, and desserts, ending after the fruits and nuts with the serving of tea or coffee, wines or liquors. Menus may be made as souvenirs by the hostess, being either hand-painted or embroidered.

MENU, Banquet.—

Soup.
Green Turtle. Sherry Wine.
Fish.
Salmon, Lobster Sauce, Iced Cucumbers,
Haut Bareac.
Roast.
Spring Lamb, Mint Sauce.
Fillet de Beuf, with Mushrooms.
Geisler Blue Seal Champagne.
Vegetables.
Potatoes. Peas. Tomatoes. Cauliflowers.
Entrees.
Sweetbreads and Peas. Chicken Croquettes.
Salad.
Lobster.
Dessert.
Ices. Meringues. Fruit. Coffee. Wines. Cigars.
Toasts.

MENU, Christmas.—

Oysters on Shell.
Soup.
Creme of Cauliflower. Sherry Wine.
Fish.
Eels, Boiled Potatoes, Nachenheimer Auslese.
Entrees.
Tenderloin of Pork. Onions, Stuffed and Baked.
Pommery Sec.
Roasts.
Turkey, Cranberry Sauce, Mashed Potatoes.
Goose, Apple Sauce.
Romanee Conti.
Salad.
Lettuce.
Dessert.
Plum Pudding, Brandy Sauce. Mince Pies.
Confections. Fruit. Cheese. Tea. Coffee.

MENUS, Breakfast.—

Spring.
Fried Hominy.
Stewed Dried Apples.
Rolls or Bread, Butter, Coffee, etc.
Broiled Ham, with Fried Eggs.
Baked Potatoes.
Flannel Cakes.
Summer.
Coarse Hominy, boiled.
Small Fruit and Cream.
Bread, Butter, Coffee, etc.
Cold Roast Beef, sliced thin.
Fried Potatoes, sliced Cucumbers.
Dried Beef, dressed with Cream.
Radishes.
Graham Gems.
Autumn.
Hulled Corn, with Cream.
Baked Pears, Grapes.
Brown Bread, Rolls, Coffee, etc.
Veal Cutlets and Fried Potatoes.
Mushrooms, baked.
Muffins.
Winter.
Fried Mush.
Stewed Apples.
Rolls, Bread, Coffee, etc.
Venison Steak and Potato Snow.
Sausages.
Buckwheat Cakes.

MENUS, Dinner.—

Spring.
Vermicelli, clear, and Oysters.
Trout with Clam Sauce.
Lamb and Mutton Sweetbreads.
Fillet of Beef, Mushrooms and Potatoes.
Roast Chicken with Beans.
Asparagus, Spinach, Radishes, Watercress, Celery.
Pineapple and Small Fruit.
Nuts.
Coffee, Tea and Wine.
Summer.
Vegetable Soup.
Baked Salmon Trout, with Claret Wine.
Tenderloin of Beef, with Green Peas.
Roast Venison, Asparagus and Corn.
Lettuce, with Olives.
Charlotte Russe, Peaches and Cream.
Coffee, Tea and Wine.

Autumn.

Chicken Soup.
Boiled White Fish with Potato Croquettes.
Boiled Young Chicken.
Ragout of Veal with Spinach.
Lamb Chop with Asparagus.
Roast Duck.
Pish Pash of Mutton with Celery Salad.
Apple Snow. Blanc Mange.
Mince, Pumpkin and Cranberry Pie.
Fruits and Nuts.

Winter.

Raw Oysters.
Julienne Soup.
Broiled White Fish *à la Maitre de Hotel.*
Roast Turkey with Cranberry Sauce.
Beef *à la Mode.*
Lamb Chops with Dried Peas.
Roast Quail, larded. Lettuce.
Mayonnaise. Rice Croquettes.
Currant Jelly. Custard.
Floating Island. Coffee.

MENUS, Tea.—

Spring.

Clams and Sardines.
Bread, Butter, Tea, etc.
Cold Roast Beef.
Blanc Mange and Jelly.
Cake.

Summer.

Salmon Cutlets.
Cold Chicken.
Bread, Butter, Tea, etc.
Lobster Salad.
Crackers and Cheese.
Ice Cream, Small Fruits and Cream.
Cake.

Autumn.

Boiled Fish with Lobster Sauce.
Potato Croquettes.
Bread, Butter, Tea, etc.
Cold Chicken or Turkey, Cranberry Sauce.
Watercress and Lettuce.
Assorted Cakes. Jelly. Blanc Mange.

Winter.

Oysters.
Bread, Butter, Tea, etc.
Lamb Chops and Potatoes.
Chicken Salad.
Dried Beef, dressed with Cream.
Light Pudding and Charlotte Russe.

MENU, Holiday Dinner.—The following will be seen to be very elaborate; but selections can be made from the different parts to form a smaller menu.

Oysters on Shell.

Soup.

Mock Turtle. Tomato. Fish Chowder.

Fish.

Boiled Cod's Head and Oysters.
Fried Sea Trout with Rashers of Pork.
Baked Striped Bass, Stuffed, Claret Sauce.

Removes.

Roast Turkey. Boiled Turkey and Oyster Sauce.
Roast Tenderloin of Beef.
Boiled Capons and Pork, Celery Sauce.
Roast Geese.
Boiled Leg of Mutton, Caper Sauce.
Roast Ham, Champagne Sauce.

Cold Ornamental Dishes.

Calf's Head, boiled, decorated.
Lobster Salad, garnished in Jelly.
Gelatine of Turkey with Truffles.
Quail with Plumage, on Form.
Boned Chicken with Truffles. Smothered Liver.
Oysters, Fricasseed.

Entrees.

Macaroni *à la Creme.* Mutton Cutlets, breaded.
Venison Steak, Jelly Sauce. Veal Patties.
Partridge Croquettes.
Terrapin Stewed, Port Wine Sauce,
Roasted Grouse, with Truffles.
Sweetbreads, larded, with Green Peas.
Veal Cutlets, larded, Tomato Sauce.
Mutton Kidneys, Champagne Sauce.
Fillet of Beef with Mushrooms.
Fillets of Chicken. Calf's Head, Turtle Sauce.
Oysters fried in Crumbs.
Tripe Lyonnaise.

Game.

Gray Ducks. Canvas-Back Ducks.
Black Ducks. Partridge. Prairie Grouse.
Quail. Teal.

Dessert.

Meringue Baskets. Omelet Souffle.
Blanc Mange. Pastry. Creams. Confectionery.
Wine Jelly. Charlotte Russe. Ambrosia. Nuts.
Oranges with Jelly. Apples and Nuts.
Lemon Snow. Grape Pyramid.
Plum Pudding. Fried Bananas.
Roman Punch. Coffee and Wines.

SETTING THE TABLE.—Much of the general comfort of a meal depends upon the neatness and taste with which it is served. The actual laying out of the table must depend upon circumstances, the viands to be served, and the means of the host. The bread should be cut in thin, square slices. To prevent waste by the constant leaving of slices of bread, use a wooden

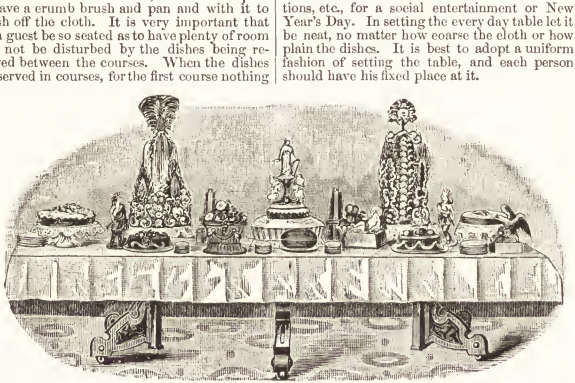
Wooden Bread Plate.

bread plate, upon which the loaf is placed to be cut as needed. When the napkins are used for the first time fold them in some fancy form, inclose the bread in them, and place one by the

side of the plate of each sitter. There are innumerable ways of folding the napkin according to the caprice of fashion; but any unique form may be adopted by the one who does the folding. The napkins may be folded neatly and placed in rings, or in the goblet of each sitter. Water caraffes, salt cellars, pepper and mustard stands, and individual butter plates should be abundantly supplied. In arranging the plates on the table place them face downward; arrange the napkin with the knife and fork on the right hand. Have the centre piece placed in position first, and then the smaller ornamental pieces. From these the dishes must radiate. The meats should be arranged with a view to convenience of carving and serving; the vegetables, by their bulk, shape and color, should be utilized for effect of appearance, and the *tout ensemble* plainly saying to the guests, "Please make yourselves at home." It is best to serve the dishes in courses, where the number of the different dishes is likely to cause confusion in the appearance of the table and discomfiture to the guest. After each course, the dishes should be quickly removed, clean plates, etc., brought, and in some cases the table-cloth changed; but as this causes some trouble, it is a better plan to have a crumb brush and pan and with it to brush off the cloth. It is very important that each guest be so seated as to have plenty of room and not be disturbed by the dishes being removed between the courses. When the dishes are served in courses, for the first course nothing should be on the table save the decorations, soup

Crumb Brush and Pan.

plates and spoons, napkins, etc. When the first course is removed, the plates should be placed at the side of the carver, if the meat is carved at the table. Vegetables, when possible, should be served in individual dishes. The general cloth in use is the white, but when a change is made during the meal a colored one is used when fruits are found among the desserts. For a light tea, breakfast or lunch, the colored cloth is also appropriate. The napkins should correspond with the cloth used. When the table is laid for a large party, at which the guests are not expected to sit, but sit around the room, the table should be arranged to present artistic arrangement rather than comfort. Our illustration shows a table well decorated with confections, etc., for a social entertainment or New Year's Day. In setting the every day table let it be neat, no matter how coarse the cloth or how plain the dishes. It is best to adopt a uniform fashion of setting the table, and each person should have his fixed place at it.



Ready for the Guests.

"HOME, SWEET HOME!"

THE HOUSEHOLD.

REMARKS.—It should be the constant object and aim to render home attractive. Let the boys and girls have a pleasant, sunny room to themselves. If each one cannot have a separate apartment, let him have his own drawers, and a specified portion of closet room. See that they are kept in order. Let the room be just as warm, bright and cheerful as motherly love and sisterly ingenuity can make it. Mothers should learn to cook well and there will be no spoiled bread, cakes, puddings and unsavory dishes, with their manifold perplexities. Ignorance makes a poor mechanic or wife, and saddens life, unless the possessor is so great a fool as to be unconscious of the torture inflicted upon others, and of his own littleness. Allow nothing to be wasted in the kitchen. Require the servants or help to follow your rules. Do it quietly and kindly, but firmly. Never relax and never make a fuss. Help that can not be controlled into the observance of order by such means, had better be got rid of. Judicious praise of good work is a duty, and it will pay double in the faithful service returned. If a good servant happens to be irritable and "crusty" sometimes, remember that servants have feelings as keen as your own; pass a casual offense of temper for the time, and recall it kindly when the offender has grown cool. If there is no penitence, a discharge is the alternative.

CHILDREN.

CHILDHOOD has been divided into two distinct periods by medical writers; 1st, that of *infancy*, which extends to the end of the 2nd year; and 2nd, *childhood proper*, which ends when maturity has been reached. The rules governing the care of both periods are different in almost all respects.

INFANCY.

REMARKS.—As the infant, in its helplessness, is unable to make known its wants other than by its cry, there is no part of a mother's duty to her child more essential than an early study of the meaning of this cry. This is by no means difficult; a close attention to its tone, and the expression of the babe's features, are the important points, and the key to both she quickly finds in her heart and in the knowledge of her success in the comfort of her child. It is the duty of both mother and nurse, as well as of the woman expecting to become a mother, to acquaint themselves with the wants of children, and with the proper means for caring for and supplying them. The first want of a child is plenty of air, and this want never ceases while life lasts. The common practice of having night lights in the bedrooms of children should be deprecated. It has a most injurious effect upon the nervous system of young children, besides injuring their eyes, which are attracted to constantly gaze on anything bright.

BATHING.—The morning hours are the proper time for bathing children. Take care that you have a spot in a warm room free from draughts; let all baby's clothes hang ready and warm to put on; the towels must also be warmed. Adorn yourself with two flannel aprons, and see that the water is warm; also that you have everything in readiness for the tiny toilet—needles threaded and all handy. Take a flat piece of fine, soft sponge; use castile soap; soap the tender head all over as the baby lies on your knee, continuing as well all over the body, paying extra care to the armpits and all crannies and creases; with the left hand and arm firmly held under the head and back, lay the baby in the bath, and sponge the face and head thoroughly well and carefully, so as to eliminate every sign of soap; but beware of relaxing the hold till the back is sponged. Take it quietly out, and with a soft, dry or warmed towel, begin at the face and gently dry the entire surface of the body. Do not scour the skin with a single fold of the towel, but have it doubled. Dress the child as soon as possible, and be careful not to move it about the room too much before it is clothed.

Sometimes a physician orders a salt or hot water bath to be given the child. If the former, it should be given as an ordinary bath, only adding as much common salt to the water as may be necessary. Have the water warmer before the salt goes in than you wish the bath to be after the salt dissolves. If the hot bath is ordered, take an ordinary hand basin, or, if it is not large enough, use a small wooden tub; stand it in front of a fire until the inside becomes quite warm; pour into it the water, which should be as hot as the child can bear without inconvenience. See that every door and window has been closed; let no one come into the room until the

Infancy.

child has been bathed and dressed. Stand it in the tub, and with a towel, which has been dipped into the water of the tub, wash its limbs and the lower part of the body. The child should now be made to sit down in the water; then with the towel wash the other parts of the body, neck and face, which are not under the water. Do it quickly, but never forget to be gentle. A little Castile soap may be also used. The length of time which the child should remain in the bath must, as in other cases, be left a great deal to the intelligence of the mother; but usually it should not exceed two minutes. A good general rule, in the absence of a better one, is to take it out as soon as the perspiration breaks out on the skin. For babies for whom soft towels are necessary, and whose tender skins will not bear hard rubbing, use finely powdered white starch or fuller's earth, and where there is soreness in the little fat creases of the limbs, a slight dusting of pulverized nutmeg added to the starch, and rubbed on softly or sprinkled in with the fingers, will soon heal it. The following is also a good powder: Take 1 oz. of pulverized hemlock bark, 1 oz. of magnesia, and 1 oz. of laundry starch; pulverize finely by laying upon a platter and grinding with a knife; sift through a hair sieve.

BEDS.—Hard beds should never be given to little children, unless, perhaps, in hot weather. If the bed is not kept sweet and clean by daily airings and frequent beating, whether it is soft or hard, it is injurious.

CLOTHING.— Good sense requires infants' dresses to be made with long sleeves and high in the neck. Woolens should encase the whole body next the skin, with the exception of the head and hands. In the first stage of infancy, warmth depends on clothing alone, for there is little muscular movement. Avoid a degree of warmth which produces sensible perspiration. Dress the child loosely, and fasten with strings, not with pins. The umbilical cord, navel and belly band require much attention. Avoid keeping the child's head too warm, or its feet too cold. Avoid chilling the child, or taking it abroad in cold weather. Attend to the form and size of the child's shoes, so that the feet shall not be cramped. Quite as much attention should be paid to keeping the child cool in summer as to keeping it warm in winter. Overheating is a source of sickness then. Tight dressing causes permanent distortion and interferes with the regular course of the blood and action of the various organs. Heavy diapers have a tendency to deform the lower limbs of the infant. Their use need not be prolonged beyond a very few months of infancy. When used, let them be loosely fitted. The substitution of short for long dresses may take place when the child is about 4 months old. At this time it should be watched carefully and protected against cold. Whatever the season, let it wear woolen socks at first.

EXERCISE.—Very little motion, and that of the gentlest and most careful kind, is all the infant should have for a considerable time after birth. Avoid the upright posture as much as possible. Avoid all sudden and violent jerking, and long continued positions. Allow the child to move its limbs freely, on the floor or in bed. Avoid sympathizing too strongly with a child when hurt. Assist quietly, and show how the accident happened. Children who are angry when hurt should see that you do not sympathize with their rage, although you do with their sufferings. Abjure all leading strings and go-carts, or other artificial means of teaching the

child to walk. Never drag the child by one hand, or lift it by either one or both arms. The mother should have her eye both on child and its attendant out of doors, and be as much as she can in her child's company. It is injudicious to take an infant out during the hottest part of the day in summer; such a proceeding tends to enervate and depress, rather than to strengthen. Whenever it goes out its head should be protected from the direct rays of the sun. During other periods of the day, the weather being favorable, an infant cannot be too much out of doors, especially during teething. Infants of 3 or 4 months old may, under certain precautions, be sent out into the open air during sunny winter days. They must be wrapped up. As it advances in age and strength, the time of keeping it out should be gradually prolonged, until, during pleasant weather, it lives most of the day in the open air. The position of the child should be frequently changed while being carried, and, until able to sit up, its head and back should be carefully supported. Care should be had in tossing children about, lest in the as yet imperfectly united condition of the bones fracture may be produced.

FOOD. — A mother's milk is the most appropriate food for an infant, and the breast should be given within twelve or eighteen hours after birth, at least. Foment the breast with warm water if the milk does not flow; avoid rubbing the breasts with spirits. If there be too much milk, drink little, and take cathartic medicine. It should be the only food given until the first teeth are being cut, or until the infant is at least three or four months old. For the first month an infant should be put to the breast every two hours, and after this the interval should be increased by a quarter of an hour every week, until at length it has it about every four hours. Feed the baby regularly and do not give him the bosom every time he cries. Let him go without a meal, put him into a warm bath, and give him a little cold water if thirsty. When the infant is three or four months old, occasionally even before then, artificial food may be necessary. If a good wet nurse cannot be found, cow's milk, condensed milk, goat's milk, ass's milk, etc., may be given. Cow's milk should be pure and fresh, and taken from one healthy cow, if possible. It should be prepared thus: Dissolve a lump or two of white sugar and a pinch of salt in a pint of warm water, and add to this a pint of fresh unboiled milk. This food is to be given night and morning, but not oftener when the baby is being suckled as well. As the child gets older, diminish the water. If the above food disagrees, as it sometimes will, omit the sugar, or change the proportions to two parts of water and one of milk. If the milk purge violently or cause offensive motions, boil it, or put one or two tablespoonfuls of lime water into each bottle of food. In the case of delicate infants, add a tablespoonful of cream to each pint of milk. The most convenient way of feeding the infant with artificial food is with a feeding bottle, with *black*, pure rubber nipple. Great care is necessary in using it, as it soon turns sour; immediately, therefore, the child is fed, the teat should be thrown into a tumbler about half full of cold water, and it should remain in the glass until it is again required. The bottle itself should be attended to with the most scrupulous attention; it should be rinsed out every time it has been fed from, and the food should not be suffered to remain in it and again offered to the child. Avoid the use of pure starch food, like arrowroot; it does not sufficiently nourish the bones and nerves. When the infant begins to cut his teeth it is unadvisable to give him any farinaceous food. It may then have beef or mutton soup at least once a day, and when 10 months old a crust of bread and a piece of rare beef to suck. All sweets should be carefully guarded against. The following are good substitutes for the milk, when that does not agree with a child: 1. Boil the crumbs of bread for 2 hours in water, taking care it does not burn; add a lump of sugar, a pinch of salt, and pour a little new milk on it while boiling hot. —2. Bake some biscuit flour in a slow oven until it is of a light fawn color; reduce it with a rolling pin to a fine powder, and keep it in a tin ready for use; 2 tablespoonfuls to ½ pt. of milk, boiled and sweetened.—3. Boil 1 teaspoonful of powdered barley with a little salt in ½ pt. of water for 15 minutes; strain, mix with half as much boiled milk, and add a lump of sugar.—4. Scotch oatmeal; prepare in the same way as flour.—5. Dissolve 1 teaspoonful of cocoa essence in ½ pt. boiling water; strain and add new milk and sugar. These are all to be given lukewarm through a nursing bottle.

NURSES.—The wet nurse acts as a substitute for the mother or aids her when there is a deficiency in the maternal supply of milk. She should be near the age of the mother, strong in constitution, with perfect teeth. The milk drawn into a spoon should be white with a slight bluish tint, its taste saccharine, and its consistence not too thick. Her temper, disposition and morals have much to do with the healthy nurture of the child, for it is well known that these are apt to affect the child. Temperance in eating and drinking is another important qualification, the latter especially. A wet nurse should be used only when a positive necessity exists. The suckling of the child is the natural office of the mother, and is of the greatest benefit to the infant. The child will naturally place its affections where it receives its sustenance. The dry nurse is a person who brings up a child by hand when the mother is incapable of suckling her child, and a wet nurse cannot be substituted. A sensible, kind and patient person, who possesses some knowledge of the nature and habits of children is indispensable; and the person most likely to possess these qualities, is one who has had children of her own. A nurse-maid is one who assists the mother in her care of infants; she should love children, be of good disposition and morals and obey the mother's directions.

SLEEP. — Allow the child plenty of sleep without disturbance. Avoid accustoming the child to sleep on the lap; it will then not sleep in bed. Establish times for regular sleeping. As soon as the infant begins to take notice, the nurse should endeavor to form the habit of

sleeping more during the night than day. Keep the hands and feet comfortably warm; blankets are better than sheets. Avoid laying the child in the same bed with an adult. An unspoiled child does not need rocking, fondling, walking about or trotting on the knee to put it to sleep. It may be put on its bed or crib, wide awake, and left. When quiet can not be secured, and baby is worried out and can't go to sleep, and nobody knows what is the matter, in hot weather, a soft napkin or fine towel wet in warm water and folded over the top of its head, eyes and ears, will often act like a charm, and it will drop off into a refreshing sleep in a few minutes.

WEANING.—The exact time when this should be done must depend on the strength or weakness of the child, and the health and capability of the mother for the duty of a wet nurse, and to some extent the season of the year. When mother and child are both in a fair condition of health, the best time for weaning the infant is generally between the ninth and twelfth month; as a general rule, the child should not be weaned during the heat of summer; the spring and autumn are the better periods. Should the child, however, be very backward with its teeth, the time of weaning should be postponed for a few weeks or months. As a general rule, when the child has a sufficient number of teeth to enable it to mumble the soft food on which it is fed, the time has arrived to wean it. Gradually prepare the infants for the change, by beginning to feed them once, twice and finally three times a day for some weeks before absolute weaning, at the same time reducing the number of times of daily suckling; by this means the weaning is made easy and gradual, and the children are in a great measure spared the distress consequent upon an abrupt change. The mother can take for herself a cooling purgative and refrain from fluids and stimulating diet. A good application to the breast is 3 oz. compound soap liniment, 3 dr. laudanum, 1 dr. camphor liniment. If this be too irritating, foment with warm water, or poppyheads and chamomile flowers boiled together in water. Avoid tightness or pressure from the dress, and all roughness, for fear of abscess. Avoid drawing the breasts and exposure to cold.

CHILDHOOD.

BATHING.—The daily bath of a child should be considered a necessity and not a luxury. Some children have a horror of cold baths and enjoy a tepid one; others seem to enjoy a cold bath. In either case it is safe to consult the child's wish; but they must be thoroughly bathed from head to foot, at least once a week in winter and oftener in summer, in cold or tepid water. It is not necessary to use much soap every time a bath is given, but it is best to use a little. When used, it should be a good Castile soap. Care must be taken that the child is wiped dry with gentle friction. The greatest attention should be paid to the care of the teeth. Until a child is old enough to use a brush they should be washed with a soft rag dipped in cold water at least twice a day. The hair should be well brushed, but never touched with a fine comb, which causes disease of the scalp. Cleanse the hair by occasionally washing in warm water to which a little borax is added, and by thoroughly rinsing with clear water. If it splits at the ends it is owing to a deficiency of natural oil and may be remedied by using a little glycerine.

CLOTHING.—Children should be warmly dressed, particularly when going into the open air, and every part of the body should have equal protection; but care must be taken not to overload them with clothing. The sweat glands are very active in youth, and if over stimulated by heat become inflamed, producing a rash. Light woolen materials should be used in winter, and colors selected that will wash when necessary. It is better that childrens' clothing, as far as possible, should be fastened with tapes, or hooks, or buttons, avoiding pins on account of the danger of their being pricked by them. Where pins are absolutely necessary, nursery pins should be used. All little boys should be provided with thick woolen drawers, a little shorter than their trousers, to wear in all except the hottest weather. For children of both sexes, combined waist and drawers is the most convenient fashion for under garments. In summer it is more convenient to have them made in two parts, buttoning together around the waist. For girls, provide long sleeved, high necked, thick cotton waists for the spring and fall and cool summer days, and other thinner ones with low neck and short sleeves for hot weather. It is best to take off all the clothing worn during the day at night and air it for morning. As the children grow up avoid the use of corsets and tight belts as much as possible. In place of the loose night dress, a pair of drawers, with a body reaching up to the neck and legs long enough to cover the feet, is a good substitute. It can be opened in the back or front, and the material depends on the season. In selecting a child's wardrobe, have everything as good and pleasing as means will permit.

FOOD.—Children require plenty of healthful, substantial, nourishing food; they not only have to repair the daily waste of the system, but also create new bone and muscle every day. Their food may be varied by hominy, boiled rice, or porridge of corn meal. Better than all are cracked wheat and oatmeal, which so well feed their bones and nerves and assist in forming sound teeth. Soft boiled eggs are also good. Tender, juicy, broiled beefsteak, and roast beef or roast mutton are better than lamb or veal, as they contain more nutriment. Well made soups and broths are never out of place. Simple puddings should be substituted for pastry. Tea and coffee had better be dispensed with until 18 or 20. The good effect of going without them will be seen in a healthy nervous system. When cow's milk is found to disagree with the partaker, it may be rendered entirely wholesome by adding to it a small portion of table salt, just enough to be perceptible to the taste. The ordinary simple vegetables may generally be used if well cooked, except cabbage, green corn and beans, whether green or dry. The vegeta-

bles which are eaten uncooked should be avoided. Most nuts and dried fruit are injurious; boiled chestnuts ought to be prohibited. Sugar at meal times and in moderate quantities does no harm, but candies must be ate in moderation. A white potato roasted, not boiled, is the first vegetable to give the child. Regular meals should be insisted upon. Children may eat oftener than grown folks, but it must be at regular, appointed periods.

SLEEP.—Children require more sleep than adults, and to rouse any child in the morning who has been up late the night before is cruel. Have a regular early hour for their retiring, and they will have had sufficient sleep by early morning. For young children 9 or 10 hours is necessary. For school children in their teens, 8 hours of quiet sleep is generally enough, but do not restrict them.

SPORTS AND EXERCISES.—Healthy children require a great deal of exercise, and should not be discouraged from playing vigorously and shouting lustily. If perfectly well, they should be sent out in all good weather. In bad weather they should have on part of their out-door clothing, be sent into a room where the windows are open, and made to play tag, puss-in-the-corner, or any active indoor game, for ½ hour or more. Find amusements for the children while in the house. Costly toys amuse for the moment, but home-made ones, which can be pulled around and be none the worse for bad treatment, are always a source of enjoyment. At Christmas give the children as much pleasure as your means will allow. Give them a tree, or let them hang up their stockings. At Easter give them pleasure by hiding their Easter eggs and letting them hunt for them.

TRAINING, Mental.—Endeavor to always talk your best before children. They hunger perpetually for new ideas. They learn with pleasure from the lips of parents what they dream is drudgery to learn from books, and even if they have to be deprived of any educational advantages, they enjoy in childhood the privilege of listening daily to the conversation of intelligent people. One of the first things necessary in the education of a child intended for a farmer is the cultivation of the habit of observation. With this habit once formed he never becomes stupid, because he is busy seeing things and reflecting over what he has observed. This faculty is especially necessary while preparing the soil and watching the growth of crops. A child seeks for information about physical science very early. The first teaching it wants is an object lesson of one sort or another; and as soon as it is fit for systematic instruction of any kind, it is fit for a modicum of science. Be careful that when he learns he knows of his own knowledge. Don't be satisfied with telling him that a magnet attracts iron. Let him see that it does; let him feel the pull of the one upon the other for himself. A judicious mother will so manage her daughters that even at the early age of 13 they can, in an emergency, prepare a meal. A thorough domestic training is very useful to a girl. Girls left to their own devices waste a great deal of time which might be utilized to their advantage. A girl who can climb trees, who can dance hours without fatigue, jump rope or take long walks, skate and row, can also sweep, and scrub, and make bread and wash and iron, if she is encouraged to do so. The latter accomplishments she must possess in order to make a happy home, though she may have half a dozen servants at her call. Give the proper encouragement and the means, and many boys whose mechanical aptness is allowed to run to waste, or is diverted from its course, would become good workmen. The mechanical boy ought to have a shop of his own. Let it be the attic, or an unused room or a place in the barn or the woodshed. Give him a place and tools. Let him have a good pocket knife, gimlets, chisels, gouges, planes, cutting nippers, saws, a foot rule, and material to work. If he is a mechanic it will come out, and he will do himself credit. If he fails, he is to follow some calling that does not demand mechanical skill.

TRAINING, Moral.—Moderate any propensity of a child, as anger, violence, greediness for food, cunning, etc., which appears too active. Show him no example of these. Let the mother be, and let her select her servants like she wishes the child to be. The youngest child is affected by the conduct of those in whose arms he lives. Cultivate and express benevolence and cheerfulness. Let a mother feel as she ought, and she will look as she feels. Much of a child's earliest moral training is by looks and gestures. When necessary exhibit firmness and authority, always with perfect temper, composure and self-possession. When the child is most violent, the mother should be most calm and silent. Out-screaming a screaming child is as useless as it is mischievous. Steady denial of the object screamed for is the best cure for screaming. In such contests, witnesses should withdraw, and leave the mother and child alone. A child is very ready to look round and attract the aid of foreign sympathy in its little rebellions. Never promise to give when the child leaves off crying. Let the crying be the reason for not giving. Never strike a child, and never teach it to strike again. Never tell a child to beat or threaten any animal or object. Teach your children the evil of secret vice, and the consequences of using tobacco and spirituous liquors; teach them to be temperate, orderly, punctual, truthful, neat, faithful and honest. Teach them to always pay debts promptly; to never shirk a duty; to do an equal share, and to always live up to an agreement. Teach your children to confide in you, by conference together. Tell them your plans, and sometimes ask their advice; they will thus open their hearts to you, and will ask your advice. The girl who tells all her heart to her mother has a shield and a protection about her which can come only with a mother's advice and counsel. From their earliest infancy, teach them instant obedience. Never under any circumstances tease or allow a child to be teased. It makes them cross, irritable and impudent, and they will imitate you in all things. Never allow talebearing. Teach them self-denial, not self-indulgence of an angry and resentful spirit.

TRAINING. For Work.—One of the greatest defects in the education of children is the neglecting to accustom them to work. A certain amount of work is necessary to the education of children; their future independence and comfort depend on their being accustomed to provide for the thousand recurring wants that nature entails on them. No man or woman is thoroughly educated if not required to labor. Whatever accomplishments they possess, they require more practical knowledge and experience derived from accustoming themselves to useful labor of some sort. Their physical strength also depends on the exercise they have. (See *Sports and Exercises.*)

CLEANING.

HOUSEHOLD.

Too much care can not be bestowed on keeping house implements clean. Keep each to its own special use. The scrubbing brush needs attention, and unless kept clean will smell. Have it well rinsed, and all hair and pieces of flannel fluff picked out of it after using. Cloths and washing flannels must be thoroughly rinsed in separate waters, and hung out in the open air to dry.

ALABASTER. To Clean. — 1. If much discolored, make a paste with quicklime and water; cover the article well with it, and let it remain all day; wash off with soap and water, rubbing hard the stains.—2. Put 2 oz. of aquafortis into pure, cold water; dip a clean small brush into this liquid and wash the alabaster with it for 5 minutes or more; then rinse with clear cold water, and set it in the sun for 2 or 3 hours to dry.

BARRELS, To Clean.—1. First scald well with boiling water (letting the water stand in them till cold); fill them with cold water, and throw in a large quantity of live coals from a wood fire, leaving the cask uncovered. By repeating this, the casks may be made perfectly sweet, provided they have at no time contained fish.—2. Fill with meal or bran and water till fermentation takes place. It will entirely cleanse them, and the mixture will afterwards do for food for swine.

BLEACHING JUTE.—To bleach jute, the yarn is first placed in a weak and slightly warm soap bath for 10 minutes, and then transferred to a chloride of lime bath of 1.0035 specific gravity; after the lapse of 40 minutes the yarn is taken out; sometimes it may be necessary to repeat the operation; finally the yarn is washed in warm and then in cold water and dried in the open air.

BLEACHING WOOL.—In bleaching raw wool it is first deprived of the yolk or peculiar natural varnish with which it is covered. For this purpose it is steeped and stirred for about 20 minutes in rather warm water, either with or without the addition of ¼ part of stale urine; after which it is placed in baskets to drain, and soon afterwards thoroughly rinsed in a stream of water, when it is again allowed to drain, and it is hung up to dry. The further operations depend on circumstances, wool being sometimes whitened in the fleece, or in the yarn, but still more frequently and extensively not till woven. When it is intended to send it in the first two forms white to market it is hung up or spread out while still wet, and sulphured; after which it is either at once rinsed for some time in cold water, or is previously treated with a very weak bath of soft soap. (See *Bleaching Yarn.*)

BLEACHING YARN.—Scour well the yarn; when dry get a barrel with the head out; put in an iron vessel 2 or 3 oz. of lac-sulphur, and set this in the bottom of the barrel; throw in coals enough to make a smoke; put some sticks across the barrel for the yarn to rest on; lay the yarn on the sticks and cover up the barrel with a cloth to keep the smoke from escaping. An ounce of sulphur to the cut is the allowance. This will bleach yarn as white as snow, and renders home-made yarn beautiful for knitting hoods and comforts.

BOTTLES. To Clean.—1. Put ashes into each one, and immerse them in a pot of cold water; then heat the water gradually until it boils. When they have boiled in it 1 hour, take it from the fire and let them remain in it till cold; then wash them in soap-suds, and rinse them in pure water till clean.—2. Dissolve 1 oz. of chloride of lime in 1 qt. of water, and fill the bottles with the liquid; set them aside for several days and rinse them well with water. The water of chloride of lime can be used several times.—3. A concentrated solution of permanganate of potassium, to which a few drops of hydrochloric acid are added, will remove fatty substances.—4. Simply shaking ashes in a little water in a bottle, will clean it.

BRASS, To Clean.—1. Brass may be cleaned with pumice stone and water, applied with a brush, polishing with dry pumice stone and woolen cloths.—2. Rub the surface of the metal with rotten stone and sweet oil, then rub off with a piece of cotton flannel, and polish with soft leather.—3. A solution of oxalic acid rubbed over tarnished brass soon removes the tarnish, rendering the metal bright. The acid must be washed off with water, and the brass rubbed with whiting and soft leather.—4. Immerse or wash it several times in sour milk or whey. This will brighten it without scouring. Then scour with a woolen cloth dipped in fine, soft ashes.—5. Mix some cream of tartar with warm water to a thick paste; rub this well into the brass with a flannel and brush; afterward rinse off the water under a stream of cold water, and dry with a soft cloth in front of the fire, polish-

ing with a dry leather.—6. Brass inlaid work may be cleaned with tripoli and linseed oil, applied by a rubber of felt or leather; the whole being afterwards thoroughly rubbed off, and then finished with clean soft leather.—7. A fine color may be given to brass ornaments, when not gilt or lacquered, with a little sal-ammoniac in fine powder, moistened with soft water. The articles must be afterwards rubbed dry with bran and whiting.

BRASS, Powders for Polishing.— 1. Rotten stone, 7 oz.; powdered oxalic acid, 1 oz. Used with a little water.—2. Rotten stone, 3 oz.; powdered soap, 1 oz.

BRASS or COPPER KETTLES, To Clean.— A brass, bell-metal, or copper kettle should be cleaned immediately after it is used. Even when not used it will require occasional cleaning, otherwise it will collect rust or verdigris, which is a strong poison. After washing the kettle with warm water, put into it a teacupful of vinegar and a tablespoonful of salt; place it over the fire; when hot, rub the kettle thoroughly with a cloth, taking care that the salt and vinegar shall touch every part; then wash with warm water; next take some wood ashes, or fine sand, and scour well; afterward wash with hot soap-suds, and finish by rinsing in cold water and wiping dry.

BRITTANIA, To Clean.—To clean Brittania metal, use finely powdered whiting, sweet oil and yellow soap; mix with spirits of wine to a cream; rub on with a sponge; wipe off with a soft cloth and polish with a chamois skin.

BRONZE, To Clean.—The following mixture will remove fly specks from bronze: Lavender oil, 1 dr.; alcohol, 1 oz.; water, 1½ oz.; use a soft sponge and proceed as quickly as possible, with little rubbing.

BRUSHES, To Clean.—1. These may be best washed in a moderately cold weak solution of borax.—2. A few drops of hartshorn put into a little water will clean a hair brush, and does the brush no harm; if very dirty, rub a little soap on; after cleansing, rinse it in clear water; do not let the bristles rest on any hard substance while wet; tie a string around the handle and hang it up.—3. Dissolve soda in cold water. Soda, having an affinity for grease, cleans the brush with very little friction.

CARPETS, To Clean.—1. Shake and beat well; lay upon the floor and tack down firmly; then, with a clean flannel, wash over with 1 qt. of bullock's gall, mixed with 3 qts. of soft cold water, and rub it off with a clean flannel or house cloth. Any particular dirty spot should be rubbed with pure gall.—2. If the carpets are so much soiled as to require cleaning all over, after the dirt has been shaken out spread them on a clean floor and rub on them, with a new broom, grated raw potatoes. Let the carpets remain till dry before walking on them.—3. ½ bar white Castile soap, 2 oz. borax, 2 oz. washing soda; boil in ½ gal. of water till dissolved; then add 2 gals. tepid water and boil 10 minutes; when cold, add ½ pt. alcohol; rub on with a clean flannel.

CARPETS, To Remove Grease from.—1. Aqua-ammonia, 2 oz.; soft water, 1 qt.; saltpeter, 1 teaspoonful; shaving soap, 1 oz., finely scraped; mix well, shake and let it stand a few hours or days, before using, to dissolve the soap. When used pour on enough to cover any grease or oil that has been spilled, sponging and rubbing well and applying again if necessary; then wash off with clean cold water.—2. Sprinkle powdered magnesia, fuller's earth, buckwheat or pipe clay on the spot and let lie until the grease is absorbed; renew the powder until all the grease is removed. 3. A handful of crushed soap bark to a pail of water will also remove grease and restore colors. Scrub the spots and sponge the carpet all over.

CARPETS, To Remove Ink from. — As soon as the ink has been spilled, take up as much as you can with a sponge, and then pour on cold water repeatedly, still taking up the liquid; next rub the place with a little oxalic acid dissolved in cold water; then rub on some hartshorn.

CARPETS, To Remove Soot from. — Soot falling on the carpets from chimneys or from stove pipe carelessly handled, if covered over thickly with salt may be swept up without disfiguring or damaging the carpet.

CARPETS, To Sweep. — 1. Always sweep velvet carpets the way of the pile. Before proceeding to sweep a carpet, a few handfuls of waste tea leaves may be sprinkled over it. A stiff hair broom or brush should be employed unless the carpet be very dirty, when a whisk or carpet-broom should be used first, followed by another made of hair, to take off the loose dust. The frequent use of a stiff carpet-broom soon wears off the beauty of the best carpet.—2. Sprinkle salt over the surface and sweep well. This makes carpets look very clean and bright.

CEILINGS.—(See *Wall Paper, To Clean.*)

CHAIRS, Cane-Bottom, To Clean. — Turn up the chair bottom, and with hot water and soap sponge the cane; work well until completely soaked. Let it dry in the open air.

CHAMOIS, To Clean. — Wash in cold water with plenty of soap, and rinse well in clear cold water.

COFFEE POTS, To Clean. — Wash the coffee pot thoroughly every day, and once a week boil borax water in it for 15 minutes.

COPPER UTENSILS, To Clean.—Use a coarse cloth; have a pail of very hot water; soak the cloth a little; sprinkle on plenty of pulverized borax, and rub the boiler well; rinse off with hot water; and dry with a soft cloth. A boiler can be brightened in this way as quickly as with acid. If acid is used, see *Brass or Copper Kettles, to Clean.*

DECANTERS, To Clean. — The best way to clean decanters after port wine has stood in them is to wash them out with a little pearlash and warm water, adding a spoonful or two of fresh slaked lime, if necessary. To facilitate the action of the fluid against the sides of the glass, coal ashes or pieces of raw potato may be used. A spoonful of strong oil of vitriol will also rapidly remove any kind of dirt from glass. Decanters which have become furred by holding hard water may be cleaned with a spoonful of hydrochloric acid diluted with 3 or 4 times its weight of water.

DISHES, To Wash. — Dishes should be rinsed in clear, hot water after having been washed in soap suds. It is necessary from a sanitary point of view; the caustic alkali is corrosive and unwholesome, and the grease often impure. A rack made of narrow strips of ½ in. board is a device frequently used for draining dishes, thus saving the trouble of wiping them. This rack placed on a shelf inclining towards and adjoining the sink holds the dishes securely while they are drying. Milk is a substitute for soap in the kitchen. A little put into hot water will soften it, give the dishes a fine gloss, and will not injure the hands. China and glass (when very dirty) are best cleaned with finely powdered fuller's-earth and warm water, afterwards rinsing it well in clean water. All china that has any gilding upon it may on no account be rubbed with a cloth of any kind, but merely rinsed, first in hot and afterwards in cold water, and then left to drain till dry. Cups and saucers which have become stained with coffee or tea can be easily cleaned by scouring them with baking soda.

DRAINS, To Clean. — Dissolve 4 or 5 lbs. of washing soda in boiling water and throw down the kitchen sink to prevent the pipes stopping up with grease, etc. Do this every few weeks. Clean lead pipes leading from wash bowls by pouring down them a strong solution of potash dissolved in hot water. Don't get the mixture on the hands or clothing. It destroys all animal matter, hair, etc., and saves employing a plumber.

DUSTING. — Very frequently the dust of an apartment is not removed, but merely disturbed or driven from one place to settle down on another. It should always as much as possible be got rid of by means of a duster or a brush and dust pan. As the dust will adhere to the former, this should from time to time be taken out into the open air and shaken. During the time a room is being dusted the furniture should be collected in as small a space as possible, and enveloped in the dusting sheet. The dusting sheet on its removal should be carefully folded together, taken into the air and shaken. The furniture may then be dusted and returned to the proper places. A duster should never be rubbed over furniture standing close to a wall; or a dirty mark on the wall paper will be the result. The same caution applies to mantel pieces where contact with the duster should be avoided.

ENGRAVINGS, To Clean.— 1. Accumulated dust should first be taken off with a light feather duster; then, further, by a light rubbing, by hand, with bread crumbs, frequently renewed. —2. Immerse the print in oxygenated muriatic acid, letting the engraving remain in the acid a shorter or longer time, according to the strength of the acid. This may be tested by first immersing a leaf of an old book.—3. Provide two soft sponges, and then select a flat surface, a table, or, if available, a marble slab; place thereon a sheet of white paper, larger than the print about to be treated; take the engraving and carefully damp it on both sides with the wet sponge; fill a pint measure with cold water, and in this put some chloride of lime and some oxalic acid in nearly equal proportions; but it will be seen when the mixture is right, from the fact of the liquid turning magenta color. With this mixture well saturate the injured engraving, continuing the application until every mark or stain is removed, and then sponge off freely with pure, cold water.

FEATHER BEDS, To Clean.—To renovate old feather beds, when no steam apparatus is convenient, put them out doors during a heavy rain. Let them dry in the sun, beating them occasionally with sticks to loosen the feathers. They should be turned over several times, and thoroughly dried.

FEATHERS, To Clean.—1. Goose feathers for beds are generally purified by simply exposing them to the sun or in the oven until perfectly dry, and then beating them to remove loose dirt. —2. When carelessly collected and dirty, they are sometimes first cleansed with lime water, or, better still, with a weak solution of carbonate of soda, or water to which a little solution of chloride of lime has been added; after which they are rinsed in clean water and dried or stoved as before. Old feathers are cleansed or purified in same way. —3. Take for every gallon of clear water 1 lb. of quick lime; mix them well together, and when the undissolved lime is precipitated in fine powder, pour off the clear lime water for use at the time it is wanted; put the feathers to be cleaned in another tub, and add to them a sufficient quantity of clear lime water to cover the feathers about 3 in. when well immersed and stirred therein. The feathers, when thoroughly moistened, will sink down, and should remain in lime water 3 or 4 days; after which the foul liquor should be separated from the feathers by laying them on a sieve. The feathers should afterward be well washed in clean water and dried on nets, the meshes being about the same firmness as those of cabbage nets. The feathers must from time to time be shaken on the nets, and as they dry they will fall through the meshes, and are to be collected for use. The admission of air will be serviceable in the drying, and the whole process may be completed in about three weeks. The feathers, after being thus prepared, will want nothing more than beating, for use either as beds, bolsters, pillows or cushions.

FLOORS, To Clean.—Should the floor not be very dirty, ordinary soap rubbed on the brush will be sufficient; but if a great cleaning is required use soft soap on the brush instead, or else take soda and warm water; take the flannel to rinse off the soap, wringing it each time to dry the floor. Change the water two or three times in a small room, and more frequently in a large one. Soft soap is apt to leave an offensively "washy" smell. This will soon pass if the windows are opened and a free current of air admitted. Leave no spot untouched, and clean straight up and down, not crossing from board to board; then dry with clean cloths, rubbed hard, up and down in the same way. Boards may be rendered white and clean by scrubbing them, instead of with soap, with a mixture composed of 1 part of freshly slacked lime and 3 parts of white sand.

FURNITURE, To Clean.—1. To improve the appearance of furniture, take a soft sponge wet with clean cold water and wash over the article; then take a soft chamois skin and wipe clean; dry the skin as well as you can by wringing it in your hands, and wipe the water off the furniture, being careful to wipe only one way. Never use a dry chamois on varnish work. In deeply carved work the dust cannot be removed with a sponge; use a stiff-haired paint brush instead of a sponge. For unpolished furniture linseed oil is the best; rub in thoroughly.—2. Kerosene is excellent for cleaning furniture, either walnut or oak.

FURNITURE, Polishes for.—1. An excellent furniture polish is made with 1 pt. of linseed oil and about ½ gill of alcohol, stirred well together and applied to the furniture with a linen rag; rub dry with a soft cotton cloth and finish with an old piece of silk.—2. Equal parts of boiled linseed oil and kerosene; apply it with a flannel, and keep always ready for use.—3. Black walnut, rosewood, mahogany, oak and chestnut furniture can be cleaned with furniture polish, made by mixing 1 coffeecupful of cold drawn linseed oil, 1 of turpentine and 1 of vinegar, to which 2 tablespoonfuls of alcohol should be added. Put all into a bottle and shake well. It is ready for use at once, but must always be well shaken when applied. Pour out a little into a saucer, dip a soft flannel into it and rub the furniture according to the grain. Polish with a chamois skin or a dry flannel rolled up tightly for a rubber.—4. Take 1 oz. of yellow rosin and 1 pt. of raw linseed oil; melt the rosin in a pipkin, and add to it by degrees ½ of the oil; when thoroughly incorporated, add by degrees the remainder. Before using the polish, it will be best to wash the table well with tepid water and rub it quite dry.—5. 1 oz. beeswax and ½ oz. white wax cut into thin shreds and dissolved in 1 pt. of turpentine. It will require to be stirred occasionally while dissolving; apply with a piece of flannel and polish with a dry, soft duster.—6. For a polish to clean up and brighten old furniture, pianos, etc., dissolve 4 oz. orange shellac in 1 qt. of 95 per cent. alcohol; to this add 1 qt. of linseed oil and 1 pt. of turpentine; when mixed add 4 oz. of sulphuric ether, and 4 oz. of aqua ammonia; mix thoroughly before using. Apply with a cloth or sponge, and rub the surface to which it is applied until the polish appears.

FURNITURE, Spots on, to Remove.—1. Spots on furniture, from anything hot or from alcohol, can be removed by rubbing hard with sweet oil and turpentine. When the spots disappear, wash in milk warm soap-suds, dry quickly, and polish by rubbing briskly with chamois skin.—2. Rub them with essence of peppermint or spirits of camphor, and afterwards with furniture polish or oil.—3. Use a little aquafortis and water, or oxalic acid and water, rubbing the part by means of a cork till the color is restored; afterwards, wash the wood well with water; dry and polish.—4. Take 4 oz. of vinegar, 2 oz. of sweet oil, 1 oz. of turpentine; mix and apply with a flannel cloth.

GILT FRAMES, To Clean.—1. Rub with a sponge moistened with turpentine.—2. When the gilt frames of pictures, looking-glasses, or moldings of rooms have specks or dirt upon them from flies or other causes, they may be cleaned with white of eggs gently laid on with a camel's hair pencil.—3. Rub gently with a cloth dipped into sweet oil and wipe dry with a chamois skin.

GILT FRAMES, To Restore.—Take sufficient flour of sulphur to give a golden tinge to 1½ pts. of water; boil in this water 4 onions; strain, and when cold wash with a soft brush any part that requires restoring; when dry it will come out as good as new.

GLASS GLOBES, To Clean.—If the globes are much stained on the outside by smoke, soak them in tolerably hot water with a little washing soda dissolved in it; then put 1 teaspoonful of powdered ammonia into a pan of lukewarm water, and with a tolerably hard brush wash the globes till the smoke stain disappears; rinse in clean cold water, and let them drain till dry. They will be quite as white and clear as new globes.

GLASS, To Clean.—1. If the glass is particularly soiled, a pinch of soda in the water will cleanse it easily.—2. Take fine powdered indigo, dip it into a moistened linen rag, smear over the glass with it, and then wipe it off with a perfectly dry cloth; or fine sifted wood ashes, applied by a rag dipped in spirits, will answer just as well.

GUTTA PERCHA, To Clean.—Use a mixture of soap and powdered charcoal, polishing afterwards with a dry cloth and a little charcoal.

HAIR CLOTH, To Clean.—Take pure benzine to remove stains from hair cloth furniture.

HAIR MATTRESSES, To Clean.—Hair mattresses that have become hard and dirty can be made nearly as good as new by ripping them, washing the ticking, and picking the hair free from bunches, and keeping it in a dry, airy place several days. Whenever the ticking gets dry fill it lightly with the hair, and tack it together.

INK, To Remove from Wood.—1. Inky spots on floors can be extracted by scouring with sand wetted in oil of vitriol and water; when the ink is removed, rinse with strong pearlash water.—2. Wet salt will also get ink out.—3. Turpentine will remove ink from white wood work.—4. Stains of ink may be removed by strong vinegar, or a solution of oxalic acid.

INK, To Remove from Paper.—1. To remove ink stains from a book, first wash the paper with warm water, using a camel's hair pencil for the purpose; by this means the surface ink is got rid of; the paper must now be wetted with a solution of oxalic acid, in the proportion of 1 oz. to ½ pt. of water; the ink stains will immediately disappear; if then washed with a strong solution of chloride of lime the acid will be prevented from injuring the paper or parchment; finally, again wash the stained place with clear water, and dry it with white blotting paper.—2. Alum, amber, sulphur and saltpetre, 1 part of each, in fine powder, mixed.—3. Solution of muriate of tin, 2 dr.; water, 4 dr.; apply with a camel's hair brush. After the writing has disappeared, pass the paper through water, and dry.

INK, To Remove from Silver.—Silver ink-

stands frequently become deeply discolored with ink, difficult to remove by ordinary means. It may be completely eradicated by making a little chloride of lime into a paste with water, and rubbing it upon the stains.

IVORY, Stained, To Whiten.— 1. Discolored ivory may be restored to its original whiteness by cleaning it with a paste, composed simply of burnt pumice stone and water; after cleansing, place the article under a glass in the sun's rays.—2. Emery powder rubbed on the white ivory knife handles will remove an ordinary stain; should the stain be deep, rub first with emery cloth and then with the powder.—3. The whiteness may be restored to ivory handles as follows: Wash with soaped flannel and lukewarm water; then wipe very dry; soak them occasionally in alum water that has been boiled, and allowed to cool; let the handles lie for 1 hour in this; then remove and brush them well; after this take a clean linen towel, dip it in cold water, squeeze it out, and while wet wrap in around the handles, leaving them in it to dry gradually, as, if dried too rapidly out of the alum water, the handles will be injured.—4. Salts of lemon will remove stains from the ivory handles of knives.—5. To whiten organ or piano keys, make a thin paste of spirit of ammonia and Spanish whiting, and rub them thoroughly with the mixture; when dry, wipe off the powder with a flannel rag.

JAPANNED WARE, To Clean.—Wash it with a sponge dipped in clean cold water, wipe it dry and polish it with dry flour well rubbed on with a soft cloth.

KETTLES, To Clean.—1. The best way to clean the inside of old iron pots and pans is to fill them with water in which a few ounces of washing soda is dissolved, and set them on the fire. Let the water boil until the inside of the pot looks clean. A clam shell is more convenient for scraping kettles and frying pans than a knife. It does the work in less time. A pot cleaner as shown in the illustration is also sold for the same purpose.—2. (*Porcelain-lined.*) Boil peeled potatoes in it. The porcelain will be rendered nearly as white as when it was new.

Pot Cleaner.

KNIVES AND FORKS, To Clean. — 1. After being used, all knives should be wiped on a coarse cloth, so as to insure their freedom from grease previous to being cleaned; dipping the blades in hot water not only fails to remove any grease that may be on them, but is almost sure to loosen the handles. Handles of ebony should be cleaned with a soft piece of cloth dipped into sweet oil, and left lying for about 10 or 15 minutes with the oil on them, then wipe them with a clean cloth. Ivory or bone handles should be washed with a soap cloth or flannel and lukewarm water, and then wiped with a dry towel. —2. To clean steel forks, fill a small barrel with fine gravel brick dust or sand, mixed with a little hay or moss; make it moderately damp, press it well down and let it always be kept damp. By running the prongs of the steel forks a few times into this, all the stains on them will be removed.—3. The way to clean a stained steel knife is to cut a solid potato in two, dip one of the pieces in brick dust, such as is usually used in knife cleaning, and rub the blade with it.—4. The fine siftings of coal ashes are also excellent to scour knives with.

LAMP BURNERS, To Clean. — To clean lamp burners, wash them in ashes and water, and they will come out bright as new.

LAMP CHIMNEYS, To Clean.—1. Lamp chimneys can be washed easily by holding them over the nose of the teakettle when the kettle is boiling furiously. This will make them beautifully clear; they must then be wiped in and out with a clean cloth. — 2. Put the chimneys in strong soda water; let it be moderately hot. The longer they lie in it the better; rinse in cold water; drain and polish by rubbing with a soft cloth.

MARBLE, To Clean. — 1. Take two parts of common soda, one part of pumice stone, and one part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble over with soap and water, and it will be as clean as it was at first.—2. Make Spanish whiting into a paste by moistening with water in which a piece of washing soda is dissolved; spread on a piece of flannel, and well rub the marble, the process being repeated 2 or 3 times. It should be washed off with soap and water, and the marble afterward polished with a cloth. — 3. To remove stains from statuary marble, take equal parts of fresh oil of vitriol and lemon juice; shake up these substances very thoroughly in a bottle; wet the spots with the mixture, and in a few minutes afterward rub with a soft linen cloth, and the spots will entirely disappear. — 4. To clean marble mix quicklime with strong lye, so as to form a mixture having the consistency of cream, and apply it immediately with a brush. If this composition be allowed to remain for a day or two, and be then washed off with soap and water, the marble will appear as though it were new. — 5. To clean gray marble, rub with linseed oil, and no spots will show. — 6. Iron rust or ink spots may be taken out in the following manner: Take ½ oz. butter of antimony and 1 oz. oxalic acid, and dissolve them in 1 pt. rain water; add flour, and bring the composition to a proper consistence; then lay it evenly on the stained part with a brush, and after it has remained for a few days, wash it off, and repeat the process if the stain is not quite removed. — 7. To clean smoke off marble, wet a piece of flannel in strong ammonia and rub the marble quickly with it and then wash off with hot soap suds.—8. Stains in marble caused by oil can be removed by applying common clay, saturated with benzine. If the grease has remained long enough it will become acidulated, and may injure the polish, but the stain will be removed.

MATTING, To Clean. — Matting, after being

swept, should be wiped with a damp cloth. Hot salt and water will thoroughly cleanse it, and will not discolor it.

MICA, To Clean.—Mica in stoves (often wrongly called "isinglass") when smoked, is readily cleaned by taking it out and thoroughly washing with vinegar a little diluted. If the black does not come off at once, let it soak a little.

MIRRORS, To Clean. — 1. Take a newspaper, fold it small, and dip in a basin of clean cold water. When thoroughly wet, squeeze it out as you do a sponge; then rub it pretty hard all over the surface of the glass, taking care that it is not so wet as to run down in streams. Let it rest a few minutes; then go over the glass with a piece of fresh newspaper, till it looks clear and bright.—2. Wipe the mirrors with borax water, the cloth being wet enough to dampen it.

OIL CLOTHS, To Clean. — 1. Use half milk and half water. Skim milk, if not sour, is just as good as new milk. This makes oil cloth look as if varnished.—2. Rub them once in three months with boiled linseed oil. Put on a very little, rub it well with a rag, and polish with a piece of old silk. Oil-cloths will last years if kept in this way.

PAINT, To Clean. — 1. Use but little water at a time; keep it warm and clean by changing often. A flannel cloth is better than cotton. Put but a little soap, or skim milk in the water; add soap to the cloth when needed. A sharp piece of soft wood is indispensable for the corners. A saucer of soft sifted ashes, or whiting, used when paint is badly smoked or fly-specks are thick, is better than soap; wipe last with a clean wet towel, and don't spill a drop of water. —2. Dissolve 2 oz. of soda in 1 qt. of warm water, which will make a ready and useful solution for cleaning old painted work preparatory to repainting. The mixture, in the above proportions, should be used when warm, and the wood work afterward washed with water to remove the remains of the soda.—3. An oz. of pulverized borax, 1 lb. best brown soap in small pieces and 3 qts. water are to be mixed and put on the fire. It should simmer until the soap dissolves, being frequently stirred. Do not allow it to boil. Use with flannel and rinse off as soon as the paint is clean. — 4. In washing painted walls it is a good plan to remove from the room everything that can be injured by steam and then hang sheets wrung from hot water in the room. The vapor, condensing on the walls, softens the dirt, which may be wiped off with woolen cloths wrung from soda water.

PAINTINGS, To Clean. — 1. Castile soap and water can be used on oil paintings without danger, care being taken of course not to wet the back, or let water through cracks. For ordinary dusting of pictures a silk handkerchief should be used.—2. Sponge with warm water; then cover with spirits of wine, renewed for ten minutes and wash off with water; but without rubbing. Repeat the process until the whole is removed. —3. Mix linseed oil, 2 oz., with methylated chloroform, 1 oz.; and apply a little over the painting, previously washing it with clean water applied with a little cotton wool; wipe off the composition with a soft silk handerchief during the next day. The mixture possesses the valuable property of restoring the faded colors of paintings.—4. Spread a coating of copaiba balsam on the old painting, and then keep it face downward over a dish of the same size filled with cold alcohol, at an altitude of about 3 ft. The vapors of the liquid impart to the copaiba a degree of semi-fluidity, in which state it easily amalgamates with the varnish it covers. Thus the original brilliancy and transparency are regained without injuring the oil painting.

PAPIER-MACHÉ, To Clean. — Wash papier-maché articles with a sponge and cold water (without soap); dredge while damp with flour, and polish with a piece of flannel.

PICTURE FRAMES, To Clean.—Black walnut frames may be renewed by first brushing thoroughly with a stiff brush, to remove the dust, and then applying pure linseed oil with a proper brush. In the absence of a brush a piece of new bleached muslin will answer the purpose.

PIE PLATES. To Clean.—Pie plates that have been used much for baking are apt to impart an unpleasant taste to the pies, which is owing to the lard and butter of the crust soaking into them and becoming rancid. It may be removed by putting them in a brass kettle with wood ashes and cold water, and boiling them in it for 1 hour.

PLASTER FIGURES, To Clean.—A coating of whiting and very thin glue applied with a brush will restore whiteness to plaster figures and make them once more real ornaments.

RUST, on Stoves.—1. To keep a stove free from rust in any atmosphere you have only to rub off all the rust you can and varnish it with common varnish. In the autumn, after putting it up again, the varnish will all burn off in a very short time, and all odor from it will go with it.—2. To remove rust from stoves, rub them with a rag dipped in oil of tartar. The rust will disappear immediately.

RUST, on Tin.—1. If tinware is well rubbed with lard and then with common unslacked lime, before being put away, it will never rust. This is also the best plan to remove rust.—2. Rub fresh lard over every part; then put it in an oven and heat it thoroughly; thus treated, any tinware may be used in water constantly, and remain bright and free from rust indefinately.

RUST, To Remove from Steel.—1. Every particle of iron rust, when the iron is not eaten into, may be removed by softening it with petroleum and then rubbing well with coarse sand paper.—2. To remove rust from steel rub well with sweet oil; in 48 hours use unslacked lime, powdered very fine; rub till the rust disappears.

SEA SHELLS. To Clean.—1. Fresh water shells can be cleaned by soaking them in a solution of chloride of lime and polishing them with pumice stone.—2. Boil in milk. This will cleanse them thoroughly.

SILVER, To Clean.—1. Silver plate can be beautifully cleaned and made to look like new by dipping a soft cloth or chamois skin in a weak preparation of ammonia water and rubbing the articles with it.—2. Wash in hot water containing a good quantity of concentrated lye;

or, if very black, boil for some time in soft water with a considerable amount of washing soda added; then wash in a good suds, rinse in clear water, and rub with flannel cloth, or, better, chamois skin, and your silver will not often require cleaning, but will shine like new for a long time.—3. The discoloration can be readily taken from silver spoons by washing them in water in which potatoes have been boiled.—4. To remove egg stains from silver spoons, rub with salt and it will entirely remove the discoloration.—5. Rub with slices of lemons or limes; then wash with soap suds, rinse off and polish with chamois skin.—6. Wet a flannel cloth in kerosene, dip it in dry whiting and rub the plated ware; let it dry on it, and then polish with a chamois skin.—7. Make a solution of ½ lb. cyanuret potassa in 2 gals. rain water; immerse the article till the tarnish has disappeared; then rinse off carefully in 3 or 4 waters, and dry in sawdust.

SILVER, Powders for Polishing.—1. An article for cleaning silver and other metallic ware is the zinc white (No. 1. quality) used by painters. Rub it fine with a knife, sprinkle it on a soft flannel cloth, with which rub the ware; then brush off with tissue paper, or any clean soft cloth.—2. Jeweller's rouge, ¼ lb.; prepared chalk or levigated burnt hartshorn, ¾ lb.; mix.—3. Quicksilver with chalk, 1 oz.; prepared chalk, 11 oz.; mix. Used to clean and polish plate.—4. Cream of tartar, common salt and alum, equal parts; a little of this powder added to the water in which plate is boiled gives to it a silvery whiteness.

SILVER. Washes For.—1. Cyanide of potassium, 3 or 4 dr.; nitrate of silver, 8 to 10 gr.; water, 4 oz.; apply with a soft tooth brush; wash the object thoroughly with water; dry it with a soft linen cloth, and polish with a chamois skin.—2. Mix 1 pt. of alcohol, ½ pt. of ammonia, ½ pt. of distilled water, 4 oz. of Spanish whiting; rub on with a sponge, and wipe off with a cloth.

SPICE MILLS, To Clean.—Grind a teaspoonful of rice through the mill and all impurities will be removed. A coffee mill may be fitted to grind any spice in the same way, using rather more rice. The rice will of course be flavored by whatever may have been in the mill. It is useful to thicken soups, or gravies, or sauces, when the spice is no objection.

SPONGES, To Bleach.—Wash and squeeze them out repeatedly in water; then plunge them in a mixture of 1 part muriatic acid and 6 parts water, in order to separate all calcareous matter. This immersion is for 1 hour, after which they are carefully washed in clean water, and then plunged in a second bath of muriatic acid, prepared as at first, except there is added 6 per cent. of hyposulphite of soda dissolved in a little water. The sponges are allowed to remain in this bath for 24 hours. A final washing with water removes the chemical substances, and the sponge acquires a beautiful whiteness.

SPONGES, To Clean.—1. A strong solution of salt and water, in which they should soak for a few hours, and then be thoroughly dried. Sponges should be kept suspended where the air can freely circulate around them. Quick evaporation of the moisture keeps them in good order.—2. Sponges can be cleansed by washing them in ammonia and water (use the proportion of 1 teaspoonful to 2 qts.), and afterwards in a solution of muriatic acid—1 part acid to 25 parts of water.—3. Steep the sponge in milk for some hours; then squeeze it out and wash in cold water.

STEEL. To Clean.—To clean steel ornaments, dip a small brush into some paraffin oil and then into some emery powder, such as is used in the knife machines, and well brush the ornaments and all the rust will soon come off; polish with a dry leather and duster.

STONE STEPS, To Clean.—Boil 1 lb. of pipeclay with 1 qt. of water, 1 qt. of small beer, and put in it a bit of stone blue. Wash with this mixture, and when dry rub the stones with flannel and a brush.

STOVES. To Clean.—If the stove is greasy, wash it off with a piece of flannel dipped in hot water containing a little soda. Mix a little black lead or stove polish with enough water to form a thin paste; apply this to the stove with a soft rag or brush; let it dry a little and then polish it with a stiff brush. If there are any steel fittings about the stove, polish them with emery paper; if they have rusted from neglect, rub some oil on them at night and polish them with emery paper in the morning. If the fittings are brass they should be cleaned with emery, or finely powdered and sifted bath brick dust rubbed on with a piece of damp flannel and then polished with dry dust and chamois skin.

STOVE PIPES, To Clean.—1. To free the pipe of soot, take the stove handle or any convenient implement and rap the pipe smartly on all sides from top to bottom. The soot will fall into the stove and be harmlessly consumed, or it can be removed in the usual way. If there be a horizontal pipe, this should be taken down twice a year and thoroughly cleaned. Or, if the pipe be only a few feet in length, and the arrangements will admit of it, provide the horizontal pipe with a permanent scraper, as follows: To the end of a stout wire, a few inches longer than the pipe, attach a small segment of a disc of sheet iron, at right angles to the wire; remove the elbow and thrust the scraper into the pipe; pass the other end of the wire through a hole punched in the elbow, loop the end of the wire for a handle and replace the elbow. After first rapping the pipe the soot can all be drawn out and let fall into the stove. Clean the pipe thus as often as once a fortnight during cold weather.—2. To clean out a stove pipe place a piece of zinc on the live coals in the stove. The vapor produced by the zinc will carry off the soot by chemical decomposition.

STOVE, To Polish.—1. For a stove of medium size, pulverize a piece of alum the size of a large hickory nut; stir into 2 tablespoonfuls of vinegar; add this to the stove blacking, mixed with water in the usual manner; apply this mixture with a cloth or brush to a cold stove, and while wet rub briskly with a dry brush. The polish will appear at once.—2. If stove polish is mixed with very strong soap suds the lustre appears

immediately, and the dust does not fly around as it usually does.—3. A tablespoonful of molasses added to the blacking will cause it to adhere better and retain the polish longer.

STOVE POLISH, To Make.—½ lb. black lead finely powdered; the whites of 8 eggs well beaten; dilute with sour beer or porter till it becomes as thin as shoe blacking; after stirring it, set it over hot coals to simmer for 20 minutes; when cold it may be kept for use.

SWEEPING.—Set the broom evenly and move it with long, regular strokes, being careful not to fling the refuse about the room, or to raise much dust. A quantity of fresh grass or weeds cut up wet in a basin and spread over painted floors, oil cloths or matting will take off all the dust, and make them look very clean and nice. Used in sweeping the same as tea leaves. It is particularly good for chambers.

TEAPOT, To Clean.—If a tin teapot has become brown inside, and the tea made in it tastes brackish, put in a little sal soda, soft soap and water, and boil; have your dish rag wrung out of hot water; pour the water out in a pan, put in your dish cloth and wipe quickly; pour the water back and boil again; repeat several times and it will all wipe off almost as bright as new.

TIN, To Clean.—1. All kinds of tins, molds, measures, etc., may be cleaned by being well rubbed with a paste made of whiting and water; they should then be rubbed with a leather, and any dust remaining on them should be removed by means of a soft brush; finally, they must be polished with another leather. Always let the inside of any vessel be cleaned first, since in cleaning the inside the outside always becomes soiled. For very dirty or greasy tins grated bath brick and water must be used.—2. Kerosene will make tin tea-kettles as bright as new. Saturate a woolen rag and rub with it. If very dirty, mix the oil with fine ashes.—3. The fine, soft coal ashes which are found in the pipe in the spring, and which sift under the pan, are excellent to scour tin with. Take a piece of old flannel, dip lightly into soft soap, and then in the ashes and rub; it will brighten up your tinware surprisingly; rub well with a clean flannel after polishing with the soap and ashes.—4. Common soda is excellent for scouring tin, as it does not scratch the tin, and will make it look like new. Apply with a piece of moistened newspaper and polish with a dry piece.

TORTOISE SHELL, To Polish.—Take some whiting (having rubbed it between the finger and thumb that there may not be a particle of grit); mix with water to the consistency of cream; rub with a very soft rag; polish with some of the dry whiting.

UPHOLSTERY, Faded, To Restore.—Beat the dust thoroughly and afterward brush, then apply a strong lather of Castile soap by means of a hard brush; wash the lather off with clear water, and afterward wash with alum water. When dry the colors will be restored to their original freshness.

WALL PAPER, To Clean.—Wipe down with a flannel cloth tied over a broom or brush; then cut off a thick piece of stale bread with the crust on, and rub them down with this. Begin at the top and go straight down. Plastered walls and ceilings may be cleaned in the same way.

WALL PAPER, To Remove Grease from.—1. To remove oil marks on wall paper, or the marks where inconsiderate people rest their heads, take pipe clay or fuller's earth, and make it into a paste about as thick as cream, with cold water; lay it on the stain gently, without rubbing it in; leave it on all night. It will dry by morning, when it can be brushed off; and unless an old stain, the grease spots will have disappeared. If old, renew the application.—2. Lay several folds of blotting paper on the spot and hold a hot iron near it until the grease is absorbed.

WINDOW GLASS, To Clean.—To clean windows, especially in freezing weather, when it is impossible to use water, tie up some finely powdered whiting in a small piece of muslin. Dab it over the glass thoroughly; the dirtier the glass the more whiting will adhere to it. Next smear it evenly with a damp rag, and let it remain until perfectly dry; then rub it off with a leather. This is an easy, clean, and a thorough plan. If alcohol be used instead of water, it will dry in less time and polishes the glass better.

WINDOW GLASS, To Remove Paint from.—1. Moisten a rag with spirits of turpentine and rub paint spots on windows. For the floor pour on a little turpentine; let it remain for a few moments and scrape up. The turpentine will evaporate in a short time.—2. To remove paint from windows, take strong bicarbonate of soda and dissolve it in hot water; wash the glass, and in 20 minutes or ½ hour rub thoroughly with a dry cloth.—3. Scour with fine ashes and water.

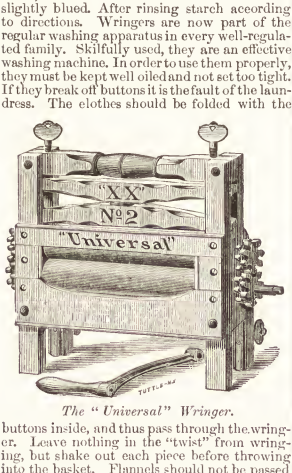
WOOD, To Remove Grease from.—1. For removing spots of grease from boards, take equal parts of fuller's earth and pearlash, ¼ lb. each, and boil in 1 qt. soft water; while hot, lay it on the greased parts, allowing it to remain on them for 10 or 12 hours; after which it may be scoured off with sand and water. A floor much spotted with grease should be completely washed with the mixture, the day before it is scoured.—2. To take oil out of a floor, wash with a mop dipped in strong hot lye of potash or wood ashes, and let it dry without wiping; then wash in suds. This will take the oil out of floors which have been finished in linseed oil, but will need several applications.

ZINC, To Clean.—1. To clean zinc rub on fresh lard with a cloth and wipe dry.—2. Dissolve 2 oz. alum in 1 qt. vinegar and clean the zinc with this as hot as you can use it, afterwards rubbing dry.—3. Put on the zinc a little sulphuric acid and rub over with a cloth so that every part is wet. Afterward wash off with clear water, and then the zinc will be bright and clear.—4. Scour with sifted coal ashes; afterward rub with kerosene.

LAUNDRY.

REMARKS.—The first grand requisite is plenty of good soft water; when it is necessary that hard water should be substituted, some simple chemical process can be used successfully to lighten the labor. If soda is chosen, the less quantity that will suffice the better. This should be dissolved by pouring boiling water over it before it is put in the tub. Borax is a simple and harmless addition of real value.

WASHING. — Before beginning to wash, the clothes should be assorted, and the fine ones kept separate all through the washing. Rub the clothes in warm, not hot water. Turn them and rub them till perfectly clean in the first water. If the water becomes much soiled, throw it out and take fresh; for if the water is allowed to become very much soiled, the clothes will be dingy. The clothes should then be rubbed out as thoroughly in the second as in the first water. After the second rubbing put the clothes in cold water to boil, without rubbing soap on them or putting soap in the water; they are soapy enough. Too much soap makes clothes yellow and stiff. As soon as they begin to boil remove them to the sudsing water. If they boil long they will be yellow. Let each article be well "soused" up and down in the sudsing water, rubbing it out thoroughly with the hands to get the suds out; wring and throw in the "rinsing-water," which is the last water. Let this be slightly blued. After rinsing starch according to directions. Wringers are now part of the regular washing apparatus in every well-regulated family. Skilfully used, they are an effective washing machine. In order to use them properly, they must be kept well oiled and not set too tight. If they break off buttons it is the fault of the laundress. The clothes should be folded with the



The "Universal" Wringer.

buttons inside, and thus pass through the wringer. Leave nothing in the "twist" from wringing, but shake out each piece before throwing into the basket. Flannels should not be passed through them, as they rub the wool up into little hard naps. The "Universal" wringer is constructed in a superior manner and gives satisfaction. Clothes should be on the line as quickly as possible after the rinsing in bluing water, or there will be danger of some streaks and cloudy looking places when dry. Be sure to stretch every inch possible to the sun and wind. Garments hung double, or in bunches or festoons, will not bleach. Care should be taken to see that the clothes-pins are clean, and the clothes line should always be wiped with a cloth before the clothes are hung upon it. If they are left in the yard instead of taking in after using, they will mildew and stain the clothes badly.

STARCHING. — For starching muslins, ginghams, and calicoes, dissolve a piece of alum the size of a shellbark, for every pt. of starch, and add to it. By so doing, the colors will keep bright for a long time, which is very desirable when dresses must be often washed; the cost is but a trifle. A shirt should always be starched on the wrong side. Shirts may either be dressed by single or double starching, and single starching may be either cold water starch or it may be hot. The double dressing is the most economical, and gives the most satisfaction; when properly done there need be no more dread of limp cuffs and collars. Mix a handful of starch in a basin with just as little cold water as will moisten it thoroughly; put in a piece of white wax or spermaceti, larger than a penny, then pour boiling water into the basin till the starch looks clear, stirring all the time with a spoon. If you do not happen to have white wax, a lump of butter or a bit of candle will do. The linen should be just out of the rinse water, and starched before it dries. Take a shirt at the back of the yoke; then with the right hand gather up the breast of the shirt and the collar, like a fan. Hold them tightly in your left hand, and dip them into the starch, and see that they are thoroughly soaked in it; then wring them with your right hand. But the starch is much too hot yet to touch it with impunity; so first dip the hand into the basin of cold water, then quickly wring out the starch, always dipping the hand in the cold water before each new turn. After the starch has been well wrung out of the collar and fronts, dry-rub them. The cuffs of the shirt must be done in the same way. Then hang up the shirt to dry, but remember always to fold in the starched parts, for fear of dust and smut settling on them; and hang them in a clean, airy place. The following are good rules for making starch: 1. Take 1 oz. of the best starch, add just enough soft water to make it, by rubbing and stirring it into a thick paste, carefully breaking all the lumps and particles; when rubbed perfectly smooth, add nearly or quite a pt. of boiling water, with bluing to suit the taste, and boil at least ½ hour, taking care to keep it well stirred all the time to prevent its burning; when not stirring, keep it covered to prevent the accumulation of dust; also keep it covered when removed from the fire, to prevent a scum from rising on it; to give the linen a fine, smooth,

glossy appearance and prevent the iron from sticking, add a little spermaceti, a piece as large as a nutmeg, to the starch when boiling, and ½ teaspoonful of the finest table salt.—2. White wax, 3 oz.; spermaceti, 3 dr.; borax, 6 oz.; gum tragacanth, 1½ oz.; melt together with a gentle heat; when you have prepared a sufficient quantity of starch in the usual manner for a dozen pieces, put in a piece of the above polish the size of a large walnut, more or less, according to the amount of washing; this will make a beautiful polish, and also make the goods very stiff.

IRONING.—The irons should be scrupulously clean. They should always be perfectly wiped before putting away, and kept in a dry place. If the starch sticks to the flat iron take a bit of beeswax, put it between two sheets of paper and then rub the warm flat iron over it; or keep it tied up in a rag to rub on the irons; then, if covered with brown starch, scrape it off with a knife and rub the flat iron on the oiled paper; this gives linen a fine gloss. The warmth and heaviness of the iron should be regulated by the articles to be ironed. A shirt board for ironing is a necessity in every well regulated family. This should be covered with at least two thicknesses of blanket, and have the ironing sheet, also double, smoothly pinned over it so that it cannot slip. Iron holders should have a cover of white cotton cloth, made to fit nicely, and fastened on with buttons, and when it becomes soiled it can be removed, washed and replaced. To keep your ironing board clean and free from dust, take two breadths of calico (an old dress skirt may be used) and make a bag to slip the board in when you put it away. Muslins and laces require to be ironed twice, gently pulling them out after the first ironing. Embroideries should be ironed over several thicknesses of flannel. As a general rule, all fine muslin work should be ironed first under a piece of old cambric, as it clears the muslin from the starch and prevents it from being scorched. The bosoms and cuffs of gentlemen's shirts should also be ironed in a similar manner. In ironing pocket-handkerchiefs the flat iron should be passed over each side before the middle is touched, slightly pulling each corner with the left hand while you iron with the right. To iron plaits neatly, the frills should be laid straight in front of the ironer, while she makes the creases of the desired width with the right hand, holding the point of the hem with the left hand till the iron has pressed it down. All plaits must be laid even to the thread to look well. Laces are to be carefully brought into shape, and all the edge or purling pulled out like new. In ironing silks, cover them over with paper or fine cotton, and use only a moderately heated iron, taking great care that the iron does not touch the silk at all, or it will make the silk look glossy, and show that it has been ironed. Any white article if scorched slightly can be in part restored, so far as looks go; but any scorching injures the fabric.

BLACK GOODS, To Wash.—1. The best method of washing black calicoes and dark brown cambrics is to put 1 pt. of wheat bran into 4 qts. of cold water; boil for ½ hour; strain into a tub, and add sufficient warm water to wash 1 dress; do not use soap; rinse, and add blueing to your starch to prevent the white appearance starch leaves on dark colors. The bran softens the water. Wash brown linen in this way, adding a little hay to the bran water while boiling. If there are grease spots on the linen use a little soap on them. Brown linen should not be dried in the sun.—2. Wash black percale or calicoes as usual, and rinse with a strong solution of salt. This will prevent black from running, and also colors.—3. A teacupful of lye in a pail of water is said to improve the color of black goods.—4. For washing black or navy blue linens, take 2 potatoes, grated into tepid soft water, into which 1 teaspoonful of ammonia has been put; wash the linens in this, and rinse them in cold blue water. They will need no starch, and should be dried and ironed on the wrong side.

BLANKETS, To Wash.—Put 2 large tablespoonfuls of borax and 1 pt. bowl of soft soap into a tub of cold water; when dissolved put in a pair of blankets and let them remain there over night; next rub them out and rinse thoroughly in two waters, and hang them to dry; do not wring them. This recipe will also apply to the washing of all kinds of flannels and woolen goods.

BLEACHING COTTON.—1. Cotton is more easily bleached and appears to suffer less from the process than most other textile substances. In the chemical system of bleaching the goods are "washed" and "bucked" as on the old plan, then submitted to the action of a weak solution of chloride of lime, and afterwards passed through water soured with hydrochloric or sulphuric acid, when they have only to be thoroughly washed, and to be dried and finished for the entire completion of the process.—2. Into 8 qts. of warm water put 1 lb. of chloride of lime; stir with a stick a few minutes; then strain through a bag of coarse muslin, working it with the hand to dissolve thoroughly; add to this 5 bucketfuls of warm water; stir it well and put in the muslin; let it remain in 1 hour, turning it over occasionally that every part may be thoroughly bleached; when taken out wash well in two waters to remove the lime; rinse and dry. This quantity will bleach 25 yds. of yard wide muslin. The muslin will bleach more evenly and quickly if it has been thoroughly wet and dried before bleaching.

BLEACHING COTTON CLOTHES.—1. A bleaching preparation may be made by dissolving 2 lbs. of sal soda in 1 gal. of hot water, and add 1 lb. of good lime; stir the mixture for a few minutes, allow it to stand for ½ hour, and then carefully pour off and bottle the clear liquid; ½ pt. of this may be added to each tub of water.—2. 1 tablespoonful of turpentine boiled with white clothes will aid the whitening process.

BLEACHING LINEN.—Linen may be bleached in a similar way to cotton; but the process is much more troublesome and tedious, owing to its greater affinity for the coloring matter existing in it in the raw state. Under the old system several alternate buckings with pearlash or potash and lengthened exposure on the field, with

one or two sourings, and a final scrubbing with a strong lather of soft soap, constituted the chief details of the process. In this way a high degree of whiteness, though not an absolutely pure or snow white, was produced. Grass bleaching or crofting is still extensively used for linen; but it is more generally employed only for a limited time, and in combination with a modification of the system at present almost universally adopted for cotton goods; while, in some cases, crofting is omitted altogether, and the bleaching conducted wholly by the latter process.

BLEACHING LINEN CLOTHES. — 1. Work them well in water, to which some strained solution of chloride of lime has been added, observing to well rinse them in clean water, both before and after the immersion in the bleaching liquor. The attempt to bleach unwashed linen should be avoided, as also using the liquor too strong, as in that case the linen will be rendered rotten. — 2. Linen garments which have become yellow from time may be whitened by being bathed in a lather made of milk and pure white soap, 1 lb. of the latter to 1 gal. of the former. After the boiling process the linen should be twice rinsed, a little blue being added to the last water used.

BLEACHING SILK.—Silk is usually bleached by first steeping it and then boiling it in solutions of white soap in water, after which it is subjected to repeated rinsings, a little indigo blue or archil being added to the last water to give it a pearly appearance. When required to be very white the goods are cautiously submitted, for 2 or 3 hours, to the action of the fumes of burning sulphur, and then finished by rinsing, as before. Boiling or sulphuring is not required for the white silk of China.

BLUE, To Set. — 1. Blue calicoes, which fade so easily, may have the colors set by washing them the first time in salt and water. After this, and ever after, they may be washed in the common way.—2. To set colors in blue cambric, dip it into a solution of saltpeter, using two or three cents worth to a pailful of water. Salt will injure the fabric.

BLUING, To Make. — 1. If raw indigo is used to make the bluing water—and in careful hands it is as good as any—a few lumps should be tied tightly in a little bag and allowed to soak a short time in the water, which should be cold. — 2. Take best Prussian blue, pulverized, 1 oz.; oxalic acid, also pulverized, ½ oz.; soft water, 1 qt.; mix. 1 or 2 tablespoonfuls of it is sufficient for a tub of water, according to size of tub. —3. Dry soluble blue dissolved in water, makes a good bluing; it can be bought at any drug store.—4. 20 lbs. white potato starch; 20 lbs. wheat starch; 20 lbs. Prussian blue; 2 lbs. indigo carmine; 2 lbs. finely ground gum arabic are mixed in a trough, with the gradual addition of sufficent water to form a half fluid homogeneous mass, which is poured out on a board with strips tacked to the edges. It is then allowed to dry in a heated room until it does not run together again when cut. It is next cut, with a suitable cutter, into little cubes, and allowed to dry perfectly.—5. Put a little neutral sulphate of indigo into the water.

BUFF COLOR, To Set. — 1. For buffs or gray linen, a tablespoonful of black pepper to a pailful of water will set the color and not harden the water at all. Let the article to be washed soak in this water ½ hour or so and then wash as usual.—2. To wash fine linen so that it will retain its color, take as much hay as will color well the amount of water you wish to use; boil and rinse the goods in it, using a little soap.

CALICOES, To Prevent Fading.—1. If the calico is of fading colors, never rub on soap, but get out the grease spots with French chalk or magnesia, and then wash in a solution of hard soap and water. If the colors are red or green, add a little vinegar, or lemon juice, to the last rinsing water. Calicoes should never be washed in very hot water, nor hung with the right side out, nor permitted to freeze while drying.—2. Steep 3 gills of salt in 4 qts. water. Put in the calico while the solution is hot, and leave until the latter is cold. In this way the colors are rendered permanent, and will not fade by subsequent washing.

CHINTZ, To Wash.—Boil 2 lbs. of rice in 2 gal. water till soft, and pour the mixture into a tub; let it stand until it attains a warmth generally used for colored linens; then put the chintz in it, and wash it with the rice instead of soap, until all the dirt has disappeared. Next boil another 2 lbs. of rice, as above, in another 2 gal. water, but strain the rice from the water, and mix it in warm water; wash the chintz in this till quite clean, and afterwards rinse it in the water the rice was boiled in. This will answer the same end as starch, as no wet will affect it, as it will be stiff while it is worn.

COFFEE STAINS, To Remove. — The stains must be soaped before putting into water; this will make them disappear.

COUNTERPANES, To Wash. — Cut a lb. of moulted soap into thin slices; put it into a pan with ½ oz. potash, and 1 oz. pearlash; then pour a pail of boiling water on it; let it stand till it is quite dissolved; then pour hot and cold water into your scouring tub, with a bowl of your solution of soap; put your counterpane in it, and beat it well out with a doll, often turning the counterpane over in the tub. When this is done, wring it across a gallows or hook, which is done by turning the two opposite ends round each other, and putting a small clean stick between them; by this method you may wring it as dry as possible; the harder, without injuring it, the better. Having given it this first liquor, you may put in some old cottons or woolens, that the liquor may not be thrown away, and then give your counterpane a second liquor, as before; wring it out again, and rinse in clean, cold water; then pour a sufficient quantity of boiling water into the tub, with a small quantity of the solution of soap, so that you will reduce it to a very thin lather. Put 3 teaspoonfuls of the liquid blue into the tub when ce your goods were taken, and the acid of the liquid blue, and the alkali of the pearlash, and the soap lye, will cause a slight fermentation or effervescence; stir this thin, blue liquor, with a stick, and put in your counterpane; beat it out with the doll about 5 minutes, which will color the coun-

terpane of a fine azure blue, of the lightest shade; but as it dries in the wind, the blue mostly goes off, and leaves a brilliant white.

FLANNELS, To Bleach.—1. Hang the flannels loosely in a tight barrel over the fumes of burning sulphur.—2. A solution of 1½ lbs. of white soap and ⅔ oz. spirits of ammonia, dissolved in 12 gal. soft water, will impart a beautiful and lasting whiteness to any flannels dipped in it, no matter how yellow they have been previous to their immersion. After being well stirred round for a short time, the articles should be taken out and well washed in clean, cold water.

FLANNELS, To Shrink. — New flannel should always be shrunk or washed before it is made up, that it may eat out more accurately and that the grease which is used in manufacturing it may be extracted. Cut off the list along the selvage edge of the whole piece; then put it into warm water without soap; begin at one end of the piece and rub it with both hands till you come to the other end; this is to get out the grease and blue with which new white flannel is always tinged; then do the same through another water; rinse it through a clean lukewarm water; wring it lengthwise, and stretch it well. In hanging it out spread it along the line straight and lengthwise. If dried in festoons, the edges will be in great scallops, making it very difficult to cut out. It must be dried in the sun. When dry, let it be stretched even, clapped with the hands, and rolled up tightly and smoothly till wanted.

FLANNELS, To Wash.—1. Take soft water, as warm as you can bear your hands in; make a strong suds, well blued; in washing fine flannels wet but one piece at a time; soap the dirty spots and rub with the hands, as washboards full the flannels; when half clean, add 3 times as much blue to the rinse as for cotton clothes; rinse well; wring tight; shake briskly for a few minutes; hang out in a gentle breeze; when nearly dry, roll smooth and tight for an hour or two; press with a moderately hot iron; if embroidered, press on the wrong side. — 2. Take half the weight of soda that there is of soap; boil them with water, allowing 1 gal. to every lb. of soap, and use it when perfectly cold; wet the flannel in cold water; then wash it in fresh cold water, with some of the boiled mixture amongst it; wash in this, changing the water till the flannel becomes perfectly clean; then rinse it well in cold water, and dry it in the shade.

FRUIT STAINS, To Remove from Cotton or Linen. — 1. Recent stains of fruit may be removed by holding the linen tightly stretched over a tub and pouring hot water over the part. This must be done before any soap has been applied to it.—2. As soon as the stain is made on table linen, rub on it common table salt, before it has had time to dry; the salt will keep it damp till the cloth is washed, when the stain will disappear; or, wash the stain lightly when the cloth is removed.—2. Almost all fruit stains can be taken out by soaking and rubbing in sweet milk before washing. —3. 10 grs. oxalic acid in ½ pt. water; wet the article stained in hot water; apply to the top of the bottle so that the liquid will reach it, then rinse it well.

GLOVES, White Thread, To Wash.—These articles are so delicate as to require great care in washing, as they must not be rubbed. Make a lather of white soap in cold water, and put it into a saucepan; soak the gloves well; put them in and set the saucepan over the fire; when they have come to a hard boil, take them off, and when cool enough for your hand, squeeze them in the water; having prepared a fresh, cold lather, boil them again in that; then take the pan off the fire and squeeze them well again, after which they can be stretched, dried and then ironed on the wrong side.

GRASS STAINS. To Remove. — Pour boiling hot water on the stains before washing the garments.

GREASE, To Remove from Cotton.—1. White goods, wash with soap or alkaline lyes. Colored cottons, wash with lukewarm soap lyes. — 2. Cold rain water and soda will remove machine grease from washable fabrics. — 3. Ammonia will also remove grease stains.

GREASE, To Remove from Wool. — Dissolve a large tablespoonful of borax in a pt. of boiling water; mix ¼ of it in the water in which the wool is to be washed; put in one piece of goods at a time, using soap if needed, and if necessary add more of the borax water; wash well and rinse in cold water, or in water only slightly warmed; Shake well, and hang where the goods will dry quickly.

INK STAINS, To Remove from Cotton or Linen. —1. Ink stains are readily removed by the application alternately of strong aqueous solutions of oxalic acid and chloride of lime; rinse well with water before soaping.—2. To take ink out of linen, soak the ink spot in milk; then wash out the milk and the ink will come out with it. —3. Ripe tomatoes will remove ink and other stains from white cloth.

IRON RUST, To Remove. — 1. Saturate with sour milk and the spot will be removed. — 2. Squeeze lemon juice into a cup, add a pinch of salt, and rub the stains in this. Then wash in clear, tepid water. Sponge goods that cannot be rubbed. This is excellent for removing iron rust or ink from black goods.

JELLY BAGS, To Wash. — Use no soap; wash them in as hot, clean water as the hands can endure; rinse in boiling water and wring as dry as possible; then dry where no dust will reach them.

LACE CURTAINS. To Wash. — If the curtains are new, soak awhile to take out the starch before putting them into the suds; wash and boil, suds and rinse; starch in thin boiled starch and then in very thick boiled starch, which should be deeply blued, take as many sheets as you have curtains, and stretch and pin them to a carpet in a room as free from dust as possible; then pin the curtains to the sheet (stretching them to their former size). The pins in the curtains should not be more than 3 in. apart; when dry, they are ready to hang up.

LACE, To Wash. — 1. Applique lace can be nicely washed by first sewing it carefully, right side down, to a piece of woolen flannel; wash, stiffen slightly, and press before removing from the flannel.—2. (*For white silk lace or blonde.*)

Take a bottle covered with clean linen or muslin and wind the blonde round it, securing the ends with a needle and thread, not leaving the edge outward, but covering it as you proceed; set the bottle upright in a strong cold lather of white soap and very clear soft water, and place it in the sun, having gently with your hand rubbed the suds up and down on the lace; keep it in the sun every day for a week, changing the lather daily, and always rubbing it slightly when the suds are renewed; at the end of the week take the blonde off the bottle, and pin it backward and forward on a large pillow covered with a clean tight case; every scollop must have a separate pin, or more, if the scollops are not very small. The plain edge must be pinned down also, so as to make it straight and even; the pins should be of the smallest size; when quite dry, take it off, but do not starch, iron or mess it; if ecru is desired dip into clear cold coffee; lay it in long loose folds, and put it away in a pasteboard box. —3. (*Veil.*) Put the veil into a strong lather of white soap and very clear water and let it simmer slowly for ½ hour; take it out and squeeze it well, but be sure not to rub it; rinse it in two cold waters, with a drop or two of liquid bluein the last; have ready some very clear and weak gum Arabic water, or some thin starch, or rice-water; pass the veil through it, and clear it by clapping; then stretch it out even, and put it to dry on a linen cloth, making the edge as straight as possible, opening out all the scollops, and fastening each with pins; when dry, lay a piece of thin muslin smoothly over it, and iron it on the wrong side.

LAWNS AND THIN MUSLINS, To Wash. — 1. Boil 2 qts. wheat bran in 6 qts. or more of water ½ hour; strain through a coarse towel and mix in the water in which the muslin is to be washed; use no soap and no starch; rinse lightly in fair water. This preparation both cleanses and stiffens the lawn. — 2. Muslin dresses, even the most delicate colors, can be cleaned in 10 minutes or ¼ of an hour, without losing their color. Melt ½ lb. soap in 1 gal. water; empty in a washing tub; place near two other large tubs of clear water, and stir into one a qt. of bran; put the muslin in the soap, turn it over and knead it for a few minutes; squeeze it out well, but do not wring it lest it get turned; rinse it about quickly in the bran for a couple of minutes; rinse again well for a couple of minutes in clear water; squeeze out dry, and hang it between two lines. A clear dry day should be chosen to wash muslin dresses; ½ doz. may be done in this way in ½ hour. When the dress is dry make the starch; for a colored muslin, white starch and unboiled, but made with boiling water, is best for muslin dresses; stir the starch with the end of a wax candle; dip the dress; hang it again to dry; when dry rinse it quickly and thoroughly in clear water; hang it to dry again; sprinkle and roll it up; afterward iron it with very hot irons. This rinsing after stareheing is called clear starching.

MILDEW, To Remove from Linen.—1. To extract mildew from linen, put strong soap and salt on the mildew spots; keep them moist and expose to the sun; repeat the process several times; the soap used should be soft, such as is home made from the lye of wood ashes.—2. Mix soft soap and powdered starch, half as much salt, and the juice of a lemon; put it on both sides with a brush; let it lay on the grass for a day and a night, till the stain comes out.

NANKEENS, To Wash.—Nankeens will keep their color by washing as follows: Put a large handful of salt in a vessel with 1 gal. of cold water; put the articles in and let them soak 24 hours; then wash in hot lye, without soap, and without wringing.

QUILTS, To Remove Stains From. — Streaks can be taken out of badly washed quilts by laying them on the grass over night, when the dew falls; early in the morning, before the sun shines, turn the wet side down and let it remain until dry; the streaks will be gone.

QUILTS, To Wash.—To wash quilts, comforts, tickings, sackings, etc., soak in pure cold water 24 hours or more; then rub through warm water with a little soap, and rinse well.

RED TABLE LINEN, To Wash.—1. To wash red table linen, use tepid water, with a little powdered borax; wash the linen separately and quickly, using very little soap; rinse in tepid water containing a little boiled starch; hang to dry in the shade; iron when almost dry.—2. Red border napkins will bear boiling with other clothing, but scalding is all that is necessary.

SCORCHED LINEN, To Whiten.—1. For whitening scorched linen, it is often sufficient to wet it with soapsuds and lay it in the hot sun.—2. Put 1 lb. of white soap into 1 gal. of milk, and boil the scorched article in it.—3. Peel and slice 2 onions; extract the juice by pounding and squeezing; cut up ½ oz. of fine white soap and add to the juice; 2 oz. of fuller's earth and ½ pt. vinegar; boil all together; when cool spread over the scorched linen and let it dry on it; then wash and boil out the linen, and the spots will disappear, unless burned so badly as to break the threads.

SEERSUCKER, To Wash.—This fabric, being raw silk, need not be ironed. It requires only careful washing, without rubbing, in a suds of Castile soap; then to be rinsed out, stretched gently each way and hung out to dry.

SILK HANDKERCHIEFS, To Wash.—Silk handkerchiefs should be washed with borax, in tepid water, with little or no soap; iron them before dry.

STOCKINGS, Black, To Wash. — Wash in a cool lather of plain white soap and rain water, with a little ammonia mixed in it; keep from the air while drying, by rolling in a cloth; do not wring, but press the moisture well out; epsom salts and water form a good rinse.

STOCKINGS, Colored, To Wash. — 1. Wash colored hose in milk warm water; rinse; turn and dry quickly.—2. Put 1 tablespoonful of salt in 1 qt. of water; let the stockings soak in that for 10 minutes, and then take them out and wash in soap and water.

STOCKINGS, Silk, To Wash. — They should be washed in cold water with white soap, rinsed in cold water, laid flat on a fine towel, rolled tightly until dry, and rubbed with a piece of flannel to restore the gloss.

STOCKINGS, Woolen, To Wash.—These should be soaked all night, and washed in hot suds with beef's gall, 1 tablespoonful to ½ pail of water; iron on the wrong side.

TIES. To Wash. — 1. To wash gentlemen's neckties, let them soak a little; then wash with soap and hot water; rinse in cold water, slightly blued; dry; dip once more in cold water; starch and wring them thoroughly; then iron. —2. Muslin ties with silk embroidered ends can be washed and made to look about as good as new again by washing the muslin in quite strong suds, holding the ends out of the suds with your left hand; then, when the plain part is clean, get some fresh water, make a weak suds and rinse the whole tie in it, squeezing it in your hand, not wringing it; dip the tie in cold water in which you have put a little blueing and a bit of starch; then lay the tie, while wet, on a perfectly clean ironing board; pin the ends out carefully, just as you wish them to look when dry; then lay a thin cloth over the plain part and iron it dry, but do not iron the ends, as the hot iron will flatten the silk embroidery so it will not look well; let it remain on the board until dry. If the ends are inclined to draw and will not hang as you wish them to, then take a piece of flannel, double it and lay the ends on that and press lightly with an iron that is just warm.

TOILET MATS WITH BORDERS. To Wash.—Wash in a thick lather; rinse in tepid blue water; wring them in a dry cloth; iron immediately, while still damp.

WASHING FLUIDS. — 1. Good hard soap, ½ bar; saltpeter, 1 oz.; borax, 1 oz.; soft water, 4 qts.; dissolve over a slow fire; when partly cool, add 5 oz. spirits of ammonia.—2. Take 1 lb. of sal soda and ½ lb. of unslacked lime; put them into 1 gal. of water and boil 20 minutes; let it stand till cool, then drain off and put into a strong jar or jug; soak your dirty clothes over night, or until they are wet through; then wring them out and rub on plenty of soap, and in one boiler of clothes, well covered with water, add 1 teacupful of washing fluid; boil ½ hour briskly, and then wash them thoroughly through one suds; rinse, and your clothes will look better than with the old way of washing twice before boiling.—3. (*For Woolen Goods.*) Ammonia, 4 oz.; white Castile soap, 4 oz.; alcohol, 2 oz.; glycerine, 2 oz.; ether, 2 oz.; dissolve the soap in 1 qt. soft water, over the fire, and add 4 qts. water; when nearly cold add the other ingredients; bottle and keep well corked. Use a cupful of the fluid in each pail of warm water; put the clothes in and stir them around; then rinse in warm water and iron.—4. Sal soda and borax, ½ lb. each; gum camphor, 1 oz.; alcohol, ½ pt. Dissolve the soda and borax in 1 gal. of boiling rain water; pour in 2 gal. of cold rain water; add the camphor, first dissolved in the alcohol; stir well and bottle for use; 4 tablespoonfuls of the preparation are to be mixed with 1 pt. of soft soap, and the clothes boiled in a suds made of this. It is all the better if the clothes are soaked over night before putting them into the suds.

RENOVATING.

REMARKS. — The spots on garments may sometimes be made to disappear by merely sponging them with pure water; washing the sponge in clear water several times and squeezing it as dry as possible by wrapping it in a piece of alpaca. If the garment is very much spotted and soiled follow the specific directions given hereafter. Acid stains, as seen in the receipts, may be made to disappear by neutralizing with dilute alkalies, and alkaline stains by the use of weak acids, when the color has not been destroyed.

BLACK CLOTHING, To Clean. — Remove all dust from a garment every time it is worn. Black especially should be treated in this way: Shake thoroughly and brush with a brush or old silk, or other material, being particular that the dust that settles in the folds is all removed. A strip of old black broadcloth, 4 or 5 in. wide, rolled up tightly and sewed to keep the roll in place, is better than a sponge or cloth for cleansing black and dark colored clothes. Whatever lint comes from it in rubbing is black and does not show. When black clothes are washed, as they may often be previous to making over, fresh clean water should be used, and they should be pressed on the wrong side before being quite dry. If washed in water previously used for white clothing, they will be covered with lint. The following preparations are useful in cleaning black goods: 1. If the articles are very dirty and contain grease spots, dissolve a little strong soap in warm water, and mix it with a small quantity of ox gall; touch over all the spots of grease, dirt, etc., and rub them well with a stiff brush until they are entirely removed; after which the garment should be rubbed all over with a brush or sponge and warm water, to which should be added more of the soap and ox gall. After the garment has been well rubbed over with this mixture, rinse until the water passes off clean. Then hang up to dry. — 2. (*Cassimere.*) Wash in hot suds with a little borax in the water; rinse in very blue water and iron while damp on the wrong side.

BLACK CLOTHING, To Restore. — 1. Soft water, 1 gal.; make a strong decoction of 2 oz. extract of logwood by boiling the extract with the water; ¼ oz. saleratus; strain; when cool add 2 oz. gum Arabic in powder; bottle, cork well and set aside for use; clean the material well from grease and dirt, and apply the above liquid with a sponge evenly; dilute to suit the color, and hang in the shade to dry; afterwards brush the nap smooth, and it will look like new.—2. 2 oz. common tobacco boiled in a gal. of water. — 3. (*Alpaca.*) Sponge the right side with clear, cold coffee, which has been strained through a piece of black calico or muslin (a bit of black muslin is better than a sponge to dampen with) and iron immediately with a hot iron on the wrong side.

BLOOD STAINS, To Remove. — 1. These may be obliterated from almost any substance by laying a thick coating of common starch over the place; the starch is to be mixed as if for the laundry, and laid on quite wet.—2. Steep the article in a solution of iodide of potassium in 4 times its weight of water. This would probably not injure silk of moderately fast color.—3. For removing blood spots from woolen goods of tender colors, rub them with the inner side of a crust of bread.

BOMBAZINE, To Remove Grease from. — Gall is excellent for taking spots from bombazines and after being washed in it they look as good as new. It must be thoroughly stirred into water, and not put upon the cloth. It is used without soap. After being washed in it, the cloth which you want to clean should be washed in warm suds, without using soap.

CLEANING COMPOUNDS. — 1. Dissolve 1 oz pure pearlash in a pt. spring water, and to the solution add a lemon cut in small slices; mix the ingredients well; keep the mixture in a warm state for 2 days; then strain it and bottle the clear liquid for use. A little of this poured on stains will remove them; as soon as they disappear the cloth should be washed in clear water. —2. 1 oz. pulverized borax, put into 1 pt. boiling water and bottled for use will be found invaluable for removing grease spots from woolen goods.—3. Take 1 pt. hot water; slice into it 2 oz. shaving soap; add to it 2 oz. spirits ammonia, and 1 teaspoonful powdered saltpeter; put into a bottle and shake until thoroughly dissolved; pour a little into a saucer; dip in a sponge and rub the material vigorously. — 4. 4 tablespoonfuls spirits ammonia; the same of alcohol; 1 tablespoonful salt; shake the whole well together in a bottle, and apply with a sponge or toothbrush. This removes ink, paint, fruit or acid stains from silk, linen or woolen articles.—5. Mix 1 oz. borax and 1 oz. gum camphor with 1 qt. boiling water; when cool add 1 pt. alcohol; bottle and cork tightly; when wanted for use shake well and sponge the garments to be cleaned. This is an excellent mixture for cleaning soiled black cashmere and woolen dresses, coat collars and black felt hats.—6. Fuller's earth, 6 lbs.; French chalk, 4 oz.; pipe clay, 1 lb.; make into a paste with rectified oil of turpentine, 1 oz.; alcohol, 2 oz.; melted oil soap, 1½ lbs.; compound the mixture into cakes of any desired size, for sale if required, keeping them in water or small wooden boxes.

CLOTH, Scouring of. — The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, etc., by dissolving a little curd soap in water, and, after mixing it with a little ox gall, to touch over all the spots of grease, dirt, etc., with it, and to rub them well with a stiff brush until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark-colored cloths the common practice is to add some fuller's earth to the mixture of soap and gall. When nearly dry, the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, should be several times passed over it, which will give it a superior finish. Cloth may also be cleaned in the dry way as follows: First, remove the spots as above, and, when the parts have dried, strew clean damp sand over it, and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out, and bring the dirt with it. (See *Remarks* and *Black Clothing.*)

COAL OIL, To Remove. — Cover the spot with finely powdered chalk or corn meal; lay a paper over it, and rub it over with a moderately heated iron; 2 or 3 applications are all that is necessary.

COFFEE STAINS, To Remove. — Mix the yolk of an egg with a little milk-warm water, and use it as soap on the stain. For stains which have been on the material for some time, add a few drops of spirits of wine to the egg and water.

COLOR, To Restore. — 1. If the color is taken out by acids, wet the spots with liquid ammonia to kill the acid, and then wet with chloroform to restore the color. If the color is destroyed by alkalies, wet with acid to destroy the alkali, and then with the chloroform to restore the color.— 2. If discoloration from any acid, the color may be restored by rubbing a solution of carbonate of soda or magnesia on the part. In this case, avoid the use of soap with water, as the former will restore the red appearance. — 3. Citric acid serves to receive and raise certain colors, especially greens and yellows; it destroys the effect of alkalies and any bluish or crimson spots which appear upon scarlets. In its stead acetic acid may be employed, or sulphuric acid diluted with 100 times its weight of water; or lemon juice.

CRAPE, To Remove Water Stains from. — Wherever a drop of water falls upon a black crape veil or trimming, a conspicuous white spot remains. To obliterate it, spread the crape on a lap-board or table, and place some weight upon it to keep it steady; then slip a piece of old black silk under the stain; take a large camel's hair brush, dipped in common black ink, and paint out the white spot; then wipe it off gently with a small bit of soft old black silk.

CRAPE, To Renew. — 1. Rinsing it in ox gall and water, to remove the dirt; afterwards in pure water, to remove the gall; and lastly, in a little gum water, to stiffen and crisp it. It is then clapped between the hands until dry.—2. Skimmed milk and water, with a little bit of glue in it, made scalding hot, restores rusty Italian crape. If clapped and pulled dry like muslin, it will look as good as new. — 3. Thoroughly brush all dust from the material; sprinkle with alcohol, and roll in a newspaper, commencing with the paper and crape together, that the paper may be between every portion of the material; allow it to remain in the roll until perfectly dry.

FEATHERS, To Bleach. — To bleach black,

brown or gray feathers, first thoroughly wash with soap and water, to free from any oil they may contain; next transfer to a bath composed of bichromate of potash dissolved in water, to which has been added a few drops of nitric or sulphuric acid. In this bath they rapidly lose their black, brown, or gray color, and become almost white; on being removed from this bath they are well rinsed in water, and are then fit to be dyed, even the most delicate color. Great care is required in the process, as the fine of the feather is apt to be destroyed, if kept too long in the bath. A bleached feather may be readily known by the yellow color of its stem.

FEATHERS, To Clean.—1. Cut some white curd soap in small pieces, pour boiling water on them and add a little pearlash; when the soap is quite dissolved, and the mixture cool enough for the hand to bear, plunge the feathers into it and draw them through the hand till the dirt appears to be squeezed out of them; pass them through a clean lather with some blue in it; then rinse them in cold water with blue to give them a good color; beat them against the hand to shake off the water, and dry by shaking them near a fire. Black feathers may be cleaned with water and some gall, proceeding as above.

FEATHERS, To Curl.—When they are nearly dry, draw each fibre or flue over the edge of a small blunt knife; turning it around in the direction you wish the curl to take; then if the feather is to be flat, place it between the leaves of a book to press it.

FEATHERS, To Restore.—1. Black feathers are revived by holding over smoke made by throwing sugar on live coals. Then rub on a little nice oil, and curl.—2. Take a little salt and sprinkle it upon the hot stove and hold the plume over the smoke a few minutes.

FURS. To Clean.—Strip the fur articles of their stuffing and binding, and lay them as much as possible in a flat position; they must then be subjected to a very brisk brushing, with a stiff clothes brush; after this, any moth eaten parts must be cut out and be neatly replaced by new bits of fur to match.—1. Sable, chinchilla, squirrel, fitch, etc., should be treated as follows: Warm a quantity of new bran in a pan, taking care that it does not burn, to prevent which it must be actively stirred; when well warmed, rub it thoroughly into the fur with the hand; repeat this 2 or 3 times; then shake the fur, and give it another sharp brushing until free from dust.—2. White furs, ermine, etc., may be cleaned by laying the fur on the table and rubbing it well with bran made moist with warm water; rub until quite dry, and afterward with dry bran; the wet bran should be put on with flannel, and the dry with a piece of book-muslin; the light furs, in addition to the above, should be well rubbed with magnesia, or a piece of book muslin after the bran process.—3. Wash them in a cold lather of soap and water, with a little soda and blue in it; then draw them with the hand, the same as flannel, through several lathers, until they are clean; rinse in clean water; shake well, and hang up to dry, frequently shaking them while damp.—4. Thoroughly sprinkle every part with hot flour and sand and well brush with a hard brush. Then beat with a cane; comb it smooth with a wet comb, and press carefully with a warm iron. Furs are usually much improved by stretching, which may be done as follows: To 1 pt. soft water add 3 oz. salt; with this solution sponge the inside of the skin (taking care not to wet the fur) until it becomes thoroughly saturated; then lay it carefully on a board with the fur side downward, in its natural position; then stretch as much as it will bear into the required shape, and fasten with small tacks. The drying may be quickened by placing the skin a little distance from the fire.

GLOVES, Kid, To Clean.—1. Pour 1 teacupful of benzine into a pint bowl, and put a pair of gloves into it, soaking them completely and rubbing them together just as if you were washing cotton rags; then rinse them in fresh, clean benzine; squeeze them as dry as you can; beat them against each other, and hang them out in the air. In an hour or less the odor will be gone, and they will be found to be clean and soft.—2. Go over them with a clean towel dipped in skim milk, wearing them during the process and until they are quite dry.—3. Procure some gasoline, put on one glove, pour some of the fluid into a saucer, and cork the bottle to prevent evaporation; then rub the glove all over, quite hard, with a sponge wet with the contents of the saucer; keep the glove on your hand until nearly dry, but avoid stoves and lamps; then repeat the operation with the other. The odor of gasoline is disagreeable. Hang the gloves out of the window for a while. Then put away with a sachet.—4. Wash the hands thoroughly clean; then put on the gloves and wash them, as though you were washing your hands, in a basin containing spirits of turpentine, until quite clean; then hang the gloves up in a warm place, or where there is a free current of air, which will carry off all the smell of the turpentine.—5. Use a strong solution of pure soap in hot milk beaten up with the yolk of 1 egg to 1 pt. of the solution; put the glove on the hand and rub it gently with the paste, to which a little ether may be added; then carefully lay by to dry. White gloves are not discolored by this treatment, and the leather will be made thereby clean and soft as when new.—6. Put your glove on; take a piece of cotton, pour some rose oil on it, and rub gently all over until you think it is clean; then take another piece of cotton and rub until dry, and you will be surprised to find how soft and nice it looks. The same gloves can be cleaned several times, especially light ones. Be careful and use the oil in a cool place, as it is very explosive.—7. Dissolve 3 oz. of soap by heat in 2 oz. of water, and when nearly cold add 2 oz. of eau de Javelle, and 1 dr. of water of ammonia; form a paste, which is to be rubbed over the glove with flannel till sufficiently clean.

GLOVES, Wash Leather, To Clean.—1. Wash them in warm water and soap until the dirt is removed; then pull them out into their proper shape, or stretch them on wooden hands; do not wring them, but place them one on the other and press the water out; mix a little pipe clay, or pipe clay and yellow ochre, according to

the color required, with vinegar or beer; rub this over the outside of the gloves, and let them dry gradually in the shade or by the fire, but at some distance from it; when about half dry, rub them well and stretch them on the hand or wooden mold; after they are rubbed and dried brush them with a soft brush, to extract the dust; finally, iron the gloves with a smoothing iron moderately heated, taking the precaution to place a piece of cloth or paper over them.—2. Stretch them on a hand, or lay them flat on the table, and rub into them a mixture of finely powdered fuller's earth and alum; sweep this off with a brush, sprinkle them with a mixture of dry bran and whiting; lastly, dust them off well.

GREASE SPOTS, To Remove.—1. Cover the spots with French chalk, buckwheat, potter's clay or magnesia; over this place a piece of brown paper; set a moderately warm iron on this, and let it remain till it gets cold. Be careful not to have the iron so hot as to scorch or change the color of the cloth.—2. Gasoline or benzine is excellent for cleaning coat collars, etc. The stained portion should be laid between two sheets of blotting paper, and the upper sheet well soaked with benzine. In this way, if sufficient time be given, the whole of the fatty matter becomes dissolved and absorbed by the paper.—3. Turpentine, chloroform and ammonia in water are all good for removing grease spots.—4. Oil of turpentine and oil of lemons, equal parts; both of the ingredients should have been recently distilled or rectified.

GRENADINE, Black, To Renovate. — Take strong, cold coffee, strain it, and wring the grenadine out of it quite tight, after which shake out and fold up; then iron it with a moderately hot iron over a piece of any old black material.

HATS, To Clean.—After well brushing the hat, get about 1 wineglass of spirits of ammonia; put it in nearly 1 qt. of lukewarm water; well sponge the hat the way of the nap; then hang it up, and, when nearly dry, get a hot iron and cover it with a piece of cloth and iron the hat all over. Great care should be taken that the iron is not too hot, or it will burn the cloth.

HATS, To Stiffen.—For a stiffening, dissolve borax 10 parts, carbonate of potash 3 parts, in hot water; then add shellac 50 parts; boil until all is dissolved; apply with a sponge or a brush, or by immersing the hat when it is cold, and dip at once in very dilute sulphuric or acetic acid to neutralize the alkali and fix the shellac.

LACE, Black, To Clean.—1. Wipe off the dust carefully with a cambric handkerchief; then pin it out upon a bed, inserting a pin in each projecting point of the lace; sponge it all over with table beer, and do not remove the pins till it is perfectly dry. It will look quite fresh and new.—2. Throw into alcohol; churn up and down till it foams. If very dirty, use the second dose of alcohol, squeeze out, pull out the edges, lay between brown paper and leave under a heavy weight.—3. Green tea will revive rusty black lace, and render it as good as new.—4. Pass through a warm liquor of ox gall and water; after which rinse in cold water; then finish as follows: Take a small piece of glue, about the size of a bean; pour boiling water upon it, which will dissolve it, and when dissolved, pass the lace through it; then clap it between your hands and frame it or pin it out, taking care to keep the edge straight and even.—5. Silk lace may be cleansed by washing and rinsing it in benzine. When clean, hang it in the open air until all odor has left it; press between folds of white paper.

LACE, Gold and Silver, To Clean.—1. Reduce to fine crumbs the interior of a 2 lb. stale loaf, and mix with them ¼ lb. of powder blue; sprinkle some of this mixture plentifully on the lace, afterwards rubbing it on with a piece of flannel; after brushing off the crumbs, rub the lace with a piece of crimson velvet.—2. Lay the lace smooth on a woolen carpet or piece of woolen cloth, and brush it free from dust; then take burnt alum; powder it fine, and afterwards sift it through a lawn sieve; rub it over the lace with a fine brush and it will restore its brightness, if it be not too much worn on the threads.—3. Sew the lace in a clean linen cloth; boil it in 1 qt. of soft water and ½ lb. of soap, and wash in cold water. If tarnished, apply a little warm spirits of wine to the tarnished spots.

NAP, To Raise.—Clean the article well; soak it in cold water for ½ hour; put it on a board, and rub the threadbare parts with a half worn hatter's card filled with flocks, or with a teazle or a prickly thistle until a nap is raised; then lay the nap the right way with a hatter's brush and hang up to dry.

NITRATE OF SILVER, or NITRIC ACID, Stains, To Remove.—Apply iodine, and afterwards rub briskly with strong water of ammonia.—2. Apply dilute solutions of permanganate of potassa and hydrochloric acid, followed by washing with hyposulphite of soda solution, and rinsing in plenty of fresh water.

PAINT, To Remove.—When fresh, make repeated applications of spirits of turpentine or spirits of wine, rubbed on with a soft rag or flannel. Ether also will answer, if applied immediately. When neither turpentine nor benzine will remove paint spots from garments, try chloroform; it will remove paint which has been on for six months.

RAIN SPOTS, To Remove.—Carefully sponge the articles all over with cold water, and hang to dry in a cool place.

RIBBONS, To Renew.—1. Wash in cool suds made of fine soap, and iron when damp; cover the ribbon with a clean cloth, and pass the iron over that; if you wish to stiffen the ribbon, dip it, while drying, into gum Arabic water.—2. Rub magnesia or French chalk on greasy silk ribbon; hold near fire, and brush off grease.—3. Lay the soiled ribbon or piece of silk in a plate, and cover it with camphene; then lay it, after rubbing it a little with a piece of flannel, in a clean cloth to dry it somewhat, and iron it on the wrong side; then put the ribbon outside in the air.

SCOURING BALLS.—1. Dry fuller's earth, moistened with the juice of lemons; add a small quantity of pearlash, and a little soft soap; knead the whole well together into a thick elastic paste; form it into small balls and dry them

in the sun; when used, moisten the spot on the clothes with water; then rub it with the ball, and let the spot dry in the sun; when washed with pure water the spot will disappear.—2. Whiting and pipe clay, equal parts; water, q. s. Used for soldiers' belts, trousers, etc.—3. Pipe clay, 2 lbs.; fuller's earth, 1 lb.; whiting, ½ lb.; water, q. s.—4. Bath brick, 1 lb.; pipe clay, 2 lbs.; soft soap, ½ lb.; ox gall, ½ pt.

SEALING WAX, To Remove.—Dissolve the spots with spirits of wine or naptha. Apply the spirit with a camel's hair pencil.

SHAWLS, White Merino, To Wash.—Wash the shawl in fair suds made beforehand; rub no soap on the shawl; rinse in clear warm water with two changes; then take a solution of gum Arabic, and add to it warm water till you think it will produce a little stiffness like starch when dry; press with a moderately hot iron before quite dry, laying a clean cotton or linen cloth between the iron and the shawl. Wash knitted shawls in the same way, but do not iron.

SHOES. White Satin, To Clean.—Put in the shoe something which will fill it out; then rub the shoe gently with a piece of muslin dipped in spirits of wine; do this several times; then wipe the shoe carefully with a piece of dry muslin.

SILK, Black, To Clean.—1. To bullock's gall add boiling water sufficient to make it warm, and with a clean sponge rub the silk well on both sides; squeeze it well out, and proceed in like manner; rinse it in spring water, and change the water until perfectly clean; dry it in the air and pin it out on a table; but first dip the sponge in glue water and rub it on the wrong side; then dry before a fire. — 2. Brush and wipe the silk thoroughly; lay it on a flat table with the side up which is intended to show, and sponge with hot coffee strained through muslin; allow it to become partially dry, then iron. — 3. Take a piece of carbonate of ammonia the size of a walnut; add 1 gill of alcohol and ½ as much water; sponge and press while damp. — 4. Sponge the silk with beer.— 5. Sponge with a decoction of common black tea; then iron with a moderately hot iron on the wrong side.

SILK, Colored, To Clean.— Salts of ammonia with lime, will take out the stains of wine from silk. Spirits of turpentine, alcohol, and clear ammonia, are all good to remove stains on colored silks. Spots of ink can be removed by saturating them with lemon juice, and rubbing on salt, then putting them where the sun will shine on them hot, for several hours. As fast as it dries, put on more lemon juice and salt. Iron mold may be removed in the same way. Mildew and most other stains can be removed by rubbing on soft soap and salt, and placing it where the sun will shine on it hot. Where soap and salt will not remove stains lemon juice and salt will generally answer. The above things will only remove stains in warm, clear weather, when the sun is hot. Sulphuric acid, diluted with water, is very effectual in removing fruit stains. Care should be taken not to have it so strong as to eat a hole in the garment, and as soon as the stain is out, it should be rinsed in pearlash water, and then in fair water. The following mixtures are also useful for cleaning silk: 1. Grate potatoes into cold spring water, say a large potato to every qt. of water, of which 5 or 6 will do for a couple of dresses. If for very light silk, pare the potatoes; if for dark, merely wash them clean. The pan of water must not be stirred in the least for 48 hours; then, very slowly and steadily pour off the clear liquor, but not a particle of the sediment, into a large open vessel, dip the pieces of silk into this liquid up and down a few times, without creasing them; then wipe them on a flat table with a clean towel, first one side then the other; hang each one as dipped upon a line to allow the drops to drain off a little before wiping. Have a damp cloth to cover them in till all is done; then iron one way, on the soiled side.—2. For colored silks, mix ½ pt. of pure Holland gin, 4 oz. of grated white soap, and 2 oz. honey; shake until thoroughly mixed in a bottle; spread the silk smoothly over a board covered with linen and sponge with this mixture till all spots are out.—3. Put a wineglassful of ox gall in 2 gal. of water, and rinse the silk, first in clear water, then in the gall and water; never wring silk, but shake out the water and hang to dry; iron on the wrong side.

SILK, White, To Clean.—1. Grate ½ lb. of curd soap in 1 gal. lukewarm water; set it on the fire in an earthen vessel set in a tin or iron one filled with water; stir until all the soap is perfectly dissolved; place the silk in a deep white china dish or bowl, and pour the hot suds over it; let it stand 10 minutes; then squeeze without rubbing, until clean; if very dirty, repeat the process; rinse in lukewarm water, clear, and hang smoothly over a line to dry; while still damp smooth the silk over long pieces of damp linen, and roll both together tightly for 1 hour; then iron on the wrong side, with the linen between the silk and the iron. The iron must not be very hot or it will yellow the silk.—2. White or light silk may be cleaned by rubbing it on both sides with corn meal, and carefully dusting it with a bit of silk or fine handkerchief.

STRAW HATS, Black, To Renew. — 1. Old black straw hats that look rusty and dirty may be made to look almost as nice as new, providing they are not battered up so as to be out of shape, by blacking them with ladies' shoe polish. — 2. Best alcohol, 4 oz.; pulverized black sealing wax, 1 oz.; put them into a vial, and put the vial into a warm place, stirring or shaking occasionally until the wax is dissolved; apply it when warm before the fire or in the sun.

STRAW, To Bleach.—1. Expose to the fumes of burning sulphur in a close chest or box. — 2. Immerse in a weak solution of chloride of lime, and afterwards well wash in water. — 3. Dip the straw in a solution of oxygenated muriatic acid, saturated with potash. The straw is thus rendered very white, and its flexibility is increased. — 4. Mix powdered sulphur to a mush with water; plaster it thickly over the straw, and place in hot water several hours; brush off when dry.—5. Rub the soiled straw with a cut lemon, and wash off the juice with water; stiffen with gum water.

TAR, To Remove.—Scrape off as much as you can; then wet the place thoroughly with good salad oil or melted lard and let it remain for 24

hours; if linen or cotton, wash it out in strong, warm soapsuds; if woolen or silk, take out the oil with ether or spirits of wine.

VELVETEENS, To Clean.—To wash velveteen use cold water, and do not wring; but shake thoroughly; spread on the line as much as possible; when partially dry take down and shake again.

VELVETS, To Restore.—1. The best mode of cleaning any kind of velvet is to sponge it with benzoline, and apply a weak solution of gum Arabic to the back; then sew it in a frame (an embroidery frame will do), and iron it on the wrong side with a damp rag placed between; if the nap requires raising, hold it with the wrong side downward over a basin of hot water; if there are any grease spots, pour turpentine on the place, and rub it till dry with a flannel.—2. Strain it tightly over a board, and sponge with pure Holland gin, the sponge being squeezed out very hard, that it may be damp, not wet; then hold near a fire, the wrong side to the heat, until the pile begins to rise; iron by passing the wrong side over the edge of a warm flat iron, as no pressure must come upon the right side.

House Furnishing.

REMARKS. — There is nothing more changeable or delusive than that ineffable something called "Style"—that which nearly every woman, and some men, worship even more than "Fashion." Yet it is higher and better than the latter, especially when dominated by "Good Sense" and "Taste." We will not attempt to describe styles, then, which are so fleeting, but will refer only to the apparent tendency of modern house furnishing, finishings, and decoration. First, let us note the partial return to imitations of antique art. This has been carried to the extreme of the bizarre, as also the importation and copies of relics of Japanese or Chinese barbaric ages. A revulsion from these has followed, so that a chair from the Middle Ages, or a vase from Japan, must now be comfortable or pleasing, and not racking to the frame or hideous to the eye, to open the purses of connoisseurs. Therefore, with discrimination and taste, duly exercised, innumerable are the remaining examples and opportunities of reproducing simple, yet unique and elegant, ancient forms, each piece a study of itself. The beauty of simplicity thus becomes a revelation, exposing the ugliness of much modern machine-made, veneered and badly shaped furniture. Another pronounced and almost wholly pleasing change has been to simple, square forms, in place of the long ruling bulbous shapes, devoid of any true art or purpose in design. This revolt has been so pronounced that the second-hand furniture shops are full of the old shapes, and the square forms prevail in everything, manufacturers not attempting to vary them much yet, except by decoration. The truth of this change will be seen on a visit to any well equipped furniture store, or even by reference to most of the engravings of modern interiors which we give in this department. The art education of the country is progressing so fast during its peace and prosperity, that the taste of its people is being elevated in all that pertains to the decoration and comfort of its homes; and in a wise avoidance of extremes in too great collections of storks, sunflowers, or whatever may be "the rage" at any time, and an earnest seeking after the fit and beautiful, safety and gratification lie.

Settled in Life.

In furnishing a house a leading idea should control the management of each room; the different rooms contrasting, but the transition from one to another being rather a mild surprise to the senses than to the mind. All kinds of furniture are ever changing, the old returning and the modern disappearing, and such selections of styles should be made as will serve best to make the house home-like and comfortable, and at the same time give satisfaction to the eye of taste and contribute to the culture of the beautiful. Carpets being the most expensive articles, it is safest to buy them first, and then to let their color guide in the tone and style of the curtains, paper-hangings (unless the paper is already on the wall), chair covers, hearth rugs, and the various minor articles. The tints of the carpet, of the paper or paint of the walls, and of the window curtains, should be all in harmony or in pleasing contrast, in each room. No pat-

tern or total of ornament of a room can be considered perfect if any of the three primary colors is absent, either in its pure state or in combination. When colored figures are placed upon a ground in contrast, they should be bordered by a lighter tint of their own hue. Thus, a green leaf on a red surface should have an edging of lighter green; colored ornaments on a gold ground should have an edging of a darker color; and bordering lines of white, black or gold form proper edgings for colored figures placed upon grounds of another color. Gold ornaments, on whatever ground, should have a narrow black boundary line; golden or colored figures may be used upon black or white grounds without edging of any kind. Regular sets of furniture, all to match, are no longer the necessary style; instead, the upholsterer makes a sofa, one large arm chair, and a smaller chair *en suite*, and then varies the effect with fancy seats of all sorts; wicker chairs, ebonized or gilded and fitted with movable cushions; dainty rockers, Louis XV. chairs, Turkish ottomans (which are merely frames holding piles of soft cushions), tete-a-tete chairs, and so on in endless variety; blending colors and making contrasts as carefully as a florist makes up a bouquet. If double parlors are to be furnished, or a large parlor which calls for two sofas, the two may be different from each other and yet harmonize—carpets, curtains and seats all uniting to form one harmonious whole, in which, however, there is no suggestion of sameness. In draperies or hangings, which terms include curtains, portieres and lambrequins, the materials are too numerous to be catalogued. Turkoman stripes, rich shellas, giving the effect of rich plush, alike on both sides, are an economical purchase in spite of first cost, since, comparatively speaking, they last forever.

General Furnishing.

CARPETS. Paper.—The floor of a spare chamber, seldom used, may be covered with wall paper at little expense. Select a paper looking as much like a carpet as you can find; first paper the floor with brown paper or newspaper; put a good coat of paste on a section of the paper the length of the room; then lay down and smooth (see PAPER-HANGING); when the floor is all covered, size and varnish; only glue size and common dark varnish need be used, and the floor will look all the better for the darkening these will give it; when dry, put down a few rugs by the bed-side and before the toilet table. If not exposed to constant wear, or if occasionally revarnished, it will last for years.

CARPETS. Rag.—To make a nice rag carpet, you should have the pattern you wish it wove in your mind, to guide you in arranging the colors, and the number of balls you may want of each. Care should be taken in cutting and tearing the rags, so that they will be even-sized threads in the filling; for if the texture of the carpet is uneven it will wear out more easily. The more wool there is, both in warp and woof, the longer the carpet will retain a new, clean look.—1. A carpet may have a plain stripe of one color, either black, brown or gray, and the fancy stripe can have the other colors, such as red, blue, green or yellow, etc.; squares can be made in the fancy stripes, by cutting two colors equal lengths and sewing together alternately. A hit and miss stripe can be made by sewing all colors together. Two colors can be twisted together; for example, red and white, or blue and white, which has a very pretty effect. For 20 yds. of carpet it will take 30 lbs. of rags and 3 balls of yarn to make that number of yards 1½ yds. wide. —2. For 33 yards of carpet get 25 lbs. of brown chain and 15 of orange, and 9½ lbs. of white. A pretty stripe for the rags is: 4 threads of red, 3 of white on each side of the red, and 3 of black on each side of the white; then 4 threads of blue on each side of the black; put all the colors of rags between the stripes. The white cotton rags may be colored indigo blue according to the receipts in DYEING. The thinner the rags the prettier they will color. Dip the brown and orange in weak salt water before weaving, to set the colors. Those colors are most serviceable, as they do not fade nor show dirt as some others do.

CARPETS, Selection of.—A carpet should always be chosen as a background upon which the other articles of furniture are to be placed, and should be adapted to the room for which it is chosen. The surface of a carpet serving as a ground to support all objects, should be quiet and negative, without strong contrast of either form or color. The leading forms should be so composed as to distribute the pattern over the whole floor, not pronounced either in the direction of breadth or length. The decorative forms must be flat, without shadow or relief, whether derived from ornament or direct from flowers or foliage. In color, the general ground should be negative, low in tone, and inclining to the tertiary hues; the leading forms of the pattern being expressed by the darker secondaries; and the primary colors, or white, if used at all, should be only in small quantities, to enhance the tertiary hues and to express the geometrical bases that rule the distribution of the forms. The laws regulating the harmonies and contrasts of color should be attended to. Small rooms need no borders; wide borders suit large apartments. French moquette and body Brussels is the best carpets to wear. Aubusson, Axminster and Turkey are equally good, but their price is of course high. Tapestry Brussels is not as desirable, as when the gay figures wear off there is nothing left but hemp. On this account, an ingrain (two-ply) will often outwear a tapestry. The most durable carpets are closely woven and thick, soft and pliable. In body Brussels the colors can be distinguished on the wrong side.

Aubusson.—These carpets are of French make. This is not a pile or velvet carpet, but a kind of fabric very much like the ordinary reps used in upholstering furniture, but stouter. The patterns are said to be worked, in part, by the nee-

dle. Imitation Aubusson carpets and rugs are made.

Axminster.—The pile is very rich and soft. This carpet is made both in breadths and in whole pieces, and is high priced. The softness of these carpets is due to the same cause which principally gives that quality to Turkey and other eastern kinds, in distinction from Brussels and analogous varieties. The surfaces of all consist of woolen loops woven on a backing of hempen threads. In the eastern, Axminster, Moquette and Wilton (or velvet pile Brussels) the loops are cut through and sheared, making a very soft pile.

Body Brussels.—These carpets are very durable, and if of a good quality are handsome and expensive. The materials employed are linen and yarn; a number of wires are inserted between the linen and wool, which are withdrawn when the carpet is made; the loops thus formed are allowed to remain, and this gives the corded appearance to the surface. This may be termed the favorite durable carpet.

Ingrain, or Two-Ply.—Is made of 2 threads only, and the colors are reversed on the other side; in the best both threads are wool; in the cheaper kind the warp is of cotton. It is most frequently used in bedrooms. It is the favorite durable cheap carpet, as it is reversible in use.

Linoleum.—Is a peculiar preparation of linseed oil hardened or oxidised, mixed with ground cork, pressed on canvas by rollers, then painted and printed, and used for floor cloth. It is preferable to the ordinary oil cloth, because it is more elastic, not so cold, noiseless, and impervious to dampness. For rooms that are not much used the figured linoleum is pretty; but where there is much wear it is best to obtain the plain, and have a bright figured border, or the figures will wear off and the surface look shabby.

Matting.—It is not desirable to have carpets on the floors of sleeping rooms in summer, and matting may be substituted, which will give the rooms a cool and fresh appearance. Matting coarse and loosely woven is soon worn into holes, but if fine and closely woven is very durable. Cocoanut is thick, strong and useful. Indian is made in squares of red and white, and is not so pliable as cocoa.

Oil Cloth.—A strong, substantial covering for floors is known by this name. It is made by printing canvas or other strong fabrics, in various colors and designs. It is well adapted for covering the floors of halls, public rooms and places of business where much traffic is carried on. The poorer qualities are not nearly as good as linoleum, but the best qualities are claimed to be equally as good. Oil cloth may be made to last much longer by frequently varnishing.

Tapestry Brussels.—Tapestry carpet is similar in essentials to the Brussels, but in place of the material being all dyed in the wool, the pattern of the warp threads is printed. It is the cheapest elegant floor covering where much wear is not expected.

Three-Ply.—This is the same as ingrain, except that a third thread is added. It is the prettiest and heaviest of the cheaper all-wool carpets, but will not last much longer than ingrain, as one layer of thread is apt to wear off.

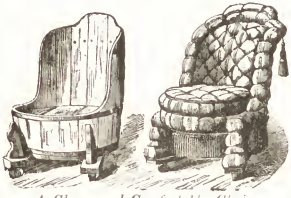
Turkey and Persian.—Persia and Asia Minor are the seats of the finest fabrics for tapestries and carpets, but India is not far behind these countries in the same art. The textile fabrics of these lands have been always held in the highest esteem. Their softness of texture gives an added charm of perfect fitness. The Turkey carpet is not adapted to the recesses and angles of rooms, but should occupy the centre of the floor, with a margin around it. This margin should be parqueted or stained, or may be covered with oil cloth or linoleum bearing geometrical patterns. When a Turkey or Persian carpet (or any modern imitation thereof) is procured of the full size of the room, it should be provided with a broad border. The use of good Turkey, Persian or Smyrna rugs upon parquet or stained floors has much to recommend it, both on the score of good taste and comfort. Turkey carpets proper are made from 6 ft. square upwards. They are produced by hand, every separate stitch being knotted and tied.

Velvet.—The weaving of velvet carpets is the same as with Brussels, only the loops are cut, thus giving it a high velvet pile. It wears better than tapestry, and has a rich and soft effect. The finest velvet carpet made is the Wilton.

CARPETS, Stair.—Body Brussels is the most economical for stairs. Tapestry looks well for a while, but soon grows shabby. Stair carpets should always have cotton pads under each step and over the edges. They can be made to last a long time by having a yard more than the length needed to cover the stairs, for then they can be changed so that the same place in the carpet will not come upon the edge of the stairs every time it is put down.

CHAIRS, To Upholster.—To upholster an old chair, measure the back of the chair for its width; divide the width needed into three equal parts; take a strip of flannel for each part, each strip being of a different color; dark blue, olive green, or garnet; or the two outside strips may be alike, the center one being the darkest color. These strips should be long enough to cover the back and seat, and hang down about 6 in. from the seat, and over the back. Finish the ends with fringe. The strips may be embroidered with rows of herringbone stitch in bright colored silk or wools, or with vines of autumn leaves; or the strips may be ornamented with inch wide strips of gay colors of any material put on in clusters across the strips, or lengthwise, the edges button-holed or feather-stitched down. Patchwork in bright colors of either woolen or silk goods make pretty stripes. After ornamenting the strips sew them together, press the seams flat, and cover the joint with a fancy stitch of some kind. If the woodwork of the chair is defaced, paint it black, with here and there a narrow ring of bright yellow, or better still of gilding. Make flat thin cushions for the back and seat, tacking them firmly on; then put on the covering, tacking it on with brass-headed nails to the top of the back, and both the front and back of the seat. Flag bottomed chairs can be made to look nicely by first taking a strip of

strong cloth as wide as the chair seat, and twice the length; pass it under the chair and sew it tightly together on the top; cut a pattern exactly fitting the chair, and cover with rep, cretonne or chintz. Finish with a border of the same about 3 in. wide. A good easy chair can be manufactured as follows: The chair consists merely of a barrel cut off above the second hoop so as to form a complete back with half arms at



A Cheap and Comfortable Chair.

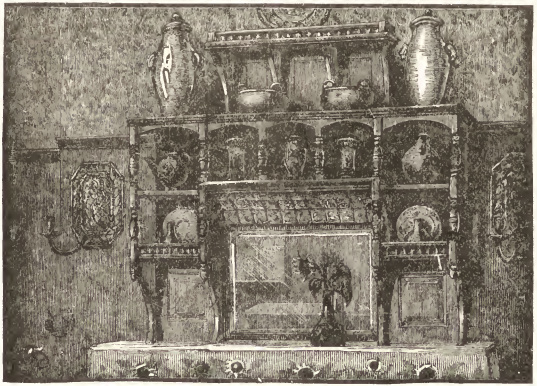
the side. The barrel thus cut is mounted on two strips of wood, having castors under their ends, and brackets above to form the legs and to add to the appearance of the chair. A head is fitted to the circular portion, and the whole is then neatly upholstered.

FIRE-PLACE.—Many of the modern stoves and their appurtenances of firedogs and fenders are great improvements on the fireplaces of even a score years back. The perforated brass Queen Anne fender, the brass or wrought iron fireguard and fire sets are artistically superior to any cast iron artificially bronzed article. The free employment of encaustic tiles and *plaques* around the grate and for the hearth brightens still more

Brass Fender.

the most cheerful place in the room. Best of all is the wrought iron grate itself, with antique firedogs of steel or brass. Many grates are too large and too open. Obtain from the nearest iron foundry or gas works a quantity of "clinkers," or save the residuum of your furnace; place these at the sides and back of the grate; a little wire may be used to hold them in position, if necessary; having thus reduced the dimensions of the grate, light the fire with wood and coals in the ordinary manner; in an hour or two the clinkers become red hot and throw outwards a great heat, although but a small supply of coals be required for the centre. The advantage of using clinkers instead of bricks or other material is that the fire is more sightly. Whether simply laid or lit the grate has the appearance of being filled with coals. It is easy to save a large per cent. of coal by this process. Small coal readily burns throughout fires so constructed, being held in the interstices of the clinkers.

Fire Set.



Mantel-Piece Decoration.

FLOORS.—To prepare floors for coloring or hard polish, proceed as follows: If the floor is already painted or spotted with paint, cover with caustic potash; leave this on till the paint is dissolved. It will take perhaps 36 hours if the paint is old and hard; then scour the floor, not letting the mixture deface the washboards. In case of wide cracks between the flooring, have them puttied, or the dust will gather in them, showing ugly stripes between the shining boards. If the planks are narrow and of equal width, color alternately oak and walnut, by first staining the entire floor oak and then the alternate stripes dark. It would be safe to dilute the mixture with an equal quantity of turpentine, as it is too thick when bought. In staining in stripes, lay a board on each side of the stripe to be stained and then draw the brush between. This guards the plank from a false stroke of the brush, and saves time. But if the dark staining should run over on the light plank, wipe it off with a bit of flannel dipped in turpentine before it dries. If the floor is to be all walnut, stain without a brush. Buy at a grocer's, for a medium sized room, a 1 lb. can of burnt umber, ground in oil; mix a sufficient amount of this with boiled linseed oil to color without perceptibly thickening the oil; by trying the mixture upon a bit of wood till the desired color is attained, the quantity may be easily determined. It should be a rich walnut brown. Rub this thoroughly into the wood with a woolen cloth, till the stain ceases to come off. Never use boiled oil on the floor. Like a varnish it attracts and holds the dust, which can only be removed by caustic potash, sand paper, or the plane. If the coloring matter is not dark enough when dry, rub on another coat. The floors may look dull, but in a few weeks, with proper care, will be satisfactory. When the staining is done prepare for the next day's waxing. Mix 1 gal. of turpentine with 1 lb. of beeswax, shaved thin. Soak the wax all night in the turpentine before using; rub it on with a woolen cloth. When the wood finally becomes well polished, the wax need only be applied once a week or fortnight. When the floor is polished, lay rugs on the floor. (See *Rugs*; and STAINING, in PAINTING AND PAPER-HANGING.) Floors are frequently made of oak, disposed in patterns, grooved and tongued together. The wood is usually 1 in. thick, and great care is taken in laying it, the wood being keyed at the back for farther security. Different colored woods are frequently employed with great effect small pieces being so disposed as to produce geometrical patterns. All angular figures can be used as bases for the patterns. Large rooms may be finished by a border of parquetry, and sometimes a large centre ornament is introduced. Floors of this kind are extremely durable, but necessarily expensive from the careful workmanship needed. A thin parquetry, something like stout veneer, is also used. This is affixed to the original flooring boards of the room by means of glue, or glued on a backing of cloth—then called "wood carpet."

FOOTSTOOLS AND OTTOMANS.—Footstools and ottomans may be manufactured out of boxes, or peck and half bushel measures. Nail old bagging looscly on the top, leaving one side open until you have filled it heaping with cotton, hay, moss or excelsior. Nail the canvas very tightly all around the sides and over the top, and cover with embroidery, or with material to match the furniture; cover the edges with gimp or fringe; nail a piece of oil cloth over the bot-

Footstool.

tom to make it slide easily over the carpet when moving it; the top may be fastened by a piece of strong leather or hinges to one side of the box and stuffed, covered and trimmed. Castors can be placed on the bottom to move it with less trouble. Legs can be made, and covered with plush or gilded.

HANGINGS.—There may be a rolling shade next to the window sash; then long curtains of lace; and inside of all heavy curtains of rich damask, satin or raw silk; in the summer these may be removed, and only the lace curtains and the shade be retained. At the top of the inner curtains is usually a lambrequin trimmed with fringe. When putting up curtains which are to be draped, in a low room, put the cornice, to which the curtains are to be fastened, close to the ceiling, even if the window is put in lower down, as it gives the effect of greater height to the room; the curtains meeting at the top will conceal the wall.

Chintz.—In using cretonne or chintz for curtains the right side should be in the room. It is customary to line such curtains with colored silesia, buff, blue or rose color, to match the ground of the chintz, and this makes a pretty show on the outside.

Dining Room. — Scarlet Holland shades trimmed across the ends with antique lace are pretty good and serviceable for a dining room, giving a soft and warm light to the room.

Hall Door.—Holland or oiled calico shades of red, trimmed across the bottom with antique lace, are pretty for hall doors. A very tasteful hall curtain is made of bobbinet, worked in some desired pattern with linen floss. The curtain may be fastened to the door either plain or fulled at the top and bottom. A lining of colored silesia should be added as a finish. The same effect may be obtained by using dotted Swiss instead of the bobbinet. Another pretty curtain is made of antique lace insertion and ribbon.

Lambrequins.—A pretty mantel can be made of pine wood painted black, the lambrequin fringe or drapery fastened to the edge with brass headed nails; make the drapery of any plain dark cloth; have it straight and not more than

5 in. deep; baste on one or more rows of velvet ribbon 1½ in. broad; cover this with a network of coarse sewing silk in long stitches, using bright colors; finish it with fringe; if you cannot

Mantel Lambrequins.

buy fringe make it; cut the material for your drapery deep enough for fringe and all, say 9 in.; with sharp scissors cut the lower edge into strips 4 in. deep, and ¼ in. wide; prepare two more strips 4 in. deep in the same way; have them of contrasting colors; for instance, if your drapery is garnet, have one of blue and one of yellow. Fasten these strips underneath the fringe on the drapery; take a bright colored coarse silk; tie these three fringes into little tassels, drawing the under colors forward to give a variegated appearance. Instead of the velvet bands, embroidery presents a pretty effect. Satin, painted or embroidered, is often used instead of cloth.

Madras.—A great point in favor of Madras curtains is, that while they are gaily colored, the figures and colors show on both sides, and are visible inside and outside the window alike by night and day. Among choice designs are detached floral figures on a light ground, floral stripes and a charming oriental effect in cross stripes of maroon and gold, picked out with pale blue. This last lights up beautifully the maroon, brightening into crimson and gold, flashing out in all its gleaming brilliancy whenever the gaslight falls upon it. A desirable style for back windows is a Madras curtain with dado and border of oriental design, the centre being in leaves on a dark background, the effect against the light giving the impression of the pattern suspended in air, or painted on the window, as the background disappears altogether as the light shines through.

Persian Tapestry.—Curtains are made of silk-faced tapestry or satine in solid color, with wide dado of Persian tapestry framed in plush with straight valance at the top to match the dado.

Portieres.—Portieres for a single door hang straight and smooth like a window shade, closing the door and forming a panel of tapestry framed in plush, to be swept aside with a touch of the hand. Windows and double doors and the entrance to alcoves call for more voluminous draperies, a full curtain on each side, and perhaps lambrequin above. Poles and rings are the usual idea in cornices, and a slight pull on a silken cord furls the drapery instantly, leaving door and window open, and closes it again as readily.

Silk Rag.—Collect every available scrap of new or old silk about the house. Any very high colored pieces may for a very small sum be dyed crimson or dark blue, which gives richness. Cut the silk into strips, from ½ to ⅔ in. wide; bias, straight, even or irregular may all be used if fastened together securely; roll the strips into balls, keeping each color to itself; 11 lbs. of silk will make 8 yds. of curtain 35 in. wide. The woof of linen thread is scarcely visible. The weaver usually folds the strips into narrow bands to suit himself.

Unbleached Muslin.— Pretty curtains can be made of unbleached cotton, trimmed with a stripe of cambric; choose a delicate and pretty vine harmonizing in color with the other appointments of the room. In place of a cornice, a box plaiting of the cambrics may be used for a heading. Curtains can also be made from the same material after some of the various patterns of lambrequins, folded over a short space at the top, and trimmed all around with red fringe, the fringe being made from red calico cut in slashes. Curtains made from chocse cloth and of two straight parts, looped back from the windows with autumn leaves and a wreath of autumn leaves across the top, can be made to look very pretty. The leaves, if sprinkled with rosin and ironed quickly with a hot flat-iron, will retain their original colors and beauty for years.

LIGHT.—For softness, purity and delicacy of effect the light of wax candles is unapproachable; and in the mansions of the rich, where expense is not regarded, it is the favorite esthetic light. Elegant sconces are made for holding the candles. Next to these, in point of taste and light, is an elegant lamp; for the light given by a lamp is much softer and steadier than gas light, which last injures delicate furnishings and vitiates and heats the air of rooms. In the arrangement of gas in the principal rooms, either of two plans may be followed—a central chandelier may be employed, or the light be distributed around the room by bracket burners; for the dining-room a chandelier of simple and tasteful form, with glass globes, may be used above the table; and a bracket over the sideboard lights the china and plate; the strides made in electric illumination will soon give us further choice of lights, and this agent will doubtless be found to have its advantages and disadvantages.

Sconce.

REFRIGERATOR. Cheap. To Make. — Secure two dry goods boxes, the more substantial the better, one of them to be 3 or 4 in. smaller than the other on all sides, and fix the tops to open on hinges of iron or stout leather; the larger the boxes, of course, the more convenience and comfort is afforded; place 1 or 2 in. of sawdust over the bottom of the larger box, and set the smaller one into it; bore a ¾ in. hole through both boxes at either end, near the top, and insert a roll of stiff pasteboard in each to act as ventilators; fill the space between the boxes with sawdust; put in shelves at either end, leaving space

in the center for the large deep pan or pail that is to hold the ice; there can also be two or three pegs, on which to hang pails of milk or fruit; a large tin pail, with a thin round board at the bottom to prevent it being bruised, would be the most convenient thing for holding the ice.

RUGS. — The main open space, on parquetry or stained and polished floors, should be covered by a large rug, made of American Smyrna, velvet or Brussels, edged with a border to match. 1. Very handsome rugs can be made of burlap canvas fastened to a stout frame of the desired size for the rug, and then narrow strips of red, green and gray flannel "drawn in" in any pattern desired; the border should be of solid color—gray is the prettiest, and is a neat finish; loops must be left on the surface and the whole carefully trimmed off when the pattern is complete. — 2. A good ornamental small rug can be made of Turkish toweling, decorated; pieces of cloth or velvet can be cut into leaves from cretonne and stitched on; it is not best to cut each leaf separately, for the effect is better if a large cluster is laid on, and veins made in the leaves of bright heavy silk. — 3. Take a coffee sack, and bind it with something dark; tack it to 4 laths; have a hook made of wood or iron, the same as a crochet-hook, only larger; tear the rags as for a carpet; place the end of a rag under canvas; put your hook through, and draw it up; then skip every other thread, and draw up in loops ½ in. long; care should be taken to draw each end of the rag to the top of the canvas; dark rags for border, and plain, such as copperas color, make a nice ground; then bright for flowers; old red flannel and green of any kind, make a very handsome border.—4. Take for the foundation ¾ yards of brown cambric, or scarlet flannel, or the best end of an old sheet; make buttons of any old, thick cloth, by cutting the largest one 2 in. across, round of course; the second size, 1½ in. across; the smallest, 1 in; have a great contrast in the color; sew them upon the foundation, one in the centre, six around it, twelve around that, then twenty-four, and so on; when the foundation is covered, line with old bed-ticking, if you have it, or old calico, or an old sheet; bind the edge and it is done; the buttons are made by sewing one upon the other, as in felling a seam, sewing the smallest one on the second size, and the second size on the largest; have all the buttons of one row alike.

STOVES. — The multitude of patterns, which have emanated alike from inventors and their critics, is so voluminous that it is impossible to attempt to give a list of the numberless stoves in use; of late years, gas stoves, both for heating and cooking purposes, have come largely into use; the simplest gas-stove is the best; they should not be surrounded by a non-conducting material, as that affords no advantage; the Bunsen burner should be employed, as the mixture of common air with the gas not only prevents the formation of soot, but also intensifies the heat; gasoline stoves are also largely used, and if great care is exercised to prevent conflagrations, are desirable; oil stoves are objectionable on account of their greasy nature, their odor, and the soot they are likely to make.

WARDROBES. — Cheap wooden wardrobes and other articles of furniture can be improved by painting them black and ornamenting the panels with flowers, rather longer than life; storks and bullrushes, sunflowers, lilies, large daises, and poppies all look well.

WINDOWS. Frosted.—Windows may be made only translucent by frosting or crystalizing as follows: Make a solution of glauber or Epsom salts in hot water and cover the glass with it, using a "dauber" made of a soft roll of muslin; the glass must first be freed from grease by washing with water and soda.

PARTICULAR APARTMENTS.

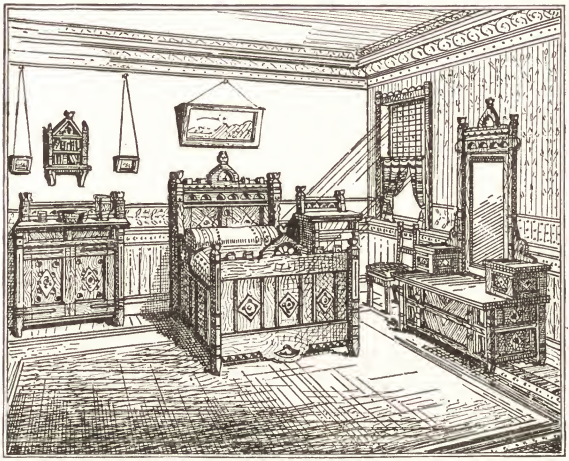
BATH-ROOM. — Encaustic tiles make an excellent wall covering, either over the whole surface or employed as a dado; if these are not employed, a plain paper well varnished, or matched pine boarding, also carefully coated with varnish, will answer; copper is the best material for the bath, and cast iron with porcelain enamelled interior the next best; the bath should, if possible, be placed in a recess; for the floor, linoleum or Indian matting is to be preferred, especially the former; a washstand, towel rail, one or two chairs of cane or other light material, a rug or two, a wire wall pocket to hold sponges and a blacking box and brushes complete the fittings.

BED-ROOM.—A bedroom should impress the observer with the idea of a dainty cleanliness reigning supreme in every part of it, while the prevalence of cool, soothing tones of color suggest repose and rest. The paint might be delicate chocolate, the walls soft pea green; no color equals green for giving rest to the eyes, and in its paler tints it offers a pleasant sense of coolness during the most sultry days of summer, while they are free from the suspicion of coldness seen in many of the gray shades commonly used; light colors make a room appear

Brass Bedstead.

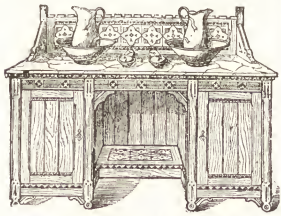
larger than the dark shades; woodwork painted chocolate, and cream walls look well with

the least possible amount of furniture; and whatever furniture there is should be as free as



Modern Bedroom.

bright-blue furniture coverings and curtains, or maroon paint and citrine wall with deep blue; a wall of a pale tone of blue and sage-green woodwork will harmonize with furniture cover-

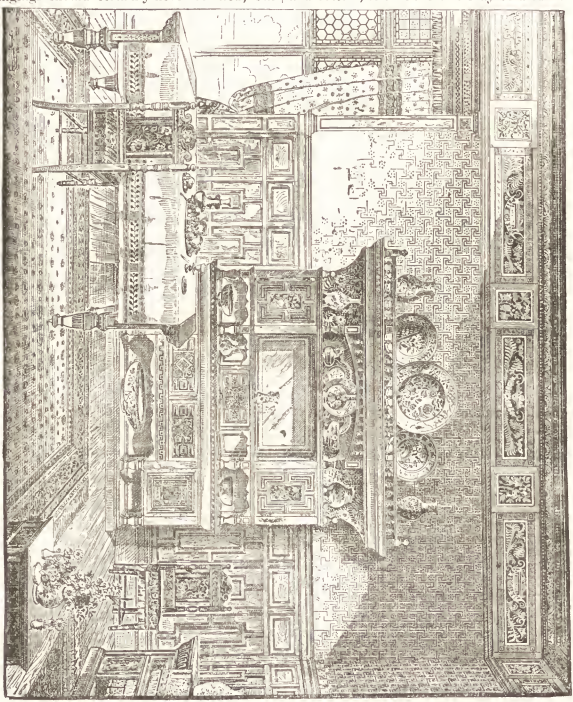


Gothic Double Washstand.

ings bearing a design of autumn-tinted leaves; stained boards are best for bedrooms; a square of carpet covers the center, leaving 3 feet all round the room; dust collects under furniture and chairs, dresses and draughts of air sweep it up into the corners; but the boards, being without covering, allow of its being easily taken up with a duster; the bedroom should have in it possible of all that can hold dust and fluff; in the bedroom the furniture selected should be simple; let the bedstead be plain, but yet not too plain; the brass bedstead recommends itself for elegance, simplicity, and as leaving no hiding places for bugs; let the dressing case be the object of attraction; the marble-top washstand and table are the most desirable articles of furniture; if the owner of the room makes it a business room also, instead of the table there should be an escritoire; this should be as ornamental as means will allow, and odd; the chairs should correspond with the main pieces of furniture, at least three in number; besides these, there should be an easy rocking chair, a low reclining chair and a settee; the rocking chair and settee are very pretty made of willow ware, decorated with ribbons; if these are used then there should be two easy chairs; make these of some pretty lively cover; in a gentleman's room a handy article is a blacking box; on the walls, have a few photographs, chromos, and two large companion pieces; in the corners of the room have little

Blacking Case.

fancy brackets and catchalls; let most of the decorations be of your own handy work; a towel-rack, the china set, the toilet set, and mantel ornaments must be selected with regard to adding to the appearance of the room; the absence or presence of hangings is a disputed point; very many people object to them on the score of injury to health; heavy, old-fashioned hangings should certainly never be used; but



A Modern Dining Room.

in a well ventilated apartment a canopy and head curtains can not be at all prejudicial to health if open to the air; and they can be made to contribute not a little to the picturesqueness of a modern bed-room; the material of hangings may be reps, chintz, dimity, or cretonne; a pretty toilet table for a lady is made as follows: Nail 4 pine boards together so as to form a box about the size of a small bureau; the sides are left open; let the back rise 4½ feet above where it joins the top board, sloping till at the top it is not more than a foot across; on this nail a half circle, projecting ½ foot in front; then cover the box with some delicate colored silesia or cambric; nail tight all round, except at the sides, where it should be fastened only on top, and left loose at the sides and bottom, so that the box may be used as a closet; cover the cambric with white dotted Swiss, with a broad hem at the bottom and two deep tucks above, both finished with narrow lace edging; at the top of the table nail a flounce of the same material; round the top nail a plaiting of narrow ribbon, with fine brass-headed nails; fasten long loops and ends of narrow ribbon in the centre of the top and festooned up at the end of the table; in the centre of the black

board, half way to the top, cut a piece out 1½ feet long and 1 foot wide; on this plait the narrow ribbon; in the opening place a fine mirror, fastened on the back with cleats; from the half circle at the top a long curtain of dotted Swiss muslin is nailed a little full, opening in the middle and fastened with a bow of blue ribbon, with a broad hem and tucks, edged with lace like the bottom part; this curtain falls apart from the mirror, leaving that and the table open, and reaches nearly to the floor, fastened at each corner of the table with bows. In regard to the mattress there is no better form than one made of moss or horsehair, both for children and adults. The pillows should also be made of the same material. In selecting covers for the bed the very best are those which give the maximum of heat with the minimum of weight; hence blankets are better than heavy wadded quilts, and a light down covering better than either; one of these thin coverlets takes the place of two or three blankets, and causes much less fatigue to the sleeper; white bed-spreads are the nicest outside coverings for a bed, but, to save labor, colored calico or chintz can be used; sheets should be from two and a half to three yards long and two breadths wide unless made of full breadth linen; linen sheets last longer than cotton ones, and in hot weather are most comfortable, but in a variable climate cotton sheets are much preferable. Every bed-room, even those of the boys, should be provided with a clock; always the plainest procurable; one striking the hours with a soft tone, but without any useless apparatus for indicating the quarters; besides the large mirror of the dressing case, a hand mirror is very desirable.

BILLIARD ROOM.—The wall decoration of this room should be of tolerably light character, but not too delicate, as the apartment is generally a smoking-room also, and the fumes are apt to cause discoloration; either Brussels carpet or linoleum is the best floor covering, with a set of billiard mats of kamptulicon or corticine around the base of the table; a settee or two and a few chairs will be sufficient furniture, and if the billiard table is of modern Gothic design these should match; on the walls should be a marking board and cue-stand; or a circular revolving cue-stand may be preferred; over the table a four or six-light chandelier; if any pictures be desired, sporting scenes are most suitable.

DINING ROOM.—The chief articles of furniture in this room are the sideboard, a good substantial table and the chairs; the chairs should be cushioned, if possible; the table should be selected in regard to size of the room; cover the sideboard with plate or bright china, white and colored glass, Japanese lacquer-work and flowers; one complete tea-set, one dinner set, 2 dozen napkins and six tablecloths are necessary in this room; a side-table is a great addition to hold the silver water pitcher and goblets. For the floor, nothing is superior to good parquetry or linoleum, and a carpet of such dimensions as to leave some vacant floor space around it. The curtains may either contrast or harmonize with the wall decorations. Deep rich colors are best, and the material may be reps, damask, tapestry, pekinade, or cretonne. Tuileries or other lace is best for summer. The fireplace should be of good dimensions. Bronzes and statuettes are the best adornment for the walls on brackets, and bronze, marble or oak for the clock-case. In purchasing china, glass and earthenware, care should be taken to select those sets that, in case of breakage, can be readily matched; peculiar or rare patterns should be avoided, unless oddity is aimed at; in that case the broken piece can be replaced by an odd one.

The Old is the Best.

DRAWING ROOM.—Light, brightly decorated walls are here a desideratum, with tones of delicate color on the ceiling. If the floor is parqueted or stained, the patterns and colors should partake of the prevailing delicacy which ought to characterize this room. With parquet floors, rugs are preferred scattered about, to even a large central carpet. Where the floor is ordinary wood, the space outside the carpet, or in recesses, bays, etc., can be filled in with plain felt carpet of crimson, sage green, or other self-colors, or Indian matting, or floorcloth printed in tile patterns. Failing these expedients, stain may be applied. The patterns both on the walls and carpet should not be bold, but small and graduated. Hearth-rugs should partake of the character of the carpet. Sometimes rugs of sheepskin or Angora are dispersed about. For the window curtains see *Hangings*. Stained or painted glass of a light character may be used in part of the windows. The chandeliers should be of plain, effective design, or painted. If the furniture is of the Queen Anne style, wall sconces, plated or brass, are well suited. The necessary articles in this room are chairs of every style and color, tete-a-tetes, at least 1 table, ottomans, 1 or

2 sofas, and 1 piano. The stove, if of antique design, can be set in encaustic tiles, or with large side-painted *plaques* in the jambs; fenders and fire-irons lighter and more elegant than those of the dining-room. For Queen Anne style, the old-fashioned fender of perforated brass has been re-introduced. Mantelpieces are furnished with stages of shelves forming an *etagere* for the display of *bric-a-brac*, especially porcelain. The furniture should be light and elegant in character, ebonized wood, with incised gold linings and ornaments, seems well suited for the drawing room, as are pieces in which marqueterie or boule work enter. The upholstering of the couches, etc., should be light both as to fabric and hue. Mirrors are scattered all over the room. Cabinets and chiffoniers are very elaborate, and take a conspicuous place, being the receptacles in which the art treasures of the owners are displayed. Marble, inlaid wood, or ormolu clocks, and parian statuettes and bronzes form adjuncts for the mantleboards. A tasteful piano, screens, *jardinieres*, and portfolio rests, with a hundred nick-nacks, make up the *ensemble*. Anything which suggests pleasant ease and enjoyment finds its fitting place here. For pictures, water-color landscapes, choice engravings, and *photo-gravures* are suitable.

A Corner of the Drawing Room.

HALL. — It is not necessary to have a stereotyped hat and umbrella rack; have a Gothic hall table and seats; for an umbrella stand, get or decorate some neat, handsome tall jar; they can be had in every imaginable style; have a mirror, large or small, of some odd shape, framed in a durable way, with many pegs for the hats and coats; if the hall is dark have a

white cast or bust at the end; in a corner have an ornamental little cupboard, to hold brushes and other things needed on going out and coming in; make the hall look as large as possible; for floors, encaustic tiles or parquetry; if boarded, good linoleum or oil-cloth with rugs is the best covering; for lighting, plain pendants or brackets; a fireplace looks hospitable.

Gothic Hall Seat.

skewers; 1 basting ladle and slice; 1 toasting fork; 1 measuring pail, so graduated and marked that one can tell at a glance how many quarts of fruit or milk are in it; 1 rag-bag for odds and ends; 1 knife board, covered with thick buff-leather, on which is put the polish to be used.

KITCHEN TABLE AND SETTEE, Combined.—The illustration shows plainly how this is made. This table economizes space, affords a good seat, has a nice shelf on which to place the ironing cloths, etc., and when adjusted as a table is suitable for every purpose.

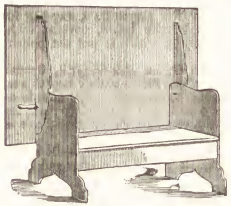
KITCHEN TABLE. To Make. — It should be 8 feet long, 2 feet 7 in. high, and should be

A Hospitable Hall.

KITCHEN.—The walls may be either covered wholly or partially with pine matched board, stained or painted; the floor uncarpeted with 2 or 3 undyed sheepskins thrown about; or it may be partially covered with linoleum or cocoa matting; plenty of shelf and closet room; chairs and tables of unpainted wood; a good range; a plate-rack, towel-horse, and round towel; no curtains at windows, as they catch dirt; some of the necessary utensils are: 1 iron pot; 1 fish kettle; 2 large iron saucepans, one with a steamer; 1 stew-pan; 2 small saucepans for vegetables; 2 butter saucepans; 1 small saucepan lined with china, for boiling milk; 1 gridiron; 1 frying-pan; 1 baking pan; 2 bread pans; 1 bunch of

2 feet 3 in. wide on top; below, it is enclosed at the back and ends and has doors in front; it has no floor, but stands directly on the floor of the room and is movable; the enclosed space below is divided into 3 compartments; the right hand closet contains the flour barrel; a door coming down to the floor opens to admit it and closes tightly again until the next barrel is needed; inside there is a space to hang baking pans by their rings on the partitions; over the flour barrel there is a lid that is raised whenever the flour is to be taken out; the sieve and scoop remain in the barrel; the lid is a part of the surface of the table and opens over the whole width of the flour compartment; above the door of the mid-

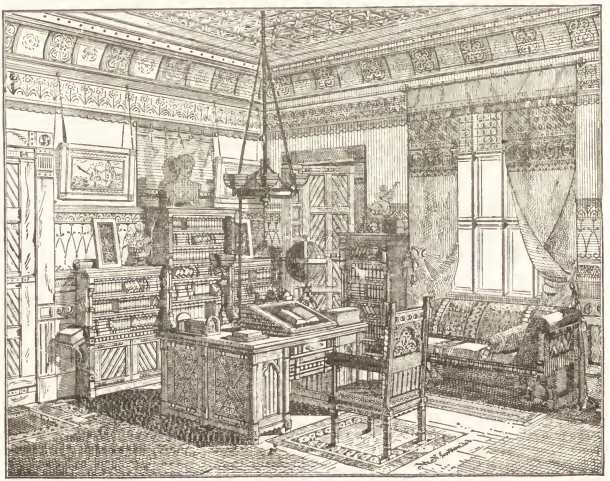
dle closet there is a drawer without back or sides,



Combined Table and Settee.

which is the bread-board; when drawn out and turned round, the front becomes a back, and is very useful in preventing the scattering of flour in rolling pastry; when returned to its place the roller can remain upon the board; below this drawer is a closet with door, and a shelf large enough for a pan of milk, or bowls and pudding dishes; below the shelf is space for a bucket of sugar, a jar of lard or cream, and a molasses jug; the left-hand closet has at top a drawer divided into two compartments, one for eggs, the other for spices, yeast powders, nutmeg grater, and cake cutter; a shelf below holds boxes of saleratus, a bag of salt, boxes of rice or tapioca, jug of syrup, jars of preserves, while in use, or is an excellent place to keep pies; the table, including its surface, being about 1½ in. higher than a flour barrel, a short woman cannot mold bread or roll pastry easily without something to stand on; a narrow piece of board about two feet wide, with two pieces of board nailed across its under side, is one of the best; there should be a narrow strip of wood nailed upon the back of the surface of the table, and one across, between the principal part of the table and the flour division, to keep water from flowing over the back or into the division containing flour, when washing the table after cooking.

LIBRARY.—The wall decoration here is a secondary matter, as the principal space is supposed to be filled by the book cases; it is a common error to decorate too darkly; the tints should be tolerably light, although grave in tone; for the carpet and curtains a tolerably bright crimson or some soft green may be selected; oak is the best material both for the book cases, chairs and writing tables, and some form of Gothic the best style; bronzes and statuettes are suitable ornaments to this room; in the centre should be a large table or desk with small drawers, to hold papers, pencils, ink, pens, pamphlets and newspapers. All the chairs should be selected in regard to comfort; leather covered chairs, brightened up with bright tidies, are the best. The fireplace should be a

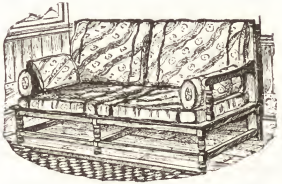


The Library.

large, open one; small book-stands may be

Use and Beauty.

handy to the large chairs; an argand burner or student's lamp should be on the table; in this room also the secretary can find a corner; place a plaster bust or urn at the top of each book case.



Sofa with Changeable Cushions.

SMOKING ROOM.—This is generally combined with the billiard room, but, if possible, should be separated; it should be a little snuggery, cheerfully but not too delicately decorated; walls and upholstering in shades of olive, sage green, or peacock-blue; or, if a warmer style is preferred, an oak dado round the room, a frieze paper with some lively pattern above, and a deep crimson paper for filling in between; striped Oriental, damask, or rep curtains, the stripes running horizontally; parquet border to floor, and Oriental or Smyrna rugs about easy chairs, upholstered in morocco, roan, or reps; tile-lined fireplace. If any pictures they should be glazed, and the frames not heavily gilded; a couple of neat cuspidores are necessary adjuncts; also 1 or 2 little tables to hold the paraphernalia of a smoker.

ORNAMENTS.

ACORNS, Fancy Articles of.—Picture frames, brackets, boxes, and baskets of all shapes and sizes for the reception of flowers and ferns, may be made with acorns. The foundation is made of cardboard or wood, according to the strength necessary for the style of article. When the framework is completed the ornamentation is begun. Fir-cones are very generally used with acorns; the frame is covered with cones, which

Fancy Basket and Bracket.

are sewed or stuck on with liquid glue, after which the acorn cups or the full acorns are put on. Some design should be made and followed out in the placing of the acorns. Arrange the acorns on a table, and when the pattern is formed leave it undisturbed, while other acorns are taken and fixed according to the copy. Full designs look most effective—that is to say, those which require the acorns to be clustered and grouped together. When the work is complete, varnish the whole.

ALABASTER, Imitation of.—Common plaster of Paris figures may be made to look like alabaster by dipping them into a strong solution of alum water.

ALUM BASKETS.—A very pretty basket can be made to look as if composed of crystals, as follows: Obtain a very small wire basket; wind lamp cotton round every part; fill it with clinkers from a stove; suspend this in a solution of alum mixed in the proportion of 1 lb. to 1 qt. of water, in which it has boiled until dissolved; do not let the basket touch the sides of the pan, or become exposed to the air; let it remain in the solution 24 hours; when taken out carefully suspend it in the shade until perfectly dry. Different hues may be given to the crystals by adding powdered turmeric to the hot solution to obtain a yellow; litmus for a red; logwood for purple; common writing ink for black. For a blue tint use sulphate of copper instead of alum. Very beautiful variegated crystals are obtain-

able by taking ½ oz. each of the sulphate of iron, zinc, magnesia, alum, soda and potash; dissolve these separately, and afterwards pour them together; now let them rest, and when the water has evaporated and the crystals are dry they are of many colors.

AUTUMN LEAVES.—1. Gather the leaves from the trees before frosts, getting all the shades and tints possible, singly and in sprays suitable for pressing, and at once placed between the leaves, not too near together, of books or newspapers, and several pounds weight laid upon them; keep while pressing in a cool place, and as often as every other day change into new books; this is important, because the paper absorbs the dampness from the leaves. They should be kept in press between two and three weeks. They are then ready for a coating of oil or varnish. A mixture of 3 oz. of spirits of turpentine, 2 oz. of boiled linseed oil, and ½ oz. of white varnish is preferable to either alone; get a perfectly smooth board, large enough to lay a spray upon, with no reaching of the leaves beyond the outer edges; take a piece of soft cloth to apply the dressing; after the application the leaves must be laid carefully on boards or papers, not overlapping each other, until dry, and then disposed of as taste suggests, avoiding as much as possible a stiff, unnatural arrangement; the stem can be broken off and a fine wire attached in its place, which makes them a little more yielding to handle.—2. Spread the fresh leaves and press them in a suitable dish, with alternate layers of fine sand, which is thoroughly dry and quite warm; when the sand has cooled they may be removed, smoothed under a hot iron, dipped for a moment in clear French spirit varnish, and allowed to dry in the air. By many, melted white wax or paraffin is preferred to the varnish. These latter must not be too hot.

BACHELOR'S COMPANION.—Make a pasteboard box 5 in. long, 2 in. wide, 1¾ in. deep; cover and line, and bind each of the four sides of the box separately, afterward overcasting them together; make a cover in the same way; the bottom needs no kid piece, but should be neatly covered on both sides with the same material as the lining; fasten in one end a small cushion for pins; partition off an inch at the other end for buttons, and you will still have room for thread and tape; a little strap on the inside of the cover will hold a paper of needles, or make a tiny needle-book of two leaves of woolen goods, of a color to correspond with lining, and fasten it on to the cover; put an elastic loop in the lid, and a button on the box to keep it closely shut; on one side of the box put a strap to hold scissors.

BOUQUET, Dried.—The background make of fern, and to every leaf or cluster of leaves add a small sprig of fern, the whole interspersed with light, feathery grasses, which can be gathered in the fields or woods at any time during the fall; tie tightly, to prevent becoming disarranged when removed from the vases to be cleansed, which can be done by blowing the breath on them; they should never be shaken.

BOUQUET, To Arrange.—The main feature in arranging cut flowers is to show each flower separately and not a quantity crowded together, forming a mass of petals, but that each flower may be seen reposing quietly among the green, giving to each bloom an individual character. A few colors in a bouquet have a much prettier effect than a mixture of many colors.

BOUQUET, To Keep Fresh.—1. When you receive a bouquet, sprinkle it lightly with fresh water; put it into a vessel containing some soapsuds; this will nutrify the roots, and keep the flowers bright as new; take the bouquet out of the suds every morning, and lay it sideways into clean water; keep it there a minute or two; then take it out, and sprinkle the flowers lightly by the hand with water; replace in the soapsuds, and it will bloom as fresh as when first gathered. The soapsuds need changing every 3 or 4 days.—2. Cut ½ in. from the end of the stem in the morning; put the freshly trimmed end instantly into quite boiling water; the petals become smooth and resume their beauty in a few minutes. Colored flowers, carnations, azaleas, roses and geraniums, may be treated in this way. White flowers turn yellow.—3. If the bouquet during the heat of the day is wrapped in paper which has been soaked in water, and then put in a box, in the evening they will be fresh and pretty, and can be placed in water, but they should be replaced in the wet paper for the night. In this way they will keep fresh several days.

BOUQUET, To Preserve.—1. Immerse them in a solution of gum Arabic and water two or three times, waiting a sufficient time between each immersion to allow the gum to dry. The whole surface must be completely covered; for if the air only gets entrance at a pinhole the labor will be all lost.—2. Provide a vessel with a movable cover; fit to the top a piece of fine metallic gauze; replace the cover; pass through a sieve into an iron pot, sand sufficient to fill this vessel, and heat it with ½ per cent. of stearin, carefully stirring; place the flowers on the gauze; remove the bottom of the vessel; pour in the sand and stearin, so as to cover and envelope them; place on the top of an oven for 48 hours; remove the cover, invert the vessel and the sand runs away through the gauze, leaving the flowers dried in their natural position.

Bracket.

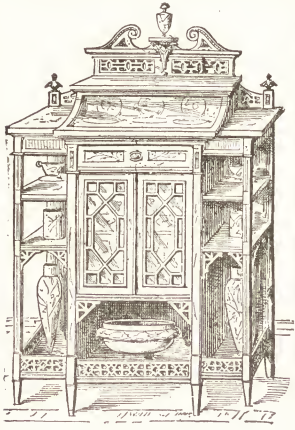
BRACKETS.—A useful and ornamental bracket can be made as follows: Make the rough bracket, any design desired, of wood; then on this nail pieces of bark or rustic branches, prepared for the purpose, covering it completely. More elaborate brackets are made with a background of glass, thus adding much to the beauty of the articles.

CABINETS.—These are of all sizes, from the tiny corner cupboard, which holds at the most two or three treasured pieces of china, to the large Queen Anne cabinets. Cheap ones can be manufactured at home. A pretty

shell cabinet is made as follows: Make a frame 20 in. long at top and 15 in. at bottom; the sides 3½ in. in width or smaller, to suit one's convenience; place the shelves in on the slant, the upper edge being higher by ¼ in. than the lower; select the shells; arrange them on each shelf, putting the handsomest ones in the centre. Having decided where to place them, use putty to stick them on,

Rustic Bracket.

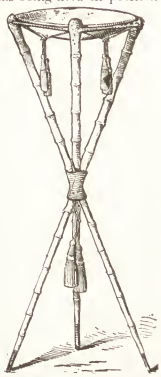
first heating and keeping it warm all the time. If it is too stiff, put in a very little boiled linseed oil. Glass doors should be fastened on. The



Parlor Cabinet.

shells present a pretty effect when the shelves are not used; they are arranged in the same way on the sides and back of the cabinet. If the shelves are used, either paint or cover with black velvet the back and sides of the cabinet. The outside is to be ornamented by wood carving or paint.

CARD RECEIVERS.—A pretty card receiver can be made with three bamboo canes or walking sticks, bound together at the middle to form a tripod, the three sticks being held in position by a strong cord wound vertically between the canes. The outer winding is of some kind of ornamental cord tied together and furnished with tassels. The cord which binds the canes together is wound so tightly as to spread the upper ends of the canes slightly beyond the final dimensions. The heads or upper ends of the canes are bored transversely, and are drawn together by a fancy cord, which is held tight by the spring of the canes. Other cords with tassels are hung loosely about the upper ends of the canes. An ornamental platter rests upon the cords, and forms a receptacle for cards.



Card Receiver.

The canes may be gilded with gold leaf with good effect, or a coating of gold paint may be applied. Small ones to set on the table can be made in any shape desired of cardboard, ornamented with pictures. The edges can be ornamented by pinking, and the different pieces joined together by bows of bright ribbon. If the different parts are made of bristol board, an ornamental design should be embroidered on each, the edges bound with ribbon, and the backs lined, before sewing them together. Cardboards covered with acorns are also pretty.

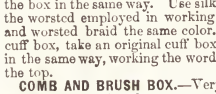
COLLAR BAG.— 3 balls tidy cotton, No. 6 or 8; 2½ oz. red zephyr; bone needle; 2 chain, Afghan stitch; widen at each side until you have 13 rows from the point and 25 stitches on needle; then narrow to a point, having 13 rows to form each point; make 4 of these pieces; work a figure or large initials in cross-stitch with zephyr; crochet a row of short red stitches around each piece; crochet them together with short white stitches on right side, beginning at point; scallop with red around top; wrap wire and fasten inside, to give it shape; a long cord from each point, caught at top with a short cord and 2 large tassels at bottom, finish this pretty article. Choose as large a figure for each piece as you can get on. Pretty ones are made of canvas worked and edges bound with braid.

COLLAR AND CUFF BOXES.—Make one of pasteboard, 6 in. across and 4½ high, with the cover on; cut a piece of perforated cardboard round just the size of the cover; work on it a bunch of roses, cherries, violets, pansies, or a simple pattern, or decorate it with embossed pictures, and glue it upon the cover; put a

strip of the same colored cardboard around the edge of the cover, and finish both edges with box-plaited worsted braid; take a strip of cardboard long enough to go around the box and lap enough to fasten, and wide enough to cover it when the cover is on; work the word *Collars* across the front and mucilage upon the box; finish with about 3 embossed pictures across the back and box-plaited braid around the bottom edge; put the cover on, and the box is done. If something more elaborate is desired, line the cover with very thin silk, puffed in, and sew into it a puff of cotton batting, scented with perfume powder; put the perfume between the silk lining and the cover; then line the box in the same way. Use silk the color of the worsted employed in working the outside, and worsted braid the same color. To make a cuff box, take an original cuff box and cover it in the same way, working the word *Cuffs* across the top.

Collar Box.

COMB AND BRUSH BOX.—Very pretty ones can be made of cigar boxes, or pasteboard ones of the length and width of brush and comb. Line the box inside and out with a pretty color in silk or woolen material; fasten the lid, and when covered fasten by overcast stitches to the lower part; cover all with a puffing of Swiss muslin, edged with lace or bright zephyr; the cover of the top of the lid fill with some material that will allow the pins to be stuck in easily; or the lid may be made so as to fit down on the box, in which case, the box must be covered tightly with the desired material. The sides and top of the lid only should be ornamented.



Cover to Comb and Brush Box.

COMFORT, For Baby. — Take two widths of cheese cloth the required length; on the upper side mark it off in diamonds 4 in. square; with worsted, say light blue, follow these marks in a long, loose chain stitch; stretch the under piece of cheesecloth on your frames and cover it thickly with the best cotton batting, from which all seeds and specks have been picked out; lay the top piece over this, and with your needle make little tufts of blue worsted at the intersection of each diamond; work these tufts through to the under side, which will hold it all firmly in place; fasten the edge with two rows of machine stitching, and if you like finish with little blue tassels about 2 or 3 in. apart.

CORK ORNAMENTS. — On account of the resemblance of cork to stone, very pretty ornaments can be made to represent architectural models or picturesque ruins. The model must be decided upon; then the cork cut into the shape of the stones to be represented; the cork may be used in its natural color or dyed black; when the blocks of cork are prepared they must be attached to the foundation; when the article is complete, varnish it lightly with shellac varnish. For illustration of a pretty window box made in this way (see *Plant-stands and Pots*, in WINDOW GARDENING).

COUNTERPANES. — 1. A handsome one is made of satin and lace; take a square of antique lace and line it with the desired shade of satin; around it sew an insertion of satin of the desired width; around this one of antique lace, and so on until it is of the desired size, lining each insertion of lace or not; finish with a deep edge of lace.—2. A pretty and attractive one is made of the odd bits of silks lying around; make squares of crinoline lined with calico of the desired size; on these baste the odd ends of silk regardless of color or shape, turning their edges in neatly; around the edge of each piece, work the feather-edge or herring-bone stitches; a flower or any design may be embroidered on the larger pieces of silk; when all the squares are done place them on a foundation lined with some desired material and join their edges by some fancy stitch.

CRAZY CUSHIONS. — These can be made in the same way as the counterpanes—of odds and ends of silk.

CRYSTALLIZED FLOWERS AND GRASSES. — Sink in a solution of alum, of 1 lb. to 1 gal. of water, after the solution has cooled; the colors will then be preserved in their original beauty, and the crystallized alum will hold faster than when from a hot solution; when you have a light covering of crystals that completely covers the articles, remove them carefully, and allow to drip for 12 hours.

DOYLEYS.—Take fine linen; fringe the edge and hem-stitch within, describing a central square; the corners of this hem-stitching do not intersect; the inside is divided into diamonds with brownish yellow silk in outline stitch, and inside of the diamonds are central rings with rays and four-leaved clovers also in outline stitch; other doyleys have bunches of cherries, flowers and conventional designs, but these are all done in brown tints, scarcely varied with other colors, and in the finest of silks; still others have Chinese and Japanese pottery designs, done in the lighter blues, reds and olive greens.

FEATHER FANS. — 1. Take card-board, the white breast feathers of the turkey, thick flower wire, glass and steel beads; the foundation of the fan is of two circles of cardboard measuring 3½ in. in diamcter, and covered with white glazed calico; the feathers must be washed in lukewarm soap and water, and dried, then sewed to the foundation; care being taken to choose the sizes, so as to preserve the shape of the fan; the feathers at the edges should measure 5½ in., so that the fan, when complete, is 9 in. in diameter; the handle is of strong wire, twisted over tightly with ribbon of two shades, finished with a button covered with silk, and ornamented with beads.—2. To make a peacock feather fan, cover a Japanese fan both sides with dark green silesia; sew on the small pea-fowl feathers, commencing at the edge and working to the centre; sew them on thickly so that the silesia may not show; fasten a cluster in the middle to hide

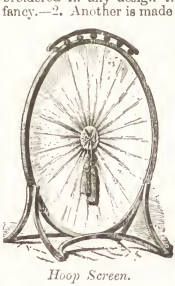
the last ones sewed in; cover the other side in the same way; but as it is difficult to cover both sides without the stitches showing after the feathers on one side, cut a piece of satin for the wrong side and cover the silesia, leaving one side dark green satin, the other peafowl feathers.

FERNS.—Ferns when placed in a room should always be in groups. To group them in masses above pictures, first fill all the space between the cords and for 2 in. outside with pins stuck in the wall, and placed about 3 in. apart; then, commencing at the top, by the nail, hang the ferns on the pins, building downward until the whole space is filled.

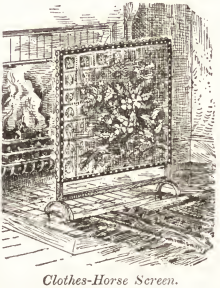
FIRE SCREENS.—1. The stand for a pretty embroidered fire screen has a base sawed out of a pine board covered with plush, and supported on four wooden balls forming the legs. The vertical standard of the screen is a broomstick covered with plush, and having a brass knob on the top to finish it, and a brass hook screwed in the side near the top to receive the cord which supports the horizontal bar. The latter is simply a wooden stair rod, which may be covered with plush or not as the taste of the maker may dictate.

Embroidered Fire Screen.

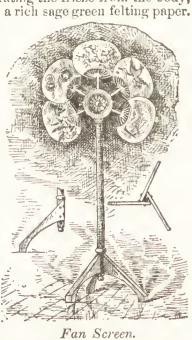
The screen itself is made of any pattern and embroidered in any design that the maker may fancy.—2. Another is made of boy's hoops, two of these forming the frame upon which the screen is stretched, while a third and fourth are cut up for the legs, braces and the top ornament. The screen may be made plain and painted, or embroidered, or the material may be attached to one of the hoops by one of its edges, and be gathered in the centre. In either case the material is fastened to the side of one of the hoops after it has been covered on the inner edge and one side with plush. The other hoop is then covered in the same way and placed against the first in such a way as to include the screen between the two hoops; a ribbon plush is then tacked upon the edge of the screen so as to cover both hoops; the legs, braces and top ornament of the screen are made of sections of hoops covered with plush, and fastened together with brass screws.—3. Another pretty screen is made of bamboo walking canes, cut and placed together according to fancy. The satin or velvet is pretty, either embroidered, painted or covered with green ferns.—4. A very useful one is made with a single clothes horse. Tack common cotton cloth to the bottom and carry it over the top and down the other side to the bottom. All the exposed portions of the wood on the edge and the feet, which are cut a little concave on the inside, should be covered with a good coat of black shellac, and rubbed down with emery cloth to a soft even surface. Next in order is the decoration, which consists of paper. At the top use a pretty strip of single band frieze paper 18 in. wide, a background of gold, against which grows very nicely grouped sunflowers, with leaves, stems and buds comprising a low-toned mixture of olives, old gold, browns and rich warm red. Below this a narrow strip border of peacock blue, edged with black, separating the frieze from the body, which should be a rich sage green felting paper. To put the paper on, first make a strong flour paste; lay the paper, face down on a flat clean board, and cover all parts equally with a good coat of paste, avoiding lumps. Give the surface of the screen which is to be covered a coat of the same; take up the paper carefully by the top, putting it and the corners exactly in place; then draw the hand downwards, smoothing the paper well in to place; at the bottom another strip of blue and black must be added; at the top, where the cotton is left exposed, tack on



Hoop Screen.



Clothes-Horse Screen.



Fan Screen.

the front and back edge with brass-headed nails a strip of plush 3 in. wide, a deep rich red. Cover the back with a neat and harmonious paper, put on as the front; or both sides may look alike. Both sides, instead of the above, may be covered with oil-cloth, on which is painted some fancy design in oils; or with satin, hand painted; or with satin, velvet or plush, embroidered.—5. A round upright of white wood 1 in. thick and 3 ft. 6 in. in length is set into a 3-sided piece at the bottom, and a simple flat leg is screwed into each of 3 faces; at the top fasten a round disc 1½ in. thick; into the edge of this bore a number of holes, equal to number of fans to be used; into these fit Japanese fans; finish the wood work with black shellac.—6. A very handsome screen is made of black satin, embroidered. The design is to be worked with colored silks in embroidery stitch; the tufts of the pampas work in 4 shades of brown; the leaves in 4 shades each of olive and bronze; and the stalk in brown; for the bird on the wing take several shades of gold and crimson; for the bird on the stalk, peacock blue, and on the breast a delicate rose; the kingfisher work in green and red, and the fish in its bill in pearl. For the flowers of the flag use 5 shades, from light to dark, of purple; and for the leaf, 4 shades of green; the trefoil flowers work in yellow; the pond lilies make with 3 shades of white tipped with pink; for the centre of the lily use olive and 2 shades of yellow; the cat-tails work in 3 shades of brown, and the leaves in olive and green; for the dragon-flies use green and gray; for the water, 3 shades of peacock blue, and work the grasses in the background in olive. Procure a suitable frame and fasten the satin on it neatly.

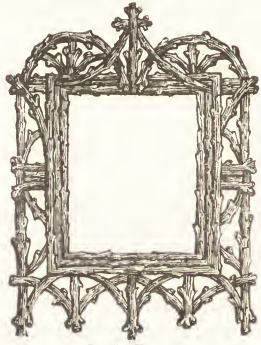
Embroidered Satin Screen.

FOOT WARMER.—An ornamental yet useful article can be made out of an old box; if possible it is preferable to have it round; line it neatly with some woolen fabric and cover it on the outside with silk or other light material of the same shade and color as the lining or of a contrasting color; the outside covering may be embroidered, or 3 or 4 ruffles of lace may be sewed on; woolen goods or silk embroidered makes pretty ruffles instead of the lace; the lid should be made to fit and covered and lined the same as the box; it should be fastened on by bows of ribbon or brass hinges; a bright silk cord finishes the edge of both box and lid neatly; inside of this place the hot bricks, or, better still, a rubber bag filled with hot water.

FRAMES.—1. For etchings and old wood or copper-plate engravings, nothing is better than a plain oak frame, flat, with a small bead on the internal and external edges; the frame must

Foot Warmer.

by no means slope to the picture; it is best flat, but if there be any inclination, let it be from the picture; these oak frames need not be stained nor varnished; an etching should be placed in a large mount, or mounted on a piece of drawing-board, so that it has a good margin; if the pictures are small, the frames may be made to hold two, three and upwards; plain pine frames, ebonized, and with a few incised gold lines, look well for landscape and architectural photographs; they may be easily made by an amateur.—2. Procure a glass of the required size; then a card of bristol-board the same size,

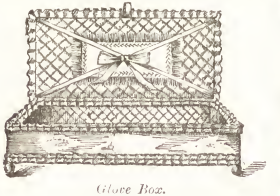


Rustic Frame.

to which glue or paste the picture after neatly cutting out; paste a sheet of strong paper, about 1 in. larger than the glass, on the back of the card, folding the edges neatly over on the glass;

thereby holding glass and picture together; procure black glazed paper and bind the edge, and trim with a strip of gilded paper inside the black edge.—3. Take yellow, withered leaves; dissolve gum Arabic; get mixed black paint and some copal varnish; choose perfect leaves; dry and press them between the leaves of books; rub the surface of the frame with fine sand-paper; give it a coat of fine black paint; when the paint is dry, rub smooth with pumice-stone, after which apply two more coats of paint; allow it to dry; after which arrange the leaves in any manner and variety you desire; gum the leaves on the under side, and then press them upon their places; dissolve some isinglass in boiling water; while the solution is warm, brush it over the work; when dry, give three coats of copal varnish, being particular to allow sufficient time to elapse between each for drying before putting on another coating; cut the frame from wood. —4. A little care in selection of material, and skill in handling tools, will frame engravings and paintings at slight cost. Oak wood, denuded of the bark, presents a beautifully corrugated surface; out of which the knife easily removes the few fibres which adhere, and it is ready for varnishing as soon as it is seasoned; the season cracks, should they occur, may be filled with dark-brown putty, and will even heighten the general effect. Take a thin board, of the right size and shape for the foundation or mat; saw out the inner oval or rectangular form to suit the picture; nail on the edge a rustic frame, made of the branches of hard seasoned wood, and garnish the corners with some pretty device, such, for instance, as a cluster of acorns.

GLOVE BOX. — Take a long, narrow pasteboard box 4 in. wide, 3 high, and 10 long; 1 yard of satin; a piece of feather-edged satin ribbon 1 in. wide; 2 yards of very narrow gros-grain ribbon; 4 round gilt beads or buttons having holes in each end; 4 large pins with which to fasten these on the box; 2 sheets of white wadding, and 2 spools of blue sewing silk;

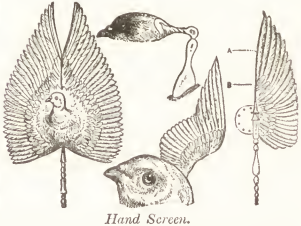


Glove Box.

cut a strip of satin 4 in. wide and long enough to fit round the box; draw this smoothly round the sides of the box, leaving ½ in. at top and bottom to be turned in; then cover the bottom with a plain piece of satin; turn in the edges and overcast with sewing silk to the piece which is fitted round the sides; for the lining cut pieces of pasteboard to correspond with the bottom and sides of the box, but a trifle smaller; cover them with quilted blue satin, sew the bottom and sides firmly together, and slip it within the first box; sew the edges of the 2 boxes together all round the top; trim it around inside with satin ribbon box-plaited; fasten a bead at each corner, thus forming the feet; a pin is run through the bead and the point inserted between the 2 layers of pasteboard, holding it securely in place; the upper and lower edges of the outside of the box trim with plaited ribbon; cover the lid outside with several layers of wadding and then draw the satin smoothly over it; it may be painted or embroidered before putting it on; line it with quilted satin; strap across the lining narrow gros-grain ribbon with a bow where it is crossed; these straps hold in place a sachet made of 2 layers of wadding, between which place the sachet powder; cover this with blue satin fringed out on each edge; cat-stitch the pieces together; then fasten the lid on by firmly sewing the back edges of it and the box together; a piece of narrow gros-grain ribbon about 5 in. long should be sewed to each side of the lid and carried down to each side of the box; trim the edge of the cover all round with plaited ribbon; place a short loop of gros-grain ribbon in the middle of the upper edge of the lid by which to lift it.

HANDKERCHIEF HOLDER.—Take two pieces of cardboard 6 in. square, one for the bottom and the other for the top, which is made to open like a portfolio; take a piece of blue ribbon 2 in. wide and 50 in. long; gather both sides; line the top and bottom with silk; fasten them together with the gathered ribbon; when completed it will look like a portfolio.

HAND SCREENS. — 1. A pretty mode of decorating Japanese hand-screens that have become discolored and damaged is to cover them neatly and tightly with a piece of China crepe, soft silk or merino, showing the sticks; then work a pretty floral design in crewel silks.—2. To make hand screens of feathers, select a bird; the common house pigeon is well suited for this



Hand Screen.

purpose; first remove the wings by severing the muscles at the elbow joint; place the bird on its back; place a weight on its tail and feet to keep it steady; raise the breast feathers around the top of the furcula bone, carefully holding them back; cut the skin across with the point of a pen knife; continue the cut downward towards the head on each side; turn the bird over and

join the cuts straight across the back; replace the bird and turn the skin inside out over the head by gently pulling and cutting; take care to cut the skin as deeply down into the orifice of the ear as possible; also avoid cutting the eyelids; sever the head at the base of the skull and scrape off all pieces of flesh or skin on the skull and jaw; take the eye out whole by carefully cutting around it; scoop out the brain from the hole at the base of the skull; stuff the cavity of the skull firmly with wool with sufficient arsenical soap to wet it; poke little bits of the same into the palate and the space between the jaws; rub the skull over with the soap and redraw the skin over the skull; now stuff the exterior nostrils with the soaked wool; open the mouth and stuff in as much wool as possible, pressing it down with a knife; make a little hollow indentation in the centre of the space for the eye-ball; use the wool to aid in this process; put the back of the eye in the hollow and arrange the front according to nature with the aid of a darning needle; press the skin firmly to the skull; a wire should be inserted to obtain the natural pose of the bird; fasten the head on to a board prepared for the purpose; a little stroking and smoothing of the feathers, and perhaps a little more stuffing with wool, so as to bring up the breast of the bird into its natural shape, will be all that is required; possibly aided by a pin or two being stuck through the edge of the skin of the breast into the board, and the head thus fastened is complete; remove all the flesh and sinews that lie between the pinion and elbow joints on the wings; rub the skin and bones well with arsenical soap, being careful of the feathers; lay each wing on the board and stretch them out; begin by confining the bone close to the elbow joint by strong pins, one on each side; then confine the first pinion feather, by fastening it with a single pin close to the stalk and 3 in. from the end; pin each succeeding feather in the same way; if the feathers do not lie flat to the board, pin strips of card board across the whole wing; take off the wing coverts (tufts that grow on the back of the bird) with the piece of skin on which they grew, and after being rubbed with arsenical soap, lay them down flat on the board; put the boards away where no dust can reach them; now select the handles and fasten them to a piece of board 3 or 4 in. round; make holes in the board by which the wings are fastened on when taken off the stretching board; tie the wings on in their proper position with a darning needle and twine; when both wings are fastened on, tie them together at points A and B; now put the head on; take it off the board, and pull out all the wool as far as the skull, taking care not to soften the hardened skin, or displace the feathers; sharpen a piece of copper bell-wire to a fine point, and insert it up the neck-bore through the skull, holding the pigeon's head in the palm of your hand, until the wire comes out at the top of the head; turn down the extreme end of the wire with a small pair of pincers, and withdraw the wire till the turned end is hidden amongst the feathers; replace the cotton wool, taking care to bend the wire to the shape, and, as far as possible, to keep it in the centre of the neck; bore a hole in the binder's board to match the position of the wire; glue the edges of the skin of the breast to the board; pass the wire through; press the head close down and then turn the wire on the other side and tie it to one of the wing-bones, or to some of the strings by which the wings were fastened on; glue the wing coverts side by side, on the inside of the wings, to cover the bones and fastenings, making their upper ends just cover the tie A; and at the other ends, if they are not quite neat in themselves, a small bow of ribbon may be glued on afterwards.

LAMP MATS.—1. Crochet a square or round mat the size desired; work a chain very loose of 16 stitches and fasten into each stitch around the edge; work five of these chains into each stitch.—2. Use bed-ticking; cut it any shape you wish and work the white with brown and red yarn in herring-bone stitch; first a row of brown, then a row of red; finish with crochet border in chain stitch.

LAMP SHADES.—1. A beautiful lamp-shade can be made of large sheets of fine, thin Bristol board; cut the sheets the shape of the wire frame, making a scalloped edge and bottom by placing a 25 cent piece on the edge and drawing a pencil around it; when this has been repeated all along on both sides, cut half of the mark away; procure a number of beautifully colored autumn leaves, either natural or embossed ones, and break off the stems close to the leaves; paint a vine all around the shade, and join the leaves to it in natural order, sticking them on with gum tragacanth; when completed let it lie under pressure for a few hours, then give the whole a coat of colorless varnish; when thoroughly dry, join the shade together with gum, pressing it dry with a hot iron; then fasten it to the wire frame.—2. For a circular shade, cut a perfect circle of size desired, fold it into 4 equal parts, and cut away one of the quarter sections; this will give a correctly proportioned figure for the shade; when the 2 edges are united, take fine white or tinted card board and cut by the pattern, forming the lower edge into large scollops, and with a "pinking-iron" finishing the edges of these; place the piece right side up on a flat, smooth surface; mark out the exact centre of each division formed by cutting the same number of small scollops at the top as at the bottom; run a line from one to the other; design some graceful figure, the simplest being an oval; but a prettier one is formed by marking a diamond or square of proper size; then draw a circle intersecting the diamond, thus forming 4 segments of a circle and 4 points of the square by effacing the inner lines of each figure. A clover leaf intersected by a triangle, forms another graceful figure; bind the edge with gold paper, or carefully pink it in small scollops; cut pieces of gelatine paper of some bright color, or, if preferred, using a set of small diaphanie plates, you may form charming illuminations; but a still more artistic embellishment for these spaces is obtained by using architect's transparent cloth with painted designs; in tracing the designs the transparent cloth may

be placed upon the picture and the outlines carefully traced, then with lamp-black rubbed up with dammar varnish fill in the centres, using great care to keep the outlines distinctly defined; put on the color with a camel's hair brush abundantly charged; the transparencies should be fastened in place with strong boiled paste with a little white glue added. It is well to line the circle of card-board with isinglass or transparent paper in order to protect from the heat of lamp or gas; the shade requires two circular pieces of wire united by 3 perpendicular pieces, and as many horizontal ones extending from the bottom ring to a ring in the centre fitting round the lamp-burner.

MIRRORS.—Glass is of great value in furnishing a room as it answers the same purpose as water in a landscape; too much glass is of course detrimental; small hand mirrors are not only ornamental but useful in the bedroom; they are made in various forms, the single oblong glass being the most common; triplex and duplex mirrors are also handy things in the bedroom; a plate glass surrounded by a rustic frame, presents a pretty effect; ivy vines may be twined over the frame.

Triplex Mirror (Open).

Triplex (Folded).

PEN WIPERS.—1. Make one in the form of a miniature tea cosy; line the cosy with stiff card and fill in with strips of cloth or, better, with ends of black worsted; the outside should be prettily worked.—2. Arrange cloth in 3 different colored rolls and pad by odd scraps until about ½ in. in diameter; form small strips of enameled cloth similar to those used for shawls, and fasten the tiny luggage together; a few threads of gold-colored silk will represent the buckles.—3. A parasol pen wiper is made of bright colored silk, attached to an ivory handle, and filled inside with cloth. — 4. Take a few sheets of the softest tissue-paper you can get, and fold and roll them all together into a bundle about 8 in. long; put an India rubber band around the middle of the roll, and then cut off the tops so as to allow insertion of pen for wiping, making the packet into hour-glass shape.

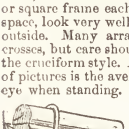
PIANO COVERS.—An upright piano may have a scarf with long ends to hang down on either side of the top. If the piano is scratched or marred it will conceal the fact in a great measure; if it is new it serves as a protection, while at the same time it is ornamental. One style is to have on one end a bar of music, with notes and words added to suit the fancy. Another is peacock blue serge bordered with old-gold satin, on which is worked peacock's eyes in filoselle. Below this is a band of green-blue plush, with a fringe of tufted crewels. Square pianos should always be covered with a cloth cover, of a color in harmony with the rest of the

Rustic Looking Glass.

furniture. A pretty border, not loud or pretentious, is a great addition around the edge.

PICTURES, To Choose and Hang.—A light picture makes a room look larger, and a picture darker than the wall it is hung upon will reduce the size of the room, unless the lightness of the frame is sufficient to compensate for the difference. If the room is small, hang very light pictures in it, and when it is uncomfortably large reduce it with dark ones. But there are other things to be considered. Pictures which represent narrow interiors do not enlarge rooms much, because they convey a feeling of confinement; but landscapes with vast distances enlarge rooms immensely. In engravings and water-colors the margin has an important effect. The whiteness of it may be ample compensation for the darkness of the print itself. The judicious selection of subjects is a matter of the first importance in the acquisition of pictures. This is especially the case when they are but few in number, and intended for the adornment of the rooms of a small house. As a general rule, oil paintings are considered most appropriate to the dining-room, but good engravings are also admissible. Paintings and engravings should not, however, be both used, as the effect of mixing the dissimilar forms of art is injurious to both. For the drawing-room, water-color drawings, or chromos, best harmonize with the lighter and brighter style of the apartment. Photos of good size may also be employed. For bedrooms, bright, cheery water-color drawings,

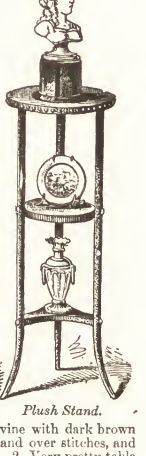
chromos, or photographs may be sparingly used, but the walls of a bedroom should never be crowded. Particular care should be taken to exclude unpleasant subjects, as in cases of illness their effect on the patient may become absolutely injurious. The same observation applies with equal force to the nursery. The pictures here need be of little money value, but they ought always to be pretty and tasteful, and if some of them are seasoned with a spice of fun it will be none the worse. It is seldom well to hang a sombre picture in a broad light, or a cheerful, sunny one in a shaded corner. A moonlit landscape or a night storm at sea are better placed in a mild light, while a group of laughing children, or a harvest scene, seem naturally to require a strong one. Companion pictures should be near together. The space between two windows, if not occupied by a mirror, is very nice for a gilt-frame picture of good size; dark frames look better in a more subdued light. Three pictures of the same general appearance hung in a horizontal row—about half the width of the picture is considered a proper distance between them—with two smaller above and the same below, matching the spaces, and making seven in all, are a very convenient and common form; or if the central piece is larger than the others the effect is equally good. Two ovals, one above the other, with a smaller rustic or square frame each side, matching the vacant space, look very well; or vice versa, the ovals outside. Many arrange pictures to represent crosses, but care should be taken not to overdo the cruciform style. A good guide for the height of pictures is the average height of the human eye when standing. Rods of brass placed just below the cornice, supported at intervals by brackets and having sliding hooks for any degree of adjustment, are best to hang pictures from. Picture cord is the usual agent of suspension, but gilt wire cord is perhaps less conspicuous and does not harbor dust. When cord is used care should be taken that its color harmonizes with the walls. Large hooks are always found useful, attached to the cornice.



Cornice and Hook.

PLUSH STAND.—This consists of two circular pieces and one triangular piece of pine board and three round sticks with bent ends. Rake handles, such as are used in hay rakes, answer well for the legs. The top and shelves are covered with plush, the legs are covered with the same material. The plush is applied to the legs with glue. It may be tacked on the two shelves and on the top, but the upper side of the top should not be covered until after the stand is put together, as it may thus cover the screws used in fastening the top to the legs. The plush is drawn down over the edges of the top, and the edge afterward covered with a brass strip fastened with brass nails. A large ornamental brass nail is placed in each leg opposite the two shelves. The legs should be covered with old gold plush, the top and shelves with maroon or garnet plush.

TABLE COVERS.—A very pretty cover can be made of fine gray ladies' cloth, 1½ yds. square, hemmed nearly all around, and decorated in the following manner: With a piece of chalk draw the outline of a vine running all around the cloth, about 2 in. from the edge; cut, from dark green cloth, a large number of ivy leaves; different sizes of real English ivy leaves answer for patterns, and the imitation ones will look very natural; place at unequal distances apart, along each side of the vine, marked with a large cluster in each corner, and a simple spray running around the cloth; tack them all on first, then fasten each leaf down by button hole stitching around the edge with zephyr the same shade as the leaves; work the vine with dark brown Berlin wool, simple over and over stitches, and the effect is really pretty.—2. Very pretty table covers are of satin, with velvet borders, at the corners of which are squares of plush, the borders being worked in point Russe stitches on both edges in colored silks.



Plush Stand.

POTTERY, To Decorate.—In this work, wood, glass or tin can be used, and two or more articles of different material may be cemented with white paint to form a receptacle for cards or fruit, according to the style of dish desired; when well dried, give the whole a coat of paint prepared as follows: Mix ⅜ of No. 1 coach varnish and ½ Japan dryer; use paints to color; if desired to paint brown, pour a little of the above in a dish and mix in with a paint brush burnt umber to give the right shade; do not get it too thick; for scarlet, use a little of the best vermilion by mixing what you need in another dish; decorate with embossed pictures or any fancy pictures, gilt bands, etc.; then varnish with the prepared varnish, clear, not too thick. If light tints are desired, procure white zinc ground in varnish, and for pale pink mix a very little vermilion in some of the zinc; pale blue, use ultra marine blue; pale green, use chromic green, or Paris green will do; mix these colors for pale tints with the white zinc, and always finish with a coat of demar varnish.

SCRAP BAGS.—1. A neat scrap bag or catch-all consists in simply trimming one or both sides of a rush basket with flowers and grasses, finished off with a bright jaunty bow.—2. Take 2 medium sized, 3-ply wooden plates; bore in

each 12 holes near the edge and at equal distances from each other, leaving a space where there are no holes for the opening of the bag; paint or draw with India ink on the bottom of each plate, which is to be the outside, some pretty design; take a piece of satin about ¾ yd. long and over ½ yd. wide; hem each end and run in a short piece of elastic; gather each side and draw up till it makes a puff just long enough to reach between the two end holes of a plate; bind the edges of the puff; make 12 little slits in each binding corresponding to the holes in the plates; take 2 yds. of satin ribbon, ½ in. wide; put it through the first hole on the outside of the plate and through the first slit in the binding, through the second slit and second hole, and so on till it comes out through the twelfth hole in the plate; tie the ends together in a bow; take 2 yds. more of ribbon and do the same with the other plate.

SHAVING CASES.—Take ½ of a sheet of silvered perforated card board; cut off round at the bottom, running up to a point at the top; bind around with worsted braid of any color; box-plait enough of the braid to go around, catching together by one edge, and sew just under the edge of the binding; cut a back the same size, of plain card board, and pierce 2 holes through each; put a ribbon through to hang up by; fill with any kind of paper.

SLEEPING ROLLS.—Measure the width of your chair back and make a stout linen bag, drawn up at each end, of a length corresponding to that width; the diameter depends upon the amount of support you wish to give to the sleeper's head; stuff the bag with the best hair, and after closing it put on the cover, knitted and crocheted to match the roll in size; draw up the cover at the ends and put on tassels, and strings to fasten the roll to the chair.

SOFA PILLOWS.—1. Take little scraps of silk and ribbon cut the width of a pencil and 2 or 3 in. long; knit with strong tidy cotton, in the same way fringe is knit into mittens; as it is heavy and cumbersome work, it is best to knit it in strips or squares and then join together.—2. A handsome cushion cover or sofa pillow can be made of bed ticking; get narrow braid of different colors; sew them on each stripe, or work them with worsted on the white strips in different stitches.

TABLE MATS.—A ball of No. 6 white tidy cotton and medium size crochet hook; set up a

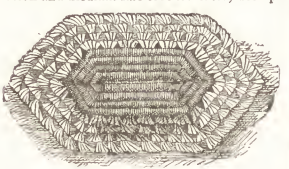


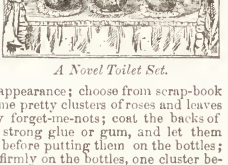
Table Mat.

chain of 32 stitches, and crochet back 1 row plain, widening at the end of the row; turn the work every time, as you do not work round, but must leave it open at one end, for the work is to be ribbed; widen 6 times each row; make the mat 6-sided by widening at each end and at the four corners; crochet until there are 9 ribs, counting from the centre; make the border of shell stitch. This is the largest mat in the set. Smaller ones are made in the same way by using 21 stitches and making 6 ribs from the centre.

TEA COSIES.—They are made in cap shape to cover the teapot, and must be warmly wadded and lined. Quilted silk, satin or merino are the materials most used for them. Some are daintily embroidered or hand painted.

TIDIES.—1. Select any pattern resembling lace; edge-work the main pattern with split zephyr; then fill in all the other stitches of the border with sewing silk.—2. A pretty tidy is made by taking white tidy cotton No. 8. Make a diamond in Afghan stitch; commence with 1 stitch; widen once each time across on each side alternately until you have 30 stitches; work 10 times across, and narrow the same as you widen until done; embroider in cross stitch any little flower or pattern in each diamond; sew them together, there being 7 of them; crochet around the edge with the same color of worsted that you embroidered the flower with; make 4 tassels for the ends.—3. Lace tidies are made by sewing velvet or satin ribbon and insertion together alternately, finishing them with a row of lace and insertion; scarlet velvet and black lace look very rich.—3. Use a teacup for a pattern and cut out pieces of bleached cotton or silk, a quantity of small pieces; turn in the edge; gather it by whipping the thread over; then draw it up together as closely as possible with a strong thread; fasten a tuft of corn-colored zephyr in the centre of it; it is quite a representation of a daisy.

TOILET SET.—The straw-covered bottles in which the Farina cologne is put up can be very prettily ornamented for the toilet table in the following manner: First give a coat of any good gold paint; directions for its use are given with each bottle; after the gilt is dry rub with a piece of cotton batting until of a somewhat burnished appearance; choose from scrap-book pictures some pretty clusters of roses and leaves with a few forget-me-nots; cut the backs of these with strong glue or gum, and let them dry a little before putting them on the bottles; then press firmly on the bottles, one cluster being sufficient for each; the corks are also gilded, or it gives a much handsomer finish if glass stoppers are used; these, too, should be gilded; tie a bow of bright ribbon round the neck just below the stopper; gild the powder box in the



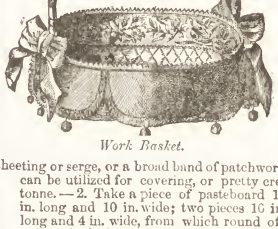
A Novel Toilet Set.

same manner as the bottles, and a similar design of roses and forget-me-nots glued on the side; a bow of the same colored ribbon used for the bottles is placed in the middle of the cover, and answers as a handle by which to lift it off; the basket is then lined with silk or satin.

WALL POCKETS. — Cut a tastefully shaped piece of stiff pasteboard 18 in. broad and 20 in. high, rounding off the lower corners, and cutting a large scallop out of each side above, which form a point in the centre and at each end; cover with bright colored cambric, lining the back with white muslin; cut a piece of white pique to fit the lower half of the pocket after gathering in ½ of its size; also a piece of the same, fitted in the same manner to the upper part, and upon this arrange 3 small pockets; cut in small half circular pieces; the centre one arranged as a watch pocket, with open circle in the centre; ornament the edges of all the pockets with quillings of the bright colored cambric, pinked out on each edge and inclosed in the band, binding the tops of the 2 large pockets with a strip of strong elastic; fasten the upper pocket to the card board back along the sides and bottom; then the lower pocket; which should extend 2 in. above the lower edge of the upper one; sew the pinked quilling around the entire edge, and form suspension cords of the cambric pinked out on the edges, with bows of the same.

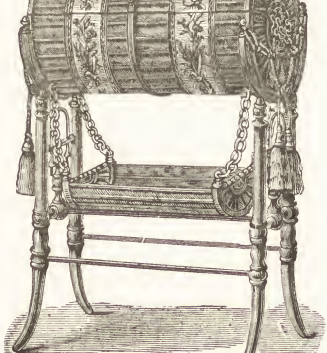
WHISK BROOM HOLDER.—Cut 2 pasteboard hearts 10 in. long, 8 across the top; cut 2 wedge-shaped pieces 3 in. long and 1 at the top for the sides; cover with black lady's cloth, and line with blue flannel; after joining together, work around the edges with gold-colored silk in button hole stitch; on the front work with gold colored silk some pretty pattern in chain stitch; in the centre work your monogram; hang with blue cord and tassels.

WORK BASKETS. — 1. Take a wooden pail; draw a piece of satin in a frill round the top, and fasten it with small tacks, and draw in again with a draw string round the bottom, and again secure it; fasten a ruche round the top and bottom and twist satin ribbon round the handle; make a top of cardboard, covered neatly with satin, with a ruche round the edge and a fall of lace; attach by a ribbon on one side, so that it will come off, and hang down when the receptacle is being used; black satin with a ruche of gold-colored satin round the edge, with a fall of cream-colored lace, looks well and suits all furniture, though red or blue is very pretty and bright looking; a piece of embroidered crash,



Work Basket.

sheeting or serge, or a broad band of patchwork can be utilized for covering, or pretty cretonne. — 2. Take a piece of pasteboard 16 in. long and 10 in. wide; two pieces 10 in. long and 4 in. wide, from which round off uniformly the lower corners; cover one side of each of these with black or colored alpaca; sew the two end pieces along the sides to form the foundation of the basket, putting the covered sides out; next cut a piece of cherry-colored silk as large as the bottom part; lay a layer of cotton over, and quilt in diamonds; baste this over the bottom and half way up the sides; cut pieces in the same way to fit the rounded ends; take a piece of the silk 4 in. wide, and long enough to extend round the basket, which piece cut into 10 scallops, and ornament the edges with a narrow silk braid fringe or embroidery; sew the ends together; then, putting the lambrequin or drape over the basket, sew it round the edge; next cut a strip of corn-colored flannel or cloth to go round the inside; pink each edge and embroider the design on it with cherry-colored, yellow, black, and white silk; or use a figured ribbon for this band; for the handle cut a piece of pasteboard ½ in. wide; sew a wire on each edge and cover with cherry and corn-colored ribbon wound round it; finish with ball-buttons and bows of ribbon. — 3. A handsome and convenient work-stand can be made as shown in cut. Get a cabinet maker to make a frame; then, if



Work Stand.

wicker-work is preferred for the receptacles, get them made by a basket maker, and line and trim to suit, seeing that the upper half of the largest receptacle is the smallest part of the cylinder. Or a good way would be to have a paper-box manufacturer make the sections of the cylinder, which completely cover and line according to taste. Hang the smaller receptacle by cords or light chains.

HOUSEHOLD MISCELLANY.

BEDS, Dampness in.—After the bed is warmed, put a glass globe in between the sheets, and if the bed be damp a few drops of wet will appear on the inside of the glass.

BEDS, To Warm.—1. Take a long stone quart bottle, let it be filled with boiling hot water, with a good cork; wrap it up in 2 or 3 folds of flannel or woolen cloth; this done about ½ hour before bedtime, introduce it between the sheets at the foot of the bed; the water thus bottled will be found to retain its heat till the next morning. — 2. Providing one has neither warming pan or soapstone, bricks make a very good substitute; heat them well, wrap in thick brown paper so as not to scorch, and move about between the sheets.

BLANKETS, To Store.—Spread a large coarse sheet on the floor; fold up the blankets and place them on it, having sprinkled between every fold either shreds of tobacco or bits of camphor; having piled the blankets smoothly, put the remainder of the sheet around them and over them, and pin up tightly in various places; then lay the whole in a large chest or dark closet; let them remain unopened during the summer.

BOOKS, To Preserve.—A few drops of any essential oil will secure libraries from the effects of mold and damp; Russian leather, which is perfumed with the tar of the birch tree, never molds.

BREAD, Stale, To Freshen. — Put a stale loaf into a closely-covered tin vessel; expose it for ½ hour or longer to a heat not greater than that of boiling water; allow it to cool, when its freshness will be found restored.

BREAD, To Keep Moist.—Keep a large earthen jar—a cover of the same material is better than a wooden one—and have it well aired and fresh; let the bread be well cooled after it is taken from the oven; then place it in the jar and cover closely.

BROOMS, Care of. — Keep a separate broom for the parlor, the dining room, sleeping room and kitchen; when the latter is too much worn for use in the house, send it to the barn, take the second best for the kitchen, the broom from up stairs for the dining room, the parlor broom for the chambers, and let the new one be kept for the parlor and hall. Leaning heavily on a broom when stooping to pick up articles while sweeping, results in bent and broken splinters and a worthless broom; when a new broom is purchased provide a way for hanging it up; always hang or stand it with the brush up; if the broom becomes one sided, scald it and bend it back; if brooms are wet in boiling suds once a week, they will become very tough, will not cut a carpet, will last much longer, and will always sweep like a new broom. (See *Sweeping* in Household Cleaning).

BUTTER, Rancid, To Sweeten.—Put 15 drops of chloride of lime to 1 pt. of cold water, and work the butter in it until every particle has come in contact with the water; then work it over in pure cold water.

BUTTER, To Keep Cool.—Butter may be kept tolerably firm in even hot weather by setting the crock containing it in a shallow dish of water, with a cloth tucked well over it, so that the vessel is covered and the ends are under it in the water.

CANDLE, To Burn Slowly. — Put finely powdered salt on the candle till it reaches the black portion of the wick; it will give a dull light, suitable for the sick-room, and be sure to last the entire night.

CELLARS, Dampness in, To Test. — Take a thermometer, a glass tumbler filled with water, and a piece of ice; then notice how low the thermometer, when placed in the tumbler, has to sink before any moisture begins to show itself on the outside of the vessel of cold water; the lower the temperature to which the thermometer has to sink before moisture is precipitated, the less there is of it in the moisture of the cellar.

CELLARS, Dry Rot in.—This, in cellar timbers, can be prevented by coating the wood with whitewash to which has been added enough copperas to give the mixture a pale yellow hue.

CELLARS, Freezing in. — Paste the walls and the ceiling over with 4 or 5 thicknesses of newspapers; make a curtain of the same material; paste over the window at the top of the cellar; paste the papers to the bare joist over head, leaving an air space between them and the floor; it is better to use a coarse brown paper; whatever paper is employed, sweep down the walls thoroughly, and use a very strong size to hold the paper to the stones; it is not necessary to press the paper down into all the depressions of the wall; every air space beneath it is an additional defence against the cold.

CELLARS, Mold in.—1. Put some roll brimstone into a pan and set fire to it; close the doors, making the cellar as nearly air-tight as possible for 2 or 3 hours, when the fungi will be destroyed and the mold dried up; repeat this operation every 2 or 3 months, and the cellar will be free from parasitical growth. — 2. Pour 2 parts of concentrated sulphuric acid over 1 part of common salt; during the process all openings must be closed, so as to prevent any escape of the gas, and the greatest care exercised not to enter the cellar after the operation until it has been thoroughly ventilated.

CHEESE, To Keep Moist.—1. Take a linen or cheese cloth; dip it in white wine; squeeze out

excess of wine and wrap up the cheese in it; by doing this the cheese is not only kept moist, but the flavor is improved.—2. Cut a sufficient quantity for a few days' consumption from the cheese, and keep the remainder in a cool place, rather damp than dry, spreading a thin film of butter over the fresh surface, and covering it with a cloth or pan to keep off the dirt.

CHINA, Care of. — When fine china is put away in the china closet, pieces of paper should be placed between them to prevent scratches on the glaze or painting; the china closet should be in a dry situation, as a damp closet will soon tarnish the gilding of the best crockery; in a common dinner-service, it is a great evil to make the plates too hot, as it invariably cracks the glaze on the surface, if not the plate itself; when the glaze is injured, every time the "things" are washed the water gets to the interior, swells the porous clay, and makes the whole fabric rotten.

CHIMNEYS, Burning of.—Place movable fire-frames of iron work near the base of the chimney, one above the other, about 1 foot apart; no flame passes through them, whilst the draught in the chimney is not interfered with, the result being that no fire can happen in the chimney.

CHIMNEYS, Cure for Sooty.—Plaster the inside with salt mortar; the proportions used are 1 pk. salt added, while tempering, to 3 pks. mortar; chimneys thus treated have remained perfectly clean for 15 years.

CHIMNEYS, Smoking. — 1. Large fire-places are apt to smoke, particularly when the aperture of the funnel does not correspond in size; for this a temporary remedy may be found in opening a door or window—a permanent cure by diminishing the lower aperture; the best method of cure is to carry from the air a pipe under the floor and opening under the fire. The chimney may only smoke when the wind is in a particular quarter, connected with the position of some higher building, or a hill, or grove of trees; the common turn-cap, as made by tin and iron men, will generally be found a fully adequate remedy.—2. Use a screen or blower of fine wire gauze, from 36 to 40 wires to the inch, immediately in front of the fire and about 2 in. therefrom.

CHIMNEYS, To Sweep. — When soft coal is used daily, the chimney requires sweeping every 3 or 4 months; should it smoke, it is a pretty sure sign that sweeping is necessary; for though the chimney itself may be clean enough, the chimney-pot may have become choked up in some way or other that prevents the smoke having free egress. Persons often clean their own flues in the following manner: After the fires are out at night, a mat or other convenient material is then fixed against the front of the mantelpiece, in the same way that it would be by the sweep; then pass a gun up the chimney as high as can be reached from the left-hand side, removing the mat only just enough to admit his right arm, and holding the mat close with the other; the gun is then fired up the chimney; as soon as the soot has settled and the gun reloaded (of course with powder only), the operation should be repeated, 2 discharges of the gun being generally sufficient; the mat must remain safely secured against the chimney-piece all night, and in the morning ascend to the roof and sweep down as far as can be reached; for this purpose a long stick should be procured, to the end of which an old broom, or, better still, a brush should be attached.

CISTERNS. Waterproofing.—To make cisterns and tanks waterproof, paint thickly on the inside with a mixture composed of 8 parts of melted glue and 4 parts of linseed oil, boiled with litharge. In 48 hours after application it will have hardened so that the cistern or tank can be filled with water.

CISTERN WATER. To Clear.—1. Never allow a mudhole to remain about a well. If the water is muddy and impure throw in a peck of lime to purify it; if animalculæ appear in the water throw in ½ gal. of salt to make them settle to the bottom.—2. Add 2 oz. of powdered alum and 2 oz. borax to a 20-barrel cistern of rain water that is blackened or oily, and in a few hours the sediment will settle, and the water be clarified and fit for washing.

CISTERN WATER, To Keep Sweet.—1. To prevent cistern water from becoming impure, have the supply pipe run nearly to the bottom of the well, where the purest water is always to be obtained.—2. First collect the water in a tank, and filter it into the cistern below the surface. This will remove the organic matters, and prevent fermentation. Care should also be taken to prevent surface drainage into it.—3. The spout from the roof should have a joint in it, which can be drawn aside so as to prevent any water falling on the roof from reaching the cistern. It should be kept thus drawn aside during dry weather; when rain comes on allow the roof to get thoroughly washed off before replacing the joint. If this be done the water will always be clear and fit to drink.—4. Drop into the cistern a large piece of common charcoal.

CLINKERS IN STOVES, To Remove.—When the firebricks have become covered with clinkers which have fused and adhered, they may be cleaned by throwing oyster or clam shells into the fire box when the fire is very hot, and allowing the fire to go out. The clinkers will generally cleave off without the use of much force the next morning. From 1 qt. to a peck will be sufficient for most stoves, and the operation can be repeated if some of the clinkers still adhere. Salt sprinkled on clinkers adhering to firebrick will also loosen them.

CLOTHES. Burning. To Extinguish. — The clothes of females and children, when on fire, may be most readily extinguished by rolling the sufferer in the carpet, hearth-rug, table-cover, or any other woolen article at hand; if this be expertly done, the flames may be rapidly put out, unless the skirts of the dress be distended by hoops or crinoline, when there is great difficulty in staying the progress of the flames. Should assistance not be at hand, the person whose clothes are on fire should throw herself on the ground and roll the carpet round her; or if such a thing is not in the room, she should endeavor to extinguish the flames with her hands, and by rapidly rolling over and over on the floor. In

this way the fire will be stifled, or the combustion will proceed so slowly that less personal injury will be experienced before assistance arrives.

COAL, Artificial.—1. 125 parts sifted peat; 10 parts river mud; 1,000 parts anthracite dust, and 100 parts residues of schist oil, or 120 parts of dry coal pitch; mix.—2. Small coal, charcoal, or sawdust, 1 part; clay, loam, or marl, 1 part; sand, or ashes, 2 parts; water, q. s.; make the mass up wet into balls. For use, these balls are piled on an ordinary fire to a little above the top bar. They are said to produce a heat considerably more intense than that of common fuel, and ensure a saving of one-half the quantity of coals, while a fire thus made up will require no stirring, nor fresh fuel for 10 hours. The quantity of the combustible ingredient in them should be doubled when they are intended to be used with a very little foundation of coal.

COAL OIL, Dangers of.—It should be kept in some portion of the house where neither sunlight nor any fire nor artificial heat can come. Lamps should be filled in the daytime and under no circumstances should be filled at night with another light near. The oil itself is not explosive; it is the gas engendered by the oil that occasions the explosions that daily occur. A half empty lamp, although standing on a table, without being touched, is liable at any moment to explode. Great care should be taken to buy none but oil above a safe fire test. This is nominally 112°; but 140° or over should be insisted on.

COAL OIL, To Test.—In a small cup or glass place a small quantity of oil to be tested; immerse in the oil the bulb of a good thermometer; suspend the cup containing the oil in a vessel of water; move about close to the surface of the oil a lighted taper, and note the degree on the thermometer at which the oil begins to emit inflammable vapor (the flashing point), and again that at which the oil inflames. Oil to be used in lamps should not take fire below 112° Fahrenheit. In applying the lighted taper the flame must be kept away from the glass of the thermometer.

COAL, To Protect.—Soft coal should be kept protected from the frost, rain and snow. If allowed to become wet and then subjected to alternate heat and cold, it will crumble and become difficult to handle and hard to burn. Dry coal is tolerably clean to handle, while it kindles easily and produces comparatively little smoke.

CORKSCREWS, Substitutes for.—A convenient substitute for a corkscrew may be found in the use of a common screw, with an attached string to pull the cork. Or, stick two steel forks vertically into the cork on opposite sides, not too near the edge; run the blade of a knife through the two, and give a twist.

CORKS, To Remove.—With a stout string projected into the bottle, turn the bottle around until the cork is caught in a loop of the string, and with force pull out the cork.

CORN COBS, As Fuel.—Corn cobs make the best and cheapest summer fuel to be obtained. They are richer in potash than any wood, and the ashes ought to be saved for soap making.

CREAM, To Keep.—Cream already skimmed may be kept 24 hours, if scalded without sugar; and, by adding to it as much powdered lump sugar as will make it sweet, it will keep good 2 days in a cool place.

DISHCLOTHS.—1. Get a pair of wooden needles and one ball of candle wicking; set up a row of 20 stitches; knit back and forth until you use up the ball; then it will be done—a nice, soft, thick dishcloth.—2. Have about ¼ yard square, when folded 4 times, or any other dimensions that may suit, of mosquito netting; baste it together strongly and it will make a perfect dishcloth. This is porous and light as a sponge, and can be cleaned with the least labor, and rendered perfectly sweet.

DOORS, Creaking.—Rub a little soap or a mixture of tallow and black lead on the hinges; or apply to them with a feather a little sweet or sperm oil once or twice a year.

DOORS, Slamming.—To prevent the noise of door slamming, a small piece of vulcanized India rubber, cork or leather may be placed so as to receive the shock.

EARTHENWARE AND IRON, To Season.—Put new earthenware into cold water, letting it heat gradually till it boils; then let it cool. Brown earthenware especially may be toughened in this way. A little rye or wheat bran thrown in while it is boiling will preserve the glazing from being injured by acid or salt. New iron should be gradually heated at first, as it is apt to crack.

ECHOES IN HALLS, To Correct.—This can be remedied by the stretching of small wires at the proper height and at suitable distances. The wires, although so small as to be hardly visible, break the sound waves and prevent the reverberation that has hitherto been the chief obstacle and annoyance to listeners. Only three or four wires crossing the room each way produces this improvement.

ENAMEL, For Copper Vessels.—12 parts of white fluor spar; 12 parts of unburnt gypsum, and 1 part borax; finely powder, intimately mix and fuse in a crucible; the fused mass is then poured out, and after cooking rubbed to a paste. Coat the vessel inside with this preparation, using a brush; place in a warm place to dry; then subject to a gradually increasing heat till the preparation fuses. On cooling, the vessel is covered with a white enamel, adhering firmly, and impervious to vegetable acids.

FABRICS, To Make Fire-proof.—80 parts pure sulphate of ammonia; 25 parts carbonate of ammonia; 30 parts boracic acid; 12 parts pure borax; 20 parts starch; 1,000 parts distilled water. Dip in this while it is hot; dry and iron.

FEATHER DUSTER, To Make.—A good feather duster may be made by boiling the wing feathers of a turkey or chicken for 5 or 10 minutes; then rinse them in tepid water; dry them and tie them up in bunches to use in greasing pans and for brushing egg over tarts or pastry; take any round stick of the proper size, such as the end of a broom handle, for the handle of the brush; if one happens to have an old duster handle that can be used once more, with a saw make a series of grooves or deep notches in the

lower end of the handle; by the aid of a hammer the lower portion of each quill should be so flattened as to pass into the grooves; as fast as feathers are put in they should be tied with strong twine; as the work proceeds glue should be added, that the feathers may be more firmly fastened; in this way new rows of feathers, followed by the twine and glue, may be added, until the end is completely covered and the duster is of sufficient size, after which the finishing row of large feathers selected for the purpose is placed around the whole and tightly bound with twine; outside of the base of this last row of feathers, a neat strip of leather may be glued to improve the appearance and render the feathers more secure.

FEATHERS. Goose. To Keep Sweet. — Goose feathers are more oily and sooner turn rancid than chicken feathers; they should be well washed in hot water, with plenty of soap, and a cup full of ammonia to a barrel of water; then rinsed and dried; if chicken feathers are mixed with them, or the large goose feathers, the vanes should be stripped from the quills; the vanes then curl up and are as elastic as the other feathers.

FEATHERS, Moth Proof. — Dip the joint or fleshy ends of turkey, geese or chicken wings into a strong solution of copperas; this makes them moth-proof, as well as more durable.

FEATHERS, To Change,—To change feathers from one bed to another, make an opening at the end of the tick to be emptied and also in the one to be filled, and sew them together; then rip the seam at the side of the one to be emptied; make the opening large enough to put your hand through; put the feathers into the new tick with your hand; you will find it can be done quickly and without scattering the feathlers; if you make the opening for your hand too large pin it at the wrist.

FEATHERS, To Utilize. — The wings of turkeys, geese and chickens should never be thrown away; they are excellent for cleaning windows, and much more economical than chamois; they are also useful for putting on paste when papering walls; cut the plume portions of the feathers from the stems with scissors; throw away the stems and put the remainder in coarse sacks; when the bags are full, close them up, and subject the contents to a thorough kneading with the hands; at the end of 5 minutes the feathers become a down of great lightness, even more so than eider down, which is considered so valuable.

FIRE ALARMS. — 1. A device for indicating fire in any one of a series or suite of rooms has been made by drawing a long iron wire through all the rooms near the ceiling; one end is fixed to the wall, and the other is secured to a common house bell hung on a spring; in each room the wire is broken and the gap is closed by a small strip of gutta-percha; under each piece of gutta-percha is a short slack piece of chain, so that when it melts the ends of the wire will be held secure; in case of a fire in any room the gutta-percha melts (at 100° Fah.), and the wire is drawn apart by a weight at the end where the bell is placed; this frees the spring, and the bell rings; the bit of chain prevents the weight from falling, and as each room is provided with a different length of chain, the distance the weight has fallen records the room where the wire is parted. — 2. An old gun loaded with a heavy charge of powder, and hung near the rafters in a barn, or in any dangerous locality about the house, makes an excellent fire-alarm; the explosion is caused by the heat.

FIRE, Causes of.—Allowing sparks to fall on the floor and remain there without extinguishing them; carrying a light into rooms containing inflammable substances; smoking carelessly and in dangerous places, as workshops, warehouses, on shipboard, etc.; keeping matches in improper places, and neglecting to pick up those that may happen to fall on the ground; improper construction of buildings; covering up a fire place when not in use, with wood, or paper and canvas, etc.; the soot falls either from the flue itself or an adjoining one into the grate; a neighboring chimney takes fire, a spark from this falls down the blocked-up flue, ignites the soot in the grate, which smoulders until the covering is burnt through, and thus sets the building on fire; loss of property is sometimes caused by want of proper care in hanging up or removing the goods in dry goods store windows when the gas is burning; putting hot ashes in wooden boxes or barrels, where the coals will remain alive, when covered, for 3 or 4 days; leaving cloths soaked in oil around the premises; after a few days they ignite of themselves; they are frequent causes of fires in shops; the careless practice of allowing the wick cinders or trimmings of the wick to collect around the burner; they are apt to take fire and thus, unobserved, heat the lamp, until the oil begins to vaporize, when an explosion takes place; reading in bed with a lamp standing on a chair or stand beside it; the reader falls asleep, and with the movement of an arm, or of the bed covering, the lamp is knocked over, and the room is on fire in an instant.

FIRE, Chimney on. — 1. Shut the doors and windows, and stop up the bottom of the chimney with a piece of wet carpet or blanket, throwing a little water, or flowers of sulphur or salt, on the fire before doing so; by this means the draught is stopped, and the burning soot extinguished for want of air.—2. Burn a few pounds of "carbon disulphide" on the hearth; the combustion of this substance produces large volumes of carbonic and sulphurous acid gases, both of which are effectual extinguishers of flame.

FIRE KINDLERS.—1. Take rosin, any quantity, and melt it, putting in for each pound being used, from 2 to 3 oz. of tallow; when all is hot, stir in pine sawdust to make very thick; and, while yet hot, spread it out about 1 in. thick, upon boards which have fine sawdust sprinkled upon them, to prevent it from sticking; when cold, break up into lumps about 1 in. square; but if for sale, take a thin board and press upon it, while yet warm, to lay it off into inch squares; this makes it break regularly, if you press the crease sufficiently deep, greasing the marked board to prevent it from sticking.—2. Take 1 qt.

of tar and 3 lbs. of resin; melt them; bring to a cooling temperature; mix with as much sawdust, with a little charcoal added, as can be worked in; spread out while hot upon a board; when cold break up into lumps of the size of a large hickory nut, and there will be, at a small expense, kindling material enough for a household for 1 year.—3. Dip corn-cobs for about 1 minute in a bath composed of 60 parts melted resin and 40 parts tar; spread out to dry on metallic plates heated to the temperature of boiling water.

FIRE, To Deaden. — If you are in a hurry to broil a steak and the fire is too brisk, a little salt will deaden it.

FIRE, To Escape from.—Escape from apartments on fire may be best effected by creeping on the hands and knees to the window or door; the atmosphere of a room so full of smoke as to produce suffocation to a person standing upright, may generally be safely breathed on nearly a level with the floor; a damp cloth, or handkerchief, tied over the mouth and nostrils, or over the whole face and head, will enable a person to effect a passage through the densest smoke, and in many cases, to escape from buildings on fire, when otherwise it would be impracticable; should descent by the stair-case be found impossible, then the window should be immediately sought, and a ladder or fire-escape waited for; a good ready-made fire-escape is a knotted rope; in the absence of either, if the danger is imminent, a rope should be made by tying the sheets and blankets of the bed together (being careful to tie square knots), one end of which should be firmly secured to one of the bed-posts, and with this apparatus descent should be cautiously attempted. Jumping out of the window should be avoided, as persons run just as much danger in performing such an exploit as they do by remaining in the burning building. When it is impossible to escape from a burning building by the stairs or windows, retreat may be sometimes secured by a trap-door opening on to the roof, or by a skylight, when, unless it be an isolated house, the roof of one of the adjoining buildings may probably be gained with safety. When arriving at a large hotel, one should familiarize himself with its plan before retiring.

FIRE, To Extinguish.—If the fire appears at all serious, and there are fire engines within a reasonable distance, it is best to wait until they arrive. Many buildings have been destroyed from opening doors, and trying to extinguish fires with insufficient means. If no fire extinguisher is at hand, collect as many buckets outside the room on fire as can be obtained, keeping the door shut; then creep into the room on hands and knees (if the heat and smoke are considerable), and throw the water as nearly in the direction of the fire as possible, keeping the door shut while more water is being collected. When an apartment is found to be on fire, the door, chimney and windows should be immediately closed, if possible, and only opened for the purpose of projecting water on the flames. By this means the supply of air will be cut off, and rapid combustion prevented. It is found that sal ammoniac (5 oz. to the gal.) added to water used to extinguish fires renders its action more effective. Salt and kitchen soda act less effectively.

FLIES, To Drive from a Room.—Place a castor oil plant in the room and the flies will leave.

FLOUR, Musty. — Carbonate of magnesia, 3 lbs.; flour, 765 lbs.; mix. This causes the flour to become more wholesome, producing lighter and better bread than when alum is used, and absorbs and dissipates the musty smell.

FURNITURE, Friction of. — The slides and rests of desks or bureau drawers may be made to move easily by spreading common stove blacking evenly with a cloth or the finger over their surfaces.

FURNITURE, Swelling of. — Sulphuric acid rubbed on the edges of bureau drawers will prevent their swelling in damp weather.

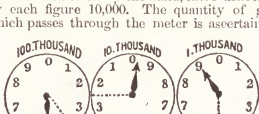
GAME, To Keep.—Newly ground coffee sprinkled over game will keep it sweet and fresh for several days. Clean the game, that is, wipe off the blood, cover the wounded parts with absorbent paper, wrap up the heads, and then sprinkle ground coffee over and among the feathers or fur, as the case may be; pack up carefully, and the game will be preserved fresh and sweet in the most unfavorable weather. Game sent open and loose cannot be treated in this manner; but all game packed in boxes or hampers may be deodorized as described. A teaspoonful of coffee is enough for a brace of birds, and in this proportion for more or for larger game.

GAS LEAKS.—To know how to read the meter will show how to detect escaping gas. To detect the locality of a leak the first thing is to see that no burners have been left turned on by accident, which is often the case where the cock has no stop, and is caused by the cock being turned partially round again as to open the vent. The next thing is to try the joints of the gas fittings. If gas is escaping it will take fire at the leak, if a lighted match is held near the joint; or if too little to burn steadily, it will momentarily catch and extinguish in little puffs. If beneath the floor, the sense of smell will generally detect the section of the floor under which the leak is, as it escapes, owing to its levity, upwards through the crevices of the floor, and penetrates the carpet, if there be one. If bracket or side burners are used, and the escaping gas is behind the casings, the crevices in the casings, or the openings where the pipe enters the room, will let the escaping gas enter the room sufficiently at these points to indicate somewhat nearly the location of the leak. In such cases never apply a light to the crevices or casings, but turn off the gas at the meter, and send for a gasfitter, otherwise an explosion may occur.

GAS METERS, To Prevent Freezing.—½ pt. of good glycerine is said to prevent the freezing of 1 gal. water, though at least double the proportion is preferable in the country, whatever the temperature in the winter may happen to be.

GAS METERS, To Read.—The figures on the index at the right hand denote even hundreds. When the hand completes the entire circle it denotes 1,000, and is registered by the hand in the centre circle, pointing to 1—each figure in the centre circle being 1,000, this entire circle

being 70,000, and is registered on the index of the left hand circle by the hand, there denoting by each figure 10,000. The quantity of gas which passes through the meter is ascertained



Face of Gas Meter.

by reading from the index at the time the amount is required to be known, and deducting therefrom the quantity shown by the index at a previous observation. If the whole is registered by the hands on the three circles above it indicates 49,900; amount at previous observation, as shown by the dotted lines, 42,500; this shows amount which passed through since last taken to be 7,400. The register at all times shows the quantity that has passed through since the meter was first set, by deducting from which the amount that has been paid for (without any regard to the time when) shows that the difference remains unpaid.

GAS. To Avoid Waste of.—Turn the gas partly off at the meter; much gas is burned to waste by too great pressure in certain localities. In buildings of any size a good regulator will soon pay for itself.

GLASS OR CHINA, To Pack.—Procure some soft straw or hay to pack them in, and if they are to be sent a long way, and are heavy, the hay or straw should be a little damp, which will prevent them from slipping about; let the largest and heaviest things be always put undermost in the box or hamper; let there be plenty of straw, and pack the articles tight; but never attempt to pack up glass or china which is of much consequence till it has been seen done by some one used to the job. The safety of glass articles packed together in a box does not depend so much upon the quantity of packing material used as upon the fact that no two pieces of glass come into actual contact. In packing plates, a single straw placed between two of them will prevent them from breaking each other. In packing bottles in a case, such as the collecting case of the microscopist and the test case of the chemist, rubber rings slipped over each will be found the best and handiest packing material. They have this great advantage, they do not give rise to dust.

GLASS STOPPERS, To Remove.—1. Heat the neck of the bottle over a flame, or take one turn with a piece of listing around the neck of the bottle and move it backwards and forwards very rapidly, having previously stood the bottle in some hot water to warm the air or contents inside. The friction of the listing will warm and expand the neck without warming and expanding the stopper; and the pressure produced within the bottle by previously heating its contents will tend to elevate the stopper. If bottle stoppers be greased slightly before they are put in, it will prevent them from sticking.—2. Put a few drops of sweet oil about the cork, and set the bottle near the fire where it will get warm.—3. When a stopper has been fixed by crystallization from solution, water will sometime set it free, and it is more efficacious in such cases than oil, because it dissolves the cement. When the cementing matter is a metallic oxide or sub-salt, a little muriatic acid may be useful, if there be no objection to its application arising from the nature of the substance within.

GLASS, To Prevent Cracking.—1. When boiling water is poured suddenly into a glass jar, the glass will crack if there is nothing to carry off the heat from the glass, because then the glass retains the heat, and the expansion breaks it. If a metal spoon is in the glass, or the jar is placed on a wet folded towel, these absorb and carry off the surplus heat and save the glass.—2. When new, all glass and earthenware should be placed in cold water in a saucepan, and after some hours the saucepan containing the vessel or vessels should be placed over the fire until the water reaches the boiling point.

HEATING. Economy in.—For warming 3 rooms a single heating stove should be used, the heat from which passes into 2 drums; one of these drums is placed in a room adjoining that containing the stove, and the other is up stairs in a room above the second one; the intermediate drum, or that between the stove and last one, heats the room from 6 to 12 degrees hotter than the stove can heat, though both rooms are of the same size and the drum is somewhat smaller than the stove; fuel, and consequently expense, is not only saved by the use of sheet-iron drums, but the house is more comfortably and completely warmed, not only with less fuel but with no trouble of making and keeping up fires.

ICE, To Keep.—1. Small quantities of ice may be preserved in summer by making a small bag large enough to hold the ice; then make another much larger bag, and fill the space between with sawdust or feathers.—2. Cut a piece of flannel about 9 in. square, and secure it by a ligature round the mouth of an ordinary tumbler, so as to leave a cup-shaped depression of flannel within the tumbler to about half its depth. In the flannel cup so constructed, pieces of ice may be preserved many hours; all the longer if a piece of flannel 4 or 5 in. square be used as a loose cover to the ice cup; cheap flannel with comparatively open meshes is preferable, as water easily drains through it, and ice is thus kept quite dry; when good flannel with close texture is employed, a small hole must be made in the bottom of the flannel cup, otherwise it holds water and facilitates the melting of the ice.

IRON AND STEEL. To Prevent Rusting.—Dissolve ½ oz. of camphor in 1 lb. of hog's lard; take off the scum, and mix as much black lead as will give the mixture an iron color; iron and steel goods, as well as machines of all kinds, rubbed over with this mixture, and left with it on for 24 hours, and then rubbed with a linen cloth, will keep clean for months.

KNIVES AND FORKS, To Preserve.—1. Scour bright; wipe thoroughly; dry them by the fire; dust fine wood ashes fresh from the stove

plentifully over the knives on both sides, leaving those which adhere to the blades; wrap in a piece of cloth and roll up in a paper, taking care to fold the ends of the paper so that the knives are all covered up.—2. When not in use, rub the steel part with a flannel dipped in oil; wipe the oil off after a few hours, as there is often water in it; or dust the blades and prongs with quicklime, finely powdered and kept in a muslin bag.—3. Make a flannel bag, and stitch from top to bottom, 1½ in. apart, a dozen times, making a receptacle for each; roll, and keep in a dry place.

LAMP CHIMNEYS. To Prevent Cracking. — 1. Place the chimneys in a pot filled with cold water; add a little cooking salt; allow the mixture to boil well over a fire and then cool slowly; chimneys become very durable by this process, which may also be extended to crockery, stoneware, porcelain, etc.; the process is simply one of annealing, and the slower the process, especially the cooling portion of it, the more effective will be the work.—2. If the chimney-glass of a lamp be cut with a diamond on the convex side; it will never crack, as the incision affords room for expansion produced by the heat, and the glass, after it is cool, returns to its original shape, with only a scratch visible where the cut is made.

LAMP-LIGHTERS. — Cut old postal cards lengthwise into strips ½ in. wide; they burn readily, do not give off sparks, and leave scarcely a trace of ashes.

LAMPS, Care of. — Always keep a lamp full of oil; never allow it to get more than half empty, as the space above fills with gas, which is easily ignited, especially if the oil is not thoroughly rectified; and the light will not burn so high or clear as when the lamp is full; occasionally soak the wicks before using in either strong vinegar or alum water; dry them thoroughly, and the lamp will give a clearer light and will not smoke or smell disagreeably; in lighting the lamp, turn the wick up slightly at first, until it gets well started and the oil flows freely to the flame; and then turn up to the desired height; if the flame drops to any considerable extent after the wick is turned up, make a change in the wick; never attempt to extinguish a lighted lamp by blowing down the chimney; the best way to extinguish the light is with the mouth upon a level with the top of the chimney, and about 1 foot or more from it; blow horizontally over the top and the light will go out instantly.

LAMPS, Night. To Make. — 1. Take a cork about 1 in. across, and cut a piece off the top about ⅛ in. thick; make a hole in the centre; take a piece of tin the size of the little finger nail, and make a small hole in the centre sufficient to hold a common white cord; fill a common goblet ⅔ full of water and pour over that about ¼ in. of sperm oil; place the tin on the cork and put a piece of cord 1 in. long through the holes, then set the cork afloat on the oil, and you have a good night lamp; kerosene or other low test oils should not be used.—2. If sulphide of lime be enclosed in a bottle the figures of a watch may be distinguished by its aid; to renew the luminosity of the mass place the bottle each day in the sun or in strong daylight; or burn a strip of magnesium wire close to a bottle; it will thus absorb light, which will again be available at night time.—3. Take a stick of phosphorus and put it into a large dry vial, not corked, and it will afford a light sufficient to discern any object in a room when held near it; the vial should be kept in a cool place, where there is no current of air, and it will continue its luminous appearance for 12 months.

LEAKS, To Stop.—1. Yellow soap, beaten up thick, with whiting, and rubbed into the leak, has sometimes stopped it when all other things have failed. —2. Coal tar applied hot to a roof will cure it of leaking; take an old broom or tie rags on an old broom stick, and use for spreading the tar over the desired surface.

LIGHTNING, To Escape. — Avoid standing under trees to escape from the rain during a thunder storm, but boldly expose yourself in the open; it will preserve you from the lightning; avoid standing close to any metallic bodies, as lead pipes or iron railings, etc.; when in doors during a thunder storm, sit or stand as near to the middle of the room as convenient; avoid standing at the window or sitting near the wall,

MARBLE, To Pack.—Marble should be put in a box by itself, wetted sheets of clean paper laid between the pieces, and each piece held firmly in its place by side-pieces and wedges; it may then be carried over a rough road in a wagon without injury.

MATCHES, Care of.—Parlor matches light the most readily, and are much more dangerous than the common matches; the general stock should be kept in a tin box; for each room where matches are used there should be a match safe of some kind; in the kitchen and bedroom, or wherever else matches are in frequent use, have the match safe fixed and always in the same place, so that it can be found, if need be, in the dark.

MATS, Husk.— 1 bushel basketful and 1 boiler full of husks is sufficient to braid a large mat; have ready a teakettle full of hot water, and turn on the boiler of husks; begin a common 3 strand braid, and as you bring over a strand place about 3 husks on, leaving the large ends of the husks up; when enough is braided for a mat, sew firmly with twine in any shape you choose—long, round or oval; then sprinkle warm water on upper side; run a fork through the husks, splitting the ends into a mass of little, curly fibres; then with the shears trim off evenly.

MATTRESS FILLINGS.—1. A cheap and very comfortable bed, with an underbed of straw, hay or husk, can be made by putting on the top a light cotton mattress; for the two sides of the mattress bed-ticking is best, and they should be somewhat longer and wider than the top of the bed, as in tying, the size is somewhat reduced; put 2 or 3 times as much cotton between the sides as is put between those of a "comfortable," and tie quite closely; finish by turning in the 2 edges and sewing them overhand, or stitch on machine; beds of straw or husk look infinitely better and far more comfortable when the ticks are made

like those of a mattress, with a straight, upright piece sewed all around; the corners should be clipped off so that the ticks will be round at the corners, as it fits the bedstead better. — 2. The best way to save husks is to pick the ears from the stalks and carry them into the barn, where the husks may be stripped rainy days, and the coarser parts saved for fodder; after stripping, the husks should be allowed to become perfectly dry before putting into the tick; it is a good plan to spread them for awhile upon the floor of a warm room.

MEAT, To Protect from Flies. — Use a wire meat safe, or cover the joints with a long loose gauze, or some thin cloth, and hang them from the ceiling of a dry room; pepper and ginger should be sprinkled on the parts likely to be attacked by the fly, but should be washed off before the joint is put to the fire.

MILK, Sour, To Sweeten.—Milk or cream may be sweetened after it has become slightly sour, by a small portion of carbonate of magnesia; saleratus also will correct the acid, but slightly injures the flavor, unless very delicately managed.

MILK, To Prevent Souring.—1. Put 1 teaspoonful of scraped horseradish into each pan, and it will keep sweet for several days. — 2. Dissolve ½ thimbleful of California borax in hot water; put into the milk and it will keep perfectly sweet.

MIRRORS, Care of.—Avoid hanging a mirror near a stove or fireplace, or where the sun can shine on it; if this precaution is neglected, granulation is likely to occur, even in a comparatively dark room, by the influence of warmth instead of light; A lamp or gas jet, if placed too close, while burning, though it may not crack the glass, will often bring about the same injurious crystallization, and will even sometimes cause the amalgam to melt and run off.

MIRRORS, To Pack.—In packing mirrors for removal, they should be placed by themselves in a box, and fixed in their places by side pieces and wedges, driven closely and nailed; laths should be placed across mirrors, and no elastic materials, as pillows or feather beds, be used in packing them.

MOLD, In Vaults, To Prevent.—A small lump of camphor placed in the safe, will prevent the accumulation of mold upon the money, books or paper.

NAILS, Names of.—Many persons are puzzled to understand what the terms "fourpenny," "sixpenny," and "tenpenny," mean as applied to nails. "Fourpenny" means 4 lbs. to the thousand nails, or "sixpenny" means 6 lbs. to the thousand, and so on; it is an old English term and meant at first "ten pound" nails (the "thousand" being understood), but the old English clipped it to "tenpun," and from that it degenerated until "penny" was substituted for "pounds"; when a thousand nails weigh less than 1 lb. they are called tacks, brads, etc., and are reckoned by ounces.

NAILS, Rusted, To Draw. — First drive them in a little, which breaks the hold, and then they may be drawn out much easier.

NAILS, Rusting, To Prevent. — Cut nails may be made flexible by heating them; but if, instead of allowing them to cool in the open air, they are thrown when red-hot into linseed oil, it will prevent them rusting almost as long as if they were galvanized.

NAILS, To Drive.—When driving a nail into a wall, clothes-press or closet, to hang things on, drive it through a spool to the head; dip the tips of nails in grease and they will easily drive into any hard wood, where otherwise they would double and break.

NAILS, To Remove Rust from.—Mix 1 pt. linseed oil with 2 oz. of black lead, stirring until the whole is thoroughly incorporated; heat the nails red hot and steep them in the mixture. They should then be well drained and shaken up in an old nail bag until dry.

NOISE, To Deaden.—Rubber cushions under the legs of a workbench are an effective method of deadening noise. Kegs of sand or sawdust, applied in the same way, afford similar immunity. A few inches of sand or sawdust being first poured into each keg, there is laid on it a board or block, upon which the leg rests, and around the leg and block is poured fine, dry sand or sawdust. By this simple means, not only all noise, but any vibration and shock are so completely prevented that an ordinary anvil thus mounted may be used even in a dwelling house, without annoying its occupants.

NUTMEGS, To Select.—To select nutmegs, pick them with a pin; if they are good the oil will instantly spread around the puncture.

NUTS, Rusty, To Remove.—Pour a little kerosene or other oil on the nut and let it have time to penetrate; try the nut both ways; if it can be moved at all, the battle is half won; keep moving it as far as possible; put on oil and then turn it back again, and repeat again and again. If a hot iron can be placed on the nut, so as to expand it without expanding the bolt, the nut can often be started. Hammering the nut will sometimes heat it sufficiently to have the same effect.

PAILS AND TUBS, To Prevent Shrinking.—Saturate with glycerine and they will never shrink.

PIPES, To Test.—Take soiled cotton waste and sulphur, the smoke from which, after ignition, is blown into the drain or pipes; if leakage exists in the latter inside of the house, the smoke and smell both issue forth and show that something is wrong, and generally tell just where the fault or faults are.

POKER, To Harden.—When a poker has become soft and bent, it may be again hardened by making it hot two or three times and plunging it every time into a pail of cold water. The sudden cooling of steel makes it again hard.

POLISHED METALS, To Prevent Rusting.—(See CLEANING.)

RUBBER, To Restore Elasticity of.—Use a simple mixture composed of 1 part of aqua ammonia with 2 parts of water, in which the articles should be immersed until they resume their former elasticity, smoothness and softness, the time required varying from a few minutes to an hour.

SCISSORS, To Sharpen.—Take a fine file and sharpen each blade, being careful to keep the same angle as they had at first; file till the rough places are all taken out; put a little oil on the edges of the blades, and snap together; then wipe off.

SCREW. To Start.—A screw that refuses to be started may sometimes be drawn by applying a piece of red hot iron to the head for 1 minute or 2 and then immediately applying the screw driver.

STEAM KETTLE, Economical.—Take the dinner kettle that comes with a 7 or 8 in. stove; place in the bottom of it half a brick nicely washed; pour in water to nearly or quite cover the brick, and set it over the fire; when it boils, or nearly so, set in the bread or pudding dish, and cover closely with a tin cover, of conical form, with a rim set on the edge so that it will fit the kettle closely, and suffer no steam to escape; if this cover does not come with the kettle, one can be made at the tin shop for half a dollar; the flat cover throws the steam back on to your bread and cannot be made to fit as nicely; this arrangement has the advantage over a steamer set over the kettle in that it brings the bread much nearer the fire, requires much less fuel, raises it lighter and cooks it more thoroughly; all batter and berry puddings, and even biscuit and custard puddings, are cooked very nicely in this manner; a breakfast Johnny-cake may be cooked in this way with much less fuel than it would require to bake it; an Indian pudding, made as for baking, can be steamed over a fire that would have little effect upon the oven of a large stove; be careful not to fill the dish too full, as steaming raises the pudding more than baking; stir it down once or twice.

STOVE PIPES. To Prevent Rusting. — Apply pure graphite (plumbago) ground to a very fine powder and mixed with a little water; then rub over with some of the same, dry.

STOVES. Cracks in. To Mend.—1. Good wood ashes are to be sifted through a fine sieve, to which is to be added the same quantity of clay, finely pulverized, together with a little salt; the mixture is to be moistened with water enough to make a paste, and the crack in the stove filled with it.—2. An excellent cement for iron stoves or furnaces is a paste of soluble glass and barytes, with or without some fine fire clay; or the soluble glass may be replaced by a solution of borax, and both these and barytes by a mixture of clay and powdered glass.

TASTE OF WOOD, To Remove. — To prevent this scald the vessel well with boiling water, letting the water remain in it until cold; then dissolve some pearlash or soda in lukewarm water, adding a little lime to it; wash the inside of the vessel well with this solution; afterward scald it well with hot water, and rinse with cold water before using.

TIN CANS, To Remove Lids from. — Place a shovelful of live coals on the top, which will speedily unsolder them; they can then be removed by the aid of an old case knife; care must be taken or the side seam will also open.

TINWARE, To Mend.—1. Take a vial ⅔ full of muriatic acid; put into it little bits of sheet zinc, as long as it dissolves them; then put in a crumb of sal-ammoniac and fill up with water, and it is ready for use; with the cork of the vial wet the place to be mended, with the preparation; then put a piece of sheet zinc over the hole and hold a lighted candle or spirit lamp under the place, which melts the solder on the tin and causes the zinc to adhere without further trouble; wet the zinc also with the solution; or a little solder may be put on in place of zinc, or with the zinc.—2. Put putty on the outside; let it dry well, and the pan will never need mending in the same place again.

UMBRELLAS, Care of.—Always stand a wet umbrella with the handle down; one trial will convince you of the rapidity with which it will drain, and your umbrella will last longer if dried quickly.

WALLS. To Deaden. — The propagation of sound through the ceiling may be most effectually prevented by insulating the floor from the beams by means of porous light substances, as a layer of felt, a filling of sand, or of stone coal dust, the latter being particularly effective; it is difficult to prevent the propagation of sound through thin partitions, but double unconnected walls filled in with some porous matcrial answer the purpose best; covering the walls and doors with hangings, as of jute, is also quite serviceable.

WATERING POTS, To Repair.—Tin watering pots much used in the garden often become rusted at the lower corners, and begin to leak; the holes may be effectually stopped by covering them inside with a small piece of linen dipped in copal varnish, the tin being previously thoroughly dried; when the varnish hardens by drying, they are perfectly water tight.

WATER-PIPES. To Prevent Freezing.—1. The tying up of the ball-tap with straw or flannel during severe weather will, in general, prevent the freezing of water-pipes. The surest method is to have the main pipe higher than the cistern or other receptacle; and, being thus of a regular incline, the pipe will immediately be exhausted when the supply ceases. When water remains in the pipes, if each tap be left dripping, the circulation of the water will prevent it from freezing in the pipes.—2. When the frost begins to set in, cover the water-pipes with hay or straw bands, twisted tight round them.—3. In pumping up water, let all the water out of the pipe when done; but if this is forgotten, and it should be frozen, take a small gimlet and bore a hole in the pipe, a little distance from the place where it is let off, which will prevent its bursting. Put a peg into the hole when the water is let off.

WATER, To Ascertain if Hard or Soft.—1. Dissolve ½ oz. of good white soap in 1 pt. of hot rain water; let it cool and settle; mix about 1 oz. of this with 1 pt. of the water to be tested and let stand a few minutes; if the water is soft it will remain clear; if hard it will become opalescent. — 2. Procure a small quantity of soap dissolved in alcohol; let a few drops of it fall into a glass of water to be dried; if the water becomes milky it is hard, but if little or no milkiness results, the water may be said to be soft.

WATER, To Cool.—Fill a jar with water; wet

a porous cloth and place over the jar; then set it in a shallow basin of water so that the edges of the cloth will be in the water; the evaporation in the cloth lowers the temperature.

WELLS, To Remove Foul Air from.—Throw down a quantity of burned but unslaked lime; when it comes in contact with the water, a quantity of heat is set free from the water and lime, which rushes up, carrying the gases with it, after which the descent may be made in safety; always lower a light before descending; if the light is extinguished, there is still danger, and the operation of the lime should be repeated.

WELL WATER, To Test for Lead. — Evaporate by gentle heat a small sample of the water nearly to dryness in a clean porcelain cup; moisten the residue with acetic acid; add to a portion of it a few drops of strong hydro-sulphuric acid; a black precipitate indicates lead.

WINDOW GLASS, To Prevent Frosting.—Apply a very thin coat of glycerine on both sides of the glass; this will prevent the formation of moisture.

WINDOWS, Old, To Tighten.—Smear the edge with putty, and the sash with chalk, then close very firmly; the putty will fill up the crevices, and the excess, pressed out at the sides, may be removed with a knife, while the chalk prevents adhesion to the sash, letting it move freely.

WINTER PREPARATIONS. — Floors that are open and cold may be improved by covering with old newspapers or thick brown wrapping paper, the thicker the layers the better; over this put a good supply of straw and then the carpet; doors that fit loosely should have strips of list or other thick, soft cloth fastened round the inside of the casing; these must be only thick enough to fill the crack, allowing the door to shut easily; sometimes a very small open space at the bottom of a door will keep the feet cold and aching all day, whether one be sitting or going about; an old carpet folded in several thicknesses, may be fastened on the outside threshold in such a way that when the door is shut, it will lie close against the crack; this is not as elegant as a weather-strip, but keeps out the cold, besides possessing the advantage of being some thing that can be attached at pleasure.

WOODEN BOWLS, To Prevent Cracking. — Place over a good fire in a wash-boiler of cold water; heat to a boiling heat, and boil 1 hour (be sure to have it all covered); then set the boiler off the fire, and let it cool gradually; then take it out of the water; wipe dry, and keep it in the shade; it will never crack or break.

PESTS.

ANTS, Black.—1. A strong solution of carbolic acid and water poured into holes kills all ants it touches, and the survivors immediately take themselves off.—2. A few leaves of green wormwood, scattered among the haunts of these troublesome insects, is said to be effectual in dislodging them.—3. Flour of brimstone, ½ lb; potash, 4 oz.; set them in an iron or earthern pan over the fire till dissolved and united; afterwards beat them to a powder, and infuse a little of this powder in water; and wherever you sprinkle it the ants will die or fly the place.

ANTS, Red. — 1. Set a quantity of cracked walnuts or shell-barks on plates, and put them in the closets and places where the ants congregate; they are very fond of these, and will collect on them in myriads; when they have collected turn nuts and ants together into the fire, and then replenish the plates with fresh nuts; after they have become so thinned off as to cease collecting on plates, powder some camphor and put in the holes and crevices, whereupon the remainder of them will speedily vanish.—2. Grease a plate with lard and set it where the ants are troublesome; place a few sticks around the plate for the ants to climb upon; occasionally turn the plate over a fire where there is no smoke, and the ants will drop off into it; reset the plate, and in a few repetitions all the ants will be caught; they trouble nothing else while lard is accessible.—3. Sprigs of wintergreen or ground ivy will drive them away.—4. They may be kept away from anything by surrounding it by a chalk mark; for instance, a barrel of sugar may have a chalk mark around it below the top.—5. Dishes placed on pie-plant leaves will be protected from ants; they should be replaced every morning.—6. Sprinkle Scotch snuff, red pepper, dry salt or ground cloves on the shelves.—7. Take 2 lbs. of alum and dissolve it in 3 or 4 qts. of boiling water; let it stand on the fire till the alum disappears; then apply it with a brush, while nearly boiling hot, to every joint and crevice in your closets, pantry shelves and the like.

BEDBUGS. — 1. Take the furniture in which they harbor to pieces and wash all the joints with soap and boiling water, carefully exploring all the cracks and openings with a stiff piece of wire; when the wood is dry, saturate the joints with kerosene oil, using a small paint brush; fill up the cracks with a mixture of plaster and linseed oil; if the rooms are papered, saturate the places where the paper joins the baseboard with benzine, using a brush or a sponge and carefully avoid the presence of a light; do the same with the linings of trunks; if the floor cracks are infested fill these with plaster and linseed oil.— 2. 2 oz. of red arsenic; ½ lb. of white soap; ½ oz. of camphor dissolved in a teaspoonful of spirits rectified; made into a paste of the consistency of cream; place this mixture in the openings and cracks of the bedstead.—3. Touch all you can with a feather duster dipped in carbolic acid; remove all clothing and then fumigate the room and bedding with brimstone; close the room tightly, and in 24 hours all bugs will have vanished.—4. Muriate of ammonia, 2 oz.; water, 1 qt.; dissolve and add corrosive sublimate, 2½ oz.; muriatic acid, 2 oz.; mix and

apply with a small brush.—5. Mercurial ointment, 1 oz.; spirits of turpentine, ½ pt.; mix well together until thoroughly incorporated, and use with a feather.—6. Mix together 2 oz. of camphor; 4 oz. spirits of turpentine; 1 oz. corrosive sublimate, and 1 pt. alcohol.

BEES. —Place 2 or 3 shallow vessels—the larger kind of flower pot saucers will do—half filled with water, on the floors where they assemble, with strips of cardboard running from the edge of the vessel to the floor, at a gentle inclination; these they will eagerly ascend, and so find a watery grave.

CRICKETS. — Sprinkle a little quicklime near the cracks through which they enter the room; the lime may be laid down over night, and swept away in the morning; in a few days they will most likely all be destroyed.

CROTON BUGS. — They attack the starch or sizing in the cloth covers of books and often destroy the gold to secure the little albumen used in the work; take a plentiful supply of a powder in which *pyrethrum* is the principal ingredient; with a small bellows, throw this powder among the books on the shelves and allow it to remain; this operation performed once a year will be sufficient to keep them out.

FLEAS.—1. The oil of pennyroyal will drive these insects off; but a cheaper method, where the herb flourishes, is to throw cats and dogs into a decoction of it once a week. When the herb cannot be got, the oil can be procured. In this case, saturate strings with it and tie them round the necks of dogs and cats. These applications should be repeated every 12 or 15 days. —2. Oil of cloves, 2½ drs.; carbolic acid, ½ dr.; cologne, 3 oz.; diluted alcohol, 2 oz.; sprinkle bedding, beds, etc.—3. (*Flea Trap.*) Place a plate of molasses under the house where the animals love to congregate; drive a little stake on each side, and then fasten a sheet of writing paper in a vertical position over the middle of the plate. The fleas will jump against the paper and slip down into the molasses, from which they will be unable to extricate themselves.

FLIES.—1. Infusion of quassia, 1 pt.; brown sugar, 4 oz.; ground pepper, 2 oz.; mix together, and put in small shallow dishes where required.—2. A teaspoonful of pure Persian chamomile, heaped in a little cone and burned in a closed medium-sized room, will kill every fly in it.—3. Cold green tea, well sweetened, and put into saucers, will destroy flies.—4. Black pepper 1 teaspoonful; brown sugar, 2 teaspoonfuls; cream, 4 teaspoonfuls.—5. Pour ½ oz. of oil of lavender into a pt. bottle of cold water and shake it up; scatter the water and oil of lavender on the tablecloth and the flies will go away.

FLY PAPERS.—1. A good kind of fly-paper is that which contains a large quantity of arsenic in its substance. This paper is kept wet when in use, and the flies, by sipping the moisture, are poisoned.—2. Melt resin, and add while soft, sufficient sweet oil, lard or lamp oil to make it, when cold, about the consistency of honey; spread on writing paper, and place in a convenient spot.—3. Boil linseed oil and resin; melt and add honey; soak the paper in a strong solution of alum and then dry before applying the above. — 4. Pour a little simple oxymel into a common tumbler glass, and place in the glass a piece of cap paper, made into the shape of the upper part of a funnel, with a hole at the bottom to admit the flies. Attracted by the smell they readily enter the trap in swarms.—5. Take some jars, mugs or tumblers; fill them half full of soapy water; with a piece of paper, either tied down or tucked under the rim; rub this paper inside with any thing sweet; cut a small hole in the centre, large enough for a fly to enter. The flies will settle on the top, attracted by the smell of the bait, and will then crawl through the hole to feed upon the sweet beneath; the warmth of the weather will cause the soapy water to ferment, and produce a gas which overpowers the flies, and they will drop down into the vessel.

GNATS.—The best preventative against gnats, as well as the best cure for their stings, is camphor.

INSECT POWDER. Persian. — The powder is the pulverized flowers of pyrethrum, carneum and roseum, growing on the Caucasian Mountains. It is not poisonous to man unless inhaled or swallowed in large quantities, but it is known to be death to insect life in all its forms, first stupefying, and then killing. Scattered over the bedstead and clothing, or the person, it destroys bed-bugs, lice, etc. For flies and mosquitoes, the best way to apply it is to burn it. Take a teaspoonful of the powder, in a dish of any kind, and set fire to it. A dense smoke arises, which is certain destruction to all insects with which it comes in contact. A tincture prepared by placing 1 part of the powder in 4 of alcohol, distilled with 10 times its bulk of water, and applied to the body, is said to be a perfect protection against vermin of all kinds. White hellebore answers the same purpose, and is cheaper.

LICE.—Wash with a simple decoction of stavesacre, or with a lotion made with the bruised seed in vinegar, or with the tincture, or rub in a salve made with the seeds and 4 times their weight of lard very carefully beaten together. The acetic solution and the tincture are the cleanliest and most agreeable preparations, but all will destroy both the creatures and their eggs, and relieve the intolerable itching which their casual presence leaves behind on many sensitive skins. White precipitate ointment is also effective.

MOSQUITOES.—1. 3 oz. sweet oil, 1 oz. carbolic acid; let it be thoroughly applied upon hands, face, and all exposed parts, carefully avoiding the eyes, once every ½ hour, when they are troublesome, or for the first two or three days, until the skin is filled with it, and after this its application will be necessary only occasionally.—2. 6 parts sweet oil, 1 part creosote, 1 part pennyroyal. Oil of pennyroyal alone is very efficacious.—3. A camphor bag hung up in an open casement will prove an effectual barrier to their entrance. Camphorated spirit applied as perfume to the face and hands will act as an effectual preventive; but when bitten by them, aromatic vinegar is the best antidote.—4. Drop a small quantity of kerosene on a piece

of cotton; squeeze out the excess as much as possible; then rub the cotton over the face, hands, etc., and they will not alight where the scent has been left.—5. A mixture of glycerine and toilet vinegar rubbed upon the person is a safeguard against mosquitoes.

MOTHS.—1. Steep ¾ lb. of cayenne pepper in 1 gal. of water; add 2 drs. of strychnia powder; strain and pour this tea into a shallow vessel. Before unrolling a new carpet, set the roll on each end alternately in this poisoned tea for 10 minutes, or long enough to wet its edges, for at least an inch. After beating an old carpet, roll and treat all its seams and edges to the same bath; let the carpet dry thoroughly before tacking it to the floor, in order to avoid the accidental poisoning of the tacker's fingers by the liquid. If preserved for future use, carefully label "poison." This preparation will not stain or disfigure carpets or corrode metals in contact with the carpet.—2. 1 lb. of quassia chips, ¾ lb. of cayenne pepper steeped in 2 gal. of water; strain and use as above.—3. Little black carpet moths can be effectually destroyed by a free use of benzine or naptha; poured around the edge of carpet it leaves no stain; the odor soon disappears and so do the moths. All use of either must be attended with care, and applied in the day time and not near an open fire. — 4. Wring a cloth out of hot water; lay it over the bindings and edges, and iron with as hot an iron as can be used without scorching. This will destroy both the moths and their eggs.—5. If fine-cut tobacco be sprinkled under the edge of the carpets, and under places where bureaus, book-cases and the like make it dark, the moths will be prevented from laying their eggs in them, as it will drive them away. — 6. Pour strong alum-water on the floor to the distance of ½ a yard around the edges before laying the carpet; then once or twice during the season sprinkle dry salt over the carpet before sweeping. Insects do not like salt, and sufficient adheres to the carpet to prevent their alighting upon it.—7. Pulverized borax well shoved in all the cracks and seams; if necessary, sprinkle all over the furniture; it will not discolor or injure in any way the furniture or carpet.—8. Sprinkle Persian insect powder into every infested spot and around the edges of the room on tacking down the carpets. Be sure and get a good quality. That which is pure will cause sneezing on the part of the person applying it.—9. 1 oz. gum camphor; 1 oz. of the powdered shell of red pepper; macerate in 8 oz. of strong alcohol for several days; then strain; with this tincture sprinkle the furs or cloths and roll up in sheets; instead of the pepper, bitter apple may be used. — 10. A small piece of paper or linen moistened with turpentine and put into the wardrobe or drawers for a single day at a time, 2 or 3 times a year, is a preventive against moths. — 11. Where the moths have been unusually troublesome, fumigate the room or closet, or even the whole house, with sulphur, removing any articles liable to be bleached by it.—12. Tarred paper, the same as that used in covering roofs, when cut into slips and placed in convenient situations under carpets and behind sofas and chairs in a room, will repel the moth miller from depositing its eggs. If similar strips are placed inside the backs and seats of parlor suits they will render the furniture moth-proof.—13. Sprinkle furs or woolen stuffs, and the drawers or boxes in which they are kept, with spirits of turpentine, the unpleasant scent of which will evaporate on exposure of the stuffs to the air.

RATS AND MICE.—1. When rats refuse to nibble at toasted cheese and the usual baits, a few drops of the highly scented oil of rhodium poured on the bottom of a cage top, will always attract them.—2. Strew pounded potash in their holes. The potash gets into their coats and irritates their skins, and the rats desert the place.—3. Mix corn meal or wheat flour with plaster of Paris or carbonate of baryta. This forms a hard cake in the rat's stomach and kills. Be careful to keep it out of the reach of children.—4. Gather any kind of mint and scatter it about the shelves, and they will forsake the premises.—5. A tincture of Calabar bean is exceedingly efficacious in preserving entomological and other natural history specimens from destruction caused by mice.—6. Place a quantity of red pepper in cotton and stuff the wad into the holes.—7. Sprinkle a little calomel on buttered bread and place where the rats can get it, putting a dish of water close by. This does not kill them but makes them soon disappear.—8. 1 oz arsenic, 1 oz. lard; mix into a paste with meal, and put about the haunts of the rats. They will eat this greedily. Rat poisons are objectionable because the rats are apt to die in their holes.

ROACHES. — 1. Cut up green cucumbers at night, and place them about where roaches commit depredations. What is cut from the cucumbers in preparing them for the table answers the purpose, and 3 applications will destroy all the roaches in the house. Remove the peelings in the morning, and renew them at night.—2. Red lead, 4 oz.; flour, 1 oz; powdered sugar, 1 oz; mix the ingredients well; use by placing some on pieces of paper.—3. Mix finely powdered borax and fine sugar, half-and-half, and spread around where the roaches are most troublesome. For a few days it may seem that the remedy is doing no good, but soon they will begin to die, and in a short time will disappear. — 4. 1 teaspoonful of powdered arsenic, with 1 tablespoonful of mashed potato; crumble this every night at bed-time where the insects will find it; it is an effectual poison.—5. Place a bowl containing a little molasses on the floor at night. A bit of wood, resting on one end on the floor and the other on the edge of the vessel, serves as a bridge to conduct the insects to the sweet deposit.—6. Mix up a quantity of fresh burned plaster of Paris (gypsum, such as is used for making molds and ornaments), with wheat flour and a little sugar, and distribute on shallow plates and box boards, and place in the corners of the kitchen and pantry, where they frequent. In the darkness they will feast themselves on it and die. — 7. Strew the roots of black hellebore, at night, in the places infested by these vermin, and they will be found in the morning dead or dying.—8. Corrosive sublimate sprinkled around the places which the roaches

infest, will kill them quickly. — 9. Equal parts of powdered borax, Persian insect powder, and powdered colocynth, well mixed together, and thrown about such spots as are infested with these insects, will destroy them.

WORMS, On Dried Fruit. — Dried fruit put away with a little sassafras bark (say a large handful to a bushel), will keep for years unmolested by those troublesome little insects which so often destroy hundreds of bushels in a season.

WARDROBE.

REMARKS.—As this is not a treatise on transitory fashions or styles, but for permanent suggestions and guidance, some subjects will appear to be neglected. But due consideration will show that those omitted will, many of them, prove to be concerning such articles of apparel as are constantly changing in cut, or, like underclothing, are so simply made from patterns always on hand, that it would be a waste of space to treat of them. Thus, while the art of cutting and fitting the upper part of the form is treated of as if for ladies only, it should be realized that the same principles can be applied to fitting men's or children's forms. But the drapery and trimmings of fabrics on the human form constantly change, and directions suitable for these to-day would be antiquated to-morrow. Varieties of shape, material and contrivance are limitless. Hints and helps are all that even an encyclopedia can give. (See DRESS in TOILET.)

APRONS. — An old Swiss muslin dress skirt can be converted into little fancy ruffled aprons. These are pretty trimmed with lace or ruffles of themselves. Ornament the pockets with little bows. A kitchen apron is made as follows: Get a piece of cheviot as long as you are from the turn of the bust to the bottom of your dress in front. Hem each end, sew tape at the waist line for strings. A white one can be made in the same way. A sewing apron is made by cutting a small round apron of calico, or any other material desired; make a deep pocket across the bottom; the large pocket may be divided by stitching it through the centre, and smaller pockets may be added at the top. Tennis aprons made of colored sateen, covered with Madras muslin, are very pretty; they are nearly a yard square, and are usually made with one corner forming the bib, and a band around the waist outside; two corners have ribbons sewn on, and these ribbons tie at the back of the skirt; pink, blue and mauve are the most fashionable colors, and there are bows of shaded ribbon on the two pockets, and a frill of cream-colored lace all round; the Madras muslin is 2 yards wide, so 2 aprons can be got out of 1 yard, or 3 smaller ones. There are other aprons made of plain foulard, with 2 flounces of shaded Surah, and a spray of flowers worked or painted to one side of the plain part.

BABY'S OUTFIT.—We here give an economical account of the articles for a baby's outfit; the number may be increased, or they may be made very elaborate or plain, according to the taste and means of the parties: 6 dresses, 6 day-slips, 6 night-gowns, 6 white skirts, 4 flannel skirts, 2 flannel baricotes or pinning blankets, 6 shirts, 6 flannel bands, 6 pairs knitted socks or slippers, 4 doz. diapers, 1½ doz. bibs. These should be prepared before needed. It is also very convenient to have ready a baby basket fitted up with pin-cushion, pockets, fine brush and comb, powder-box and puff, nursery pins, both large and small, etc. Baskets of the most elaborate description are furnished by dealers, but a very neat one can be made at home at a trifling expense, by lining a square wicker basket with a delicate shade of silesia and covering this with dotted Swiss or similar material, with a flounce of the same around it, and trimming with ribbons of a corresponding shade. These can be made more or less elaborate as the fancy dictates. The skirts may be cut either straight or gored slightly, and about 3½ yds. in length. These to be sewed on straight bands of about 6 in. in width, and from 18 to 20 in. in length. Dresses can be cut simply as slips, or gathered and joined to a yoke; or where more ornament is required the entire front may be composed of lace and embroidery. However, simplicity is preferable as a general rule. The best band or binder is knitted of white wool so as to be very elastic and fit closely, with shoulder straps attached. These to be worn winter and summer while the child is teething. Shawls or blankets may be made of flannel or merino, about 1 yard square and trimmed with lace, crochet edges, embroidery, and in a variety of ways.

CAPE. — Take a piece of paper as long as the cape will be required; cut a perfect circle, and another in the centre large enough for the neck; cut it down the middle; try it on the figure it is intended for; should it require any alteration, make it while on, which can be done by taking a plait down each shoulder; when you have succeeded in fitting the pattern perfectly, lay it smoothly on the cloth and cut it out, creasing the seams on the shoulders carefully, which, if neatly stitched, will not be observed when the cape is made; this can be lined; first cut the lining from the pattern, then the material from the lining; put the two faces together; pin it to keep it in place while running the edge inside all round to the neck; then turn it inside out; smooth it on a table; baste it round the edge to keep it in place until it is trimmed, which can be done by putting on a cross-piece, or rows of braid, fringe or frill; then cord the neck; a bow of ribbon to fasten it makes it complete.

CAPS.—These should be made of very fine linen or French cambric; the border either of plain cambric or with a Valenciennes edging sewed on it; the crown of the cap is about 2½ in. in diameter; it is prettier if worked in crochet, tatting or embroidery; the two former are

Baby's Outfit.

very strong, and quite suitable even for night-caps; the cap is composed of 3 pieces, the crown, the head, and the neck; the head piece is 10 in. long and 5 deep; the neck-piece $1\frac{3}{4}$ by 2; it is joined to the other to form a round, in which the crown is set; and the head-piece is then slightly sloped, to shorten it toward the ears; run 6 shirrings, set in pairs, with fine bobbin in them; they should draw at the end, not at the top of the head; the frills are set on one behind the other; very handsome ones are also made of lace and lined with silk.

CAPS, Dusting.—They are prettiest when made of shining cambric and gay ribbons; but may be also made of plain dark calico, using an oval piece 22 in. long and 18 in. wide; bind this with gray plaid, and put on another strip $\frac{1}{2}$ in. wide and 1 in. from the edge; under this run rubber cord and finish with a knot of ribbon in front.

COATS, To Hang. — A heavy garment, like an overcoat, if hung by the loop at the back of the collar, will soon stretch out of shape by its own weight; a piece of hard wood, long enough to reach from the outside of one sleeve to that of the other, will prevent this; it should have a hole bored through centre, or a loop of strong cord to hang it upon the nail or hook; under-coats and vests may be hung in same way.

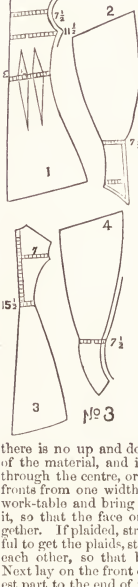
COAT, To Fold. — First, spread it on the table; double the left sleeve from the elbow toward the collar; the other the same way; then the left lappel over the sleeve as far as the back seam, and the other in the same manner; next turn up the left skirt so that the end may touch the collar; do the same with the right skirt; give it a light brushing all over; then turn $\frac{1}{2}$ the coat exactly even over the other half.

COAT, To Make. — To make a coat for a man of medium size $3\frac{1}{2}$ yards will be required. Procure a pattern, either of a tailor or by ripping up a well fitting garment and from it cutting the pattern; it is important that the neck and shoulders fit well; cut out first the body, then the sleeves, and from the pieces the collars, cuffs and facings; cut out the lining in a like manner; with the old coat before you, first sew up the little openings at the top of the coat around the neck; press them; sew the buckram or stiffening on to the lapels and press them; then fit in nicely the stiffening in the front of coat; sew the buttons on the right side; under each button sew to the stiffening a strong piece of brown Holland; mark the button-holes corresponding to the buttons, but do not work the button-holes yet; now prepare the lining, padding and quilting as in model; fit the lining to the outside, basting it carefully to every edge and sew it neatly on the shoulder; now make the sleeves and insert them, taking care to have the fullness on the shoulder or under the arm; press it smoothly; face the lining of the coat down each side of the front with a piece of the goods; now prepare the collar; sew the inside of the collar, with the buckram sewed on it, just as it is on the lappels, to the outside of the coat and the outside of the collar to the lining of the coat; baste the seams together around the neck on the inside; turn the collar over as it is intended to be worn; baste it round the edge; take the binding, begin at the opening of the skirt in the back seam, baste it all around and end where you began; sew it down; press; now work the button holes; put in the pockets; a coat for either lady, child or gent can be made in this way.

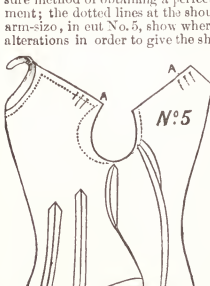
COLLARS AND CUFFS. — Pretty collars and cuffs can be made of any pattern and hem-stitched; cut the pattern and be sure it is a good fit; then cut two layers of white muslin for each collar and cuff; then two of nice linen; take the two pieces of muslin and one of linen; baste them evenly together; if a colored border is desired baste the border around the edge of the three basted together; turn the inside edge in nicely; now baste the second piece of linen on to the first piece; stitch it evenly around the edge; turn, and baste it evenly around the edge; now finish with a neat band if it is a collar; if a cuff, before turning stitch all around with the exception of one little corner; then turn and baste, turning the open corner in neatly; when turned and basted stitch around at the desired depth; if it has a colored border, stitch on the edge of it; they can be trimmed with lace or embroidery if desired; pretty collars for children are made of Paris muslin; cut a strip of sufficient length; put an edging of lace or embroidery on each side, narrow and wide; on the side of the narrow edge run 4 rows of shirring; under the shirring place a straight band, the size of the child's neck and sew the collar on to it; let the wide edge come up to the ends; these are also pretty made of satin, silk or velvet.

CUTTING AND FITTING.—The first thing to be learnt is the measures of the one for whom the dress is to be made. (See *Self-Measurement.*) To illustrate the system of cutting, suppose the following measurements to have been taken: First measurement, length of back, $15\frac{1}{2}$ in.; second measurement, across the back, 14 in.; third measurement, length of waist under arms, $7\frac{1}{2}$ in.; fourth measurement, across the bust, 23 in.; fifth measurement, the chest, 15 in.; sixth measurement, waist, 24 in.; seventh measurement, around the neck, 13 in. Now apply these measurements to the pattern before cutting out the lining. All the alterations are made after seeing that the dart-seams are in the right places. From the front edge to the first dart at the waist line, the measurement should be $2\frac{1}{2}$ in. From the top of the dart to the front of the waist, $3\frac{1}{2}$ in. The bust measurement is 23 in.; the pattern of half the front is $11\frac{1}{2}$ in. As the pattern measures 13 in., to reduce to the proper size, mark at $11\frac{1}{2}$ in., then move the tape up to get the chest measurement. The pattern measures 9 in., therefore mark at $7\frac{1}{2}$ in., taking care to keep the same curve around the arm-size. The double lines show how and where to make the pattern smaller. If the length of the side-body is $\frac{1}{2}$ in. too long, put a plait of $\frac{1}{2}$ in. at the waist. The size around the waist is obtained by placing all the pieces together, and then measuring across them, from the front to the first dart, then between the darts, and from the back dart to the under-arm edge. It measures

13 in., while 12 in. is wanted. Take ½ in. from each side-body, from the arm-side down. (See double lines.) The front edge of the pattern is laid on 1½ in. from the selvage of the lining, this is for turning in for a stay for the buttons and button-holes. After laying the pattern on the lining as it should be, pin each piece in its place smoothly, pinning through both thicknesses of the lining. See that the bottom of the waist comes straight upon a cross-thread of the lining. All waist linings should be cut double, or both sides at once. When the pattern is all pinned on, trace its outline on the lining with the tracing wheel. After tracing the several pieces of the pattern, cut out the lining, allowing ½ in. for seams, except on the shoulder and under the arm, where an inch is to be given. Then remove the pattern from the lining and proceed to cut it in the outside. If there is no up and down to the figure or nap of the material, and if it is not folded down through the centre, or wide enough to get two fronts from one width, lay one end upon the work-table and bring the other end over upon it, so that the face or right sides will be together. If plaided, striped, or figured, be careful to get the plaids, stripes, or figures opposite each other, so that both sides will be alike. Next lay on the front of the waist, with the largest part to the end of the material (as shown in cut No. 4). If there is a right and wrong side, and no up and down, still follow the above; if there is an up and down to the material, either in the nap or the figure, that requires the goods to be cut all one way, then if the material is cloth and folded down the centre, do not unfold or open it, but cut double, with each piece of the lining laid with the upper part toward the top of the nap. Some materials, such as velvet, velveteen and plush cloth, require to be cut the opposite way of the nap. If a material is of a width that will cut to better advantage by cutting it single, do so. In cutting from the single width care should be taken not to get two fronts for one side, or when cutting from the double, not to cut the same piece twice, or instead of two pieces there will be four. To avoid this error lay one-half of each piece of the lining aside, that it may not confuse in cutting. The rule for the cutting of the single width, when there is a right and wrong side, or an up and down face, is to cut the entire pattern to the best advantage; this will give half of the garment; then cut the second half by the first, laying the faces of the material together. After cutting out the body of the dress, such as the waist and overskirt, or polonaise, skirt and sleeves, baste together before cutting the trimming. Begin to baste by separating the lining from the outside, if it has been cut double; then lay the outside down upon the table, with the wrong side up, and put the lining of the same piece upon it with the right side up; be careful to smooth out every wrinkle or fold of both the lining and the outside. If the outside has been pieced, do not baste the lining on it until the seam has been well pressed. Always join the lining and outside together smoothly before basting them; if the material is velvet, silk or satin use fine needles instead of pins; after basting the lining and outside of each piece firmly together near the edge, take the side-body of the left side and pin it in its place on the curve of the back, holding the back a little full, from the arm-size about half way down to the waist, always commencing to baste the side-form in from the arm-size: pin the rest of the seam evenly, and alike on both sides, down to the bottom of the waist; if there are any plaits to be put in, baste them; the right side-body must be pinned in to correspond exactly with the left, always commencing to baste it in from the bottom of the waist, in order that the back piece or full side shall be up; then join the back down the centre, making the seams according to the marks made by the tracing wheel in the lining; do not trust to the outside edges being even, but see that the tracing of the upper and under sides are exactly opposite, and make sure that the needle goes down and comes up in the lines made for the basting; the front should now be basted smoothly on the lining, commencing at the neck and following down the line traced for the hem, then up and down on both sides of the darts. Great care should be taken not to get the outside in the smallest degree tighter than the lining, especially in closely-fitting portions of the waist. The front darts should slope 1 in., and be placed 2 in. from the edge of the front at the bottom of the waist, and 3 in. at the top; the proper distance between the darts is about 3 in. at the top, tapering to 1½ in. at the bottom of the waist; the front dart at the top should be from ½ to ¾ in. shorter than the back dart; while basting let the work lie on the lap; do not pin it down or hold it over the



fingers; after all the seams are basted except the shoulder seams, take the waist by the middle seam in the back, folding it together and putting a pin at each seam, in order to see that the corresponding seams are even; this is the only sure method of obtaining a perfectly fitting garment; the dotted lines at the shoulders and the arm-sizo, in cut No. 5, show where to make the alterations in order to give the short and high



effect to the shoulder seams; letters A A show where to give the required fullness to the front and back of the waist in sewing up the shoulder seams; stretch the front about halfway down the seam, but not enough to have tho back show any fullness when sewed; then reverse the fullness to the front seams, stretching the back the rest of the way to the bottom; in basting the position of the darts and the shape of tho back and side-forms have much to do with making the form appear round or flat; cut No. 6 illustrates how and where to basto the lining on the material; now cut the sleeves by

the pattern and baste the lining carefully on the outside; baste up the inside seam first then tho outside seam; make the outside seam come out even at the top and bottom, and if tho upper side is longer than the under, let it fall in gathers at the elbow; if the sleeve is then to be made tight the armhole should be made small and the sleeve just large enough to fit in without any gathers; if the sleeve is too large it should be cut off along the outside seam. When it is all basted together try it on, wrong side out, and make such alterations as are necessary until it fits the figure perfectly; after having made the basque or waist, measure off first the breadths of the skirt; pin or tack the breadths together, and if gored, be careful that the gores are even, and the sweep of the skirt falls exactly in the centre of the back breadth; be careful that no breadth is turned wrong side out, or with the pattern upside down; allow in the gored skirt for the stretching of the cut edge more than the selvage, or the work will pucker; in a plain skirt begin the seam at the bottom, that any unevenness may come at the top, but in a gored skirt, begin at the top, and let the difference, if there is any, come at the bottom; in case of a cut edge and a selvage coming together, the selvage must be held from you.

We are indebted to Messrs. Strawbridge & Clothier, of Philadelphia, the far-famed dry goods and furnishing emporium, for their courtesy in allowing us to copy these directions in the art of cutting and fitting, as also for other suggestions and illustrations from their handsome *Quarterly*, in which ladies will find a great fund of information, profusely and beautifully illustrated.

DRESSES, For Girls. — For little girls make the dresses as plain as possible; a very pretty style and one that does not change is to make a yoke of some white material, fancy or plain; to this shir a long slip of the same material; make the sleeves to correspond with the yoke; fasten at the wrist with a ribbon, letting a little ruffle fall over the hand; the slip can be tucked and have lace edging and insertion or embroidery to correspond with the yoke; princess dresses, relieved by white aprons, are also pretty; whether of silk or calico, make them plain; for a miss of over 16 the style depends a great deal upon fashion.

DRESS, For Ladies.—For a lady of medium size, 15 yds. of silk will make a neat, plain dress; but if it is trimmed the quantity must be increased accordingly; of double width but half the number of yards is required; for a calico dress, 10 yds. will make a plain suit, 14 a very pretty one; of lawn about the same amount is required; 4½ yds. of lining are needed for a skirt, 3 yds. for a basque; the other articles which are needed for a dress are: 2 spools of buttonhole twist, 2 of silk, 1 of basting thread, 1 braid for the skirt, 2 whalebones, hooks and eyes for skirt, buttons for front of waist; the remaining trimmings depend upon fashion. Always have the materials required ready before the sewing is commenced. After it is all cut and fitted (see *Cutting and Fitting*), stitch the seams carefully right under the basting. Overcast all the seams neatly, putting stays on the darts and under arm seams; next make the collar; if it is a turn-down collar, baste it on the wrong side of the waist, stitch and fell the lining of collar on to the waist goods; if a standing collar, stitch it on the right side of waist and fell the lining of collar on to the lining of waist; now put in sleeves; stitch them strongly and overcast the seams; don't forget to put in an insido belt to support the strain at the waist; sew it to each seam; be sure that it is at an equal distance from the bottom on each corresponding seam. The waist is now done. Now the drapery has to be put on; this depends so much on fashion that no direct rules can be laid down; be sure though that it is faced neatly, that all stitches are small and neat, and that where it is looped up the stitches are made strong, to prevent tearing. If the dress is a summer dress it need not be lined, but a handsomely trimmed or plain corset cover sewed in as a lining makes a great improvement.

HATS AND BONNETS. — Shapes depend on fashion. The best materials should be used in trimmings; cotton velvet or ribbon will soon look rusty; but silk may be used again. An ostrich feather, undyed, is worth many false wings, butterflies, etc. Simplicity shows taste; a wreath of flowers, with a bow, is beautiful; or a feather instead of the flowers; the flowers can go all around with no other trimming; ribbons, silk, velvet, or plush, with flowers, feathers or lace, fixed stylishly, make beautiful hats; summer hats are pretty trimmed with lace or flowers.

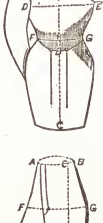
JACKETS. Crocheted. — It takes 4 oz. jacket yarn for a jacket without sleeves; use brown for the jacket and scarlet for border, or chinchilla for jacket and blue for border; the long crochet stitch is the quickest; shape by a basque, knitting the back, then the fronts; crochet together on shoulders and under arms; put on a border of shell stitch, and the same around the arm-holes; leave places for button holes as you crochet; line with a strip of cambric and work with yarn; in crocheting the fronts, make the bias by widening; that is, make a stitch from a loop, shaping by the biases in the basque.

LINEN, To Detect Cotton in. — 1. Boil; then dry; put in common vitriol for a minute; wash in water several times, then in a weak solution of soda or potash; the cotton dissolves, or becomes opaque white, while the linen is transparent. By comparing with a portion not tried, the cotton can be estimated. — 2. Immerse in a mixture of equal parts of hydrate of potassa and water when strongly boiling; take out; press between blotting paper. The dark yellow threads are linen, the white or bright yellow are cotton.

MITTENS. — Use three-threaded Saxony yarn and No. 20 needles; set up 34 stitches on the first needle, 31 on the next and 22 on the third, and knit once around plain; 3d row: Seam 2, knit 1 plain, throw the thread over and knit 1; do the same for 7 additional stitches; this will make 17 stitches from seaming; seam 2, slip 4 stitches on to a hairpin and knit the next 4; slip the stitches from the hairpin back on the needle and knit them; seam 2, knit 1, throw the thread over and knit 1; do the same for 7 additional stitches; seam 2; this is the end of the first needle and forms the back of the mitten; knit 1, throw the thread over and knit 1; do the same for 7 additional stitches; seam 2; repeat until you finish that row and reach the first needle again; 4th row: Seam 2, slip and bind, that is, slip 1 stitch, knit 1 and draw the slipped stitch over the knit one and drop it from the needle; knit 13 plain, knit 2 together; this will give 15 stitches between the seamings; seam 2, knit 8 plain, seam 2, slip and bind, knit 13 plain, knit 2 together; repeat from "seam two"; 5th row: The same as 4th; there will be 13 stitches between the seamings; the 8 stitches which form the twist in the middle of the first needle are never altered; 6th row: Same as 4th, giving 11 stitches between seamings; 7th row: Seam 2, knit 1, throw the thread over and knit 1; do the same for 7 additional stitches; seam 2, knit 8, seam 2, knit 1, throw the thread over and knit 1; do the same for 7 additional stitches; 17 stitches between the seamings; repeat; 8th row: Same as 4th; 9th row: Same as 5th; 10th row: Same as 6th; 11th row: Same as 7th; 12th row: same as 3d; 13th row: Same as 4th etc.; the first needle has two shells with a twist between them; the second needle has 3 shells and the third 2 shells; these shells are begun with 9 stitches, increased gradually to 17, and reduced to 9 again; the twist in the middle of the back is made by slipping the stitches on the hairpin every second time that thread is thrown over increasing the shells to 17; these shells are carried up about half a finger, to form the wrist, after which the second and third needles are knitted plain; the fancy back is continued until seven rows before beginning to narrow; when the shells on the second and third needles are turned into plain knitting it must be when they are reduced to 9 stitches, between the seamings. To shape the mitten, knit 12 rows after these two needles are turned into plain work; then on the third needle widen at the 16th stitch, leaving 15 at the other end of the needle; every third row round, widen at the 16th stitch from one end of the third needle, add the 15th from the other end; this widening, which is for the thumb, must be proportioned according to the shape of the hand; when long enough slip the thumb stitches on a thread, cast on 9 stitches in their place, join the works and continue the hand until long enough to reach the end of the finger; knit eight rows plain all the way round, and the next row narrow every 7th stitch; knit seven rows plain and narrow every 6th stitch, six rows plain and narrow every 5th stitch, and so on until after you narrow every stitch, then bind off and whip the end together on the wrong side; take up the thumb and the 9 stitches that were made between; narrow at each end of these extra stitches every third time round until they are all narrowed away, which will make a little gusset; when the thumb is long enough narrow every 4th stitch; knit four plain rows and narrow every 3d stitch, three plain and every 2d stitch; two plain and every stitch and bind off; if coarser work is desired use No. 18 needles and set up one less shell, or make only 7 stitches in each shell instead of 9.

PANTS, To Make.—It will require about 2½ yds. for a pair of pants. Spread the cloth on a table; pin the patterns down smoothly on the cloth, folded double that both legs may be cut out at the same time; let the nap run down the leg; cut so that the remnants may be left in pieces as large as possible; line from waistband 6 or 8 in. down; sew the facings on the pockets; press these down; insert the pockets; now make the upper front part; baste together the legs; sew the long seams and press them; stitch the legs together on the back seam; baste on the waist bands; sew them; add the triangle at the back; now the strap and buckle; sew on the buttons; now finish the bottom of the leg; examine your model closely; be sure and have the buckram fit nicely and stitch so the stitches will not show through; have a hot iron to press with; dampen the seams with a sponge; sew on a lock-stitch machine.

SELF MEASUREMENTS, For Gentlemen.—*Boy's Suit.*—From nape of neck to heel of boot; round the neck, as for shirt; from H to I for elbow point; on to K for length of sleeve; round the breast, underneath the outside garment; round the waist, underneath the outside garment; length of the trousers inside the legs, measure as in trousers for men, from centre of fork down to K.

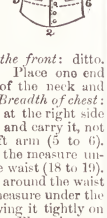


Coat.—Take these measures outside the coat: From A to B and on to C; from H to I for elbow point; on to K for length of sleeve. Take these measures under the coat: From D to E around the breast; from F to G around the waist.

Pants.—From A to B round the waist; from C to D top to bottom; from centre of fork, close up, down to K for length of leg inside, keeping the leg straight down; from F to G round the seat; from H to I round the bottom; L round the knee.

Shirt.—Pass the tape round the neck; take the length of sleeve; measure with arm bent as in coat, from centre of back, round the elbow, to within ½ in. of the knuckle; measure round the hand, now round the chest; each measure to be in inches, and the number of the same to be given.

Vest.—Take these measures over the waistcoat: From 1 at centre of the back round the inside edge of the collar to height required for top buttons; from top button to 2 for length in front; from 3 to 4 round the breast; from 5 to 6 round the waist.



SELF MEASUREMENT, For Lady.—*Length of skirt in the back:* Measure from the waist at the middle to touch the floor. *Length of skirt in the front:* ditto. *Length of waist in front:* Place one end of the measure at the base of the neck and carry it to the waist (1 to 2). *Breadth of chest:* Place one end of the measure at the right side of the chest, close to the arm, and carry it, not too tightly, across to the left arm (5 to 6). *Length under the arm:* Place the measure under the arm and carry it to the waist (18 to 19). *Size of waist:* Bring the tape around the waist evenly. *Arm size:* Slip the measure under the arm and meet it without drawing it tightly on the shoulder. *Length of arm:* Place the tape on the shoulder at 9, carry it down the outside, doubling at the elbow, 10, to the wrist, 11. *Breadth of back:* Draw measure tightly from shoulder to shoulder (16 to 17). *Bust measure:* Draw the tape tightly around the form, letting it lie across the front on the line 3-4. *Length of back:* Place the tape at 14 and carry it to 15. *Shoulder seam:* Carry the measure from 24 to 25.

SKIRT, Infant's. To Knit. — Cast on 82 stitches; purl across; knit across plain; slip off first stitch, narrrow 1, 2 plain, thread over and knit 1, thread over and knit 2, narrow 2, knit 2, thread over and knit 1, thread over and knit 2, narrow 2, knit 2, etc., across; purl across; same as 4; knit across plain; purl across; knit across plain; begin at 4 and so on to 10 until you have 4 times knitted the inclusive rows, and you will have 4 rows of scallops, which form the bottom of the skirt; then knit 2 plain, purl 2, 2 plain, purl 2, and so across; make 45 rows in this manner, being careful to have them match, so as to give the work the appearance of seaming; cast on 16 stitches for the shoulder; then knit across the entire width, shoulder and body; purl across; knit 2, thread over and knit 1, narrow 1, knit 2, etc., across; this last row makes a row of holes, through which narrow ribbon can be drawn to make the neck smaller, if desired; bind off; the sleeve is made of the 4 rows of scalloping in the same way as that round the bottom of the body, and joined to the shoulder.

SHIRTS, To Make. — Baby's shirts should be made of cambric; linen is too coarse; they are a straight piece with the arm-holes cut out and the shoulders shaped; they may be shaped under the arms also; fell the seams neatly so that they will not rub the tender skin. Gentlemen's shirts are made of white muslin with fine white linen for the bosom; the very first thing to do is to set the linen bosom on the front; stitch it twice across the lower edge, and cut out the neck by the shirt pattern; next finish the back. If a yoke shirt is to be made, gather the fullness, and placing it between the front and back of the yoke, sew the seam and turn the yoke, leaving the seam inside; if it be a sack-shirt, face the back for a depth of 12 in. Next sew up the shoulder seams, always leaving the facing of the back or the lining of the yoke, to stitch down on the right side; this makes all smooth and well finished. Then take the sleeves, which have already had the wristbands sewed on, but are still open from wristband to shoulder, sew

them into the body of the shirt, leaving ½ in. to turn down for a facing; this makes unnecessary the troublesome arm-hole facing and gives the requisite strength and finish; now comes the long seam, closing both the sleeve and the body, and almost finishing the garment; this seam must be carefully felled; make the narrowest hem possible round the bottom of the shirt; stay the ends of seams with tiny gussets or a tape stitched firmly across; the pattern ought to be so perfect that the neck will need no trimming out; a circular band is the best fitting, and this requires a pattern; upon the set of the neck band depends the fit of the bosom and the comfort of the wearer; use a tape measure that it may be neither too large nor too small, but just right; shirt bosoms should always be lined. Woolen shirts are the best for farmers, both in summer and winter; they absorb the perspiration, prevent chills and protect the person from sudden change of temperature; the colors are permanent, and with wide turndown collar of the same material, blue flannel makes an appropriate and tidy garment.

SHOES. Creaking. To Prevent. — Rub a little olive oil into the sole, especially about the waist and ball; in boots intended for out-of-door wear, avoid letting the oil get into the seams, as it might, by dissolving the wax on the thread, be the cause of leakage.

SHOES, To Deodorize.—A strong solution of iron and copperas in water will remove the disagreeable smell arising from boots or shoes worn during the summer months.

SHOES. To Dry.—When taken off, fill full of dry oats; this will rapidly absorb the moisture; as it performs this action, it swells and fills the shoe, keeping the form good, and drying the leather without hardening it.

SHOES. To Polish.—Brush off before blacking; never wet, nor allow the blacking to dry before polishing. Patent leather will look handsome if rubbed with unsalted butter, rubbed in with flannel, and polished with buckskin. French kid can be made to look well, if rusty, by a mixture of equal parts ink and sweet oil, applied with camel's hair brush and dried in by the fire.

SILK AND WOOL, To Detect Cotton in. — 1. Unravel and burn the threads; cotton burns freely, leaving little or no black charcoal; wool and silk shrivel up, leave a black charcoal, and give a strong smell. — 2. Put into chlorine water or bleaching liquor. The cotton is whitened, and the silk and wool turn yellow, and can be distinguished by a lens. — 3. Take a thread and break it; if it breaks off brittle, it is cotton; if, in breaking, fibres pull out, it is wool or silk.

SOCKS, Crocheted. — With single zephyr of the desired color and a rather small hook make a chain long enough to go around baby's leg, probably 35 stitches, more or less; join them together to form a round, and work in DC (double crochet), putting the hook through the underhalf of each stitch for about 15 rounds; this forms the leg. Now, for the top part of the foot, raise 13 stitches, crochet tricotee; that is, put in the hook as before, pull the wool through and leave the loop on the hook; work these 13 stitches forward and backward in crochet tricotee for 10 rows, forward and backward making 1 row; on the next row narrow by drawing the wool through the first 3 vertical stitches on the right hand side of the piece, and again through the 3 stitches immediately before the last loop; repeat these narrowings on the next row; there are now 5 stitches; make a DC in each; the top part of the foot is finished. Next, work down the left side of this piece in DC; then around the stitches at the bottom of the leg, and afterward along the right of the foot and around the toe; in doing this be careful about the left side of the foot; the hook here should be put under the last of the afghan stitches down the side and through the stitch below; work round and round the bottom of foot and leg in DC for 6 or 7 rounds; then turn the work inside out, place the 2 sides carefully together, put the hook through 7 stitches at the the end and draw the wool through the whole; crochet in DC the bottom edges of the foot together till only 7 stitches are left; put the hook through all of these, draw them together to match the toe end, fasten off, turn it inside out again, and the foot is finished. Next fasten the wool on the top of the leg; make 3 chains, work 2 treble into the same hole, miss 2 stitches, and fasten with a DC into the 3d stitch; make 2 chains, work 2 trebles into the same hole as DC; miss 2 stitches and work a DC on the 3d; repeat this scallop all around the top of the leg; the work is now complete with the exception of a little chain and tassels, or a narrow ribbon around the ankle. Recapitulation: Cast on 35 stitches for the top of leg; leg 15 rounds deep; top of foot 13 stitches wide, and 10 rows to narrowings for the toe; 2 rows of narrowings, 8 stitches in all; toe, 5 stitches wide; depth of foot, 6 or 7 rounds; finish with scallop on leg and ribbon around ankle.

STOCKINGS, To Knit.—We give the following directions for knitting silk stockings, but the same directions will also apply to wool or cotton, except that the number of stitches cast on will be less in proportion as the size of the yarn is larger: Materials, 2½ oz.; cast on 84 stitches with No. 16 or 17 needles; ribbing 84 stitches, knit 2, purl 2 for 44 rounds; legs, 84 stitches; increase 1 stitch on first round, and knit plain for 10 in., including ribbed top; narrowings, 85 stitches; decrease 6 times with 7 plain rounds between or 12 decreasings in each; ankle, 73 stitches; knit 30 rounds plain; heel, 37 stitches; knit 36 rows; turn the heel Welsh fashion; pick up 19 stitches from each side of heel; foot, 72 stitches; knit 50 rounds, or 5½ in., including heel; toe, 72 stitches; decrease 10 rounds, 40 decreasings in all with 1 plain round between; cast off with 16 stitches on each needle. *Gentleman's plain silk sock.*—Material; 3 oz. silk for 1 pair; needles, No. 16 or 17; cast on 108 stitches; ribbing, knit 2, purl 2 for 50 rounds; leg, 108 stitches; increase 1 stitch on back needle 1st round, and knit 30 rounds plain; narrowings, 109 stitches; decrease on the 40th, 48th, 56th, 64th, 72d, 80th and 88th rounds; ankle, 95 stitches; knit 42 rounds; heel, 49 stitches; knit 38 rows; narrow after the Welsh fashion; pick up 24 stitches on each side of heel;

foot, 95 stitches; knit 90 rounds, or 9½ long including heel, longer or shorter, according to length of foot required; toe, 95 stitches; narrow every 3d round till only 44 stitches remain; knit front and back stitches together and cast off. *Lady's ribbed silk stocking.*—Materials, 4½ oz. of silk for 1 pair; cast on 121 stitches on No. 16 or 17 needles; rib, (knit 3, purl 1) for about 14 in. in length, purling 2 in the centre of the back needle where the seam is; narrowings, 121 stitches, 12 times, decreasing 1 on each side of the seam stitch as in plain knitting with 7 rounds of plain ribbing between the narrowings; ankle, 97 stitches; rib about 2½ in.; heel, 49 stitches; rib 36 rows, knitting 2 together in the middle of the last row; heel turned in Welsh fashion; pick up 20 stitches on each side of the heel; foot, 96 stitches; knit about 8 in. long including heel; toe, 96 stitches; narrow every 3d row 13 times; cast off with 22 stitches on each needle.

TRUNKS, To Pack. — After the trunks are ready, get everything together which is to be packed, and then go quietly and systematically to work; put the heavy things at the bottom, packing them tightly, so that they will not rattle about when the trunk is reversed; put the small articles in the tray; anything which will be scratched or defaced by rubbing should be wrapped in a handkerchief and laid among soft things; if you must carry anything breakable, do it up carefully, and put it in the centre of the trunk, packing clothing closely about it; bottles should have the corks tied in with strong twine; put them near articles which cannot be injured by the contents if a breaking occurs. If the dress is separate from the corsage, it can be laid in the tray with only a slight fold at the top of the skirt; the train is spread out first; then every puff or fold is kept up by soft wads of yellow tissue paper, white having been found to darken white and delicately-tinted satins; this is to prevent the creasing or crushing to which velvet and satin are particularly liable; large sheets of the paper are then placed over the whole. The waist is next taken and laid out flat upon the paper-covered skirt. The sleeves are filled with paper so as to retain the shape made by the arms; every button is covered with paper, and under bead fringes, etc., are laid pieces of paper to prevent discoloration or cutting; over the whole is then placed a final layer. When the top tray is reached, and, perhaps, the next one also, beside the paper a sheet of the finest cotton batting, such as florists use, is placed over it, and, in turn, over this a layer of oil silk. Tack on the trunk a card with your permanent address; as this card is to be consulted only if the trunk is lost, it is not necessary to be constantly changing it.

UMBRELLAS, To Cover.—To cover one sufficiently well for common use, is not a formidable task; if a whole section of the worn-out covering remains, it may be used as a pattern for the new; or, cut a paper circle of about the desired diameter; make the circle 8 sided; cut this into 8 triangular pieces; the base will be for the selvage; now you have a perfect umbrella pattern minus the seams, for which allowance need be made only along the half toward the centre; use old muslin first.

VEST, To Make.—In cutting a vest ¾ yards of material will be required; pin the patterns smoothly on the cloth folded double; after the fronts are cut, cut out the collar, facings and pocket-welts; now cut the back, lining, and pockets; before removing the pattern from the front, mark with chalk the places of the pockets; first stitch up and press the little gore beneath the pocket; cut the places for the pockets; sew on the welts; insert the pockets and press; on the right side baste a strip of strong linen under the buttons; sew on the buttons strongly; sew on the lining of the collar to the outside front of the vest; stitch on the facings down the front and press; also on the bottom; now sew the outside of the collar to the lining of the vest; baste upon it the buckram; fit the outside and lining neatly together; fell all around; proceed in the same way with the left side now; only work the button-holes last; make and baste on the back the buckle strap; sew the back and fronts together at the shoulders and under the arms.

"LA, MISS! HOW SWEET YOU LOOK!"

TOILET.

DRESS.

COLOR.

HARMONY.

REMARKS. — Near the face the utmost care must be used to keep the colors soft and indescribable; for a brilliant color destroys the finest complexion, and the aim of dress is to enhance, not to destroy.

BLACK. — When not worn for mourning, black will bear bright colors, and sets off gold ornaments effectively, as also a fair complexion. Black velvet for diamonds and lace, is very effective, and harmonizes with all bright colors.

BLUE. — This harmonizes with orange and a warm, rich brown; it is discordant with yellow; intolerable with green. Blue requires white next to the complexion. Other harmonious combinations are blue, crimson, gold, salmon, drab, stone, white, gray, straw, maize or chestnut.

CERISE. — This harmonizes well with silver-gray, lilac, or a pale lavender; will bear, in addition, a little gold, and then may allow a point of scarlet or crimson. Blue with cerise is harsh; but blue and gold, arranged in small quantities, will harmonize.

CLARET. — Harmonizes with orange and gold, but not with yellow. Rich if trimmed with black lace.

CRIMSON. — This is often seen with blue in paintings, but it requires white to harmonize. It will bear blue and gold, or orange, combined with discrimination; it will bear orange alone, but is improved by the softening of black or white lace. Crimson and purple are discordant alone, but crimson will bear purple and pale green in small quantities; it is dangerous to the complexion, unless clear or glowing and slightly olive, when white should be placed between the complexion and the color.

DRAB. — The drabs, fawn, mauve and mouse colors, have much the same general character as the grays, but are not so cold in tone. Crimson, blue and green relieve.

GRAY. — The grays adapt themselves to bright colors. Crimson or scarlet is effective upon a dark ground. The grays require white next the complexion when trimmed with their own color.

GREEN. — Grateful to the eye, but difficult to manage. Harmonizes with pale red; better with pale scarlet; but for an evening dress is most effective with gold; in the open air agrees well with white, and may be relieved with scarlet or crimson used sparingly; is dulled in effect by black. Very dark green requires white or crimson; it harmonizes with blue or pink of certain shades. Light green looks well with white; may be used with a darker shade, or a rich brown.

LAVENDER. — Lilac, lavender and mauve harmonize with cerise, used sparingly, and with gold; but are better trimmed with the same color of a shade darker or lighter; white may be used freely; black sparingly; lavender takes black for half-mourning; mauve takes white or black for slight mourning.

MAGENTA. — A variety of claret; improved by contact with black; injured by green; destroys scarlet placed upon it in small quantities.

MAROON — Has a tendency to brown; harmonizes with gold or orange; will bear a little green; heightened in effect by white or black; suits but few, and requires skilful handling.

ORANGE. — Effective in the evening; with purple has a splendid appearance, but suits only a tall commanding figure; black, especially in lace, is an efficient contrast; white is less effective, but looks well by gas light; orange harmonizes well with blue, but would form a doubtful combination in dress; minute points of scarlet, black or white may be added, but for dress orange is best alone, or with purple, black, or white.

PINK. — Looks best alone, or with pure white;

effective with narrow lines of black, or black lace; bears silver trimming, and with dark green or light blue makes a pretty combination.

PUCE. — Requires gold or orange. It is brightened by scarlet; not a good color.

PURPLE.—Has a magnificent effect with gold. A clear crimson or scarlet brightens it, but requires management as to quantity; this combination is improved by gold, or a little orange or amber. A minute quantity of green, as a tiny sprig, suits some shades. White and black may be used freely.

RED — A pale green looks well with it in small quantities, but a pale sea green, pearl or silver-gray, better. Blue and red are of an opposite character, but certain shades look well together.

SCARLET. — This, in an opera-cloak or fancy dress, has a brilliant effect trimmed with gold, and harmonizes well with white; in trimmings it is a valuable addition to gray, or to any of the light neutral tints; will bear black lace or swan's-down.

WHITE. — White muslin is appropriate for the young, and for festive occasions. It admits of the brightest trimmings, though scarlet and blue are most effective. Dull gold is effective with rich white silk or satin. Lace, either black or white, looks well, and colored tulle is effective over a white silk or satin underdress. Faintly tinted whites are effective, with the color of the tint as trimming, but look badly in contact with white.

YELLOW. — Harmonizes best with purple. Black may be used as trimming. Amber, straw, primrose and canary, are feebler in effect than orange; these shades are rendered weaker by contact with any strong color or tone; black looks well in lace only; trimmings of a faint crimson or cerise have a cheerful effect, but require a little dash in the wearer; white may be used as lace, but with care, and will call for the addition of small points of stronger color.

SUITABILITY.

REMARKS. — No complexion can bear every hue; try them all; wear that which is most becoming. Complexions require the colors that enforce their peculiar excellence, and render defects less conspicuous. The pink of the complexion is brought out by a green setting in dress or bonnet; any lady who has a fair complexion, that admits of having its rose-tint a little heightened, may make effective use of green; but it should be delicate, since it is of importance to preserve harmony; when there is in the face a tint of orange, mixed with brown, a brick-red hue will result from the use of green; if any green at all be used in such a case, it should be dark. A lady with a florid complexion should choose bright red, violet, or other colors which will out-shine the high tone of the complexion; for jewels, diamonds, corals, garnets; a diamond pendant on a band of ruby velvet will put a florid face in eclipse at once. A lady of a pale complexion will dress with advantage by choosing grays of all shades, with bows of pale yellow, or black, with relief of pink garnets, lava and cameos. All shades of blue or green, and some tints of purple and red, suit a sallow complexion. Intensely pallid complexions, if shaded by black hair, will not bear a dead white against the face, and only the softest and finest lace in collar or ruffle is becoming. A light, rosy complexion harmonizes with a silver-gray or pearl; gray tints will be found to suit most complexions. A pale complexion, if healthy and natural, is improved by black; black does not suit the extremely pallid complexion. Blue imparts orange, which enriches white complexions and light fresh tints; it also improves the yellow hair of blondes.

BLONDES, Colors Becoming to.—If the hair is dull, light brown, no brilliancy of complexion, the eyes gray or blue, then never wear red, fawn colors or gray. Wear black, creamy white, pale pink, pale blue, invisible green. If the hair is auburn, the eyes brown, choose scarlet, blue, gold or purple. To set off a fair blonde complexion to advantage choose pale pink, rose, lilac, or white, or dark green, dark purple, violet or caroubier. Blue should never approach red hair. Choose for red hair, white, of a creamy tone, black, invisible green, rich bottle green, rich blue green, plum color, amethyst, brownish purple, pale yellow, brown, olive green, gray green, stone gray, claret color, maroon, gold color, pale amber, dark amber, reds approaching amber. The following should be avoided: Blue of all shades, blue white, pale green, scarlet, or all bright reds, bright rose pink, all violet pinks, blue purple, lavender. Chocolate colors, and warm browns partaking of red, may be worn by fair or dark persons, provided they be not too pale, in which case the contrast will render the face death-like. For the golden blonde with hazel eyes the proper colors are, turquoise blue, rose pink, warm greens from dark to light, cream white, reds, yellows, ambers, purple, violet, black, warm grays, fawns, brown, flame color. The colors to be avoided are, cold blues, mauve pinks, cold greens, light pink, blue white, lavender, cold lilacs, cold grays. The golden blonde with gray, green or light hazel eyes, and pale, luminous "matte" skin, must make quite a different choice of colors, namely: Olive green, light and dark, black, cream white, all soft yellow greens, stone gray, blue gray, gray blue, turquoise blue, pale peacock blues, transparent white, mauve pinks, amethyst, light and dark, heliotrope in all shades, pale amber. The colors to be avoided are, orange, brilliant yellow, scarlet, tan color, heavy blue green, blue white, blue purple, cold blues, lavender, fawns, frank pinks, all reds, from dark to light. The following are the colors for a cool blonde: Jet black, blue black, cold dark green, cool pale green, blue white, cool grays, all cold blues, heliotrope purples, cold pale violet pink, cold lilacs, lavender. The colors to be avoided are: Reds, warm blues, yellow greens, olives, browns, yellows, warm violets, ambers, cream white, fawns, tans, russet.

BRUNETTES. Colors Becoming to.— The color which most enhances beauty is decidedly yellow; bright red or green are becoming, as are all bright colors. Diamonds or amber jewelry suit best. For brown black hair, steel-gray eyes and a fair skin, with rosy color, the following colors suit: Green, of all dark or full shades; blue

white, cream white, blacks, fawns, grays, reds, dark to light, rose de chine, gold color, gray-blue, all shades of blue, lilac and violet. Avoid pale green, old gold, ali fade colors, and too subtle tones, like mauves. Perhaps no color surpasses the effect of unrelieved black. Black velvet should be avoided where the contrasts are too startling. With black hair and a high color the effects are rarely in good taste, though often exceedingly brilliant; while a dark green, claret or blue would be more harmonious. For very dark-brown hair, dark-brown eyes and matte complexion the following colors are to be chosen: Black, cream white, purple, violet, amber, olive green, light or dark, rose pink, reds, especially dark reds, all the rich dark-red purples, maroons, some dark-blue greens, like peacock, russet. Avoid blue white, all light and cold blues, grays, mauve, cold yellows, pale greens. Where this color of hair and skin is combined with green hazel eyes, the range of color may be extended to cooler tones. Usually the complexion becomes a little fairer with green or hazel eyes, though the general tone is the same. The brown haired type, with warm brown skin and brown eyes, seems often to have an instinct toward certain barbaric contrasts; blue and red, black and yellow, blue and red and blue and yellow are very fine with it; but avoid black, blue, white and all pale and cold colors; all the blues worn must be warm and rich; the following colors are to be chosen for it: All reds, amber, all yellow, cream white, brown, maroon, olive green, rose pink in small quantities, all warm blues from dark to light, tan colors, fawn colors, tea colors, flame color. Avoid cold and pale blues, light green, all cold greens, pale violets, violet pinks, black, blue white, even the transparent blue white and gray of white muslin. There is a type met sometimes, that is most brilliant. The hair is black, the eyes a very dark brown, a golden-brown skin, with a rich, warm color in the cheek, the teeth often very brilliant. This type should never wear black at all. Nothing is better than the warm, dark browns, the claret colors, the deep ambers, creamy white, and yellows. It should wear no pale colors, but a warm, pale pink or flame color, and for jewels or ornaments, topazes, garnets, amber and diamonds. The most frequent type of the black-haired is combined with black eyes and a sallow complexion; teeth often dazzling white and mouth large; black, relieved with transparent white, a dark, warm gray, and occasionally a flame color or a dull red form the best setting for this type. There is very little color in it, and no color is truly harmonious with it. Especially where the eyes are fine, nothing so good can be done as to dress this type in black, with lace at the throat, white lace, to cast some light upon the face. There is no more beautiful type of the black-haired than that with pale skin and blue eyes; its possible range of color is wide; its most judicious range of color is yellow and green, and, though it may wear purple, nothing will be better than blues and some reds, though the blues are the best; blues of the sapphire shades and blues of the Chinese colors, such as come in the Canton crepes, cannot be improved upon for this type; the reds can be worn, though the lighter reds are too startling, and the dark reds, such as cardinal, are better; very pale shell pink, blue grays and white, both cream and blue white and black, both solid and transparent.

GENERAL SUGGESTIONS.—"No woman is ugly when she is dressed." Only Lord Chesterfield could have been guilty of such a gallant perversion of the truth. If he used the word "dressed" advisedly, and meant clothed with a due regard to the selection of becoming colors and to the cut and style of the gown to suit the individuality of the wearer, he was undoubtedly right—no woman is ugly when she is artistically and becomingly dressed. But so few women seem to know what colors will enhance or destroy their good looks, what style of gown will conceal their defects and heighten their charms and what way of arranging their hair will improve their faces, that dress ofttimes instead of adding beauty to the appearance has the contrary effect. People who are florid must be careful what reds they use even more than the pale people. A deep blue red, that red suggested in a plum or the velvet leaf of a red pansy that has caught a shade from the petals of its near neighbor, the dark blue pansy, is the color for florid complexions. Grown people should be careful not to wear bright red. As Modjeska observes: "As one grows older red is more becoming above the face than below it." Dark cardinal velvet above gray hair and dark eyes has a most charming effect. Pink is most becoming for fair young people. Rose color, combined with black, white or gray, can be worn with impunity by the youthful and fair. Magenta should be suppressed. Only a dazzling beauteous being could survive the uglifying effect of this depraved color, and then it must be combined with white. Dark sage green is an almost universally becoming color. It annuls any tinge of green there may be in the complexion; for this reason brunette people generally look well in green. Only those who have an exquisite complexion should dare to wear pale green. If the complexions are clear, rosy, and fair, pale and dark have equal privileges. Dark green, combined with pale, is becoming to brunettes with clear, pallid complexions. Yellow is a delicious color—a favorite hue of the old masters and Dame Nature. Warm yellow has a good effect on the complexion. It makes the skin look fairer than it really is. It goes pleasingly with many colors. A brunette will look particularly handsome in a green yellow. Mustard color, which is insufferable by daylight, is simply delicious in the gaslight. Pure blue and yellow are harsh. A good rule is never to combine two colors of equal intensity. One of the two colors should be dull and not too pure. People with blue eyes should not wear bright blue. It makes their eyes look faded and detracts from the bloom of the complexion. Every color can be made becoming by being artistically arranged and relieved by another color, or by soft effects of lace or airy tulle. All but people with coarse complexions look exceedingly well in white.

HAIR.

CARE IN GENERAL.

REMARKS.—The hair should be washed once a month, and shampooed every three months; it should afterward be rubbed dry with a towel. To dry the hair before the fire is injurious to its vitality. Once or twice weekly some of the washes recommended for promoting the growth of the hair may be used. Combing and brushing are of great service in promoting the hair's nutrition; soft brushes are the best. Never use a broken, jagged comb, and then go around complaining that your hair is coming out in handfuls. A little—half to one teaspoonful—of scented oil may once a week be rubbed well into the hair and its roots, and the superfluous oil removed by the use of a towel. The daily use of oil, except in some rare cases of obstinate dry hair, is objectionable. If you want a head of thick hair, keep it cut as short as you conveniently can. Clipping the ends about once a month will be found useful in promoting its growth, when it is not desired to shorten too much. Never should a woman allow her hair to grow to the level of her waist, for it will thin the hair and weaken the system. Of the mustache, beard and whiskers, it is eqally necessary to moderate their length, and that it will be found of advantage to occasionally apply a little oil and some stimulating lotion. Combing and brushing will also be of service. Directly hair shows any signs of thinning, shave it off or cut away as much as possible, according to its situation. Brush the eyebrows every day, in their proper artistic line, and occasionally rub in a little olive oil and some preparation. Once every month the tips of the eyelashes may, with advantage, be cut. If properly done, their beauty will be enhanced.

COLOR, To Improve.—A good circulation is essential to fineness. The scalp must be stimulated by brushing and use of the ammonia bath. Hair cannot be glossy, rich colored and thick, unless the bodily vigor is what it should be. The best remedy for poor color is strict care. Never oil red hair to make it darker; it should be kept wavy and light, to show off the lights and shadows with which it abounds. The sun has a good effect on obnoxious shades, if otherwise attended to. Pale hair shows a want of iron in the system, which may be supplied by a free use of beefsteaks, pure beef gravies and red wines. Salt-water bathing strengthens the system and the hair. Hardly any shade is unlovely when luxuriant; it is only when diseased or uncared for that the color appears disagreeable. Sandy hair, when well brushed and kept glossy with the natural oil of the scalp, changes to a golden tinge. Tow-headed children should be sent into the sun that its rays may affect the iron in the blood and change the color to an agreeable shade.

DRESSING.—Few pay enough attention to the shape of their heads and faces in arranging the hair, and the consequence is anything but a graceful appearance. A woman with an oval face, regular features and Grecian head can wear her hair in almost any fashion. A sharp or regular profile admits of the hair being twisted in a coil. A woman with a round, piquant face should wear her hair dressed high on the head. If the hair grows down on the neck very far and the hair is dressed high on the head, little curls should be made about the nape of the neck. It is unwise to wear the hair in one fashion any length of time. That portion exposed to the air will become discolored and brittle, besides producing bald spots. Every night the hair should be taken down and combed out of tangles with a bone comb. A rubber comb will split the hair; then brush vigorously the whole length of the hair. It is impossible for one to do this thoroughly for one's self, but two sisters or friends can exchange services. The hair should then be firmly but tightly braided; two braids are best. Tie the ends with woolen material, never with cotton, and do not put in any hairpins, as, while sleeping, they are apt to become rusty and produce baldness. If you wear a bang, always wear your own hair. The bang should be washed almost every day to keep it in good condition for curling. To cut a bang straight across, comb down sufficient hair, leaving a straight part between the bang and long hair. A bang to curl nicely should be cut straight below the eyebrows. Wet the hair and clip evenly across. A tightly frizzled bang looks unnatural. Loose, natural-looking rings are tasteful. Coarse paper is the best to put the hair up in. Double a piece in the center, catch it in the ends of the hair and roll up, pinning the ends of the paper down. Do not flatten the paper when rolling, or the curls will not be round. When taking the curls out, comb with a coarse comb, and brush all straight hair smoothly back. For crimping the hair there are regular hairpins. Crimped hair is becoming for married ladies, but not for girls. The hair should be crimped on either side of the part, back to the crown of the head. Some young faces with broad foreheads look well with the hair crimped and combed straight back, with a coil at the nape of the neck. There are several washes recommended to stimulate growth of hair, but the best recipe is cleanliness and brushing. Sage tea will darken the hair and make it soft, and has been known to help the growth. Abstain from wetting, twisting, or tightly binding the hair; wetting the hair often, to keep it in place, will produce dryness and a faded appearance. Disentangle carefully, and arrange so as to allow the current of fluid to course along the tubes; where the hair is naturally dry, some greasy substance may occasionally be used. If naturally greasy, no grease is needed. A healthy system should supply oil enough for the hair.

GROWTH, To Promote.—When the hair is in a weakly state, and falls off, cutting it once a month will be found of great service. Ammonia is the most healthful and efficient stimulus

known, and quickens growth when nothing else will. (See TONICS AND RESTORATIVES in this department; also *Baldness* and *Dandruff* in MEDICINE, in HEALTH AND DISEASE.

DEPILATORIES.

REMARKS.—Superfluous hairs are the result of a morbid condition, and must be eradicated as a disease. Care should be taken to brush the back hair upward from childhood to prevent growth of hairs on the neck. Depilatories act either mechanically or chemically. To the first class belong adhesive plasters, that, on their removal from the skin, bring away the hair with them. The second class includes substances which destroy the hair by chemical action. Lime or orpiment, and generally both of them, have formed the leading ingredients in depilatories. The first acts by its causticity, and when an alkali is present by reducing that also, either wholly or in part, to the caustic state. The action of the orpiment is of a less certain character, and its use is even dangerous when applied to a highly sensitive or an abraded surface.

ARSENICAL. — 1. Nitre and sulphur, each, 1 part; orpiment, 3 parts; quicklime, 8 parts; soap lees, 32 parts; boil to the consistence of cream.— 2. Quicklime, 30 parts; orpiment, 4 parts; powdered gum Arabic, 60 parts; mix, and keep in a tightly-corked bottle. When used, form a paste with water. Apply, and let remain 5 or 10 minutes, when the superfluous hair can be removed with the back of a knife.

BOETTGER'S.—Powdered sulphydrate of sodium, 1 part; washed chalk, 3 parts; made into a thick paste with a little water. Let a layer about the thickness of the back of a knife be spread upon the surface. After 2 or 3 minutes the hairs are transformed into a soft mass which may be removed by water. A more prolonged action would attack the skin.

CAZENAVE'S.—Quicklime, 1 part; carbonate of soda, 2 parts; lard 8 parts; mix. Applied as an ointment.

CHINESE.—Crystallized hydrosulphate of soda, 3 parts; quicklime, in powder, 10 parts; starch, 10 parts; mix with water; apply to the skin, and scrape off in 2 or 3 minutes, with a wooden knife.

ELECTRIC. — A moistened sponge electrode from the positive pole of the battery, having previously been placed on the back of the neck, or fixed at some other convenient spot, a 3-cornered needle, with sharp cutting edges, set in a handle and attached to the negative pole of the battery, is made to enter the hair follicle, alongside the hair, care being taken to make the needle penetrate to the depth of the follicle. The action of the current causes a few bubbles of viscid froth to be observed. As soon as this manifests itself, the needle should be rotated a few times, to cause the sharp corners to scrape away the debris, and allow electrical contact with a fresh surface. The operation is continued until the hair becomes loose, and comes away with the slightest traction. The operator then proceeds with the next hair in like manner, and so on.

PLASTER. — Spread equal parts of resin and pitch on a piece of thin leather, and apply; let it remain 3 minutes, and pull off suddenly, when it brings the hairs with it. If the plaster were left on longer, it would be apt to bring the skin.

RAYER'S.—Quicklime, 2 oz.; salt of tartar, 4 oz.; charcoal, ½ oz.

REDWOOD'S.—A strong solution of sulphide of barium, made into a paste with powdered starch; apply immediately; leave a few minutes; then scrape off with the back of a knife.

SPOLASCO'S.—Freshly prepared sulphide of calcium and quicklime, equal parts.

VEGETABLE ESSENCE.— Take polypody of oak, cut into small pieces, and put any quantity into a glass vessel; cover 1 in. in depth with Lisbon or French white wine, and place the vessel in hot water 24 hours; then distil off the liquor. Apply with a linen cloth, and allow to remain on during the night. Oil of walnuts and the distilled waters of the leaves and roots of celandine are also said to be efficacious.

DYES AND BLEACHES.

REMARKS.—Fortunately bleaching and dyeing are such tedious processes that few persons submit to their bondage. Once applied, dye becomes a necessity. Dyes need to be applied once a week, and it is well to touch the partings twice as often with a fine comb dipped in the dye, as the hair always shows the natural color as fast as it grows from the roots.

BLACK. — 1. Oxide of lead, 4¼ dr.; glycerine, 75 dr.; water, 34 oz.; precipitated sulphur, 4¼ dr.— 2. Acetate of lead, 1¼ dr.; hyposulphite of soda, 2¾ dr.; glycerine, 1 3-5 oz.; spirits of wine, 3 1-5 oz.; distilled water, 27 1-5 oz. Dissolve the salts separately, and mix the glycerine and alcohol with the hyposulphite; then gradually pour the solution of lead into the mixture. — 3. Wash the head with spring water, and comb the hair in the sun, having dipped the comb in oil of tartar; do this about 3 times a day, and in less than a fortnight the hair becomes black. The leaves of the wild vine, infused in water, are said to render the hair black and prevent falling off. — 4. Cleanse the hair with dilute ammonia water; then moisten with dilute solution of gallic acid or ammonium sulphide, and go over it with a comb moistened with a solution of 1 part nitrate of silver in 9 parts water, touching the scalp as little as possible. — 5. (*French.*) Melt together in a bowl, set in boiling water, 4 oz. white wax in 9 oz. olive oil, stirring in, when melted and mixed, 2 oz. burned cork in powder. This gives a lustrous blackness to the hair. Apply like pomade, brushing it well in and through the hair. It changes the color instantly. — 6. (*Hager's.*) 10 parts subnitrate of bismuth and 150 parts glycerine are mixed in a glass vessel and heated in a water bath; a solution of potash is then added in small portions, and with continued agitation, until a clear solution has been obtained, to which a concentrated solution of citric acid is added until merely a slight alkaline reaction is observed; enough orange flower water is added to make the whole liquid weigh 300

parts; the addition of a small quantity of a solution of aniline color completes the preparation.

BLONDE. — 1. 1 qt. of lye prepared from the ashes of vine twigs, bryony, celandine roots, and turmeric, of each ½ oz.; saffron and lily roots, of each, 2 dr.; flowers of mullein, yellow stechas, broom, and St. John's Wort, each, 1 dr.; boil together and strain clear. — 2. 5 oz. distilled water; ½ oz., each, acetate of iron and nitrate of silver; 1 oz. nitrate of bismuth; moisten the hair, and after an hour, touch with a mixture of equal parts sulphide of potassium and distilled water. — 3. A strong aqueous solution of sodium sulphite, rendered slightly alkaline with carbonate of soda.

BROWN. — 1. Dissolve permanganate of potash, ½ oz. in 1 pt. rose-water, and after having cleansed the hair with a solution of hartshorn, a teaspoonful to 1 qt. water, and dried it well with a towel, apply. It takes effect immediately and the desired shade may be obtained by applying more or less of the solution. — 2. Acetate of lead, 2 dr.; hyposulphate of soda, 1 dr.; rose water, 14 oz.; glycerine, 2 oz.; dissolve the acetate of lead and the hyposulphate in separate portions of the rose water; filter separately; mix, and add the glycerine. — 3. Add ammonia to ordinary black hair dye made from nitrate of silver. The more ammonia added the lighter the shade. — 4. Solutions of pyrogallic acid in diluted alcohol, are used with good effect.

BROWN, Dark. — 1. Pyrogallic acid, 4 gr.; distilled water, 2 oz. — 2. Crystallized nitrate of silver, 1 dr.; gum Arabic, 1 dr.; distilled water, 2 oz. — 3. Water in which potatoes have been boiled with the skins, forms a speedy dye for hair and eyebrows. The parings may be boiled by themselves, and the water strained for use. Dip a fine comb in the water, draw through the hair till thoroughly soaked. If not satisfactory the first time, repeat with a sponge, taking care not to discolor the skin of the brow and neck. Exposing the hair to the sun will darken this dye. — 4. Walnut bark, steeped a week in Cologne, gives a dye easily applied with a brush each day, and has instant effect; add a small lump of alum to set the dye.

BROWN, For Red Hair. — Oils of nutmeg and rosemary, 1 dr., each; castor oil, 1 oz.; tincture cantharides, 2 dr.; strong brandy, 7 oz.; mix. Use a small portion once a day, and brush the hair with a stiff brush ½ hour.

CHESTNUT. — 1. Permanganate of potash, 1 dr.; powdered gum Arabic, 2 dr.; rose water, 3 oz.; mix. Apply carefully with a tooth-brush.— 2. Fresh slaked lime, 5 dr.; water, 1½ oz.; mix, strain, and pour into a 4 oz. bottle. Dissolve sugar of lead, 5 dr., in water, 3 fl. oz.; add dry slaked lime, 1 dr.; stir together; wash the precipitate with a little soft water; drain off the water; then add it to the milk of lime in the bottle, and shake well and also before use.

GOLDEN. — 1. 17 parts crystallized caustic baryta and 3 parts potassium chlorate; mix in fine powder; melt by a gentle heat. The mass must be washed with cold water to remove the potassium chloride, and the residue shaken in the cold with a solution of 8 parts glacial phosphoric acid in 25 parts water; the whole cooled with ice. When the peroxide of barium is decomposed, the fluid should be decanted. — 2. Moisten the hair, previously washed and dried, with a solution of acetate or nitrate of lead, and follow with a mordant of yellow chromate of potash.

FIXATURES.

FIXATURES are used for stiffening the hair, and to make it curl firmly and remain in place. It is applied either by moistening the fingers and passing the hair through them, or by means of a small sponge.

CURLING FLUID.—Put 2 lbs. common soap, cut small, into 3 pts. spirits of wine; melt together, stirring with a clean piece of wood; add essence of ambergris, citron and neroli, ½ oz. each.

FRENCH CURLIQUE.—Oil of sweet almonds, 1 oz.; spermaceti, 1 dr.; tincture of mastic, 3 dr. Dissolve the spermaceti (white wax is as good), in the oil with a slow heat, and add the tincture. Apply a small quantity.

GUM ARABIC.—1. To common gum Arabic add enough alcohol to make thin; let stand all night; then bottle to prevent evaporating. Put on the hair after it is done up in paper. — 2. Pale gum Arabic (picked), 1½ oz.; rose water, 2 fl. oz.; pure water, 3 fl. oz.; dissolve. — 3. Gum Arabic, 3½ oz.; water, ½ pint; dissolve, and then drop in Cologne gradually until the cloudiness ceases to be removed by agitation; the next day decant.

GUM TRAGACANTH.—1. Gum tragacanth, 1½ dr.; water, 7 oz.; proof spirit, 3 oz.; otto of roses, 10 drops; macerate 24 hours, and strain. —2. ½ oz. gum tragacanth; 1 pt. rose water; 5 drops glycerine; mix, and let stand over night; if the tragacanth is not dissolved let it be ½ day longer; if too thick, add more rose water, and let stand some hours; when it is a smooth solution it is fit for use.—3. Finest packed gum tragacanth, reduced to powder, 1 oz.; rose water, 1 pint; put into a wide-mouthed vessel and shake daily 2 or 3 days; then strain. If required to be colored, infuse cochineal in the water employed, before making.

OILS.

BALDNESS. For. — Boil ½ lb. green southernwood in 1½ pts. sweet oil; add ½ pt. port wine; strain through a fine linen bag 3 times, each time adding fresh southernwood; then add 2 oz. bear's grease and replace near the fire in a covered vessel until the bear's grease is dissolved; mix, and bottle close.

BEAR'S.—Cotton seed oil, 15 gals.; oil of fennel, 3 oz.; oil of lavender, 2 oz.; oil of citronella, 3 oz.; oil of cloves, 3 oz.; no coloring.

BRILLIANTINE.—Castor oil in eau de Cologne, 1 part in 4; or glycerine and eau de Cologne, each, 1 part; honey, 2 parts; rectified spirit, 4 parts.

COCOANUT.—Cocoanut fat, 2½ lbs.; castor oil, 1 gal.; alcohol, 1 oz.; oil of lavender, 4 oz.; oil cloves, 2 oz.; oil cinnamon, 2½ oz.; oil rose geranium, 2 dr. Melt the cocoa fat at a gentle heat;

add castor oil; mix thoroughly; add alcohol, and perfume.

COCOINE.—Oil theobromæ, 3 dr.; castor oil, 15 fl. oz.; 95 per cent. alcohol and glycerine, each, 2 oz.; melt the oils together with gentle heat; transfer them to a bottle, and gradually add the alcohol, then the glycerine, as much as it will take up without becoming milky; perfume.

COLORINGS.—A red tinge is given to oils by allowing the oil to stand for a few hours over a little alkanet root (2 dr. to 1 pint) before scenting. Apply a gentle heat to facilitate the process. Yellow and orange are given by a little annatto or palm oil; and green, by steeping a little green parsley or lavender in them for a few days; or by dissolving 2 or 3 dr. gum guaiacum in each pint by the aid of heat, and, when cold, decanting.

CRESCENT.— Cotton seed oil, 15 gals.; oil bergamot, 8 oz.; oil cassia, 6 oz.; oil cloves, 4 oz.; oil white thyme, 1 oz.; mix; color with alkanet.

CRYSTALLINE CREAM. — Oil almonds, 8 oz.; spermaceti, 1 oz.; melt together. When a little cooled, add ½ oz. bergamot; put into wide-mouthed bottles, and let stand till cold. Camphorated crystalline cream may be made by using camphorated oil instead of oil of almonds.

GLYCERINE. —New rum, 1 qt.; concentrated spirits of ammonia, 15 drops; glycerine oil, 1 oz.; lac sulphur, 5½ dr.; sugar of lead, 5½ dr.; put the liquor into a bottle, add the ammonia, then the other components. Shake occasionally 4 or 5 days.

GOLDEN. — Oil cotton-seed (yellow), 15 gals.; oil bergamot, 8 oz.; oil cassia, 6 oz.; oil cloves, 4 oz.; oil thyme (white), 1 oz.; color with alkanet root.

HICKORY NUT. — Cotton-seed oil, 15 gals.; oil of fennel, 2½ oz.; oil sassafras, 3 oz.; oil thyme, 1½ oz.; oil rosemary, 1½ oz.; oil cinnamon cassia, 4 oz.; oil cloves, 1½ oz.; oil lavender, 1½ oz.; do not color.

HUILE VERTE. —1 dr. guaiacum; 1 lb. olive oil; macerate; strain, and perfume.

LYON'S KATHAIRON. — 2 gals. castor oil; 3 gals. alcohol; mix; ten oz. tincture cauthanile (officinal); 12 oz. bergamot; dissolve in alcohol. Tincture red sanders (strength, 1 lb. to 5 gal. 95 per cent. alcohol), 4 oz. to 30 gallons.

MACASSAR. — Olive oil, 1 qt.; alcohol, 2½ oz.; rose oil, 1½ oz.; then tie 1 oz. chipped alkanet root in a muslin bag, and put it in the oil; let alone some days till it turns red, then remove to other oils. Do not press.

MACE. — Mace (beaten to a paste) and palm oil, each, 1 lb.; purified beef marrow, 3 lbs.; gently melt together, and strain.

MARROW. — 1. Simple marrow oil, scented at will. — 2. Marrow oil, 4 oz.; spirit of rosemary, 1½ oz.; oil of nutmeg, 12 drops. — 3. Cold-drawn nut oil and marrow oil, equal parts; scent. — 4. Clarified beef marrow, lard, pale nut oil and expressed oil of mace, each, 4 oz.; melt together by the heat of hot water; strain into a warm stone mortar; add of oils of cloves, lavender, mint, rosemary, sage and thyme, each, ½ dr.; rectified spirit, 1 oz., in which has been dissolved by gentle heat balsam of tolu, 4 dr.; camphor, 1 dr.; triturate this mixture until it is quite cold, and then put it into suitable bottles.

NIGHT-BLOOMING CEREUS, Phalon's.—Cotton-seed oil, 15 gals.; oil caraway, 4 oz.; oil cloves, 4 oz.; oil sassafras, 2 oz.; oil lavender, 10 oz.; oil rosemary, 2 oz.; color with alkanet root.

PHALON'S.—Cocoanut oil perfumed with oil of almonds.

ROSE.—1. Olive oil, 2 pts.; otto of roses, 1 dr.; oil of rosemary, 1 dr.; mix. — 2. Cotton-seed oil (yellow), 15 gals.; oil red cedar, 3 oz.; oil geranium, 6 oz.; oil rose, 1½ oz.; oil cloves, 6 oz.; oil citronella, 1½ oz.; oil lemon grass, 1½ oz.; oil bergamot, 2 oz.; no color.

ROSEMARY. — Castor oil, 1 pt.; sweet oil, ⅓ pt.; lard oil, ⅓ pt.; alcohol, 1 tablespoonful. Perfume with rosemary.

SILVER. — Cotton seed oil, 15 gals.; oil red clover, 1 oz.; oil geranium, 2½ oz.; oil cloves, 2½ oz.; oil citronella, 1 oz.; oil lemon grass, 1 oz. No color.

POMADES.

AMMONIACAL, For Promoting Growth.—Almond oil, ½ lb.; white wax, ½ oz.; clarified lard, 3 oz.; liquid ammonia, ½ fl. oz.; otto of lavender and cloves, each, 1 dr. Place the oil, wax and lard in a jar; set in boiling water; when melted, allow the grease to cool; stir in the ammonia and perfume, and put into small jars. Apply at night only.

BALDNESS, For.—1. Macerate 1 dr. powdered cantharides in 1 oz. spirits wine; shake frequently during a fortnight, and then filter. Rub together 10 parts of this tincture with 90 parts cold lard; add any perfume; rub well into the head night and morning. — 2. Extract yellow Peruvian bark, 14 gr.; extract rhatany root, 8 gr.; extract burdock root and oil nutmegs (fixed), each, 2 dr.; camphor (dissolved with spirits of wine), 15 gr.; beef marrow, 2 oz.; best olive oil, 1 oz.; citron juice, ½ dr.; aromatic essential oil, to render fragrant; mix, and make into an ointment.

BALSAM OF TOLU. — Prepared lard, 2 oz.; white wax, 3 oz. Melt together; remove from the fire; and, when they are beginning to thicken, add, with constant stirring, balsam of tolu, 2 dr.; essence of bergamot, 30 drops.

BEAR'S GREASE, Imitation. — 1. Almond oil, 10 lbs.; purified lard, 12 lbs.; acacia pomade, 2 lbs.; otto of bergamot, 4 oz.; otto of cloves, 2 oz.; oils of rose, acacia and orange flowers, each, ½ lb. Melt the greases by means of a water bath, and then add the ottos. — 2. Prepared suet, 3 oz.; lard, 1 oz.; olive oil, 1 oz.; oil of cloves, 10 drops; compound tincture benzoin, 1 dr.; mix.

CIRCASSIAN CREAM. — 2 flasks oil; 3 oz. white wax; 2 oz. spermaceti; ½ oz. alkanet root. Digest the oil with the alkanet till colored; strain; melt the wax and spermaceti with the oil; when cool, add 2½ dr. English oil of lavender and ½ dr. essence of ambergris.

COLLANTE. — Oil of almonds, 3 oz.; white wax, ¾ oz.; melt together; add tincture mastic (strong), 1 oz.; essence bergamot, ½ dr.

COSMOS.—1½ parts white wax; 3 parts spermaceti; 2 parts castor oil; 8 parts almond oil;

2 parts glycerine; 9 parts extract of mignonette; ½ part eau de Cologne.

COWSLIP. — Plain pomade, 2 lbs.; essence bergamot, 3 dr.; essence of lemon and essence of orange peel, each, 1 dr.; huile au jasmin and essence de petit grain, of each ½ dr.; essence of ambergris, 6 drops.

CUCUMBER. — Lard, 10 oz.; veal suet, 6 oz.; balsam of tolu, 9 gr.; rose water, 44 minims; cucumber juice, 12 oz. Melt the lard and the suet over a water bath, and add the tolu previously dissolved in a little alcohol, and then the rose water. When clear, decant into a tinned basin; add ½ of the cucumber juice and stir continually 4 hours; pour off the juice, and add another ½; stir as before; then pour off and add the remainder of the juice; separate as much as possible the fat from the liquid; melt by water bath, and after some hours skim, and put into pots.

DE BEAUTE.—Oil of almonds, 2 oz.; spermaceti, 2 dr.; white wax, 1½ dr.; glycerine, 1 dr.; balsam of Peru, ½ gr.; mix by gentle heat.

DIVINE.—Beef marrow, 3 lbs.; put it into an earthen vessel, and cover with cold water; change the water daily for a few days, using rose-water the last day; pour off and press out the water; add 4 oz. each of styrax, benzoin, and Chio turpentine; 1 oz. orris powder; ½ oz., each, powdered cinnamon, cloves and nutmeg; set in hot water; boil 3 hours; then strain.

DUPUYTREN'S.—Beef marrow, 2 oz.; alcoholic extract of cantharides, 8 gr.; rose oil, 1 dr.; essence of lemons, 30 drops.

EAST INDIA.—Suet, 3 lbs.; lard 2 lbs.; beeswax (bright), ½ lb.; palm oil, 2 oz.; powdered gum benzoin, 3 oz.; musk (previously triturated with a little lump sugar), 20 gr.; digest the whole together in a covered vessel, by the heat of a water bath, 2 hours; then decant the clear; and add of essence of lemon, ½ oz.; oil of lavender, ½ oz.; oils of cloves, cassia and verbena, each, ½ dr.

FOX'S CREAM.—Marrow pomatum, 2 oz.; oil of almonds. 2 oz.; melt, and add while cooling, with constant stirring, essence of jessamine or bergamot, 2 dr.

GERMAN.—8 oz. purified marrow; melt in a glass or stoneware vessel; add 1½ oz. fresh bay leaves; 1 oz. orange leaves; 1 oz. bitter almonds; ½ oz. nutmegs; ½ oz. cloves; 1 dr. vanilla; all bruised; cover the vessel, and digest 24 hours with a gentle heat; strain while warm through linen, and stir it as it cools.

HARD. — 1. Purified suet, 1 lb.; white wax, 1 lb.; jasmine pomatum, ½ lb.; tuberose pomatum, ½ lb.; otto of roses, 1 dr.—2. (*White.*) Suet, 1 lb.; wax, ½ lb.; otto of bergamot, 1 oz.; otto of cassia, 1 dr. *Brown* and *Black* are made in the same way, but colored with fine ivory black or umber, ground in oil.

HUNGARIAN, or MUSTACHE WAX. — White wax, 4 oz.; lard, 2 oz.; Canada balsam, ½ oz.; oil of bergamot, 1 dr.; oil of lavender, 15 drops; add the balsam to the wax and lard, previously heated; when nearly cold, add the essential oils, and mold. It may be colored black or brown.

MARROW.—1. 4 oz. ox marrow; 1 oz. white wax; 6 oz. lard; melt; perfume when cooling with oil of bergamot. — 2. 1 oz. beef's marrow; soak in cold water until the blood is out; place in an earthen jar with ½ oz. unsalted butter; put the jar in lukewarm water and let it stand on the fire until the water boils, stirring the marrow and butter till thoroughly mixed.

OIL OF ALMOND. — Melt together with gentle heat 2 oz. purified beef's marrow; 2 dr. yellow wax; 1 oz. spermaceti; oil of almonds; stir until almost cold; and add essence bergamot, ½ oz.; otto of roses, 10 drops, and oil of nutmeg, 10 drops.

ROSE. — Prepared lard, 16 oz.; prepared suet, 2 oz.; melt with gentle heat; add 2 oz. rose water; 6 drops otto of roses; beat well together, and pour into pots. For making jessamine, violet, and orange pomade, put the same quantity of water, and 1 dr. of the essence.

ROYER'S BEARD-CULTIVATING. — An ointment of 1 part pulv. cinchon. rub., and 1½ parts of a hair pomade containing wax.

TRANSPARENT. — Spermaceti, 2 oz.; castor oil, 5 oz.; alcohol, 5 oz.; oil of bergamot, ½ dr.; oil of Portugal, ½ dr.

VANILLA.—Digest ½ lb. vanilla beans, finely cut, in 10 lbs. of a mixture of ⅔ lard and ⅓ beef tallow.

VIOLET.—Purified lard, 1 lb.; acacia pomatum, 6 oz.; rose pomatum, 4 oz.; work it up like marrow pomade.

WHITE.—Benzoinated suet, 1 lb.; white wax, 1 lb.; jasmine pomatum, 8 oz.; tuberose pomatum, 8 oz.; otto of roses, 1 dr. Melt at a gentle heat, and cast in molds.

SHAVING.

REMARKS. — The hair should be softened by soaking it in a lather of soap, which prevents the razor from sticking to the skin, and affords a support to the hair when opposed to the edge of the razor. The soap used should make a strong lather full of small bubbles, and be as free from alkali as possible, to avoid irritating the skin. It is better to wash the skin beforehand, then brush on the lather with the shaving brush, working it well into the skin, and let it remain to soften the hair for a few minutes; apply another coat of lather, and at once proceed to take off the beard with the razor warmed to the temperature of the skin, or rather above it. Most people find it better to stretch the skin by the other hand, but a skilful shaver manages without. The razor should be drawn in a gently sawing manner across the beard, not exactly at right angles to it, but nearly so; the art consisting in getting the two angles correctly, and in avoiding the chop instead of the proper sawing motion. The angle with the skin should be as slight as possible, close contact causing adhesion, and impeding the free play of the blade. When the head is to be shaved, it is better to remove the hair with the scissors to within ½ in. of the scalp, after which the razor may be used as for the beard, following the direction of the hair, and not meeting it.

CREAM. — White soap, 3 oz.; proof spirits, 8 oz.; water, 4 oz.; carbonate of potassa, 1 dr.; oil of lemon, 10 drops; mix; add the potassa and

oil of lemon last. — 2. White wax, spermaceti, almond oil, each, ¼ oz.; melt, and while warm beat in 2 squares Windsor soap, previously reduced to a paste with rose water.

GUERLAIN'S CREAM.—2 lbs. best white palm soap; ½ lb. good common soap; scrape small; dissolve in a copper boiler with 1 qt. rain water. Add 1 pt. 85 per cent. alcohol; 1 gill clean beef's gall; ½ gill rectified spirits turpentine. Boil 5 minutes, stirring slowly. Perfume to suit.

LIQUID.—White soap, 3 oz.; proof spirit, 8 oz.; distilled water, 4 oz.; carbonate of potash, 1 dr.; scent with essence of lemon. Dissolve the soap without heat; add the potash and essence.

RAZOR. Care of.—A razor should be strapped before and immediately after using, and will thus be kept in good order for years without any need for the stone. When a razor has lost its edge or become jagged by neglect, it may be restored on a hone oiled with kerosene oil; but without the greatest care the edge will be wired and spoiled. A strap of common leather glued to a suitable strip of wood is all that is usually necessary. The practice of pressing on the edge of a razor in strapping, generally rounds it; the pressure should be directed to the back, which must never be raised from the strap. If you shave from heel to point of the razor, strap it from point to heel; but if you begin with the point, then strap from heel to point. If you only once put away your razor without strapping or otherwise cleaning the edge, you must no longer expect to shave well; the soap and damp will soon rust the fine teeth or edge. A piece of plate leather should always be kept with the razors. As you strap your razor, strap the two sides alternately, and keep the back of the razor always on the strap, as you turn it from side to side. You thus avoid cutting your strap, and turning the edge of your razor. (See *Razor Paste* in STEEL.)

RAZOR STROP, To Renovate. — 1. Rub clean tallow over the surface, and then put on it the light top part of the snuff of a candle and rub it smooth. — 2. Rub well with a piece of soft pewter or lead.

RAZOR STROP, To Make. — Select a piece of satin, maple, or rosewood, 12 in. long, 1⅜ in. wide, and ⅜ in. thick; allow 3½ in. for length of handle; ½ in. from where the handle begins, notch out the thickness of the leather so as to make it flush toward the end; taper the thickness of the leather; this precaution prevents the ease from tearing up the leather in putting the strop in; round the wood just enough to keep from cutting by the razor in stropping and turning over the same; now select a proper-sized piece of fine French bookbinder's calfskin, cover with good wheat or rye paste, then lay the edge in the notch, and secure in place with a small vise; proceed to rub it down firmly and as solidly as possible with a tooth-brush handle, and, after the whole is thoroughly dry, trim and make the ease.

ROUSSEL'S CREAM.—2 lbs. white soft soap; 1 oz. oil of olives; 2 dr. gum benzoin; 48 oz. alcohol; digest.

SAPONACEOUS CREAM. — Melt 2 dr., each, spermaceti, white wax, and almond oil, in a porcelain-lined vessel; beat in 4 oz. best white soap, and scent.

SOAP. —1. Castile soap (in shavings), 4 oz.; proof spirit, 1 pt.; dissolve, and add a little perfume. — 2. Venetian soap, ¾ lb.; salt of tartar, 1 oz.; benzoin, ½ oz.; spirit of wine, 1 gal. —3. Best soft soap, ½ lb.; boiling water, 1 pt.; dissolve, cool, and add oils of cinnamon (cassia), verbena and neroli, each, 6 drops; dissolved in rectified spirit, 1 pt.; mix well, and if not transparent add a little more strong spirit, or filter through blotting paper.—4. White Castile soap in shavings, ½ lb.; rectified spirit, 1 pt.; 1 gill water; perfume. Put in a bottle and cork tightly, set in warm water for a short time, and agitate occasionally until solution is complete; let stand, pour the liquor off the dregs, and bottle for use. (See *Shaving Soap* in TOILET SOAPS.)

TONICS, RESTORATIVES AND WASHES.

ALPINE HAIR BALM.—10 oz. soft water; 8 oz. alcohol; ½ oz. spirits turpentine; ¼ oz. sulphur, and ¼ oz. sugar of lead.

AMMONIA.—1. When the hair has been neglected, cut it to an even length and wash the scalp nightly with soft water into which ammonia has been poured. This may be strong so it does not burn the skin; afterward put 3 large spoonfuls of ammonia to a basin of water. Apply with a brush, stirring the hair well. Dry thoroughly; comb and shake out the tresses till nearly dry: when it may be done up in a net. 1 teaspoonful ammonia to 1 pt. warm water makes a wash that may be used on a child's head daily.—2. To wash the head thoroughly, drop about 1 5 cts. worth of ammonia into a basin of lukewarm water and soap. If the hair is long, braid it in 6 or 7 loose braids, some coming to the top of the head, and tie firmly. Take a raw egg and rub vigorously into the scalp in every part. This is one of the best remedies for removal of dandruff. After rubbing in the egg, wash the head in the water and ammonia, with a little Castile soap. Wring the braids out and dry with a towel. Then, after the hair is dry, comb out and brush. Care should be taken to go in no drafts while the hair is wet. The ammonia helps it to dry quickly.

BAY-RUM RESTORATIVE. — Oil of bay, 1 dr.; oil of nutmegs, 5 drops; oil of orange, ½ dr.; Jamaica rum, 4 oz.; alcohol, 2 pts.; water, to make 4 pts. Cut oils in alcohol; add rum and water; let stand 2 or 3 weeks, and filter through magnesia and charcoal.

BERNHARDT'S TONIC. — Oil of castor, 3 oz.; oil of bergamot, 3 dr.; oil of cinnamon, 15 drops; oil of cloves, 15 drops; oil of lavender, 1½ dr.; tinct. cantharides, 2 dr.; aqua ammonia, 4 dr.; alcohol sufficient to make 2 pts.

BLACKWELL'S RESTORATIVE. — Glycerine, 1 oz.; tinct. cantharides, ½ oz.; sugar of lead, 2 dr.; lac sulphur, 2 dr.; oil of bergamot, 2 dr.; rain water, 2 dr.; mix; apply once a day. Rub well with the hand.

BORAX. — For cleaning the hair, nothing is

better than a solution of borax. Wash afterwards with pure water, if it leaves the hair too stiff. Use enough borax to render the water soft; ½ oz. to 1 qt. water.

COOLING LOTION. — 2 dr. borax and glycerine to 8 oz. distilled water.

CREOLE TONIC. — Lac sulphur, 1 dr.; sugar of lead, 1 dr.; pulverized copperas, 32 gr.; tannin, 32 gr.; rose water, 1 pt.; mix. Wet the hair once or twice a day, for 2 weeks.

EYEBROWS AND EYELASHES. To Improve. — For causing the eyebrows to grow when lost by fire, use sulphate of quinine, 5 gr. in 1 oz. alcohol. For the eyelashes, 5 gr. sulphate of quinine in 1 oz. sweet almond oil is the best prescription; put on the roots of the lashes with a fine sable pencil; it must be lightly applied, as it irritates the eye to finger it. The eyelashes may be improved by delicately cutting off their forked and gossamer points, and anointing with a salve of 2 dr. ointment of nitric oxide of mercury and 1 dr. lard. Mix lard and ointment well, and anoint the edges of the eyelids night and morning, washing after each time with warm milk and water. This, it is said, will restore the lashes when lost by disease.

FAIRY WATER. — A solution of 1½ parts lead sulphite in about 3 parts sodium hyposulphite, 7½ parts glycerine and 88 parts water.

EAU LUSTRALE. — Castor oil, 8 oz.; tincture cantharides, 1 oz.; alcohol, 48 oz.; oil bergamot, 4 dr.; oil lavender, 1 dr.; oil cloves, 30 drops; mix.

FALLING OUT, To Prevent. — 1. Sherry wine, ½ pt.; elder water, ½ pt.; tincture of arnica, ½ oz.; spirits of hartshorn, 1 teaspoonful; apply with a sponge every night. — 2. Mix 1 oz. gum camphor and 2 oz. pulverized borax; pour over it 2 qts. boiling water; when cold, bottle and keep tightly corked. Apply night and morning, rubbing it into the scalp with sponge or flannel. — 3. Water of ammonia, almond oil and chloroform, 1 part, each, diluted with 5 parts alcohol, or spirits of rosemary, the whole made fragrant with 1 dr. oil of lemon; dab it on the skin after friction with hair brush. — 4. Extract yellow Peruvian bark, 15 gr.; extract rhatany root, 8 gr.; extract burdock root, and oil of nutmegs (mixed), each, 2 dr.; camphor dissolved with spirits of wine, 15 gr.; beef marrow, 2 oz.; best olive oil, 1 oz.; citron juice, ½ dr.; aromatic essential oil to render fragrant; mix; shake into an ointment. — 5. Steep 10 or 15 minutes in soft water 3 oz. pulverized sage; strain off the liquor and add 1 teaspoonful each, pulverized borax and salt: keep tightly corked. Apply daily with a sponge, rubbing it gently over the head; then brush the hair.

GRAY HAIR. To Prevent. — Hulls of butternuts, 4 oz.; infuse in 1 qt. water, 1 hour; add ½ oz. copperas; apply with a soft brush every second or third day. When sea air turns hair gray it should be kept oiled with some vegetable oil; not glycerine, as that combines with water too readily.

HALL'S RESTORATIVE.—Glycerine, 2 oz.; bay rum, 8 oz.; salt, 2½ dr.; Jamaica rum, 4 oz.; lac sulphur and sugar of lead, each, 1 dr. and 15 gr.; rain or distilled water, 16 oz.; mix. Digest 12 hours; shake well before use.

INVIGORATOR. — Bay rum, 2 pts.; alcohol, 1 pt.; castor oil, 1 oz.; carb. ammonia, ½ oz.; tincture cantharides, 1 oz. Mix well.

JABORANDI TONIC. — Glycerine, 2 oz.; jaborandi, 4 dr.; cinchona bark, 1 oz.; alcohol, 2 oz.; bay rum, 2 oz.; rose water, 10 oz.; reduce the jaborandi and cinchona to powder, and exhaust them by percolation with the alcohol, bay rum and water, mixed together; to the percolate add the glycerine, and filter.

LANDERER'S TONIC. — Cloves, 2½ dr.; laurel leaves, 5 dr., in coarse powder; digest with alcohol, 6 fl. oz.; rose water, 3 fl. oz.; glycerine, 2½ dr. After 24 hours, add ether, ½ oz.; oil of lavender, 5 drops; filter.

LAVENDER TONIC. — Alcohol, ½ gal.; castor oil, ½ gal.; tinct. cantharides, ½ oz.; oil of bergamot, ½ oz.; oil of lavender, ½ oz.; oil of thyme (white), ½ oz. Mix.

NEIL'S TONIC.—Tincture cinchona, red, 3 oz.; glycerine, 1 oz.; Jamaica rum, 1 oz.; tannic acid, ½ dr.; tincture cantharides, 2 dr.; tincture capsicum, 1 dr.; cologne to make 9 oz. Mix. Apply twice a day, rubbing well into the scalp.

OWEN'S TONIC.—Rain water, 1 pt.; lac sulphur, ½ oz.; sulphate of iron, ½ oz.; oil of bergamot, ½ oz. Mix. Apply daily.

ST. CLAIR'S TONIC. — Castor oil, 3 oz.; oil of bergamot, 3 oz.; oil of cinnamon, 15 drops; oil of cloves, 15 drops; oil of lavender, 1½ dr.; tinct. cantharides, 2 dr.; aqua ammonia, 4 dr.; alcohol to make 2 pts. Mix.

SHAMPOOING LIQUIDS. — 1. 1½ oz. powdered refined borax; ½ oz. white Castile soap scrapings; dissolve in 1 qt. hot water; when cool, strain through a coarse cotton cloth, and add a few drops of bergamot or other essence. — 2. Powdered borax, 4 dr.; bay rum, 2 oz.; aqua ammonia, 13 oz. Mix. Apply and rub briskly; after the hair is cleansed, rinse with clean water; dry quickly, and apply oil. — 3. Dissolve ½ oz. carb. of ammonia and 1 oz. borax in 1 qt. water; add 2 oz. glycerine; 3 qts. New England rum; and 1 qt. bay rum. Moisten the hair, shampoo with the hands until a lather is formed, and wash off with water. — 4. Carbonate of ammonia, ½ oz.; carbonate of potash, 1 oz.; water, 1 pt.; dissolve, and add the solution to a mixture of tincture of cantharides, 5 fl. oz.; rectified spirit, 1 pt.; good rum, 3 qts. — 5. (*Dry.*) Sulphuric ether, 1 oz.; alcohol, 1 oz.; glycerine, 1 oz.; aqua ammonia, 1 dr.; sliced Castile soap, 2 oz.; rain water 2 pts. Mix.

SIMPLE LOTIONS. — 1. Rosemary tops, 2 oz.; boiling water, 1 pt.; infuse together; add rectified spirit, 1 fl. oz. to the cold strained liquor. — 2. Box leaves, a small handful; boiling water, 1 pt.; digest 1 hour; simmer 10 minutes, and strain.

VEGETABLE WASHES.—1. Salt of tartar, 1 oz.; rosemary water, 1 pt.; burnt sugar, q. s. to tinge it brown; dissolve, filter, and add essence of musk, 20 drops. — 2. Southernwood, 2 oz.; box leaves, 6 oz.; water, 4 pts.; boil gently in a saucepan ½ hour; strain, and to each pint of the liquid add 2 oz. spirit of rosemary and ½ dr. salt of tartar. — 3. Boil 1 lb. of rosemary in 2 qts. water, and add to the filtered liquor 1 oz. spirit of lavender, and ½ oz. Naples soap, or salt of tartar.

WILSON'S LOTION. — 1. Eau de Cologne

(strongest), 8 fl. oz.; tincture cantharides, 1 fl. oz.; oils of rosemary and lavender, each, ½ fl. dr. — 2. Water of ammonia, almond oil, and chloroform, 1 part each; dilute with 5 parts alcohol, or spirits of rosemary; add 1 dr. oil of lemon. Use after thorough friction with the hair brush.

SKIN AND NAILS.

CARE IN GENERAL.

REMARKS. — *Skin.* The best purifiers of the skin are soap and water; the best cosmetic, plenty of out-door exercise, a well regulated appetite, and a cheerful mind. A pure skin is impossible unless regard is paid to diet. Spiced mince pies, rich cakes and sharp pickles show their effects plainly in the face. Plain fare, in small quantity, will do more for the skin than any cosmetics. Full-blooded girls, whose complexions give them trouble, should not eat fat meat except in winter, nor drink milk. The regular use of cosmetics and washes dries the skin and makes it unsightly, and, clogging the pores, is very injurious. The skin hardens by exposure to the sun, or to a high wind. On returning home after such exposure, wash the face with tepid water, and dry it with a soft napkin. If exposed to dust or smoke, the face or neck should be wiped with a handkerchief, if there be no opportunity of laving them. If sitting near the fire, protect the face with a screen. If from any cause there be moisture on the skin, a handkerchief should be applied to absorb, not wipe it away; these attentions, though apparently unimportant, are necessary. Friction to the neck and arms should be performed by means of a flesh-brush, to remove the scaly particles which appear after the application of water. Wrinkles give an appearance of age, and usually come on as people get older, or as a consequence of using large quantities of powder. Knitting the brows produces a wrinkle between the eyebrows. No application will cure this; the effort must come from resolute avoidance of the cause. Living in a dirty atmosphere develops wrinkles; the grime settles in any little hollows that will receive it, and the longer it stays there the more difficult it is to remove. It may be partially kept out by wearing a veil out-of-doors, but the best thing is frequent and thorough washing with hot water, and applying a little sweet oil or cold cream at bedtime. This softens and smooths the skin. A little alum or other astringent lotion applied in the morning does good, but if it makes the skin smart it acts as an irritant, and must be avoided.

Nails. — The finger nails grow out about three times a year. They should be trimmed once a week, leaving them long enough to protect the ends of the fingers. If trimmed too close at the corners there is danger of their growing into the flesh. The "quick" of the finger is sensitive, and will promptly resent any interference by inflammation; hence great precaution should be observed in trimming to avoid lacerating the quick. The secretion under the ends of the nails should not be removed by anything harder than a brush, nor should the nails be scraped with a penknife, as it destroys the delicacy of their structure. To prevent hangnails, the skin should be loosened from the nail once a week, not with a knife or scissors, but with the small end of a tooth brush or an ivory paper cutter. The best way to do this is to first put the ends of the fingers in warm water, then push the skin back gently. The tiny white specks on the nails are made by scraping the nail at the point where it rises from the skin. Biting off the finger nails is an odious practice.

BATHING. — It is by no means necessary to own a bath-room to enjoy its benefits and comforts, for even in a basin an abundant sponge bath may be taken, both healthful and invigorating. The bath must be suited to the organization of the individual. It should always be taken quickly, followed by brisk rubbing. The frequency of the bath should be determined by its effects, and taken as often as the system desires it. The harm is done not so much by bathing often as by staying in the water too long. A hot soap-suds bath once a week is beneficial to persons with moist and oily skins. Bay-rum and camphor may be used by such persons each time after washing the face. None but robust persons should ever take baths except in a warm room. The bath-room should be arranged to be heated in a few minutes; otherwise the bath is best taken in one's own room before the fire. Those who take cold do so often from contact of the feet with the metal bottom of the tub. This may be prevented by standing on a folded towel. Be sure to put on plenty of clothing after the bath, and step about briskly within doors, but do not go out for an hour or so. If the bath produces drowsiness or depression it acts mischievously. To those able to bear the shock nothing is so refreshing as a plunge each morning, summer and winter, into a tub of water fresh from the well. However, this is not advisable, when it is not followed by a warm glow, neither when followed by a rush of blood to the head; in both cases tepid or warm water should be substituted. If not able to forego the pleasure of a cold bath, put into it a tablespoonful of whisky. No one in health should go shivering into a cold bath, and if spirit is unobtainable, wake up your dormant circulation by exercise before submitting to the chilling shock. Cold water is not a cleansing agent; in fact, it tends to make the skin retain the dirt by closing the pores, which shut up to a cold current of air or water; thus the physical evil of dirt is more likely to ensue, for if left to itself the skin would cast off this refuse material in the shape of invisible perspiration. Therefore, as warm or tepid water produces a reverse action on the pores, it is advisable to use that, with a thorough soap scrubbing, followed by a general sponging with cold water. This last may be done with cold water, only when followed by a reactionary glow of warmth; should this not occur, it is unwise

to use it, and warm must be substituted. In the oppressive weather of summer the hot bath is most cooling. The hot water dissolves the matter that clogs the pores, the rough cloth and soap remove it scarchingly, and the towel is hardly laid aside before a delicious coolness passes upon one. People who suffer much in warm weather should reckon this a daily solace. All enervating effects are warded off by an instant's plunge into water of 70°. The bran bath is taken with 1 pk. common bran stirred into a tub of warm water. The rubbing of the scaly particles of the bran cleanses the skin, while the gluten in it strengthens the tissues. Oatmeal is better, as it contains a small amount of oil that is good for the skin. Borax is esteemed for cleansing, removing stains and softening the skin. Many people object to the use of soap for the face, but any who will use the following directions will find that objection removed. Fill a basin ⅔ full with fresh water; dip face in the water, and then hands; soap the hands well and pass them with gentle motion over the whole face; having performed this thoroughly, dip the face in the water a second time and rinse it completely. (See *Bathing* in HYGIENE, in HEALTH AND DISEASE.)

LOUF. — This fibre is the seed-membrane of a gourd. Choose a close, fine (not stiff) one; shave off the ribs inside with scissors; then soak well in hot water; when soaped it makes a speedy and satisfactory lather, better than flannel. One of its advantages is, that it rinses itself the moment it is thrown into water, which only needs shaking out of it as you shake a wet brush; it is the purest thing you can use.

SPONGES. — The kinds most in use are Turkey, rock and sand sponges. Of these the former is undesirable for daily use. The rock or sand sponge, which is the common honeycomb, is the best for bath purposes, and in buying, select a white woolly one, with only a few large holes. After washing thoroughly and beating out the sand, soften by soaking in equal parts muriatic acid and water. Then sew through and through with strong cotton to prevent tearing. Nothing is more unpleasant than a dirty sponge. To preserve it clean never leave it wet, but rinse well and ring hard. No matter if you tear it, it is better to have a ragged clean one than to use a bunch of decaying stuff, which only gives you back human grease and dirt. To wash it use soap, and rinse again and again until it is fragrant. Avoid putting out of the window to dry; sunshine is injurious; a common sponge basket is the best receptacle.

TOWELS. — The choice of towels is a matter of taste, and experience and sensation must guide; each individual skin is differently sensitive, and rough towels are no more advisable than the very smooth ones; but it is well always to have a large towel or bath-sheet to throw over you in coming out of the bath.

DISCOLORATIONS & IRRITATIONS.

BLOTCHED FACE, Wash for. — Rose water, 3 oz.; sulphate of zinc, 1 dr.; mix; wet the face with it, gently dry it, and then touch it over with some cold cream, which also dry gently off.

CHAPPED HANDS, Ointments and Liniments for. — 1. Borax, 2 sc.; glycerine, ½ oz.; water, 7½ oz.; mix, and apply as a lotion twice a day. — 2. Glycerine, 3 fl. oz.; mucilage of quince-seeds, U. S. D., 10 fl. oz.; cochineal powder, 5 gr.; hot water, 1½ fl. oz.; alcohol, 2½ fl. oz.; oil of rose, 8 drops; gum Arabic, powder, 30 gr.; water, 8 fl. oz. Rub the cochineal with the hot water gradually; add the alcohol; triturate the oil of rose well with the powdered gum Arabic, and gradually add the cold water; mix the 2 solutions, filter and add the glycerine and the mucilage of quince seeds; shake thoroughly. — 3. Mix 2 parts white brandy with 1 part rose water and wash the face in it night and morning. — 4. Melt 3 dr. spermaceti, and 4 dr. white wax, with 1 oz. almond oil, and stir in 3 dr. powdered camphor; melt into small gallipots, so as to form hemispherical cakes; color with alkanet. — 5. Glycerine, 1 oz.; spermaceti, 2 dr.; olive oil 2 oz.; mix with the aid of heat. Apply every night and morning. —6. White soap, 1 lb.; spermaceti, 1 oz.; water sufficient to mix; melt together, and add 1 oz. powdered camphor. — 7. Lycopodium, 1 dr.; balsam of Peru, ½ dr.; simple ointment, 1 oz. — 8. Glycerine and rose water, each, ½ oz.; mix, and rub it on the back part of the hands night and morning. — 9. Wash the hands thoroughly before retiring; rub them over with mutton tallow and wear a pair of easy setting leather gloves. — 10. Take ¼ lb. unsalted hog's lard; work it well through clear cold water; drain, and work again, in a wine-glass rose water, the yolks of 2 fresh eggs, and 1 tablespoonful of honey; mix in gradually as much finely powdered oatmeal as will make a paste about the consistency of new butter. Spread on the hands at night, cover with kid gloves and in the morning wash off. — 11. Wash the hands in buttermilk in which some wheat bran has been stirred 20 hours before using, and dry over the fire without a towel. Use at night. — 12. Quince seeds and whisky; put the seeds in a bottle and pour on whisky to cover them; as the mixture thickens add more whisky. — 13. 1 part glycerine; 4 parts witch hazel; 4 parts water; mix and shake well before using. — 14. Rub the hands over with fine soap, and, while the lather is still on, scrub thoroughly with Indian meal. Rinse with tepid water; dry, and wet again with warm water containing ¼ teaspoonful pure glycerine. Dry without wiping, rubbing the hands until the water has evaporated. Do this at night. — 15. Lard, 16 parts; cocoa-oil, 24 parts; spermaceti, 8 parts; yellow wax, 3 parts; alkanet root, 1 part. Melt and keep at a gentle heat 15 minutes; strain through a cloth and mix with oil of lemon and oil of bergamot, each, ½ part; oil of bitter almonds, 1-15 part; pour into suitable vessels and cork.

CHAPPED LIPS, Liniments and Ointments for. — 1. 2 spoonfuls of clarified honey; a few drops of any perfume; mix, and anoint the lips frequently. — 2. Cut 4 oz. fresh unsalted butter into small pieces; place in an earthen vessel; cover with rose water; cover the vessel closely, and stand aside for 5 days in a cool place; then drain off any remaining liquid, and put the earthen

jar in a saucepan of warm water; add 1 oz. grated spermaceti; 1 oz. grated beeswax; ½ oz. powdered alkanet root; 2 dr. pulverized gum benzoin; 1 oz. pulverized borax; ½ oz. powdered white sugar; and 1 tablespoonful clear lemon juice; beat all well together, and place over a slow fire, stirring till it reaches the boiling point; remove from the fire before it boils, and when cool put in china jars. — 3. 10 drops carbolic acid in 1 oz. glycerine; apply freely at night. — 4. White wax, 1 oz.; oil of almonds, 4 oz.; rose water, 2oz.; borax, ½ dr.; oil of roses, 5 drops; by a gentle heat dissolve the borax in the rose water, which is then to be warmed a little and added to the heated oil; lastly, add the oil of roses, stirred.— 5. Wash with a strong tea, made from the bark of the white oak. — 6. 1 gill sweet oil; 1 oz. white wax; ¾ oz. spermaceti; dissolve over the fire and stir till cool.

COMEDONES, To Remove. — These are coagulated lumps, which close the pores of the skin. On the skin immediately adjacent being pressed with the finger nails, they will come from it in a vermicular form, and for this reason they are vulgarly called "flesh worms." They may be removed and prevented from returning by washing with tepid water, proper friction with a towel and the application of a little cold cream. The longer they remain in the skin the more firmly they become fixed; and after a time are converted into spines dense as bristles. With regard to the local treatment the following lotions are serviceable: 1. Distilled rose water, 1 pint; sulphate of zinc, 20 to 60 grains; mix. — 2. Sulphate of copper, 20 grains; rose water, 4 oz.; water, 12 oz.; mix. — 3. Oil of sweet almonds, 1 oz., fluid potash, 1 dr. Shake well together; add rose water, 1 oz.; pure water, 6 oz.; mix. Rub the pimples for some minutes with a rough towel, then dab them with the lotion. — 4. Wash the face twice a day with warm water, and rub dry with a coarse towel. Then with a soft towel rub in a lotion made of 2 oz. white brandy; 1 oz. cologne; ½ liquor potassa. All of these outside applications should be used with caution, for what is perfectly harmless or even healthful in some states of the system will irritate in others. Watch the effect from day to day and you can soon decide whether the remedy will prove effectual.

CRACKED HANDS. To Relieve. — White resin, 1 oz.; melt and add a little lard or oil until the resin is softened, so that when cold, and in a temperature of 80° or 90°, the thumb nail can be indented into it by using a little force. When you have obtained the right consistency by means of the oil or lard, mix the whole thoroughly, and put it by for use. Warm and drop on the hands, and, before it cools, have ready a piece of soft white paper and place it at once on the chap. The paper will adhere, or, if it does not do so, warm it over a lamp. Then moisten the paper and tear off all the outside projecting portions, leaving the wax alone. Do this at night and use no oil or grease first.

FRECKLES. To Remove. — 1. ½ lb. clear ox gall; ½ dr., each, camphor and burned alum; 1 dr. borax; 2 oz. rock salt, and the same of rock candy; mix, and shake well several times a day for 3 weeks, until the gall becomes transparent; strain through filtering paper. Apply to the face during the day, and wash off at night. — 2. 1 oz. alum; same of lemon juice in 1 pint rose water. Apply at night. — 3. Scrape horse-radish into a cup of sour milk (cold); let stand 12 hours; strain and apply 2 or 3 times a day. — 4. Lemon juice, 1 oz.; powdered borax, ½ dr.; sugar, ½ dr.; keep for a few days in a glass bottle and apply occasionally. — 5. Muriate of ammonia, ½ dr.; lavender water, 2 dr.; distilled water, ½ pint; apply 2 or 3 times a day. — 6. Equal parts pure glycerine and rose water, applied every night and allowed to dry. — 7. 1 oz. bitter almonds, 1 oz. barley flour, and sufficient quantity honey; beat the whole into a smooth paste, spread thinly on the skin at night, and wash off in the morning. —8. 2 parts, each, corrosive sublimate, sulphate of zinc, and acetate of lead; 125 parts of distilled water; mix. This preparation being poisonous, care must be taken not to get it in the mouth. — 9. Fine, pale honey, 4 oz.; glycerine, 1 oz.; mix by gentle heat, and when cold, add alcohol, 1 oz.; essence of ambergris, 6 drops; citric acid, 3 dr. — 10. Take finely powdered nitre (saltpetre), and apply it to the freckles by the finger moistened with water and dipped in the powder. — 11. Elder flower ointment, 1 oz.; sulphate of zinc, finely powdered, 25 gr. Apply with the finger night and morning.

MASK. To Remove. — This frightful discoloration can be removed by a wash made from 30 gr. chlorate of potash in 8 oz. rose water.

MOLES. To Remove. — The common mole is situated in the middle layer of the skin; the coloring matter is probably some chemical combination of iron. They are often elevated above the surface, and then the natural down of the skin over them is changed into a tuft of hair. The less they are trifled with, the better; and avoid particularly the use of depilatories to remove the hair from them, as it often causes a fœtid, suppurating wound. When slight they may be removed by touching them every day with a little concentrated acetic acid, by means of a hair pencil, observing due care to prevent the application from spreading to the surrounding parts. The application of lunar caustic is also effective, but it turns the spot temporarily black. When other means fail, the hair may be safely removed by surgical means. They can also be removed with a sun-glass. Seat the patient in a clear, strong sunlight; bring the concentrated rays of the sun to bear on the excrescence 5 or 10 minutes. In 3 or 4 weeks the mole will scale off and new skin form.

MOTH PATCHES, To Remove. — Wash with a solution of common bicarbonate of soda and water several times during the day, until the patches are removed. After the process, wash with some nice toilet soap, and the skin will be left nice, clean and free of patches. Lemon juice is good, rubbed on the skin.

PIMPLES, To Remove.— 1. Barley meal, 1 oz.; powdered bitter almonds, 1 oz.; honey, q. s., to make a smooth paste. — 2. White vinegar, 4 oz.; sulphur water, 2 oz.; acetated liquor of ammonia, ½ oz.; liquor of potassa, 2 gr.; distilled water, 4 oz.; mix, and apply twice a day. — 3. Beat a quantity of houseleek in a marble mortar;

squeeze out the juice and clarify it; pour a few drops rectified spirit on the juice, and it will instantly turn milky. — 4. 6 dr. mercury; 6 gr. flour of sulphur; 2 oz. of hog's lard; mix carefully in a mortar. — 5. 36 gr. bicarbonate of soda; 1 dr. glycerine; 1 oz. spermaceti ointment; rub on the face; let remain ½ hour, and wipe off all but a slight film with a soft cloth. — 6. Wash the face in a dilution of carbolic acid, 1 teaspoonful to 1 pt. water.

PITTING, To Remove. — Simple oil, pomade, or ointment, medicated with croton oil, and of a strength sufficient to raise a very slight pustular eruption, is probably the safest and most effective of all preparations employed for the purpose. Apply at intervals extending over several weeks.

SUNBURN. To Remove. — 1. Dip a bunch of green grapes in a basin of water; sprinkle it with powdered alum and salt mixed; wrap the grapes in paper, and bake them under hot ashes; then express the juice, and wash the face with the liquid. — 2. 2 spoonsful sweet cream; ½ pt. new milk; the juice of a lemon; ½ glass genuine French brandy; a little alum and loaf sugar; boil, skim, and when cool, it is fit for use. — 3. Borax, 15 gr.; lemon juice, 1 oz.; sugar candy, ½ dr.; mix the powders with the juice, and let them stand in a bottle, shaking occasionally until dissolved. — 4. Put a quantity of elder flowers into a jug; pour boiling water on them; let the mixture stand 24 hours; then strain through muslin. Wash the face every morning with the decoction. — 5. Pour 1 qt. boiling water on a handful of bran; let stand 1 hour and strain; when cold add 1 pt. bay rum. — 6. A mixture of lime water and sweet oil; bathe the affected parts frequently. — 7. Powdered borax, ½ oz.; glycerine, 1 oz.; camphor water, 1 qt. Wash the face twice a day.

Paints and Powders.

REMARKS. — Skin paints and skin stains are employed to give an artificial bloom to the skin. They can be of no benefit further than to produce a false beauty, and to a certain extent they must be injurious, because they fill up the pores of the skin, and if they do not prevent, they retard transpiration. Metallic colors should be avoided; those which have white or red lead for their bases, may and often do produce paralysis. Rouge and carmine are the articles generally used to communicate a red color. The first is the only cosmetic that can be employed without injury. The other, though possessing unrivaled beauty, is apt to impart a sallowness to the skin by frequent use. Starch powder is employed to impart a white tint, and generally proves harmless. Several metallic compounds, as the trisnitrate, chloride and oxide of bismuth (pearl white, Fard's white, etc.), carbonate of lead (flake white), white precipitate, etc., are frequently used, but they act as poisons. To insure a beautiful complexion by natural means is better than by artificial ones. Those who live temperately, keep regular hours, are actively employed and take a due amount of air and exercise, will, generally speaking, have no cause to be ashamed of their complexions. But, if some insuperable defect does exist in spite of every precaution, all the nostrums that it is possible to conceive of will not efface it.

ALMOND BLOOM.—1 oz. Brazil dust; 3 pts. distilled water; boil and strain; add 6 dr. isinglass; 2 dr. cochineal; 1 oz. alum; 3 dr. borax; boil again and strain through a fine cloth.

CHINESE BOXES.—They contain each 2 doz. papers, and in each paper are 3 smaller ones, viz.: a small black paper for the eyebrows; another of fine green color, but which, when fresh, makes a fine red color for the face; and a paper containing ½ oz. white powder (prepared from real pearl) for the face and neck. The red powders are best applied by a fine camel's hair brush; the colors in the dishes, wools and green papers are laid on by the tip of the little finger, previously wetted; but as gum is used in their composition, they are apt to leave a shining appearance on the skin.

CHINESE CARD.—Said to be a carthamate of soda; colorless when applied, but, being decomposed by the acid secretions of the skin, acquires a beautiful rose-like tint.

COSMETIC POWDER. — Blanched sweet almonds and beans, each, 18 oz.; orris root, 8 oz.; white Spanish soap, 6 oz.; spermacti, 1½ oz.; dried carbonate of soda, 1 oz.; oils of lavender, bergamot and lemon, each, 6 dr.; mix, and beat to a powder.

FEET, Powder for.—1. A good deodorizer for unpleasant smelling feet is the following: A mixture of equal parts salicylic acid, soap, talc and starch, to be applied in the form of powder. — 2. For excessive perspiration of the hands and feet, the following is recommended: Carbolic acid, 1 part; burnt alum, 4 parts; starch, 200 parts; French chalk, 50 parts; oil of lemon, 2 parts. Make a fine powder, to be applied to the hands and feet, or to be sprinkled inside of gloves or stockings.

FINGER TIPS. Alkanet for. — ½ oz. chippings of alkanet, tied in coarse muslin, and soaked 1 week in diluted alcohol, will give a tincture of lovely dye. The finger tips should be touched with jewelers' cotton dipped in this mixture.

FRENCH WHITE.—French chalk, finely powdered; bottled, and perfumed to taste.

HAND POWDER.—Almond powder, 1 lb.; powdered cuttle-fish bone and white soap, each, 4 oz.; orris powder, 1 oz.; mix. Use to clean the hands, and to render them soft and white.

HARMLESS POWDER. — 2 oz. pulverized starch; 3 dr. powdered orris root; 4 oz. powdered marshmallow root; 2 oz. powdered jasmine flowers (dried); pound in a mortar till mixed, and sift through muslin.

LIPS. Color for.—Color for the lips is nothing more than cold cream, with a larger quantity of wax than usual melted in it, with a few drs. of carmine. For vermilion tint, use a strong infusion of alkanet. Keep the chippings for a week in the almond oil, of which the cold cream is made, and afterward incorporate with wax and spermaceti. Always tie alkanet in a muslin when it is used for coloring.

PEARL POWDER. — The best white is literally

pearl powder, *i.e.*, made from pearls; and this is as safe as its effects are natural and beautiful; a most dangerous compound of bismuth is, however, sold under this name. The following is a good receipt: Pure pearl white and French chalk (scraped fine by Dutch rushes), equal parts, triturated together; some add more French chalk.

PINK SAUCER.—8 oz. dried safflower, previously washed in water, until it no longer gives out any color; 2 oz. subcarbonate of soda; 2 gals. water; infuse and strain; add 4 lbs. French chalk, scraped fine with Dutch rushes, and precipitate the color upon it, with citric or tartaric acid.

ROUGE. — 1. Mix vermilion with enough gum tragacanth dissolved in water, to form a thin paste; add a few drops of almond oil; place in rouge pots, and dry by a very gentle heat. — 2. (*Turkish.*) ½ pint alcohol; 1 oz. alkanet; macerate 10 days; pour off the liquid, and bottle. —3. (*Vinegar.*) Acetic acid, 4 dr.; alum, 30 grs.; rose water, 12 oz.; alcohol, 26 oz.; balsam of Peru, 50 grs.; carmine, No. 40, 2 dr.; water of ammonia, 1 dr., dissolve the balsam of Peru in the alcohol and the alum in the rose water; mix the two solutions; add the acetic acid, and macerate for a few hours; add to it the carmine, dissolved in the ammonia; shake well, and after 10 minutes, decant and bottle.

TALC WHITE. — Briancon chalk; choose a pearl gray color, and rasp gently with a piece of dog-skin; sift through a sieve of very fine silk, and put into a pint of good distilled vinegar for a fortnight; shake the bottle every day except the last, on which it must not be disturbed; pour off the vinegar so as to leave the chalk in the bottle; into which pour clean water that has been distilled or filtered; throw the whole into a clean pan, and stir well with a wooden spatula; let the powder settle again to the bottom, then pour the water gently off, and wash the powder 6 or 7 times, taking care always to use distilled water; when the powder is soft and white as desired, dry it in a place where it is not exposed to the dust; sift it through a silken sieve which will make it still finer; it may be either left in powder, or wetted and formed into cakes; dip the finger, a piece of paper, or a hare's foot, in cold cream, and put upon it about a grain of this white which will not be removed even by perspiration.

VIOLET POWDER. — Wheat flour or starch, 12 oz.; powdered orris-root, 2 oz.; otto of roses, 20 drops; oils of bergamot and cloves, each, 10 drops.

Pastes, Pomades and Ointments.

ALMOND PASTE. — 1. Blanched Valentia almonds, 4 oz.; reduce to a paste by pounding in a clean mortar; adding, towards the last, a little rose water, with some eau de Cologne, or 3 or 4 drops otto of roses or neroli, or any perfume.—2. Powdered bitter almonds, 4 oz.; white of egg, 1 oz; beat to a smooth paste, with equal parts spirits of wine and rose water.—3. Sweet and bitter almonds, blanched, each, 2 oz.; spermaceti, 2 dr.; oil of almonds, ½ oz.; Windsor soap, ½ oz.; rose water, 1 oz.; otto of roses and oil of bergamot, each, 12 drops. — 4. Spermaceti, 4 oz.; white wax (pure) 8 oz.; oil of almonds, 1 pt.: melt together in a glazed earthenware vessel, by the heat of a water bath; when cooled a little, add essential oil of almonds, and expressed oil of mace, each, 2 dr.; stir until cool, and then pour into molds.

AMANDINE.—Fine new white or pale honey, 4 oz.; white soft soap, prepared from lard and potassa, 2 oz.; mix in a marble mortar.; add 1 or 2 teaspoonfuls (if necessary) of solution of potassa, until a paste or cream is produced; then rub in, gradually, oil of almonds, 7 lbs., previously mixed with essential oil of almonds, 1 oz.; essence (oil) of bergamot, ¾ oz.; oil of cloves, ½ oz.; and balsam of Peru, 3 dr.

BISMUTH CREAM.—Subnitrate of bismuth, 2½ oz.; carbonate of magnesia, 20 gr.; gum acacia, ½ oz.; aqua rose, 8½ oz.; orange flower water, ½ oz.; essence vanilla, 10 drops; carmine 2 gr.; mix thoroughly.

CACAO CERATE.—Butter of cacao, white wax and oil of almonds, equal parts; melt and strain.

CAMPHOR CREAM.—White Castile soap, 4 dr.; boiling water sufficient to dissolve it; carbonate of ammonia, 4 dr. camphor, 4 dr.; tincture of opium, 4 dr.; oil of origanum, 2 dr.; water sufficient to complete, 2 pts.

CAZENAVE'S PASTE.—3 oz. ground barley; 1 oz. honey; the white of 1 egg; mix to a paste, and spread thickly on the cheeks, nose, and forehead, before retiring; wash it off with warm water, wetting the surface with a sponge, and letting it soften while dressing the hair or finishing the bath. Repeat nightly till the skin grows perfectly fine and soft, after which it will be enough to use it once a week. Always wash the face with warm water and mild soap, rubbing on a little cold cream when exposed to the weather.

COLD CREAM. — 1. Oil of almonds, 16 oz.; white wax, 4 oz.; melt together in an earthen vessel, and, when nearly cold, stir in 12 oz. rose water. — 2. 3 dr. of white wax; 2½ oz. sweet oil of almonds; 3 dr. spermaceti; 2 oz. rose water; 1 dr. oil of bergamot; 15 drops oil of lavender; 18 drops otto of roses. Place the wax, spermaceti, and oil of almonds, in an earthenware jar, and stand it in boiling water until thoroughly melted; pour off into a warm mortar, and stir in the rose water; when well mixed and cool, add the other ingredients; beat all together, and place in porcelain jars. — 3. Cosmoline, 24 oz.; white wax, spermaceti, each, 12 oz.; glycerine, 3 fl. oz.; oil of geranium, 1 fl. dr.

CREAM OF ROSES. — 1. Compound tincture of benzoin, ½ oz.; almond and Malaga oil, each, 1 oz.; otto of roses, 5 drops; honey, 2 oz.; and enough rose water to make the mixture measure 6 oz. Apply as often as you like. — 2. Spermaceti, 5 oz.; white wax, 2½ oz.; oil of almonds, 1 lb.; rose water, distilled, 6 oz.; melt the wax and spermaceti in the oil with gentle heat; pour into a warm mortar, holding 4 times as much, and never cease stirring with a bone spatula nor change the direction. In a short time commence

adding the rose water, previously warmed; stir briskly while adding it; and, when of a creamy consistence and quite cool, add 20 drops otto of roses, and continue stirring until thoroughly mixed.

CREAM WASH BALLS. — White curd soap, 7 lbs.; powdered starch, 1 lb.; water or rose water sufficient to mix; beat the whole together, and form into balls.

CUCUMBER POMATUM. — Clarified lard, 4 lbs.; veal suet, 1 lb.; juice of cucumbers, 3 lbs.; melt the two former together; beat them up with the juice; next day pour off the juice that has separated, and add the same quantity of fresh to the melted pomade; repeat 6 times, or until the pomade is imbued with the odor of cucumbers; melt the pomade by a water-bath, and mix with it 3 dr. powdered white starch; let it settle, and before it is too cold, pour it off into small pots, taking care not to disturb the dregs.

ELDER OINTMENT. — Fresh elder leaves, bruised, 3 lbs.; suet 4 lbs.; lard 2 lbs.; boil together until the leaves become crisp, and squeeze through a linen cloth.

GLOVES. Paste for. — 1. ½ lb. soft soap; 1 gill salad oil; 1 oz. mutton tallow; boil together; after boiling ceases, add 1 gill spirits of wine and 1 sc. ambergris; rip a pair of gloves 3 sizes too large, spread them with this paste, and sew up to be worn at night. — 2. Spermaceti cerate, 3 oz.; melt; add balsam of Peru, ½ dr.; stir 5 minutes, and, after a few minutes' repose, pour off the clear portion; to this add oil of nutmeg, 15 drops; oil of cassia and essence of ambergris, each, 6 drops; and stir until cold.—3. The yolks of 2 fresh eggs beaten with 2 teaspoonfuls oil of sweet almonds, 1 oz. rose water, and 36 drops tincture of benzoin. Make a paste of this, and either anoint the gloves with it, or spread it freely on the hands and draw the gloves on afterward.

GLYCERINE BALSAM. — 1000 parts glycerine; 120 parts orange flower water; 1 part, each, oils neroli and bitter almonds.

LEMON WASH BALLS. — Cut 6 lbs. soap into small pieces; melt with 1 pt. water in which 6 lemons have been boiled; withdraw the soap from the fire, and add 3 lbs. powdered starch, and a little essence of lemon; knead the whole into a paste, and form into balls the desired size.

LIP SALVE. — 1. Spermaceti ointment, ½ lb.; alkanet root, ½ oz.; melt together until colored; strain, and, when cooled a little, add balsam of Peru, 3 dr.; stir well, and in a few minutes pour off the clear portion from the dregs; lastly, stir in oil of cloves, 20 or 30 drops. — 2. Oil of almonds, 3 oz.; spermaceti, ½ oz.; virgin rice, ½ oz.; melt over a slow fire, mixing with them a little powder of alkanet root, to color it; stir till cold, and add a few drops oil of rhodium.—3. Oil of almonds, spermaceti, white wax, and white sugar candy, equal parts.

ORANGE PASTE.—Orange flowers, 2 lbs.; bitter and sweet almonds, each blanched, 2½ lbs.; beat to a perfectly smooth paste.

ORGEAT PASTE.—Blanched Jordan almonds, 1 lb.; blanched bitter almonds, white sugar and honey, each, ½ lb.; beat to a paste, with orange flower water, q. s., or neroli, a few drops, and put into pots; for use, rub 1 oz. with ½ pt. water, and strain through muslin.

PATE DIVINE DE VENUS. — Mix equal parts washed lard, fresh butter, and white honey; add balsam of Mecca and otto of roses to perfume.

POMMADE DE BEAUTE. — Melt together in an earthen vessel placed in hot water, white wax, 1½ dr.; spermaceti, 2 dr.; oil of sweet almonds, ½ oz.; virgin olive oil, ½ oz.; oil of poppies, ½ oz.; beat them with a few drops balsam of Peru.

POMMADE D' HEBE. — Juice of lily bulbs, 2 oz.; Narbonne honey, 2 oz.; white wax, 1 oz.; rose water, 3 drs.; melt the wax with a gentle heat, and add the other ingredients.

POMMADE DE NINON DE L' ENCLOS. — Oil of almonds, 4 oz.; prepared lard, 3 oz.; juice of houseleek, 3 fl. oz.

POMMADE DE VENUS. — Bears' oil, 4 oz.; honey, 6 oz.; oatmeal, 6 oz.; yolks of 3 eggs; 1 oz. powdered gum Arabic; mix the honey and gum first; then put in the eggs. To the oil add 2 oz. deer suet, and gradually mix with the foregoing; add the oatmeal last. Perfume with essential oils, press in fancy molds like soap, or make into balls. Use more oatmeal if necessary. When made it should be like stiff paste.

POMMADE EN CREME. — Melt together 1 dr. each, white wax and spermaceti; add oil sweet almonds, 2 oz.; pour it into a warm mortar, and gradually stir in rose or other perfumed water, and 1 dr. tincture of tolu.

POMADE, For Whitening and Softening. — 1. Camphor gum, white beeswax, spermaceti, each, 3 oz.; 2 oz. olive oil; melt slowly. If the hands be affected, anoint them on going to bed, and put on a pair of gloves. — 2. Dissolve 2 oz. Venice soap, in 2 oz. lemon juice. Add 1 oz. oil of bitter almonds, and a like quantity oil of tartar; mix and stir until it has acquired the consistence of soap; use it as such for the hands. — 3. Slice ¼ lb. Castile soap, into a pewter jar, and pour upon it 2 qts. alcohol; place the jar in a vessel of water at such a heat as will cause the spirits to boil, when the soap will dissolve; put the jar, closely covered, in a warm place until the liquor is clarified; take off any scum that may appear on the surface and pour it carefully from the dregs, then put it into a jar again, and place it in a vessel of hot water, distilling all the spirits that may arise; dry the remaining mass in the air a few days, when a white transparent soap will be obtained, free from alkaline impurities.

ROSE GLYCERINE CREAM. — Spermaceti, ½ oz.; oil of sweet almonds, 2 oz.; white wax, 1 oz.; glycerine, ¼ oz.; melt the spermaceti, white wax and oil of almonds together; add the glycerine and stir the mixture until cool; perfume with otto of roses.

ROSEMARY OINTMENT. — Lard, 16 oz.; suet, 8 oz.; yellow wax, 2 oz.; oil of mace, 2 oz.; liquefy in a vapor bath; when nearly cold, add oil rosemary and oil juniper, each, 1 oz.

ROSE OINTMENT. — Washed lard (melted), and roses (centif.) each, 2 lbs.; mix, and in 2 days remelt, and press out the fat; to this last add of fresh roses, 2 lbs., and repeat the process; color with alkanet root if required red. — 2. Spermaceti ointment melted and beaten up with

about $\frac{3}{4}$ its weight rose water until they congeal.

RUBEFACIENT PASTE. — Acetate of lead, 1 oz.; bisulphate of potassa, 3 oz.; water, q. s.

SULTANA PASTE. — 2 oz. bitter almonds; blanch, and beat into a paste with 1 oz. rose water; add honey, fine oatmeal, and glycerine, 1 oz. each, and when well mixed, 2 dr. tincture of benzoin. Apply before a fire a short time before retiring.

TAR PASTE. — Mix 1 spoonful best tar in 1 pt. pure olive or almond oil, by heating the two together in a tin cup set in boiling water; stir till mixed and smooth, putting in more oil if too thick to run easily. Rub this on the face when going to bed, and lay patches of soft old cloth on the cheeks and forehead to keep the tar from rubbing off. The black unpleasant mask washes off easily with warm water and soap. The skin comes out, after several applications, soft, moist, and tinted like a baby's.

Washes.

ALBERT'S COSMETIC.—Cucumber pomade, 3 oz.; almond soap, 1 oz.; rose water, 1 qt.; mix the pomade and soap, and add the rose water gradually.

AMYKOS.—105 dr. cloves, boiled in 1 gallon water, in which 105 dr. pure glycerine are dissolved, and to which 42 dr. borax are added.

AQUA COSMETICA.—Emulsion of bitter almonds, 3 oz.; rose and orange flower, each, 4 oz.; borax, 1 dr.; tincture of benzoin, 2 dr.; mix.

AUGUSTIN'S.—Rose water, 8 oz.; salt of tartar, 2 dr.; tincture of benzoin, 3 drs.

BALM OF BEAUTY. — Pure soft water, 1 qt.; pulverized Castile soap, 4 oz.; emulsion of bitter almonds, 6 oz.; rose and orange flower water, each, 8 oz.; tincture of benzoin, 2 dr.; borax, 1 dr.; add 5 gr. bichloride of mercury to every 8 oz. of the mixture. To use, apply on a cotton or linen cloth to the face.

BATH OF MODESTY. — Take 4 oz. sweet almonds, peeled; 1 lb. pine apple kernels; 1 lb. elecampane; 10 handfuls linseed; 1 oz. marshmallow roots; 1 oz. white lily roots; pound to a paste, and tie up in several small bags, which are to be thrown into a tepid bath, and pressed till the water becomes milky.

BLOOM OF ROSES.—1. Dried red rose leaves, 1½ oz.; boiling water, 1 pt.; infuse in earthenware for 2 hours; press out the liquor, and add juice of 3 lemons; the next day filter the clear portion. Keep in a cool place. A little spirit of wine (3 or 4 fl. oz. to the pt.) is sometimes added. — 2. Carmine, ¼ oz.; strong liquor of ammonia (not weaker than .900), 1 oz.; put them into a stoppered bottle; set it in a cool place, and occasionally agitate 2 or 3 days to effect a solution; then add of rose water, 1 pt.; and, after admixture, add esprit de rose, ½ fl. oz.; pure rectified spirit, 1 fl. oz.; well agitate, and set the whole aside for a week; lastly, decant the clear portion from the dregs for use.

BLOOM OF YOUTH. — Boil 1 oz. Brazil wood in 8 pts. water 15 minutes; strain; add ¾ oz. isinglass; ¼ oz. cochineal; 1 oz. alum; ½ oz. borax; dissolve by heat, and strain.

CALAMINE LOTION. — Levigated calamine, 40 gr.; oxide of zinc, 20 gr.; glycerine, 20 drops; rose water, to make, 1 oz. Get the white calamine, not the red.

COSMETIC LOTION. — 1. Make a hole in a lemon, fill it with sugar candy, and close it with leaf gold, applied over the rind that was cut out; then roast the lemon in hot ashes; when desirous of using the juice, squeeze out a little through the hole already made, and with it wash the face with a napkin. — 2. Take a teacupful of cold sour milk; scrape into it a quantity of horseradish; let it stand from 6 to 12 hours; strain and apply 2 or 3 times a day.

EAU D' ATIRONA. — 6½ dr. spirituous tincture of cinnamon and cloves, 1 dr. soda soap, and a drop of peppermint oil.

EAU DE PRINCESS. — ½ dr. calomel, 1-10 dr. corrosive sublimate (so altered by the added perfume that the usual tests do not reveal it), and 30 dr. orange flower water.

ENGLISH EARTH. — English earth, 6 oz.; bay rum, 2 oz.; glycerine, 1 oz.; powdered borax, 2 dr.; extract of violet, 2 dr.; distilled water, 2 pts.; rub the glycerine and the earth to a smooth paste and add the other ingredients.

FACE WASH. — 1. 2 gr. bichloride of mercury; 2 gr. muriate of ammonia; 8 oz. emulsion of almonds. — 2. 2 gals. of strong soap suds; 1 pt. pure alcohol; ¼ oz. rosemary; mix, and apply with a linen rag. — 3. Infuse well sifted wheat bran 4 hours in white vinegar; add the yolks of 5 eggs and 2 gr. ambergris; distil the whole; cork carefully, and it is ready for use in 15 days. — 4. Cascarilla powder, 2 gr.; muriate of ammonia, 2 gr.; emulsion of almonds, 8 oz.; apply with fine linen. — 5. Tincture benzoin, 2 oz.; pure alcohol, 1 pt.; bathe the skin; allow the wash to remain on a few minutes and then wipe off.

GLYCERINE LOTION. — 1 oz. sweet almonds, or pistachio-nuts; ½ pt. elder or rose water; 1 oz. pure glycerine; grate the nuts; put the powder in a little bag of linen, and squeeze it for several minutes in the rose water; then add glycerine and a little perfume. Wet the face with it 2 or 3 times a day; allow it to dry thoroughly, when, if it feel sticky or pasty, it may be washed off with water.

HANDS, Wash for.—4 oz. pulverized borax; 4 oz., each, saleratus and muriate of ammonia; mix with 4 qts. hot soft water; stir well and bottle for use. After washing the hands and face, wet with the above. — 2. Kerosene oil and water, equal parts. When the hands are discolored and soiled by rough work, before washing them dip the fingers in the mixture and rub in the usual way; the darkened skin will be effectually freed from soil and grime; then wash in soap and hot water until the smell of the oil is removed.

ITALIAN WASH.—Melilot water, 12 oz.; tincture of benzoin, 2 drs.

KALYDOR.—Bitter almonds, blanched, 1 oz.; corrosive sublimate, 8 grs.; rose water, 16 oz.

LEMON JUICE LOTION.—Fresh lemon juice, 2 oz.; glycerine, 1 oz.; rose water or rain water with 3 or 4 drops otto of roses added, 1 pt. Anoint the hands and face 3 or 4 times daily; al-

iow to remain on several minutes before wiping.

MILK OF CUCUMBERS. — Slice into ½ pt. blue skim milk, as much cucumber as it will cover, let it stand 1 hour. Bathe the face and hands, washing them off with fair water when the cucumber extract is dry.

MILK OF ROSES.—1. (*French.*) 1 qt. rose water; ½ pt. rosemary water; 2 oz., tincture of storax; 2 oz. tincture of benzoin; ½ oz. spirit of rose. Mix by shaking in a bottle, plunging it occasionally into warm water, but not hot water. — 2. (*German.*) 4 oz. blanched almonds grated; 2 oz. grated white curd soap; 1 qt. rose water. Rub the soap and almonds together with the hand, gradually adding the rose water till thoroughly mixed; warm a few minutes by standing in a vessel in a pan of boiling water; strain and bottle for use.

NAILS, Wash For.—1. Tincture of myrrh, 1 dr.; diluted sulphuric acid, 2 dr.; spring water, 4 oz.; mix. Cleanse the nails with white soap; then dip into the wash.—2. When the nails are stained or discolored, a little lemon juice or vinegar and water, is a good application. Occasionally a little pumice stone, in powder, or a little putty powder, may be used with water and a piece of soft leather or flannel. The frequent employment of these substances is injurious to the healthy growth of the nail.

OFFENSIVE FEET, Washes for.—1. Wash the feet in warm water, to which a little hydrochloric acid, or chloride of lime, has been added. — 2. Bathe every night or oftener in a strong solution of borax. — 3. Bathe in a weak solution of permanganate of potassa; 1 sc. salt to 8 oz. water. — 4. Common kitchen soda dissolved in water.

STAINS, Wash to Remove. — 1. Fruit and ink stains may be taken out by immersing the hands in water slightly acidulated with oxalic acid or a few drops oil of vitriol, or to which a little pearlash or chloride of lime has been added; afterwards rinse them well in clean water, and do not touch soap for some hours, as any alkaline matter will bring back the stains, after their apparent removal by all the above substances, except the last. — 1. To remove acid fruit stains, wash the hands in clear water, wipe them lightly, and while moist strike a match and shut them around it so as to catch the smoke, and the stain will disappear. — 3. Rubbing the hands with a slice of raw potato will remove vegetable stains. — 4. Damp the hands first in water, then rub them with tartaric acid as you would with soap; rinse them and rub dry. — 5. Put ¼ lb. glauber salts, ¼ lb. chloride of lime, and 4 oz. water into a small wide-mouth bottle, and when required for use pour some of the thick sediment into a saucer, and rub it well over the hands with pumice-stone or a nail brush. Stains of nitrate of silver may be removed from the hands by means of a solution of chloride of iron.

SULPHUR. — Break 1 oz. of sulphur, and pour over it 1 qt. boiling water; infuse 12 or 14 hours and apply to the face 2 or 3 times a day, for a few weeks. This application is useful in removing that roughness of the skin which generally succeeds pimples.

VIRGIN MILK. — 1. Dissolve in spirits of wine, gum benzoin and styrax, equal parts; the spirits become a reddish tincture, and exhale a fragrant smell. Some add a little balm of Gilead. Drop a few drops into a glass of clear water, and by stirring the water, it instantly changes milky.— 2. Simple tincture of benzoin, 2 drs.; orange flower water, 8 oz.; vary it by using rose or elder flower water.

WRINKLES, Washes for. — 1. Second water of barley, 1 pt.; strain through a piece of fine linen; add 1 doz. drops balm of Mecca and shake until the water assumes a whitish or turgid appearance. Before applying, wash the face with soft water. —2. 2 oz. juice of onions; 2 oz. white lily; 2 oz. Narbonne honey; 1 oz. white wax; melt in a new earthen pipkin and continue stirring briskly until cold. Apply on going to bed, and allow to remain on till morning. The onion juice may be omitted. —3. Put pieces of court plaster on the face where the wrinkles are inclined to come, just before going to bed, and remove in the morning. Warm water should always be used to wash the face, as it prevents wrinkles. — 4. Sleep with face done up in a mixture of the whites of eggs, sweet almond oil, and alum. — 5. Wrinkles are less apparent under a kind of varnish containing 36 gr. turpentine in 3 dr. alcohol, allowed to dry on the face. — 6. To 1 fl. oz. tincture gum benzoin add 7 fl. oz. distilled rose water and ½ oz. glycerine. Bathe face, neck and hands with it at night, letting it dry on. Wash off in the morning with a very little pure white Castile soap and soft water. If the water is hard, add a little dissolved borax.

TEETH.

REMARKS. — Sound teeth not only promote digestion, but keep the breath sweet and pure. They are bones thinly covered with a fine enamel, which is more or less substantial in different persons. Whenever this enamel is worn or eaten through in any way, the teeth cannot long remain sound. They are to be cleaned, but with precaution, for if the enamel is worn off faster by cleaning the outside than nature supplies it within, the teeth will probably suffer more than by neglect. Many persons injure their teeth by too much scouring. Water used for the teeth should be lukewarm, as hot and cold water are injurious. The brush should be well made, with the bristles very thick but not too stiff. Some teeth can bear harder brushes than others; but the hardness or softness should be a matter of personal taste; whatever it is, let it be rinsed, well dried, and kept uncovered; put away wet, and shut up, they become unpleasant. Straight brushes are impracticable; curved ones with a tuft end, bud shaped or convex, are best. The use of floss silk between the teeth ought to be recommended; also the quill toothpick; those formed of gold, silver, or any metal, should never be used. The mouth should be rinsed and the

teeth brushed with clear warm water both before and after the use of any dentifrice, and after eating, if it is only a cracker. Crosswise brushing is not wise; the upper teeth should be brushed down, and the lower ones up. The teeth are greatly influenced by what is eaten and drunk. All things that are very hot or very cold are bad. When animal food or vegetables are eaten, cleanse the teeth immediately; the first is apt to leave behind it a rancid acrimony, and the other an acidity. Clean them before retiring to rest. With smokers, this practice is obligatory. The decaying of teeth is partly due to chemical decomposition of the food lodged between them. When there is joined to this an unhealthy or weak condition of the ivory, and also the continual pressure of the adjacent teeth, decay is sure to take place. When a cavity is actually developed, the sooner it is filled the better. When it is small and has not opened into the natural cavity of the tooth, gold leaf is the best material. When this cavity is exposed, gold is useless under ordinary circumstances. Mineral as well as vegetable acids act on the teeth. Grapes in 48 hours render the enamel of a chalky consistence. Vegetable substances are inert till fermentation takes place, and acetic acid is formed. Sugar has no deleterious effect only in the state of acetous fermentation. Animal substances exert no injurious effect until putrefaction is far advanced. Dentifrices often put a beautiful pearly surface on the teeth at the expense of the enamel. The solid ingredients used in them should not be so hard or gritty as to injure the enamel of the teeth; nor so soft or adhesive as to adhere to the gums, after rinsing the mouth.

Pastes and Pastils.

These consist, for the most part, of the ordinary substances used as dentifrices, reduced to the state of a very fine powder, and mixed with sufficient honey, sugar, or capillaire, to give them the required consistence. Honey of roses is often used for this purpose, with some agreeable perfume at will. A little eau de Cologne, or rectified spirit, is a useful addition.

CAMPHOR PASTE. — 1 oz. sal ammoniac, 4 dr camphor; powder, and mix with sufficient honey to make a smooth paste; triturate until entirely smooth.

CARBON PASTE.—Chippings of turkey stone, cylinder charcoal and prepared chalk, each, 2 oz.; cochineal and cloves, each, 1 dr.; honey, 5 oz.; eau de Cologne, q. s. Put in pots until the next day, and press ve from the air.

CHARCOAL PASTE. — 1. Chlorate of potassa, 1 dr.; mint water, 1 fl. oz.; triturate until dissolved; add of powdered charcoal, 2 oz.; honey, 1 oz.— 2. Suds of Castile soap and spirits of camphor, equal parts; make into a thick paste with pulverized chalk and charcoal, equal parts.

CINNAMON PASTE. — 1. Cinnamon, 2 oz.; cloves, 6 dr.; fresh lemon peel, 1½ oz.; dried rose petals, 1 oz.; scurvy grass, 8 oz.; spirits, 3 lbs.; macerate 24 hours, and distil in a water bath.— 2. Cinnamon, cloves and nutmeg, each, 1 ar; vanilla, ½ dr.; camphor, 10 gr.; tincture of pellitory, 2 fl. oz.; brandy or proof spirit, ½ pt.

CORAL PASTE. — 1. Prepared coral, 8 oz.; cochineal, 1 oz.; cinnamon, 2 oz.; alum, 3 dr.; honey, 20 oz.; water, 1 oz.; triturate the cochineal with the alum and water; add the honey, then the coral and cinnamon; leave the whole till the effervescence has subsided; then rub it with a few drops of oil of cloves, or other aromatic oil, and put it into covered pots. — 2. Prepared coral, 8 oz.; cuttle-fish bone, 4 oz.; mastic, 2 oz.; cochineal, ½ oz.; honey, ¾ lb.; essence of ambergris, 1 fl. dr.; oil of cloves, ½ fl. dr., dissolved in rectified spirit, 1 fl. oz.

FLORILINE. — Prepared chalk, 5 dr.; starch powder, 2½ dr.; glycerine, 2 dr.; pellitory tincture, ¾ dr.; peppermint oil, 10 drops; and water q. s., colored with Florentine lac.

HONEY PASTE. — 1. 1 oz. myrrh in fine powder; a little powdered green sage; 2 spoonfuls white honey. — 2. 2 sc. myrrh, in fine powder; 1 sc. juniper gum; 10 gr. rock alum; mix in honey. Apply frequently to the decayed teeth.

MAGIC PASTE. — White marble dust, 4 oz.; pumice stone (in impalpable powder), 3 oz.; rose pink, 1 oz.; honey, ½ lb.; otto of roses, 15 drops; whitens the teeth, but should not be used too freely, nor too frequently.

METGES' PASTE. — Metges' tooth powder, 48 oz.; Narbonne honey, 32 oz.; syrup, 64 oz.; cochineal, 1 oz.; alum, 1 oz.; water, 4 oz.; triturate the cochineal and alum with the water and strain; add the honey, then the syrup; lastly the powder.

MOUTH PASTILS. — Dry compounds for perfuming or correcting the breath. — 1. Extract of liquorice, 3 oz.; oil of cloves, 1½ dr.; oil of cinnamon, 15 drops; mix, and divide into 1 gr. pills, and silver them. — 2. Chocolate powder and ground coffee, of each, 1½ oz.; prepared charcoal, 1 oz.; sugar, 1 oz.; vanilla (pulverized with the sugar), 1 oz.; enough mucilage. Make into lozenges of any form, of which 6 to 8 may be used daily to disinfect the breath. — 3. (*Bologna Catechu.*) Extract of liquorice, 3 oz.; water, 3 oz.; dissolve by heat in a water bath, and add catechu, 1 oz.; gum Arabic, ½ oz. Evaporate to the consistence of an extract, and add (in powder) ½ dr., each, mastic, cascarilla, charcoal and orris; remove from the fire, and add oil of peppermint, ½ dr.; essence of ambergris and essence of musk, each, 5 drops; roll it flat on an oiled marble slab, and cut into small lozenges. Used by smokers. — 4. Catechu, 7 dr.; orris powder, 40 gr.; sugar, 3 oz.; oil of rosemary (or of peppermint, cloves, or cinnamon), 4 drops. Make as before.

PELLETIER'S ODONTINE. — Magnesia or pulverized sepia-bone and butter of cacao, aromatised with some essential oil.

ROSEATE PASTE —Chalk, 8 oz.; myrrh and rhatany root, each, 2 oz., orris root, 1 oz.; honey of roses, q. s. to mix.

ROSEMARY PASTE. — Levigated bole, 4 oz.; myrrh, 1 oz.; oil of rosemary, 2 dr.; dissolved in 1 oz. rectified spirit; clarified honey, q. s.

ROSE PASTE. — Cuttle-fish bone, 1 oz.; prepared chalk, 2 oz., cochineal, ½ dr.; honey of roses, 5 oz.; otto of roses, 6 drops.

SALINE PASTE. — Sulphate of potash, 1 oz.; bay salt, ½ oz.; clarified honey, q. s.; eau de Cologne, 2 dr.

SPANISH PASTE. — Castile soap, in fine powder and cuttle-fish bone, each, 2 oz.; honey of roses, 5 oz.

VANILLA PASTE. — 1. Charcoal, 1 oz.; white honey, 1 oz.; vanilla sugar, 1 oz.: Peruvian bark, ½ oz.; and a few drops essential oil. — 2. Red cinchona bark, 2 dr.; vanilla, 1 dr.; cloves., ½ dr. (the last two reduced to powder by trituration with). white sugar, 1 oz.; cuttle-fish bone and marble dust, each, ½ oz.; syrup of saffron, q. s.

VIOLET PASTE.—Prepared chalk and cuttle-fish bone, each, 3 oz.; powdered white sugar, 2 oz.; orris root, 1 oz.; smalts, ½ oz.; syrup of violets, q. s. to mix.

WHITE PASTE. — Orris, sal ammoniac, cream of tartar, each, 2 oz.; tinctures cinnamon and vanilla, each, ½ oz.; oil of cloves, 60 drops; clarified honey and syrup to form a paste. — 2. Precipitated chalk, 4 oz.; sulphate of potash, ½ oz.; prepared honey sufficient to form a paste; add a few drops of otto of roses or oil of cinnamon.

Powders.

REMARKS.—The most useful form of dentifrices is that of powder, but liquids and electuaries are also employed. Care must be taken that the dry ingredients be pulverized, and the harder ones reduced to impalpable powder either by levigation or elutriation. The mixture of the ingredients must be complete; which is most readily effected by stirring them well together to a homogeneous powder, then passing it through a fine sieve. Those which contain volatile substances should be preserved in closely-corked wide-mouth bottles, and those containing acidulous or gritty matter should not be frequently used.

AMERICAN.—Coral, cuttle-fish bone, dragon's blood, each, 8 oz.; burnt alum and red sanders, each, 4 oz.; orris, 8 oz.; cloves and cinnamon, each, ½ oz.; vanilla, 2 dr.; rosewood, ½ oz.; rose pink, 8 oz.

ANTISCORBUTIC.—Extract of rhatany, ½ oz.; prepared charcoal, 2 oz.; cinnamon, ¼ oz.; cloves, ¼ oz.

ANTISEPTIC. — Prepared chalk, 2 oz.; dry chloride of lime, 10 gr.; oil of cloves, 5 drops. Mix.

AROMATIC. — 1. Finely powdered prepared chalk, 2 dr.; pure starch, 2 dr.; myrrh, 2 dr.; ginger, ½ dr.; cuttle-fish bone, 2 dr.; flower of lavender and sugar at pleasure. Mix. — 2. Calamus, 4 dr.; charcoal, 1 dr.; soap, 1 dr.; oil of cloves, 12 drops.

ASIATIC.—1. Prepared coral, 4 oz.; Venetian red, 3 dr.; ochre, 5 dr.; pumice, 5 dr.; musk, 1 gr. Mix. — 2. Bole, 3 parts; chalk, 2 parts; ochre, 1 part; pumice, 1 part; musk, to scent.

BARK. — 1. Charcoal, 4 parts; yellow bark, 1 part. — 2. Red bark and Armenian bole, each, 1 oz.; powdered cinnamon and bicarbonate of soda, each, ½ oz.; oil of cinnamon, 2 or 3 drops.

BEALL'S.—Prepared chalk, 12 oz.; powdered orris root, 2 oz.; bicarbonate of soda, ½ oz.; soft part of cuttle-fish bone, 1 oz.; add a sufficient quantity of rose pink to color it, and mix well.

CADET'S.—Sugar, 1 oz.; charcoal, 1 oz.; Peruvian bark, ½ oz.; cream of tartar, 1½ dr.; cinnamon, 24 gr.

CAMPHORATED. — 1. Camphor (pulverized by the aid of a few drops of spirit), 1 oz.; prepared or precipitated chalk, 3 oz. — 2. Camphor, 1 oz.; precipitated chalk, 2 oz.; cuttle-fish bone, ½ oz.; myrrh, 2 dr.; borax, 2 dr.; lake or rose pink, 1 dr., or q. s. — 3. Prepared chalk, 8 oz.; powdered cuttle-fish bone, 4 oz.; camphor, 1 dr.; oil of cloves, 1 dr. Dissolve the camphor with alcohol; add the remaining ingredients, and mix.

CARABELLI'S.—Cuttle-fish bone, 1½ oz.; prepared oyster shells, 1½ oz.; cinnamon, orris, and lime tree charcoal, each, 3 dr.; vanilla, 10 gr.

CARBONIC.—1. Willow charcoal, 4 oz.; cinchona bark, 4 oz.; cloves, ½ dr. — 2. Charcoal, 8 oz.; cinnamon, 4 oz.; sugar, 8 oz.; oil of mint, ½ oz.; oil of cinnamon, ¼ oz.; tincture of ambergris, ½ dr.

CARTWRIGHT'S.—Prepared chalk, 1 oz.; orris, 1 oz.; Castile soap, ½ dr.

CHALK.—1. 2 oz. prepared chalk; ½ oz., each, pulverized borax and orris root; ¼ oz. cassia powder. — 2. Cuttle-fish bone and prepared chalk, each, 2 oz.; oil of cloves, 20 drops. — 3. Precipitated chalk, 4 oz.; finely powdered charcoal, ½ oz.; powdered orris root, 2 oz.; otto of roses, 10 drops; oil of sandal wood, 5 drops.

CHARCOAL.—The charcoal made in iron cylinders, from willow, is to be preferred, reduced to an impalpable powder, and kept from the air. Charcoal of areca nut is highly commended. That of the shells of cocoa nuts is said to be used for the same purpose. 1. Prepared charcoal, 1 oz.; sugar, 1 oz.; oil of cloves, 3 drops. Mix. — 2. Powdered charcoal and white sugar, 1 oz. each; Peruvian bark, ½ oz.; cream of tartar, 1½ dr.; carnella, 24 gr. Rub together and pulverize in a mortar. — 3. Powdered cuttle-fish, 2 dr.; powdered myrrh, ½ dr.; carbonate of soda, 1 dr.; charcoal powder, 1 oz. Use freely, and allow to remain some minutes in the mouth.

CIRCASSIAN. — Prepared hartshorn, 2 oz.; sulphate of potash, 2 oz.; cuttle-fish bone, 8 oz.; orris, 4 oz.; yellow sandal wood, 1 oz.; rose pink, 3 oz.; oil of rhodium, 30 drops. Mix the ingredients, previously reduced to powder, and add the oil of rhodium.

COCOA. — Pulverized French chalk, 1 lb.; lily white, 1 lb.; white earth, 1 lb.; pulverized sugar, ½ lb.; powdered cocoa soap, ½ lb.; oil of wintergreen, ¼ oz.; oil of rose, ½ dr.; oil of cloves, ½ dr.; oil of sassafras, ¼ dr. Mix, and pulverize thoroughly.

CORAL. — Red coral, red bole and cuttle-fish bone, each, 3 oz.; dragon's blood, 1½ oz.; cinnamon, ¾ oz.; cochineal, 3 dr.; cloves, 1 dr.; bitartrate of potassa, 4½ oz. Reduce separately to fine powder and mix.

DESCHAMP'S.—Powdered talc, 4 oz.; bicarbonate of soda, 1 oz.; carmine, 6 gr.; oil of mint, 12 or 15 drops.

DETERGENT. — Bicarbonate of soda, 1 oz.; powdered Castile soap, ½ oz.; sulphate of potash, ½ oz.; sugar of milk, ½ oz.; orris root, 4 oz.; oil of bitter almonds, 4 drops.

FARINA'S. — Cuttle-fish bone, 2 lbs.; pulverized orris root, 2 lbs.; pulverized white sugar, ½ lb.; otto of rosemary, 4 dr.; otto of orange peel, 2 dr.; otto of lemon, 2 dr.; otto of neroli, ½ dr.; otto of bergamot, 2 dr. Mix, and pass through a silk sieve.

FLORENTINE. — Prepared shells, 14 dr.; orris, 6 dr.; cream of tartar, 3 dr.; lake to color.

FRENCH. — Peruvian bark, burnt crust of bread, and sugar in equal proportions.

GALVANIC.—1. Triturate 2 leaves of gold leaf, and 3 of silver, with 2 dr. sulphate of potash and 1 dr. alum; add white sugar, 2 dr.; common salt, 1 dr.; pellitory of Spain, ½ dr.; prepared hartshorn, 1 oz.; sulphate of quinine, 10 gr.; mix. Color with finest smalts, rose, pink, or lake. — 2. 2 leaves of gold; 2 of silver; alum, 3 dr.; salt, 1½ dr.; white sugar, 1½ dr.; pepper, 15 gr.; opium, 5 gr.; coral, 3 dr.; Peruvian bark, 3 dr. Grind the gold and silver with the salt and alum, and add the latter ingredients. For the double galvanic tooth powder, put twice the above quantities of gold, silver, alum, salt, pepper and opium.

GERMAN.—Peruvian bark, 6 dr.; red sanders, 2 dr.; oil of cloves and of bergamot, 3 drops.

GROSVENOR'S.—Red coral, 3 lbs.; prepared oyster shells, 2½ lbs.; orris powder, ½ lb.; oil of rhodium, 25 drops. Rose pink is now substituted for coral.

HEMET'S.—Cuttle-fish bone, 6 oz.; cream of tartar, 1 oz.; orris root, ½ oz.

JAMET'S. — Orris, 16 oz.; magnesia, 4 oz.; pumice stone, 8 oz.; cuttle-fish bone, 8 oz.; sulphate of quinine, 4 oz.; cascarilla, 1 oz.; sugar of milk, 16 oz.; oil of mint, 1 oz.; oil of cinnamon, 2 dr.; oil of neroli, 1 dr.; essence of ambergris, 1 dr.

KEMMERER'S. — Wood soot, 1½ oz.; strawberry root, ½ oz.; add a few drops of cau de cologne.

LAVENDER.—Crimson lake, 1 dr.; Chinese or Turnbull's blue, 1 sc.; mix, and add bicarbonate of soda, ½ oz.; cuttle-fish bone, 2 oz.; precipitated chalk, 6 oz.; oil of lavender, 8 drops.

LEFOULON'S. — Scurvy grass, horseradish, guaiacum, cinchona, mint, pellitory root, calamus, rhatany, of each, equal quantities; reduce to an impalpable powder; a little calcined magnesia is sometimes added.

LEMON. — Powdered arrowroot, 1 lb.; powdered orris root, 3 oz.; oil of lemon, 20 drops; oil of cloves, 10 drops; oil of bergamot, 12 drops. Rub the oils with the powders until thoroughly mixed; add indigo to strike a violet tint.

METGE'S. — Prepared chalk, 3½ lbs.; lake or rose pink, 1 lb.; orris, 2 lbs.; cream of tartar, 12 oz.; levigated pumice, 1 oz.; sugar, 9 oz.; oil of cloves, 1 dr.

MIALHE'S.—Sugar of milk, 3 oz.; pure tannin, 3 dr.; lake, 1 dr.; oil of mint, 8 drops; oil of aniseed, 8 drops; neroli, 4 drops.

MYRRH. — 1. Myrrh, ½ oz.; cuttle-fish bone, prepared chalk, orris, each, 1 oz.; cassia, ½ oz.; mix.—2 Bole, 1 oz.; myrrh, bark and orris, each, ½ oz.; mix.

PALMER'S.—Prepared chalk, 1 lb.; camphor, 1 oz.; orris, 1 lb.; cuttle fish-bone, 4 oz.; rose pink, 1 oz.

PARISIAN.—Pulverized cream tartar, 2½ lbs.; Pulverized alum, 1 lb.; pulverized cuttle-fish bone, 1 lb.; pulverized carbonate of magnesia, ½ lb.; pulverized cochineal, 3 oz.; pulverized cassia, ¾ oz.; pulverized cloves, 1½ oz.; oil of geranium, ½ dr.; oil peppermint, 1¼ dr.; oil bergamot, ½ dr.; mix.

PEARL. — Heavy carbonate of magnesia or precipitated chalk, 1 lb.; finest smalts, 3 dr.; essence de petit grain, ½ dr.

QUININE.—1. Sulphate of quinine, ½ dr.; pulverized orris root, 4 oz.; pulverized starch, 5 oz.; pulverized chalk, prepared, ½ lb.; pulverize fine and mix thoroughly.—2. Sulphate of quinine, 4 gr.; prepared red coral, 1 oz.; myrrh, 1 sc. For the coral may be substituted levigated bole, 2 dr.; precipitated chalk, 6 dr.

RHATANY. — Rhatany root, 2 oz.; cuttle-fish bone, 4 oz.; prepared chalk, 8 oz.; borax, 1 dr.

ROSE. — 1. Pulverized corn starch, 2½ lbs.; pulverized orris root, ½ lb.; terra alba, 2 lbs.; carbonate of magnesia, ½ lb.; French chalk, ½ lb.; oil of cloves, ½ dr.; oil of rose, 1 dr.; oil of bergamot, ½ dr.; mix and pulverize thoroughly. — 2. precipitated chalk, 6 oz.; cuttle-fish bone, 3 oz.; bicarbonate of soda, 2 oz.; red lake, ½ oz.; otto roses, 20 drops.

RUSSIAN.—Peruvian bark, 2 oz.; orris root, 1 oz.; sal ammoniac, ½ oz.; catechu, 6 dr.; oil of cloves, 6 or 8 drops.

TONIC.—1. 1½ dr. powder of myrrh; 3 dr. Peruvian bark, finely powdered; 10 drops oil of cinnamon; 10 drops oil of cloves; 1 oz. prepared chalk; 2 dr. orris powder; 1 oz. rose pink; mix well together and keep close. — 2. Fine powder of Florentine iris, 6 dr.; ditto pure starch, 3 dr.; quinine, 2 dr.; ditto hyoscyamus, 1 dr.; sugar to the taste; and perfume with otto of roses; carmine may be used to color it.

VIOLET. — Precipitated chalk, 6 oz.; cuttle-fish-bone, 3 oz.; rose pink, 2½ oz.; orris root, 1½ oz.; ess. violets, 1½ fl. dr.; indigo to strike a violet, a sufficient quantity.

WASHES.

ANATHERIN BALSAM.—1. Red sandal wood, 20 parts; guaiacum wood, 10 parts; myrrh, 25 parts; cloves, 15 parts; cinnamon 5 parts; oils of cloves and cinnamon, of each, ⅔ part; spirit, 90 per cent., 1450 parts; rose water, 725 parts; digest and filter. — 2. Myrrh, 1 part; guaiacum wood, 4 parts; saltpetre, 1 part; to be macerated for a night with corn brandy, 120 parts; spirit of cochlearia, 180 parts; distil of this 240 parts, in which are to be digested for 14 days garden rue, cochlearia, rose leaves, black mustard, horseradish, pellitory root, cinchona bark, club moss, sage vetiver and alkanet root, of each, 1 part; strain and filter, and to each 120 parts of the filtrate add 1 part of spirit of nitrous ether.

ANTISCORBUTIC ELIXIR. — Cinchona, 3 oz.; guaiacum, 5 oz.; pellitory, 3 oz.; orange peel, 2 dr.; cloves 5 dr.; saffron, ½ dr.; benzoin, 2 dr.; spirits of wine or brandy, 32 oz.; digest and filter.

ASTRINGENT.—1. Borax, alum, bay salt, of each 1 dr.; spirit of camphor, tincture of myrrh, of each 1 oz.; spirit of scurvy-grass (or of horseradish), 4 oz.; tincture of rhatany, 2 oz.; mix, and shake occasionally for a day or two, then filter. A teaspoonful in a wineglassful of water, to rinse the mouth after cleaning the teeth, or at any other time.—2. Tannin, 1 dr.; rose-water, 4 oz.; spirit of wine, 2 oz.; spirit of scurvy-grass (or of horseradish), 2 oz.; essence of bitter almonds, a few drops.

BALM OF A THOUSAND FLOWERS.—White Castile soap, 2 oz.; honey, 4 oz.; water, 12 oz.; alcohol, 4 oz.; melt the Castile soap and the honey in the alcohol and water with a gentle heat, and then scent with wintergreen, sassafras and rose.

BORAX. — Dissolve 2 oz. of borax in 3 pts. of hot rain water; add 1 tablespoonful of spirits of camphor stirred into 1 tablespoonful of pulverized sugar, to prevent it from curdling; before quite cold, add 1 oz. tincture of myrrh.

CARBOLIC ACID.—Spirit of wine, 2 dr.; carbolic acid, 20 drops; distilled water, 6 oz.; mix. Use the wash after cleansing the teeth.

CHELTENHAM.—Camphor, 4½ oz.; myrrh, 2 oz.; bark, 5 oz.; rectified spirit, 36 fluid oz.; distilled water, 8 oz.

CHLORINATED SODA. — Liquid chlorinated soda, 1 oz.; distilled water, 19 oz.; mix; 1 teaspoonful in a glass of water.

DETERGENT.—Alum, powdered, 30 gr.; simple syrup, 1 oz.; rose water, 3 oz., and mix. Should the mouth be very sore, dilute with water at first, and use pure afterwards.

EAU DE BOTTOT.—Aniseed, 4 oz.; cinnamon, 1 oz.; cochineal, 2 dr.; oil of mint, 2 dr.; spirit of wine or brandy, 8 lbs.; macerate 8 days, and filter. —2. Tincture of cedar wood, 1 pt.; tincture of myrrh, 1 oz.; mixed with the following essential oils: of peppermint, ½ dr.; of spearmint, ½ dr.; of cloves, 10 drops; of roses, 10 drops.

EAU DENTIFRICE DES CORDILLIERES.—360 parts strong spirits; 330 parts water; 2½ parts extract of red or yellow cinchona; 1 part of oil of cinnamon; 2 parts oil of cloves; 3 parts oil of anise; 5 parts oil of peppermint.

EAU DENTIFRICE DE MALLARD.—Star anise, common anise, cinnamon, cloves, of each, 8 parts; guaiacum wood, 10 parts; brown cinchona, 6 parts; rose leaves, 5 parts; nutmegs, 2 parts, are placed in a displacement apparatus, and percolated with 3 parts cochineal; 12 to 15 parts water, 1,000 parts spirits of wine, sp. gr. 860. The tincture is displaced with water, and 1,000 parts are mixed with 7 parts of a mixture of peppermint oil, spirit of scurvy-grass, and tinct. benzoin, allowed to stand and filtered.

EAU DENTIFRICE DE STAHL. — Spirit of wine or brandy, 2 gal.; rose water, 3 qts.; pellitory, 5 oz.; cypress root, 3 oz.; tormentil, 3 oz.; balsam of Peru, 3 oz.; cinnamon, 5 dr.; goat's rue, 1 oz.; rhatany, 1 oz.; macerate for 6 days, shaking occasionally; let it rest for 24 hours, and pour off the clear; add to the clear liquor, oil of mint, 1½ dr.; cochineal, 4 dr.; in 3 or 4 days, filter.

EXTRACT OF PELLITORY. — Take of pellitory root, 5 oz.; cinchona, 1 oz.; benzoin, 1½ dr.; essence of peppermint, 3 dr.; brandy, 1 quart.

FRENCH ELIXIR.—Rose water, 16 oz.; spirits of scurvy-grass, 2 oz.; tincture of galbanum, 1 oz.; color with cochineal.

GREENOUGH'S.—Bitter almonds, 2 oz.; Brazil wood, ½ oz.; cinnamon, ½ oz.; orris root, ¼ oz.; cochineal, alum, salt of sorrel, each, 1 dr.; spirit of wine, 32 fluid oz.; spirit of scurvy-grass, 1 oz.

HUDSON'S PRESERVATIVE. — Tincture of myrrh, tincture of bark, cinnamon water, of each, 3 oz.; arquebusade water, 1 oz.; powdered gum, ½ oz.

LEFANDINIERE'S ELIXIR.—Rasped guaiacum wood, ½ oz.; pellitory, 1 dr.; nutmegs, 1 dr.; cloves, ½ oz.; oil of rosemary, 10 drops; oil of bergamot, 4 drops; brandy, 1 pint; macerate for a fortnight, and filter.

LEFOULON'S ELIXIR.—Fresh roots of horseradish, fresh leaves of scurvy-grass and of mint, of each, 6 dr.; guaiacum, cinchona, pellitory, calamus and rhatany, each, 5 dr.; proof spirit, 1 quart; macerate for 16 days, and strain.

LEMON.—Juice of ½ a lemon; a spoonful of rough claret or port wine; 10 gr. of sulphate of quinine; a few drops of eau de Cologne or oil bergamot; mix and keep in a well-stopped vial for use.

ODONTALGIC ELIXIR.—Pellitory root, 2 oz.; simple spirits of lavender, 16 oz.; muriate of ammonia, ½ dr.; digest for 24 hours, and then filter.

PRESERVATIVE TINCTURE.—4 dr. camphor; 1 oz. tincture of myrrh; 1 oz. tincture of bark, and 1 oz. of rectified spirits of wine; mix, and put 30 or 40 drops into a wineglassful of water.

QUILLAYA.—Star anise seed, 1 oz.; quillaya bark, 3 oz.; cloves, 2 dr.; cinnamon, 2 dr.; oil peppermint, 12 minims; cudbear, 1 dr.; diluted alcohol, 28 oz.; exhaust by maceration or displacement, and filter.

ROSE ELIXIR.—Cloves, 2 dr.; cinnamon, 6 oz.; ginger, 4 oz.; spirits of wine, 5 pints; oil of orange, 2 dr.; otto of roses, 30 drops; essence peppermint, 2 oz.; mix; digest 14 days and then filter.

RUSPINI'S TINCTURE.—Orris, 8 oz.; cloves, 1 oz.; spirit, 32 fluid oz.; essence of ambergris, 1 oz. (or ambergris 1 scruple); macerate 14 days, and filter.

SOZODONT. — Carbonate of potassa, ½ oz.; honey, 4 oz.; alcohol, 2 oz.; water, 10 oz.; oil wintergreen and oil rose sufficient to flavor.

TINCTURE OF MYRRH.—1. Turkey myrrh, 3 oz.; eau de Cologne, 1 quart; digest for 7 days, and filter.—2. Borax, 1 oz.; shellac, ½ oz.; water, 8 oz.; boil together to 4 oz., and add spirit of scurvy-grass, 1 pint; camphor, ½ oz.; myrrh, 2 oz.; digest and filter.—3. Mix ½ pint of Jamaica spirits, ½ teaspoonful each of powdered alum and saltpetre pulverized, and 1 oz. pulverized myrrh. — 4. Tincture myrrh, ½ oz.; tincture of Peruvian bark, 2 oz.; a few drops in water when brushing the teeth. — 5. Balsam of Peru, 2 dr.; camphor, ½ dr.; essence of musk and liquor of ammonia, of each, ½ fluid dr.; tincture of myrrh, 3 fluid dr.; spirit of horseradish, 1½ fluid oz. To sweeten and perfume the breath, a teaspoonful

in ½ wineglassful of tepid water to rinse the mouth. — 6. (*Borated Tincture of Myrrh.*) Myrrh, 1 lb.; eau de Cologne, 16 lbs.; borax, 1 lb.; distilled water, 3 lbs.; syrup, 3 lbs.; essence (or tincture) of roses, 6 dr.; rhatany root, 4 oz.; digest for 10 or 12 days and filter. — 7. Borax, 1 oz.; shellac, ½ oz.; myrrh, 2 oz.; spirit of camphor, 2 oz.; honey of roses, 2 oz.; rectified spirit, 1 pt.; Cologne essence, 2 dr.; orange flower or rose water, 4 oz.; digest for a few days in a warm place, shaking occasionally, and then filter.

PART 3.

FARM INTERESTS.


FLOWERS
SILK CULTURE
AGRICULTURE
STOCK RAISING
THE APIARY
Unmand Wolcke

"WHOA! WHOA!"—A SLIGHT OVERSIGHT.

AGRICULTURE.

FARM OPERATIONS.

SOILS.

REMARKS.—The kind of trees indigenous to a soil should guide in selecting land. Wherever the hard wood trees flourish, a rich soil and healthy climate are found. Where the sugar-maple, beech, white and black oaks grow, wheat, oats, and similar small grains, will give remunerative crops. Willows, poplars, birch, red maple, black ash, and elms, indicate a wet soil, and while in some instances it may be made available for farming purposes by drainage, it is usually more valuable for grass than grain or fruits. The hickories, buckeyes and black-walnut indicates a strong, rich soil, rather hard to work, but of great fertility when once brought under thorough cultivation. The chestnut takes to the light and rather thin soils, easily subdued and tilled, which, under favorable circumstances, produce good crops of corn, rye and vegetables; but they are not rich enough to produce wheat, oats, or fruit trees in general, without an abundant application of the strongest fertilizers.

ANALYSIS.—Fit a cork into one end of a glass tube, 3 ft. long and $\frac{3}{4}$ in. in diameter; then half fill it with clear water, and pour into it a similar quantity of water in which has been mixed as much of the soil to be examined, as will fill about 6 in. of the tube; place the tube in a vertical position, and let it stand for about 1 hour. An examination will then show the earths deposited in the order of sand, clay, and humus; and the proportion of the latter will indicate the quality of the soil.

CLASSIFICATION.—Soils are classified according to their chief ingredients, as loamy, clayey, sandy, chalky, and peaty soils. Of these the first is the best for most purposes, but the others may be improved by the addition of the mineral constituents of which they are deficient. Sand and lime or chalk are the proper additions to clayey soils, and clay-gypsum, or loam, to sandy and gravelly ones. Clayey soils are expensive to bring into a fertile state; but when well manured, they will yield immense crops.

COMPOSITION.—The principal mineral substances which enter into the composition of rocks and soils are silica—found in quartz, flint, and sand; alumina—a leading ingredient in the composition of clays, giving them that softness, plasticity, and adhesiveness for which they are distinguished; lime—constituting the numerous varieties of limestone, marl, chalk and magnesia—existing in various states of combination with acids and other earths, and found in various mineral springs. The other important constituent of soil is vegetable mold; the three most important items of plant food contained in this are nitrogen, phosphoric acid and potash; these are essential, and if not present should be supplied by the farmer.

FERTILITY.—The most fertile soils are those which are loose in their texture and neither so light as to become too easily dry, nor heavy enough to be too wet in rainy weather. Alluvial soils are the deposits of sand, clay, or gravel, made by river action; they are the most complex and the most widely fertile, as containing a greater variety of the elements needed in the formation of different plants. Fertility is largely dependent upon the amount of nitrogen in the soil; this is stored up only by previous generations of plants. Any severe cropping—in which more nitrogen is removed from the soil in the crop than is formed and stored up in the soil during the same period—will sooner or later bring the most fertile soil to a state of exhaustion. In order to maintain and increase their fertility, and render soils fit for cultivation, ascertain the composition, and add to, or subtract from the ingredients in which it is deficient, or with which it superabounds. A soil of good apparent texture, or peats, containing sulphate of iron, or any acid matter, will be sterile; but this may be remedied by a top-dressing with lime, which converts the sulphate into manure. If there be an excess of limy matter in the soil it may be improved by the application of sand or clay. Soils too abundant in sand are benefitted by a dressing of clay, marl, or vegetable matter.

Light soils are improved by using peat, and peats by a dressing of sand; though the former is in its nature only a temporary improvement.

CLEARING,

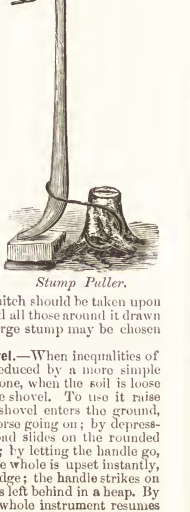
PARING AND BURNING.—Pare off the turf to a depth of 2 or 3 in., generally by a breast plow, worked by hand, or by a turf-paring plow, drawn by a horse; allow it to dry, and then burn in heaps. The result is a mixture of burned earth, charred vegetable fibre, and the ashes of that part which is entirely consumed, thus producing a powerful manure. Insects are also killed by the process. To ascertain whether a soil will be improved by paring and burning, a few sods may be taken and exposed to heat in a closely covered iron pot; the heat should not be so intense as to produce light, but should be kept up for a considerable time, till the sods are consumed. If the ashes are red, and the whole is a fine powder, with particles of charcoal in it, the soil from which it was taken may be safely pared and burned, especially if it forms a mud with water, and the earth is not readily deposited; but if it feels gritty, lets the water readily through, and soon settles when mixed with it, burning will not be advantageous.

STONES, To Remove.—1. Heat the stone to a high degree by means of a fierce fire applied to one part of it only, which will cause it to expand; when the stone has been thus made intensely hot, pour water upon it to make it crack, the effect being increased by powerful blows given with very heavy hammers.—2. Pierce the stone in the direction of its veins, and introduce into the hole a cleft cylinder of iron; then drive a wedge of the same metal in between the two halves of the cylinder.—3. A quantity of water may, during the winter season, be introduced into a hole made in the stone to a sufficient depth, the aperture to be then closed with a stopper closely driven into it. The water contained in this hole, expanding as it freezes, exerts a force sufficient to break in pieces the strongest stone.—4. Very large stones must be blasted. For this work two iron bars are needed—steel bars are lighter to handle and do not cost much more than iron—a long wooden lever, a cable and other chains, and a stone boat. The cross pieces should be fastened to the planks with iron bolts, three in each end of each plank, and for moving large stones, where the ground is not rough, no side pieces are needed, as such stones can be more easily loaded and taken off, and the boat will not be so liable to damage. For raising the larger stones use a rock lifter, which can be operated by two men, or one if necessary; it is simple in construction and easily handled; it will raise stones as large as two teams can draw. When the stones are raised to the proper height put under the stone boat and draw them at once, if possible, to the location desired.—5. When stones cannot be used for any valuable purpose, they may be sunk into the ground. For this purpose a trench, deeper than the stone itself, is dug all around it, and it is laid in the hollow thus formed. This must be greater than the stone, and so contrived that the stone when turned over may not present its edges to the ground.

STUMPS, To Blow Out.—The cheapest and most effective way to get rid of stumps in a field is to blast them out with cartridges of giant powder. This is put up in cartridges about 10 in. long by 1½ in. in diameter, and these can be cut into pieces of the size required with a knife. A piece 2 in. long is sufficient to throw out a good sized stump. A hole is punched under the stump with a crowbar; the explosive, with the proper fuse and fulminating cap attached, is put in the hole; water is poured in as tamping, and the fuse is fired. The explosion throws the stump out in several pieces, leaving the hole to be filled up afterwards.

STUMPS, To Burn.—In the autumn or early winter bore a hole 1 or 2 in. in diameter, according to the girth of the stump, and about 18 in. deep; put into it 1 or 2 oz. of saltpeter; fill the hole with water and plug it close; in the ensuing spring take out the plug and pour in about a gill of kerosene oil and ignite it. The stump will smolder away, without blazing, to the very extremity of the roots, leaving nothing but ashes.

STUMPS, To Pull.—A good stump puller is represented in the illustration. The iron hook being fastened to the stump, power is applied to the upper end of the post, which, being forced from its position, takes the stump with it. Stumps of 6 to 10 in. may be pulled out by a yoke of oxen, by hitching the chain at the top of the stump, and taking 2 or 3 turns around it so as to get a twisting pull upon it. Large stumps, up to 18 in., may all be pulled out by using a block and tackle. Blocks of 3 sheaves should be used, and a rope sufficiently strong for the purpose. A hitch should be taken upon the largest stump, and all those around it drawn out, when another large stump may be chosen to hitch to.



Stump Puller.

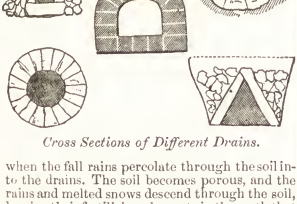
SURFACES, To Level.—When inequalities of surface cannot be reduced by a more simple process, it may be done, when the soil is loose and sandy, by a horse shovel. To use it raise the handle, and the shovel enters the ground, and is filled by the horse going on; by depressing the handle the load slides on the rounded bottom of the shovel; by letting the handle go, retaining the rope, the whole is upset instantly, turning over on the edge; the handle strikes on the bar and the load is left behind in a heap. By pulling the rope the whole instrument resumes

its original position, and is brought back to the place from which the earth is to be taken again, without any loss of time, or the slightest stoppage of the horse.

TIMBER. To Cut.—To clear land of a small growth of trees, without the aid of a stump puller, and at the same time have the land in immediate condition for tillage and cropping, the timber should be cut out by the roots; that is, until the weight of the tree breaks what are left and causes it to fall. The tree can be left for a heavy wind to prostrate it. Just after the frost leaves the ground in the spring is a good time, as the soil is easily removed from about the roots, which should be cut off below the surface of the ground, so that they will not materially interfere with cultivation. Trees and brush may be cut at any time that they will not be liable to throw up a growth of shoots. When only the roots are left in the soil, but little trouble need be anticipated from this source. After two or three plowings they will decay.

DRAINAGE.

REMARKS.—Drainage deepens the soil. The advantages of a deep soil over a shallow soil, are that a shallow soil underlaid with a cold wet subsoil compels the roots of growing crops to seek food near the surface in soil perhaps already exhausted by former crops. The water line must be lowered, then the rootlets will follow down through the little spaces and seams, giving back to the parent stock the necessary food. The air also follows down as the water line is lowered, coming into contact with elements in the earth which dissolve into food for plants, which is taken and appropriated by the small rootlets. Drainage enables the farmer to start his plow from ten days to three weeks earlier in the spring, and to keep it going when lands undrained are unfit to work, as the plow can run later in the season

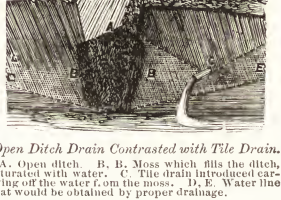


Cross Sections of Different Drains.

when the fall rains percolate through the soil into the drains. The soil becomes porous, and the rains and melted snows descend through the soil, leaving their fertilizing elements in the earth that has acted as a filter, instead of flooding the surface and carrying all their rich freights off the land. Drainage also renders the farm and neighborhood more healthy, obviating malaria. The different kinds of drains in use may be classed into 2 divisions,—drains of conveyance alone, and drains of conveyance and collection jointly. In the former all that is necessary is a channel or passage for the water, of sufficient dimensions, which may be formed by pipes of different kinds, arched or barrel drains, and box or walled drains. The illustrations show different kinds of drains, which, however, tile draining is usually superseding.

HILLS. Drains for.—When the site is on the side or foot of a hill, it is generally necessary to cut off the water that drains from the higher level, by constructing drains across the hill and connecting these with drains at right angles running down through the hill-side. Where the spring has naturally formed itself an outlet, it may frequently only be necessary to bore into it, or render it larger, and of more depth, which, by affording the water a more free and open passage, may evacuate and bring it off more quickly, or sink it to a level so greatly below that of the surface of the soil as to prevent it from flowing into or over it.

OPEN DITCH DRAINS. — Open ditch drains, though better than none at all, are not to be recommended, as they only conduct the water away, and scarcely, if at all, produce the effect of under-drainage; and, besides, are in the way of plowing or similiar operations, readily fill up, and their sides become overgrown with weeds.



Open Ditch Drain Contrasted with Tile Drain.

A. Open ditch. B. B. Moss which fills the ditch, saturated with water. C. Tile drain introduced carrying off the water from the moss. D. E. Water line that would be obtained by proper drainage.

PEAT LANDS. To Drain. — When the drains cannot be carried to a sufficient depth to take the water out of the porous stratum saturated with it, bore numerous holes with a proper auger in the bottom of the drain through the stiffer soil. The water will either rise through these bores into the drains, and be carried off, or it will sink down through them if it lies above. The bottom of the drains is sometimes choked with loose sand, and they require to be cleared repeatedly; this soon ceases after the first rush is past. The surface of the peat, being dried, dressed with lime, and consolidated with earth and gravel, soon becomes productive. When a single large and deep drain will produce the desired effect, it is much better than when there are several smaller; but this is only the case in tapping main springs, for, if the water is diffused through the surrounding soil, numerous small drains are more effective; as soon as there is a sufficient body of water collected, the smaller drains

should run into larger and these into main

Peat Land Drain.

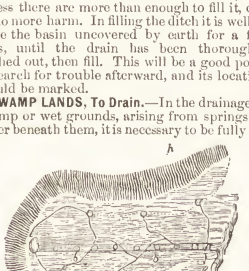
a b, hole sunk into the subsoil.

drains, which should all unite into one principal outlet.

SILT BASIN.—Small particles of soil or dirt always find their way into the drain, and are carried along by the stream and left in depressions of the pipe, sometimes developing a complete obstruction. For this reason a silt basin is placed where the grade is slightest, or at the intersection of mains. A good basin is made by sinking a large tile two-thirds its length in the bottom of the ditch, and making the tile above and below empty into it; or, rather, the drain passes through it. The bottom of the basin should rest upon a flat stone, or solid piece of plank, and the top be also securely covered. The traveling particles tumble into the basin, and unless there are more than enough to fill it, can do no more harm. In filling the ditch it is well to leave the basin uncovered by earth for a few days, until the drain has been thoroughly washed out, then fill. This will be a good point to search for trouble afterward, and its location should be marked.

Silt Basin.

SWAMP LANDS, To Drain.—In the drainage of swamp or wet grounds, arising from springs of water beneath them, it is necessary to be fully acquainted with the nature and disposition of the strata composing the higher grounds, and the connection which they have with that which is to be rendered dry. The line of springs being ascertained, and also some knowledge of the under surface, a line of drain should be marked out above or below them, according to the nature of the strata, and excavated to such a depth as will intercept the water in the porous strata before it rises to the surface. Increase the effect of these drains by boring holes in the bottom of them. When water issues forth from 2 or 3 places, find the chief spring. Remove this, and the outlets will become dry. The highest outlet, if the strongest, may be the leading spring. Determine this before marking out the drains. If the bank is formed irregularly and springs are found around the base of the outlets, carry the ditches up to a higher level in the side of the hill than the wet land. When difficult to ascertain the line of the spring, carry up the conducting drain to carry off the water. When the spring is discovered, form a cross drain on the surface at a sufficient distance on each side of the end of the strata containing the water.



Swamp Land Drain.

h h, represents the sides of a hill; the swampy lot, below, is filled with springs, which are, however, drained by running a ditch (*b b*) across it, and sinking holes into the subsoil. One of these holes is seen in the cut above (*a b, Peat Land Drain*), and the manner in which it conveys the surface water away.

TILE DRAINS.—These are the best of all drains, and are made of 1¼ in. round draining tiles, with collars for the laterals, connecting with 2½ in. tiles for the mains. These tiles are laid jointed together, the water percolating through the joints and passing off through the tiles. The proper depth to lay them is 3 ft., if the drains are 20 ft. apart, and 4 ft. if the drains are 40 ft. apart, with a fall of 6 in. to the 100 ft., although less will do. The drains should run parallel with each other if possible, and down the deepest descent of the land. To lay the tile, begin at the head of the drain, closing the outer end of the first tile with a stone. Place a collar over the other end ready for the reception of the second tile. These collars are simply sections of a larger size of the tile 2 or 3 in. long, which slip over the 2 ends, fitting closely to prevent particles of soil from getting into the drain. The layer walks backward as the work proceeds. If the ends of the tile are ragged, trim them with a hatchet having a point instead of a head. The main tile should be a little lower than the lateral drain, and the opening made as near the top as practicable. Much depends upon the skill with which these connections are made, and too much care cannot be taken in making all of the joinings perfect in every part. 3 in. tile is now being more generally used than smaller sizes, as there is less liability to choke up with silt. To render drains fully effective, the land should be thoroughly subsoiled so as to hold our heavy rains. Much of the labor of draining is now done by horse power or steam. Hammond's mole-drain plow makes a small tube of the subsoil by compression. This mode of draining is effective for a considerable time, is cheap, and can be done over again as required at but little cost. At a recent trial of draining machines very excellent work was performed. One steam tile ditcher cuts 4 feet deep and 10 inches wide, in all kinds of clay and soil, whether it is of a wet or dry character, and grades perfectly at a cost of from 5 to 8 cents per rod.

UNDER DRAINS. —When made of stone, these not only last for all time, but carry off any surface water much sooner than tile. They cannot be choked with debris like open drains. In cutting a ditch for a drain, the most expeditious way is to first run a furrow with a 2 horse plow as straight as possible, where the drain is to be, and on this first furrow backfurrow another, of equal width. After shoveling to one side the earth of which this double furrow is composed, repeat the plowing and shoveling by attaching a short chain between the doubletree and clevis, to increase the distance between the two, and thus cause the plow to run the required depth. Thus a depth of from 15 to 20 in. may be obtained, and of the proper width the drain is to be; hitch the 2 horses tandem fashion to a single coulter plow; with which rip up the sub-soil and throw out as before; repeat the operation until the proper depth is had. In finishing the bottom of the intended drain, care should be taken to have it of uniform smoothness throughout its entire length, only sufficiently inclining towards the mouth to cause the water to flow with equal freedom through every part of the drain. Prepare the stone for constructing the drain by breaking it into pieces not larger than goose eggs; place the smaller ones in the bottom of the drain, and the larger ones throw on promiscuously to within 18 in. of the surface; cover with straw and fill the balance of the drain with the excavated earth. Where low places occur in a field, on which water is inclined to stand so as to interfere with its cultivation, and for which no outlet can be conveniently had by means of a drain, a very good substitute will be found by digging a hole through the clay, some 3 or 4 ft. in diameter, filling the same with stone to within a few inches of the top, and covering with leaves and earth as above directed.

FERTILIZERS.

REMARKS. — Any substance, which, when mixed with a soil, adds to the growth or fertility of plants, is a fertilizer and promotes the growth either by entering into the composition of plants, by absorbing moisture, or by stimulating the vascular system of the plants. The coarse manures should generally be applied to the heavy clays, especially if vegetable matter is lacking. It is always better to spread manure as it is drawn than to put it in heaps. When put in heaps a large portion of the soluble matter is left in the ground under the heap and makes these spots too rich, and deprives the rest of the ground of its proper share. It should be forked over occasionally to make it fine. If it is heating, then muck or loam should be mixed with it to absorb the ammonia which is formed during the process of decomposition. The quantity of each kind of manure in use to be applied to the acre is as follows: Barnyard manure, 5 to 20 tons, or 30 to 40 cubic yds.; bone dust, 16 to 20 bush., or 700 to 1200 lbs.; fresh fish, 25 to 40 bush.; fish guano, 4 to 600 lbs.; guano, 3 to 800 lbs.; gypsum, 5 to 600 lbs.; horn shavings, 25 to 40 bush.; hops, 30 to 40 tons; lime, 50 to 150 bush.; night-soil, 20 bush.; salt, 2 to 6 bush.; soot, 20 to 50 bush.; super-phosphate, 500 to 1000 lbs.; tanner's refuse, 5 to 800 lbs.; wood ashes, 20 to 40 bush.

ARTIFICIAL FERTILIZERS. — 1. Sulphate of ammonia, common salt, and oil of vitriol, of each 10 parts; chloride of potassium, 15 parts; gypsum and sulphate of potassa, of each 17 parts; saltpetre, 20 parts; crude Epsom salts, 25 parts; sulphate of soda, 33 parts; for clover. —2. Dry peat, 20 bush.; unleached ashes, 3 bush.; fine bone dust, 3 bush.; calcined plaster, 3 bush.; nitrate of soda, 40 lbs.; sulphate of ammonia, 33 lbs.; sulphate of soda, 40 lbs.; mix the peat, ashes and bone dust; then mix the nitrate and sulphate of soda and the ammonia, in 5 buckets of water; when dissolved, add this to the first mixture; when mixed, add the calcined plaster.—3. Charcoal, 371 parts; salts of ammonia, 426 parts; salts of potash and soda, 24 parts; oxide of iron, 50 parts; silica, 65 parts; alumina, 31 parts; sulphate of lime, 31 parts; carbonate of magnesia, 2 parts.

ASHES, Wood.—Wood ashes are very valuable as a fertilizer. Their chief value consists in supplying the soil with mineral constituents, and by their action as solvents upon the insoluble salts already in the soil; also by neutralizing acids and improving the mechanical condition of the soil.

BUCKWHEAT. — This is not as valuable as clover, but will grow where clover will not. It contains large quantities of nitrogen, potash and phosphoric acid. Two or three crops plowed down in their green state will make a light soil dark and loamy; success is secured by shallow plowing; by covering only 3 or 4 in. speedy fermentation and rapid decomposition take place.

CARCASSES, To Make Fertilizers of. — For a large animal, draw 4 or 5 wagon loads of muck, sod or mold; roll the carcass on to this; sprinkle freely with quicklime; cover immediately with a generous quantity of soil; 10 or 12 wagon loads will not be too much; in less than a year, without giving offense to any one, quite a number of wagon loads of excellent fertilizing material will be had. Bones alone, or the whole carcass may be speedily decomposed by using sulphuric acid, and a valuable superphosphate produced.

CHARCOAL.—Charcoal is a most efficient manure to all cultivated plants, especially to those under glass. It should be broken into small pieces, about the size of a nut, and, for potted plants, may be mixed in the proportions of 1 part charcoal to 20 parts earth.

CLOVER. — There is no crop so valuable for the renovation of partly exhausted grain lands as clover. Sow 20 lbs. of seed to the acre, and when 6 in. high plow under.

COMPOST HEAP.—There ought to be a compost heap on every farm; into it can be thrown all kinds of refuse material—weeds, straw, ma-

nure, earth, sods, etc. A good compost heap is made by a layer of stable manure and bedding about 1 foot deep, which should be covered immediately with 6 in. of swamp muck or soil. It should be repeated from time to time as the manure accumulates, so that the pile will consist of successive layers of manure and muck. In 6 months the whole pile will be a homogeneous mass of rich manure. It should be kept moist but not wet. If swamp muck can not be conveniently obtained, cover the heap with any loamy soil that is at hand. On the compost heap should be thrown all waste matter about the house. A sprinkling of ground plaster on each layer of manure before it is covered will add much to the value of the compost, but never use quicklime on a compost heap.

COTTON SEED. — Cotton seed mixed with superphosphate makes a cheap and good manure. It contains not only the two leading elements of all good fertilizers, nitrogen and phosphoric acid, but, in addition, like stable manure, all of the elements needed by crops. The ratio of 6 bush. of seed to 100 lbs. of superphosphate makes a good combination. It should be applied fresh.

COW DUNG.—This is one of the least stimulating of all animal fertilizers. Its constituents, nevertheless, are those of most cultivated plants, and as it slowly decomposes in the soil, and does not induce over luxuriant growth, it is very generally employed to mix with the soil for potted plants.

FISH.—Fish generally owe their powerful fertilizing qualities, not only to the oil they contain, but also to the phosphate of lime in their bones. From 25 to 45 bush. per acre are the extreme quantities to be applied broadcast; but if in the drills, with the crop, 16 bush. are ample.

GUANO.—Guano is a powerful fertilizer. Its great value consists in the amount of ammonia it contains. It should always be composted with earth. It is immediate in its effects, and should never be used with ashes or any alkali. Pure guano, owing to its high price, is very commonly adulterated, or is in an advanced stage of decomposition when sold. If pure, it should be light colored and dry, coloring very slightly when squeezed together, and not gritty.

GYPSUM (Land Plaster).—This is a valuable fertilizer and deodorizer too little known and too sparingly used. For use in the stable and poultry yard it is invaluable. It is a complete absorbent of ammonia.

HOPS.—Hops, as the refuse of the breweries, when they can be obtained, are a very powerful manure, considered to be even more valuable than horse manure. They should be rotted down very slowly, for if allowed to ferment strongly they lose a large portion of their value. It is best to compost them with stable manure.

HORSE DUNG.—The fresher the dung is used the more economical; but it is more troublesome and encumbers the tools of the workmen, besides being liable to convey into the land the seeds of weeds. It is most advantageous, therefore, to use half rotted stable manure; it is easily incorporated with the soil, and the seeds of weeds have for the most part so far vegetated, that the moving and digging destroy them.

LIME.—Lime is a valuable manure, having a tendency to render light soils more retentive of moisture, and heavy soils more friable. The quantity to be applied should be determined by the character of the soil. A very excellent manure is formed by mixing 1 bush. of salt with every two bushels of lime. Lime cannot be applied to the soil too fresh from the kiln; for if allowed to absorb carbonic acid from the air, it is rapidly converted into chalk. When crops are devastated by the slug, dress them some evening, so as to render the surface of the soil quite white, with lime.

LIQUID.—The liquid manures, which should be carefully attended to, are especially devoted to those crops which will bear rich ameliorations. Some farmers reserve them for clover and other artificial meadows, or for natural pastures. They are never so advantageous as when applied to sandy soils, which they render tolerably consistent, and more adapted for the retention of moisture. It is the most economical, prompt and efficient form in which fertilizers can be applied to the garden. If, instead of digging in stable manure, each crop were watered occasionally with liquid manure, the produce would be finer and more abundant; 10 gals. of water will readily dissolve, or keep suspended in astate of minute division, about 50 lbs. weight of guano. A good way to save manure in this form is to grade the barnyard into a basin shape, the lowest part under the cow stable window; then settle a cistern 5 ft. deep and 11 ft. square; lay the walls with water cement, so that when done it will be 8 ft. square; make a stout wooden frame and place it in the centre to receive a flagstone covering; put in a rubber chain pump high enough to spout out the drainage into a hogshead standing on a truck; heave the manure right on from the stable to the cistern.

MARL.—A natural mixture of clay and chalk, with sand. It is characterized by effervescing with acids. According to the predominance of one or other of its component parts, it is called argillaceous, calcareous or sandy marl. The quantity applied per acre must vary greatly, according to the object to be attained. To render a light soil more tenacious, 100 tons per acre of clayey marl are not too much; neither is the same quantity of siliceous marl an excess, if applied to a heavy soil to render it more friable.

MUCK.—This is the richness of upland soils washed by the rain down to the low land, where it accumulates. Cultivating exhaustive crops upon the uplands, and washing the remaining richness out by rains, soon renders such lands nearly barren. As the muck, in its passage downhill, has lost the coarser parts of the original soil which make a loose and porous seed-bed, it has become so compact, that the atmosphere is absolutely excluded, and the muck by itself is a mere paste, impervious to air, warmth, and all the invigorating influences of summer rains. To make it again soluble, it must be mixed with the soil by plowing, or harrowing; muck is usually dug in the fall, piled on a slope to drain,

and left to freeze friable during the winter; in spring return it to its proper place in the barren soil, and it at once restores the original fertility. It is most valuable when composted with manure.

NIGHT SOIL.—Human excrements, or night-soil, make a very active manure. The best way of using it is to form it into a kind of compost, by mixing it with other substances, and especially by making it into heaps with turf, and adding a small quantity of burnt lime.

PEAS. — As a fertilizer, peas are reckoned by some to be equal to clover. They produce a heavy and rich crop to be returned to the soil in a shorter period than any vegetable fertilizer known, and they will thrive upon land too poor to grow clover. They produce two crops in one year, and feed but lightly on the soil, thus leaving largely in the soil what is required for the succeeding crop.

SALT.—Salt should never be applied other than in a pulverized state, and never employed on impervious, cold, and humid soils. The best manner to use it, is to combine it with other manures, a dose of 2 cwt. to the acre being sufficient. When selected to destroy insects, it should be applied before sunrise. In the case of cereals, salt strengthens the stems, causes the ears to fill better and favors the dissolution and assimilation of the phosphates and silicates. It acts vigorously on potatoes, and can be detected in their ashes to the extent of ½ or 1 per ct.

SAND.—Sharp drift sand, such as is found by the side of rivers, is a very effectual improver of heavy soils, and may be applied to them in any quantity until they are rendered more friable. Sea sand is used especially when abounding with fragments of shells.

SODA, Nitrate of.—One pound to 30 square yards of land is a sufficient quantity as a fertilizer. Plants probably decompose it. Dissolved in water, 1 lb. to 12 gals., it can be used with advantage as a liquid manure.

SOOT.—Save the soot that falls from the chimneys, when they are cleaned, as it is one of the most powerful and permanent of fertilizers dug into the soil.

TILLAGE.

FALLOWING.—The chief use of fallowing is to liberate the plant food stored in the soil as organic matter. Plowing and stirring admits air, which promotes decomposition as does the turning over of a dung heap. It destroys the roots of weeds, converting them into fertilizing material and allowing the ground to recuperate. In all cases of fallow, the first plowing should be given immediately after harvest, and as deep as the quality of the soil will permit, with a strong team, if the land be very stiff and retentive of water; and in all cases the field should be well ridged and deeply furrowed. Immediately after the stirring time of spring-work is over, if fallow crops are to be sown, the second plowing is to take place, and in the same direction with the former and, lest, by cross-plowing, a fall of rain should stagnate on the surface; in light soils a cross plowing is preferable, even at this early time. The third plowing should be executed in June, and at this time always across the original direction of the ridges; harrowing with a heavy break, if the land requires it, should regularly succeed the summer plowing; the harrowing should be executed by repeated double turns, crossing those of the previous ones, until the land is sufficiently pulverized to admit of the easy collection of weeds; drag the surface and collect as large a portion as possible of the roots of fast growing weeds in the ground. Fallowing is becoming an obsolete custom with many. The plowing in of green crops, such as clover, peas or millet is a superior practice. (See FERTILIZERS.)

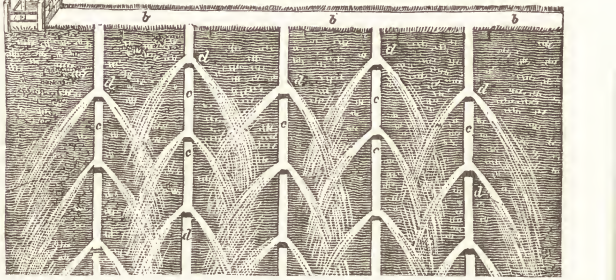
HARROWING.—This has for its object the reduction of the soil to a fine, loose condition, to permit the air to freely circulate through it. It should be done when the ground is moderately dry; it is then in a position to pulverize readily. If worked when wet, the soil becomes rough and lumpy and will remain so during the season.

HOEING. — Plants grow and mature better when the ground is hoed frequently. The loosening of the soil in the operation of hoeing is as beneficial to the plants as the destruction of weeds. The cultivated soil being made porous immediately conveys to the roots of the plants the moisture condensed from the atmosphere, and being cooler than the uncultivated, it is able to cause a greater condensation of moisture and attract a heavier fall of dew. When the surface is kept loose it acts as a mulch, affords actual resistance to the rays of the sun, and keeps the roots of the plants cool; but when it is hard it becomes a good conductor of heat, which deeply penetrates it. In the cultivation of corn, potatoes and similar crops, stirring the soil among the plants can scarcely be repeated too frequently during the early part of the season; in fact, these operations may be continued until the crop is well on toward maturity. The sprouting weeds are thus destroyed in the germ and the work is comparatively easy all the season afterwards.

IRRIGATING.—Watering poor land, especially of a gravelly nature, improves it and makes it fit for cultivation. Land, improved by irrigation, becomes fertile and productive. A channel which receives the water at a point higher than that to which the river flows, may be dug with a much smaller declivity than that of the bed of the river, and made to carry the water much higher than the natural banks; it may thence be distributed so as to descend slowly, and water a considerable extent of ground, in its way to rejoin the stream. This is a common mode of irrigation, and the shape, size, and direction of the channels are regulated by the nature of the surface, and other circumstances, which vary in almost every situation. The illustration is an example of irrigation where the soil is very porous, and gently inclined, the supply of water

being abundant. A main carrier is led from the sluice (*a*) directly across the declivity (*b*), and side feeders (*c*) taken out from it at regular distances. These feeders have stops of turf, at regular distances (*d*), by which means the water is dispersed. After watering a space of from 20 to 40 feet in breadth, it is again collected by the small drains in the furrows, and returned lower down to another feeder. In the preparation of the surface for irrigation, it is usual to form it into low ridges, the feeders being on the crowns of the ridges, and the drains for carrying off the water in the furrows. In the irrigation of lands with considerable inclination of surface, the feeders cannot be carried along lengthwise, but across the line of descent, so that the water flowing from one is intercepted by the next lower, and so on until it has covered the whole of the meadow. Water may be dammed in any break passing through a field and caused to flow back over the adjoining land. Water may also be dammed until it swells high enough to be carried by pipes through the land. Where the character of the surface to be irrigated is such that it has irregular depressions, but a general slope downward from the level of the reservoir, the courses of the distributing channels may be laid so as to irrigate the whole. A soil containing 80 per cent. of sand, may be irrigated every 5 days; one containing 20 per cent. once in 15 days. It is of advantage that the soil should lie on a warm and absorbent bottom; for the subsoil of watered meadows is considered of more importance than the quality or depth of the surface soil. The best watered meadows are sometimes those in which the soil is only a few inches in depth, especially when the bottom is porous. The waters most suitable for irrigation are those of rivers which flow through a rich and cultivated country, as they are enriched by the animal and vegetable matters which are contained in them in a state of solution. Water impregnated with iron has sometimes been used with good effect. By judicious flooding the yield of grass land may be doubled; but by flooding at improper seasons it may be destroyed. Water should not be permitted to lie on the grass more than two days at a time, nor more than 2 in. in depth, and not at all during the winter. It should never be turned on while the soil is heated during the daytime. When the grass has well covered the ground and it is nearly ready for cutting, no water should be given for two weeks before the hay is made. When that is done, watering may be repeated as before until another cutting. No water should be given for a month previous to the winter, as it is very injurious during the frosts. The aftermath should be permitted to die down on the meadow on the approach of winter, as a protection to roots from frost. Under such treatment 4 tons of hay has been gathered from 1 acre.

Plan of Irrigation.



PLOWING. — The medium depth of good plowing may be held to be 7 in., but this varies according to the kind of crop to be cultivated, and the nature of the soil. Clay, underlaid by compact subsoil, should be plowed deeply. If the clay subsoil is allowed to remain within 5 or 6 in. of the surface, it forms a crust at that depth, through which the roots of plants do not easily penetrate, and there is only a few inches of good, mellow soil at the surface for the support of plant-life; when rains fail, this shallow bed of moisture is soon exhausted, and if not soon replenished the plants suffer from drought, and in wet seasons it is soaked and injured by surplus water to an extent unknown in deep soils. In plowing the plow should be held perfectly upright, to get a slice of equal thickness and consequent uniform depth of cultivation. The plowman should walk with his body as nearly as possible upright, without leaning on the handles and without using force to any part, further than may be absolutely necessary to keep the implement steadily in a straight line. He should not shout at or whip his team frequently, as it confuses them, and at length loses its effect. There is much to be gained by plowing the ground in the fall, especially that intended for corn the following season; for if the piece is a sod, which is most excellent for corn, late fall plowing turns up the roots around which quite

an army of cut worms have put up in winter quarters, and the cold freezing weather of winter has an opportunity to destroy them, thus saving the future corn crop from much of their ravages. When the sod is plowed late in the fall the piece must be gone over with an ordinary cultivator or with a sulky cultivator in the spring, to fine up the soil and make it in good order to receive the corn. In tenacious, clayey soil, even in fallow ground, the fall plowing, followed by another plowing in the ensuing spring, is of great benefit in reducing the texture of the ground and in making it more readily worked, as well as making it more suitable for a vigorous plant growth. There may be some cases where it will not do, but in most instances late fall plowing pays well. Inventions for using steam plowing, while quite numerous, have never come into extensive use, except for very large and level fields and in farming on the largest scale. For subsoiling it is superior to other methods on account of its great power. Subsoiling is done by following in the furrow of the surface plow, which loosens up the subsoil, and it is covered by the next furrow made by the surface plow. By subsoil plowing the earth is loosened to a considerable depth and root culture is much improved.

ROLLING.—The roller may be used to a very great advantage on many wheat fields. The thawing and freezing of the ground causes "heaving," drawing the roots out of the ground, and exposing them to drying winds. Passing a roller over the field presses the roots down into the soil upon which they depend for the support and growth of the plant. In closely compressing the particles of earth on light, sandy soils, by excluding cold wind or a parching sun from the roots of young corn, its value is great, and it may be repeatedly performed to grain crops in the spring months, as long as it can be continued without breaking the stems. When the surface of the ground is so dry that lumps of earth will powder under the pressure of a roller, then is the time to use it, for the soil needs to be pulverized, not matted down into a hard paste. Don't use the roller when the ground is so wet that it will plaster down and, with the action of the sun, form a hard baked surface.

ROTATION OF CROPS. — This gives time for the disintegrating action of the atmosphere, rain and frost to prepare new material from the rock particles in the soil, and get it in a form to be used by the plant. One crop may use up the available food of a particular kind faster than it can be prepared by these natural agencies. When properly managed it enables one plant to prepare food for another. The principles upon which a regular succession of crops is based are: 1. That all plants exhaust the soil, though in an unequal degree. 2. That plants of different kinds do not exhaust the soil in the same manner. 3. That all plants do not restore to the soil a like quantity or quality of manure. 4. That all plants are not equally favorable to the growth of weeds. These principles, confirmed by experience, form the basis of an agricultural system not only rich in its products, but rendered highly profitable by the economy of labor, soil and manure. Though the system of rotation is adapted to every soil, no particular rotation can be assigned to any one description of soil which will answer at all times; much depending on climatic changes, and on the demand for different kinds of produce. On clayey soils, beans and clover, with rye-grass, are generally alternated with grain crops; and on dry loams or sandy ground, turnips, beets, potatoes, and clover. On rich soils this system of alternate husbandry is most conducive to the plentiful production of food, both for men and animals. One portion of a farm would thus be always under grain crops, while the other portion was growing roots or cultivated grasses; but, as the major part of arable lands cannot be preserved in a state of fertility with even this kind of management, it is requisite that the portion of the farm which is under cultivated grasses, should be pastured for 2 or 3 years, in order to give it time to recruit. The following is a good rotation of crops: 1st year, clover; 2d, clover; 3d, corn; 4th, oats; 5th, wheat. The clover does well with oats, and after an early mowing can be very well prepared for wheat.

FLORICULTURE.

GARDENING.

GROUND.—Depth is as necessary as firmness. Great depth supplies good drainage and consequently heat. Shallow soils must be fed continually, or the manurial matter will get washed out and the vegetable matter they contain will be dried up by the sun. The sites of flower beds should be trenched by removing all the soil to the depth of 16 or 18 inches. If the soil be poor or exhausted, take it all away and entirely renew the bed with fresh soil, composed of either clay, sand, or turfy loam from a common mixed with a good fertilizer. The roughest of the compost should be placed at the bottom of each bed. All red flowers are greatly benefited by covering the earth around them with about an inch of pulverized charcoal. Turfy loam, turfy peat, leaf mold, and rotten dung are all good fertilizers. A good liquid manure for flowers is made as follows: Put 1 bush. of cow or hog manure into a large barrel, and fill it up with water; let it stand for a week, when it is ready for use. Apply it with a watering pot. All bedding plants can be watered with this liquid every other day if they are not pot bound. Repotted plants should be watered once a week until they have plenty of working roots to take up

the manure. It will also be found excellent for hard-wooded plants if used once or twice a week. Ammonia is also an excellent fertilizer. The best way to apply it to plants is to take a teaspoonful of Peruvian guano and put it in 1 gal. of water; water the plants with this once a day; when the guano and water has been used up, give the plant a rest for a month, and if by that time they have not improved in growth and have not a deep green color, give them a second gallon.

HOT-BEDS are contrivances for the purpose of protecting tender plants from the weather and promoting their early growth. They are made in a frame, covered with glass or some other material, and are composed of earth and any fertilizing material that will ferment and produce warmth; stable manure and dead leaves are generally used, but stable manure is unquestionably the best. To make a hot bed, lay out the ground 6 in. larger than the frame. The frame may be of any size and consists of a box without a bottom, with a movable top, formed of glazed sash; the length or number of the frames is immaterial; but they should be from 9 to 12 in. deep at the front, and 15 to 18 in. at the back. This will give a good slope to carry off the rain. After the frame is made, proceed to build up the bed to the height of 2½ to 3 ft., making it rather firm and watering if the manure is dry. If the seeds are to be sown in the soil of the bed, 2 or 3 in. more soil should be added; but if in pots, no addition will be necessary. After adding the soil put on the lights, and let it stand to settle and exhaust the violent heat. The following is a good substitute for glass coverings; it possesses many advantages over glass, and may be made at about ¼ the cost: Buy unbleached muslin and sew enough together to cover a light frame the size of the top of the hot bed; this frame should have one or two cross-pieces to stay it and be enough larger than the box to fit snugly down over it or around it at the top; after stretching the muslin over the frame tightly and tacking it neatly about the edge; give it a coat of linseed oil, in which 1 or 2 eggs are well beaten or stirred; 1 pt. of oil will coat two quite large covers; let it dry for a day and the cover is ready for use; be careful to keep the cover clean until the oil is well dried. These frames are light, and easily and cheaply repaired.

PLANTING.—*Annuals.*—Should the weather be warm and dry and the beds and borders nicely trimmed, proceed to sow the hardiest annuals as follows: With a small rake draw a portion of soil from the places where the seeds are to be sown, commencing at the border or in the centre of the beds; make as many of these hollows as possible, without unnecessarily treading upon the ground; for the less it is trodden upon the better the flowers will thrive. For large seed make the hollows fully 1 in. deep; for smaller ones ¾ in. will be a sufficient depth. Having made the hollows, take two papers of the tallest annuals of different colors, carrying also as many short pieces of wood as there may be patches of flowers in the two packets of seed. The two kinds may be sown near to each other. Sow of large seeds from 4 to ½ doz. seeds, and of those that are smaller from 12 to 20 in each place; stick one of the short pieces of wood in the midst of the seeds, leaving them uncovered till the whole of the tall kinds are sown. Then with the rake cover them in, and put out all footmarks, making the ground neat and level; proceed then to open other hollows with the rake. If the soil is heavy and wet, for the small seed especially, have some light soil sifted moderately fine and cover the seeds with it.

Biennials.—These are plants raised from seeds, which do not flower till the second year, but which generally die as soon as they have ripened their seeds. Biennials are usually sown in a bed of light, rich earth, in the open year in the reserve ground, and then transplanted, in September, to the place where they are to flower the ensuing year. The finer kinds should have a bed or pit prepared for them, of rich, loamy soil, in which they are planted, with a small quantity of manure. Biennials, as a rule, need some protection through the winter; but often more harm is done by the covering than by the frost. Two things are to be avoided; material that will rot and smother the plants, and material that will serve the mice for nests, and so the plants be devoured for food. Straw is objectionable, as also corn stalks. Leaves are excellent; and very thin sods do well, laid on bits of brush.

Cuttings do not require to be planted deep, but the larger ought to be inserted deeper than the smaller ones. In the case of evergreens, the leaves should be kept from touching the soil, otherwise they will damp or rot off; in the case of tubular stalked plants, which are in general not very easily struck, owing to the water lodging in the tube and rotting the cutting, both ends may be advantageously inserted in the soil, and, besides a greater certainty of success two plants will be produced. Too much light, air, water, heat or cold, are alike injurious. To guard against these extremes in tender kinds, inclose an atmosphere over the cuttings, by means of a hand or bell glass, according to their delicacy. This preserves a uniform stillness and moisture of atmosphere. Immersing the pot in earth has a tendency to preserve a steady, uniform degree of moisture at the roots; shading or planting the cuttings, if in the open air in a shady situation, prevents the bad effects of excess of light. The only method of regulating the heat is by double or single coverings of glass or mats, or both. The degree of heat is decided by the degree of heat requisite for the mother plant. Most species of the erica, dahlia and geranium take root better when supplied with rather more heat than is requisite for the growth of these plants in green-houses. The myrtle tribe and camelias require rather less; in general a lesser portion of heat, and of everything else proper for plants, in their rooted and growing state, is the safest. Cuttings of fuchsias, zonale geraniums, fever-fews, smooth-leaved begonias, and many other plants, may be easily rooted in sand. Fill a flower-pot with coarse, gravelly sand, and stick in the cuttings close to the outer edge and quite near together. Press

the sand tightly around each one; set the pot in a saucer and soak it with water until it will hold no more. Put it in the sunshine and keep it there every hour of the day that you can; but never let the sand get dry or even approach that state. When a slip once withers, it is done for. In two weeks the cuttings should be well rooted and ready for transplanting into thumb-pots and good soil mixed with sand. They must be kept shaded for a few days. After the first watering they will need little, if any, until signs of growth appear. Cuttings of many plants can be readily started in water; in the early spring, if you have not a green-house or hot-bed, it is the safest plan. Fill small bottles or vials with warmish water; remove the lower leaves of the cuttings; be sure to have a bud at the base; put them in the water; hang up the vial to the window sash, tying a string about the mouth for this purpose. If cotton wool is put around the mouth of the vial it will prevent the evaporation of the water and make the roots sprout more quickly by keeping up a more even temperature. As soon as the roots are 1 in. long, the cuttings should be transplanted, taking care to spread out the tiny rootlets as they grow in the water; fill up the bottle with rich earth; let it dry off for 2 or 3 days and then break the glass; pot or plant out the cutting without disturbing its roots in the least degree.

Perennials. — Perennials continue to flower several years in succession. The seed may be sown at times when the ground is moist, but not very wet, from the first of April to August. Many of them may be raised in the open ground, like hardy annuals, and transplanted. As they do not generally bloom the first year, they may be thinned out or removed from the seed bed as soon as they are well rooted, and planted either in different parts of the garden, or into nursery beds, in rows a foot apart.

POTTING. — When this operation is necessary, it should generally be done after pruning, and when fresh growth has taken place. The mold for potting should be light and loamy, the fertilizing material used being well decayed. If the soil is rich of itself, it is better to be either very sparing with the fertilizer or to dispense with it altogether. In potting, drainage must be secured; to assist this place several small pieces of broken crockery in the bottom of the pot, then a little green moss, then the soil. To obtain early bloom, small pots must be used. When rapid growth is desirable, put the soil in rather loosely; when early blooming is wanted, pack it firmly round the roots. When potting plants that are to remain in the pots a number of months without being expected to bloom, pot rather lightly.

REPOTTING. — When the roots of the plant have become pot-bound (that is when the earth shrinks and forms a hard ball around the roots of the plant, leaving a space between the earth and the pot, through which all the water runs without wetting the roots of the plant), it is necessary to repot. Turn the plant out of its old pot by putting the hand upon the earth and turning the pot upside down; if the ball of earth does not come out readily, strike the rim of the pot against the edge of the potting table or shelf. The ball containing the plant will thus drop out into the left hand; the bits of earthenware that adhere to the bottom of the ball having been picked off, and any part of the root that appears decayed having been removed, a little mold is put on the drainage in the new pot; the ball of earth containing the plant having been placed in the centre, the space between it and the pot is filled in with light, rich mold, and made firm with the potting-stick; shake the pot, then take hold of the rim with both hands, and strike the bottom of the pot two or three times, with a jerk against the potting-bench. Then water the plant and set in the shade for the remainder of the day. As a general rule, do not repot when plants are showing bloom.

SEEDS. To Select. — To select seeds from plants having single flowers which will produce double ones, closely examine the bloom upon single wall flowers or single stocks, and here and there a bloom that has one more leaf in it than the ordinary bloom will be found; the presence of this extra leaf is an infallible sign that the seed produced from that bloom will produce a plant bearing double blooms. To mark the seed, a short piece of scarlet silk is loosely tied upon the stem of the extra-leaved flowers, or where the different plants have different colored blossoms, the color of the silk may denote the color of the flower also.

WATERING. — Plants should be watered regularly once a day, except when it is rainy or the sun is not very strong; then they should not be watered till they show signs of needing it. Never water plants when the sun is shining on them; evening is the best time to water them, because the roots have time to absorb their drink all night long, and in the morning the plant is bright with health and vigor. Smooth-leaved and hard plants, as a rule, require less watering than soft-leaved plants. Small pots require watering every day, sometimes twice a day. Rain-water is best for plants; it should never be colder than the atmosphere in which the plant is surrounded; too much water rots the roots, or causes them to perish with cold. Sickly potted plants, even some that have almost died, can be greatly benefited, and sometimes, indeed, entirely restored to vigor, by applying to them warm instead of cold water. Manure waters should be applied with care and not too strong. Syringing is a most valuable mode of applying water, as it promotes cleanliness, and is necessary for removing dust and incrustations from the foliage. In winter it should be done at midday, when the sun shines; in spring and autumn, in the morning; in summer, chiefly in the evening, though at that season frequently give them a dash several times a day.

WINTER CARE. — For winter protection, all tender roses, pampas grass, oleanders, tritomas, bulbs and plants that die down to the ground, may be bent to the ground and covered entirely with coal ashes. Leaves, straw and coarse manure will serve the same purpose. Tall bushes, etc., that will not bear bending down, can be protected by stacking and binding straw around the main stalk, completely covering it.

Tuberous roots, as those of the dahlia, pæonia, tuberose, etc., intended to be planted in the succeeding spring, are preserved through the winter in dry earth, in a temperature rather under than above what is natural to them; but as they do not require light during the winter it is safer to lift and store them in a dry cellar or building from which frost is excluded. A spare closet in a part of the house where there is no danger of freezing is preferable to a cellar for these.

House Culture.

Care of Plants.

REMARKS. — The principal cause of failure with house plants is the attempt to bring under the same treatment plants of diverse character. If flowers are required, sunlight is indispensable, whereas, in partially shaded situations, the so-called "foliage plants" will thrive. If symmetrical plants are desired, turn frequently and pinch back long shoots. The plants intended for winter use should not be left outside till the chilly nights stunt their growth, but they should early be brought inside, and so gradually accustomed to the changes of temperature.

CLEANLINESS.—The leaves of plants should be kept free from dust and impurities, for through these functions perspiration and digestion are carried on. Plants must be removed from the room when sweeping; or have them in a stand with open sockets at the corners, in which the edge of iron hoops may set and a clean cotton cloth thrown over and tied beneath to keep them clean; remove the cloth carefully when the dust has settled, and shake it outdoors.

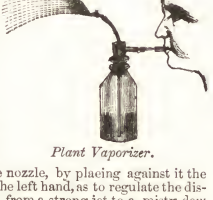
FROZEN PLANTS. — They should not be put near the stove to be thawed out, but placed in the dark where the temperature is nearly freezing, so that they can thaw gradually. If severely touched with frost, it is best to remove the frozen parts, that new stems may be forced out from the buds below. Water freely, and finally bring them to the ordinary temperature for house plants.

GREENHOUSE.—Flues, glass, woodwork and walls should be thoroughly cleaned at least once a year. The house ought to have free exposure to the east, south, and west, and be entirely free from the shade of lofty, overhanging trees. On the north side, however, and also in some degree on the east, there should be ample shelter from the cold, searching winds of spring and winter. Of whatever description the house may be, or of whatever material the stage is composed, it is of the greatest importance that it should be constructed and so situated that the plants will be as near the glass as possible. Ventilation is one of the most essential requisites; to give this, open the windows at the top of the house; never open the side slides in cold weather, but let the air in by the flaps on the roof. There are three modes by which horticultural structures are heated: 1st. The flue, or fire heat; 2d. Heated air, or the Polmaise system; 3d. Hot water. The first of these is the oldest, and by some considered the best. The flue may be built below the level of the walk, but it is best if situated above ground, so that every portion of its surface is free to give out all the heat that is generated into the body of the house. The bottom should be made of paving tiles resting on a brick at their junction with each other, so as to keep them off the ground, and to insure an open space all around them. The flue should be 9 in. square inside; the sides formed of bricks on edge, and covered on the top with tiles similar to those used for the bottom. In constructing it, care must be taken to make it perfectly tight, to prevent anything like an escape of sulphurous vapors, which would certainly destroy the plants; for this purpose the work should be put together with fine lime putty. The practice of plastering the flue is bad, for plaster is a bad conductor of heat. In houses that are used for forcing, or where tropical plants are grown, the flue should be covered with concave bricks, for the purpose of holding water and generating steam, which is necessary for all plants which require a moist atmosphere. The fire-place or furnace should be 18 in. long, 14 in. high, and 10 in. wide, with a grating for the bottom; the whole enclosed by a double iron door, that is, a door with a plate of iron on the inside of it, leaving a space of 1½ or 2 in. between. The fire-place must be a foot lower than the entrance to the flue, for the purpose of insuring a thorough draught. The 2d mode of heating consists in introducing a current of air in such a manner that it will circulate and pass all around fire-place or furnace, and during its progress become highly heated. This heated air is then conveyed into the house by an opening in the back wall, immediately contiguous to the fire-place, and thence diffused throughout the whole house. Towards the front of the house there are openings like traps communicating with an underground drain, which passes all around the inside of the house, and leading to the fire-place; down these traps, and along this drain, the cold air is conveyed to the fire-place, and becoming heated, is forced into the house, and so a continual circulation is kept up. The 3d method is the best, most cleanly, most efficient, and most easily managed; and although the most expensive at first, when iron pipes are employed, is ultimately the most economical, as it is less liable to fall out of repair. There are two varieties of heating by hot water, namely, by iron pipes and by tanks; in both cases a hot water boiler is employed, and the same description of boiler will do in either case, whether for supplying iron pipes or tanks. The boilers are made of various shapes, the preference being generally given either to the saddle or to the conical boiler. The latter is a very excellent and convenient contrivance, and can be employed without being fixed in brick work, as it stands in any position just like a common stove,

with the fire in the centre of it, and the space for the water all round the fire; it is supplied with fuel at the top, and as easily managed as a stove. Small pipes may be employed or houses of small dimensions, in some cases 2 in pipe and 3 in. are made use of; but, as a general rule, the larger the pipes are the better, as when of large diameter they contain more water in proportion to their radiating surface, and will therefore retain their heat longer, after the fire is extinguished. The heating by means o' the tank is effected much in the same way as by pipes; but the medium for conducting the water through the house is by tanks instead of pipes. If applying the tank system to the house, use the whole of the space under the platform where the pipes pass; to do this, brick piers or strong wooden trusses, about 1 foot in height, should be raised, at distances of about 3 ft. apart, and on them a wooden trough or tank erected, which must be perfectly water tight. The dimensions of this tank should be, for the house in question, 2 ft. 4 in. wide outside, and 8 in. deep inside; the length to be regulated by the length of the house. This tank must have a division up the middle by means of an inch thick partition; this partition must be 2 in. shorter than the tank at the opposite end from the boiler, to allow the water to circulate from the one side to the other; one side containing the hot water flowing from the boiler, and the other being its course back to the boiler again. The tank should be covered perfectly tight by means of flat tiles or slates, closely cemented; and when in full operation, it will be found to form a cheap and most effectual mode of heating.

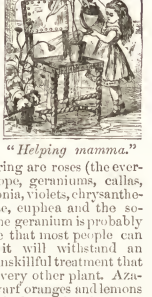
TEMPERATURE.—The average temperature should be 48° at night and 70° in the day time. Care should be taken not to get the temperature too low in cold weather, and too much fresh air should be avoided. Too much heat is just as injurious as a deficiency. If the air is dry and hot the plants will soon be infested with the red spider, green fly and mealy bug. To get the moist air so essential to all plants in rooms heated by a stove, furnace or any dry heat method, water may be evaporated on the stove or in some place near the heater.

WASHING AND SYRINGING.—A good way to occasionally wash a plant, is to spread the fingers and palm of the left hand over the surface of the soil in the pot; turn the head of the plant into a pail of water; move it briskly several times through it; then set it upright, and wash every leaf, upper and lower side, between the fingers and thumb; then swing it again through clean water, and set it once more in its position. If a little soap is dissolved in the first water, and in the washings before the last, so much the better. When on examining the foliage it is found to be supplied with bristly hairs or down on either side, then a sponge will be preferable to the fingers. In all other cases the fingers will be best, as no mechanism can ever be made to equal them. It will also be advisable, in all cases, to have a piece of loose cloth to place over the surface soil of the pot before the palm and fingers are placed across it with one hand, while the other hand holding the pot reverses the top of the plant in the water. If the plant is too large for a pail or tub it is best to lay it down, wet it all thoroughly with a good syringe, a substitute being found in a good-sized boy's squirt, especially when you can so manage the nozzle, by placing against it the forefinger of the left hand, as to regulate the discharge at will from a strong jet to a misty dew when desirable. For the latter, vaporizers, sold at all drug-stores, are often used.



Plant Vaporizer.

WATERING.—Succulents require but little water in winter, simply enough to keep them growing; aquatic or semi-aquatic plants will bear watering to saturation. (See *Ground* in GARDENING; also *Watering* in GARDENING.)



"Helping mamma."

WINDOW GARDENING.—The variety of plants that will thrive under ordinary window culture is not large and may be divided into 2 classes — *flowering* and *foliage*. Among the best plants for flowering are roses (the everblooming sorts), heliotrope, geraniums, callas, begonias, carnations, libonia, violets, chrysanthemums, Chinese primrose, euphea and the so-called Dutch bulbs. The geranium is probably the leading sort and one that most people can grow successfully, as it will withstand an amount of neglect and unskillful treatment that would be fatal to most every other plant. Azaleas, camelias and the dwarf oranges and lemons will also do well, and with those already mentioned will thrive under similar conditions. To secure good results from flowering plants, a sunny aspect is very necessary, for without sunlight the flowers will be few and poor. Among Dutch bulbs, the hyacinth, tulip, crocus and narcissus are indispensable, while anemones jonquils, snowdrops and the numerous other kinds are but of secondary importance. Hyacinths may be grown either in pots or glasses filled with water, but the others must be grown in soil only. Whichever way they are grown, it is necessary to place them in a cool, dark place for about 6 weeks, or until they have formed good strong roots. This is an important element in the successful handling of these bulbs; for on the formation of an abundant supply of good, strong roots before the flower bud starts, depends in large measure the perfection of the flowers. Crocus, tulips and narcissus can only be grown successfully in soil, but they re-

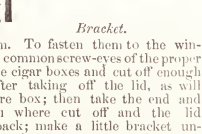
quire similar treatment to the hyacinth. Plants designed for winter flowering should be grown in pots all summer, changing them from one size to another as the pots become filled with roots. The buds should all be picked off, thereby throwing all the strength of the plant into forming a healthy and vigorous growth. For a shaded window, plants of beautiful and varied foliage are best. Among them the crotons, ma-

Window Gardening.

rantas, agaves, palms, ivies and ferns are adapted to window gardening. Very pretty effects may be made by the harmonious blending of the various colors and forms, fully equal to any made by flowers. The potting material should consist of good garden soil mixed with half its bulk of good leaf mold, well rotted manure and sand in about equal proportions. Unless very large pots are used, no drainage will be necessary, as too little water is usually applied to house plants. Do not let the pots become dry before giving water, as every drying checks to a greater or less degree the vitality. The water should be lukewarm, and given in the morning, as the room is usually warmer during the day, and the plants will not then have to contend with cold atmosphere and chilled roots, so frequent at night. The amount of water required varies with different kinds, and experience alone can determine when to give and when to withhold moisture. The temperature should not be allowed to fall much below 40°, for if kept too cold plants will not thrive, but will turn yellow and drop their foliage; this sometimes occurs when they need nourishment. This condition may be overcome by applying some fertilizing element in the shape of liquid ammonia, of which 1 tablespoonful in a pail of water will be found sufficient, or 1 teaspoonful of bone meal or some other chemical fertilizer may be scattered on the top of the pot and then stirred in. Care should be exercised in using guano, as it is highly concentrated and requires but very little to produce good results. There are many plants that will thrive in one situation that utterly fail in another, so that those who start window gardens should not be discouraged over the loss of a few plants, but try others until success is attained.

Stands and Baskets.

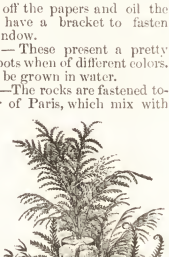
BRACKETS. — 1. These may be made of any required size, to fit any desired place. For the construction of a simple form use ¼ in. iron rod or wire, heat in stove and bend to the size wanted. When a blacksmith is near that part may be done by him. To fasten them to the window frame use common screw-eyes of the proper size. — 2. Take cigar boxes and cut off enough of the box, after taking off the lid, as will make a square box; then take the end and tack on again where cut off and the lid will make a back; make a little bracket under the box; wash off the papers and oil the box, and you will have a bracket to fasten at the side of the window.



Bracket.

BULB GLASSES. — These present a pretty effect among other pots when of different colors. In them bulbs may be grown in water.

FERN ROCKERY.—The rocks are fastened together with plaster of Paris, which mix with dry colors, grays and browns predominating. As fast as the plaster is applied, sand is thrown on it. The effect of the coloring and sanding of the plaster is to destroy its whity glaring look, and to harmonize it with the general colors of the rock work. The cans used for the flower pots are first wrapped in wet paper, to increase them in size, before applying the plaster against them when building up the rock work. In a few hours the paper wrappings will be so dried that the pots are easily withdrawn, after which the paper is removed and the pots put back in their places. This placed on a table makes an effective ornament for the room, or it can be set outdoors.

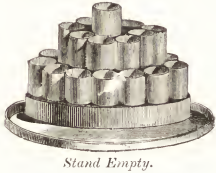


Rockery.

FLOWER STANDS. — These are made of various designs of wire, wood and iron, and are usually painted green. The size depends upon the number of plants and the style. A nice home-made stand may be constructed as follows: Secure an old centre-table and two cheese

boxes of different sizes; place one on top of the other, the smaller one on top; around the side of the lower place fruit-can flower pots; above these on the next cheesebox place more, and on the top of the smallest box place more pots, so that but little of the cheese boxes can be seen; all the pots ornament with burrs, cones, lichens, or barks; the spaces left between the boxes fill in with wood mosses; around the rim of the table nail hooping from a flour barrel; the inner angle formed by the hooping and the top of the table, patch with putty; over the entire top of the table, the hooping and the putty, apply hot asphalt with a brush; a hole bored through the top of the table affords an escape for surplus water; the cheese boxes coat inside and outside with asphalt to prevent them from warping; the open space between the first circle of pots and the rim of the table fill in with earth, on top of which build up moss to the first circle of pots.

Wire Flower Stand.



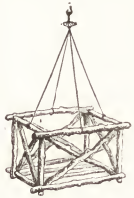
Stand Empty.

Stand Filled.

HANGING BASKETS.—Under this heading are usually classed pots, logs and the various shapes of wire and rustic baskets. A very pretty effect may be made by cutting off 3 or 4 in. of the top end of a carrot, scooping out the interior and filling with water; it will soon start to grow and the leaves will curve upward, completely covering the root. Rustic logs, pots or baskets can be readily made by one possessed of ordinary skill in the use of tools. A hanging log can be made by partially telescoping two cans together, after the opened end has been entirely removed; a section of the side of each can is cut out, to leave an opening for the reception of the soil and plants; the cans are then heavily coated with asphalt, particularly where the cans are joined, so as to strengthen the joint; barks of chestnut and oak trees are used for covering the cans. Wire baskets should be thickly lined with moss before they are filled with soil. A pretty basket may be made of rustic limbs of trees. The branches are collected and cut of uniform size. It should be made longer than it is wide. Then they are joined together, the sticks being laid to form different designs; they may be hung up by wires. When ready for use they must be lined with moss. Care should be taken not to allow the baskets to get dry, as herein lies the root of the difficulty with all hanging designs.

Hanging Log.

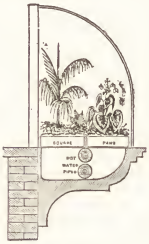
Wire Hanging Basket.



Rustic Basket.

JARDINIERES.—These are very elegant and add much to the appearance of a room. Never put more than one flower in the pot at a time; simplicity is their chief beauty.

PLANT CASES. — A fernery or plant case might be arranged to run the whole length of the front windows of a story and be heated by a small boiler placed behind a fire-place; from this a 2 in. flow and return pipe is taken through the case, so as to heat it when required; the space around the pipes can be filled with bark or water if desirable, so as to produce a moist and genial bottom heat; the ferns, mosses, and other decorative plants, are arranged in flat square pans of zinc or earthenware, and the effect of the whole, especially when seen from within, is very effective, and affords relief to the eye which might otherwise look out on a dismal prospect of blackened roofs and soot-begrimed chimney pots. Wardian cases are very convenient contrivances for the protection of ferns, mosses, and other delicate plants. They were invented by a Mr. Ward and from him receive their name. They were originally quite portable, but now appear in all possible forms and sizes. They consist of a lower portion containing soil for the plants, and of a glass inclosure, which should be very tight to exclude dust, wind, etc., and prevent the escape of moisture. The glazed inclosure is open to the light on all sides and on the top, and is sometimes movable; at other times it can be opened without lifting it. The common square or oblong form is a good one.



Section of Plant Case.

Wardian Fern Case.

WINDOW BOXES. — Window boxes for holding plants can be decorated to look very pretty. The box should be 8 in. high, 10 in. wide, and the length of the window. A design, either conventional or of flowers, birds, and butterflies, is to be painted on the outside, with a background of whatever color may be preferred; let it stand for several days, that the paint may be perfectly dry, and then give it a coat of drying oil laid on quite thin, but evenly; it should be allowed to dry thoroughly before putting in the plants. If painting is not possible, oil-cloth may be used with good effect to decorate it with; select a pattern that will give the appearance of tiling, and cut strips to fit the sides and ends exactly; these should be tacked smoothly on the box round the upper and lower edges; a narrow black walnut molding finishes the top and bottom and the joinings at each corner; the plants are then put in with sufficient earth for their growth, and the top of the earth covered with moss and vines. Small boughs of ash, hazel, or other straight-growing trees, split into halves and nailed on the front of the box in diamonds and other simple figures, are also very effective. Cones and acorns make a pretty decoration for them. Where it is practicable, the effect of the ordinary window box may be much enhanced by the addition of wire netting up each side of the window, so that climbing plants placed at each end of the box may ascend it. Or a light wire trellis arch may have its extremities fixed in each end of the box, so that it will span the window top. A very pretty box consists of a rough pine box, covered with cork shavings of different thickness, the thinner ones forming the panels under the arches, and the thicker ones the arches, pilasters and cornice.

Cone and Acorn Window Box.

Cork Window Box.

(For the preparation of the cork see *Cork Ornaments* in HOUSEHOLD ORNAMENTS.) The box should be painted inside and varnished outside to render it waterproof. The earth for the plants should not be put directly into the box, but into pots which are placed in the box and hidden by it. Boxes faced with encaustic or glazed tiles are very convenient and much used.

Jardiniere.

Pests.

Solutions to antagonize pests are often well applied by an atomizer or vaporizer. (See *Washing and Syringing* in House Culture.)

BLACK ANTS.—Place fresh bones where they congregate; they will gather upon them and may be scalded.

CATERPILLARS.—The varieties of caterpillars are innumerable. Many of them feed on leaves; some species are restricted to a single kind of plant; those which infest flowers and garden plants can only be kept away by watering the plants copiously and frequently, and by examining them often during the spring and summer and destroying the caterpillars.

GREEN FLY. — These are not always green, but vary from yellow to green, according to what they eat. They are very common and easy to get rid of. 1. They may be destroyed by tobacco smoke, or tobacco water.—2. The stems and leaves of the tomato plant are well boiled in water, and this decoction, when strained and cold, is syringed over plants which are infested by the green fly and other insects. The liquor, when once applied, leaves behind a peculiar odor which prevents insects from coming again for a long time. — 3. Take a 2 gal. water pot full of water, put into it 2 wine glasses of paraffine; then mix well with the syringe; afterward syringe the roses with the mixture. It will kill every fly and will not injure the tenderest shoot or the rose blooms.

MEALY BUG. — This species is reddish, and strewed with white dust. At the sides of the 12 segments of the body it is provided with small tubercles. The male is slender and gnat-like, with two rather broad wings, and two long, brush-shaped tail filaments. It attacks a number of species of plants, and can only be diminished in number by brushing them off carefully with soft brushes, and crushing them.

MILDEW.—To prevent mildew on roses and other plants syringe with the following: Mix 1 lb. of flour of sulphur and 1 lb. of fresh lime in 5 qts. of water; repeatedly shake the mixture; and after settling put it into well-corked bottles. For using, 1 gill of this mixture is put in 3 gal. of water.

OLEANDER SCALE.—The female appears as a yellowish, round, flat shield, almost destitute of limbs, which sucks plants with its rostrum. The shield of the male larva is smaller than that of the female, and quite white. The perfect male is brownish-yellow, dusted with white, and white wings. Length, 1-36 of an in. It lives in amazing numbers on different kinds of plants, particularly on oleanders, acacias, aloes, palms, etc., and can only be gotten rid of by careful brushings.

ORANGE SCALE.—This appears like an elliptical nut-brown shield, and is very plentiful on greenhouse plants, particularly on orange trees, fastening itself upon the branches and leaves, particularly when the trees are kept rather warm. It may be destroyed by washing the branches and leaves. If this be done in autumn, it is a great advantage, as the old ones cannot creep up again. Or, they may be destroyed by spraying kerosene through an atomizer over the leaves covered with scale and black fungus.

LICE.—A teaspoonful of ammonia to 1 qt. of water sprinkled every other day over plants will cause lice to disappear and not injure the plants.

RED SPIDER. — It is scarcely visible to the naked eye; has 8 legs; its color changes from yellowish to brown and reddish, and on each side of the back is a blackish spot. In the open air it usually attacks kidney beans. Among trees, the young limes mostly suffer, and the mites are found in thousands on the under side of the leaves. These leaves assume a dirty-yellowish or brownish appearance, and in the middle of summer the trees acquire an autumnal hue.—1. Frequently sprinkling the plants with cold water has been found efficient as a means of destroying these insects. — 2. Repeatedly fumigating the hot houses with strong tobacco smoke injures them in some degree.—3. A teaspoonful of salt in 1 gal. of water; sprinkle with this; in a few days wash the plant with pure water. — 4. Wash the plant with warm soap-suds with a very few drops of coal oil in the water; then remove all dead or sickly leaves and branches. Stir up the soil; syringe the foliage frequently.—5. Fill a barrel nearly full of water; slake in it about ½ peck of lime, and let it stand until perfectly clear; hold the plants in the water, bottom up, for about 5 or 10 minutes, then wash them with pure water.—6. A little flour of sulphur dusted over and under the leaves is efficacious. Separate those that are infested from those not touched; do so as soon as you discover them. They will always be found on the underside of the leaves. The plants should be taken from the window to a place where water can be used freely.

ROSE MOTH. — In early spring, if the new leaf-shoots of the rose tree are closely examined, a little brownish scale is found here and there attached to them, in which a worm, the larva of a small moth, is concealed, which gnaws the tender shoots. The larva which lies in the little case is about ½ in. long; yellow with a black head, and black-spotted collar. It undergoes pupation in its case, which enlarges from time to time, as necessity requires. The moth appears at the end of May. The whole body is silvery shining gray; the upper wings strewed with minute black dots, deeply fringed at the posterior edge; the under wings are narrow, pointed, with very long fringes. The only certain way of preserving rose trees from this enemy is to look for the small cases in early spring, before the foliage is developed, when they must be crushed immediately.

ROSE SCALE. — These live on the stems and old twigs of rose trees, which are sometimes entirely covered with them, and look moldy. Brush them off with strong brushes before the rose trees sprout.

ROSE SLUGS.—This is the name given to the gasteropodous naked mollusc, so great an enemy to our gardens and fields. They are, unfortu-

nately, too well known to require description; they are found in nearly every part of the world, but are more common in the temperate regions. —1. A common plan to prevent their attacking plants is to surround the foot of the plant with soot; this the slugs will not cross.—2. A good way to catch them is to get a few cabbage leaves, and having warmed them well in an oven, rub them over with unsalted butter or dripping, and place them in the haunts of the infesting mollusc. In a few hours the leaves will be found covered with slugs, and they may then be destroyed.—3. Take an ordinary sprinkling pail, with a fine nozzle; put in a few spoonfuls of kerosene and 2 or 3 spoonfuls of hellebore; then fill with water and give the bushes a thorough sprinkling. Take care to have the mixture reach the under side of the leaves as far as possible. Apply as soon as the slugs appear, and you will be entirely rid of them.

SWEET BAY SCALE.—The shield of the female is oval-shaped, brown, with a reddish-yellow elevation before. The male is pale cherry-red; the body flat; the horns or feelers rather shorter than the body. The shield of the larva the same as the female, but narrower. It is difficult to remove, as it is so firmly seated that brushing is not always sufficient; a pointed stick must be used.

THRIP is a nimble black insect, exceedingly pernicious, and very fond of ferns, azaleas, lilies of any sort, callas and the like. Their work is discernible in rusty brownish or yellowish blotches and tracings on the leaves, which they very soon destroy. The old or black ones are hard to kill. They should be bruised to death by the fingers. The young or yellowish ones should be bruised by sponging; then shower with clean water afterwards. In greenhouses thrips are killed by tobacco smoke.

WORMS. — Worms at the roots of plants can be exterminated by watering with a solution made of fresh lime and water. Use after the lime has settled.

VARIETIES.

ABRONIA.—A pretty annual, with long, trailing stems, bearing in profusion clusters of elegant verbena-like flowers of great fragrance, remaining in bloom a long time; very effective in beds, rockwork, or hanging baskets. The seeds are enclosed in a husky covering, which should be removed before planting; can be sown as early in the spring as the ground is ready to work; transplant 1 foot apart. It requires a light soil.

Abronia.

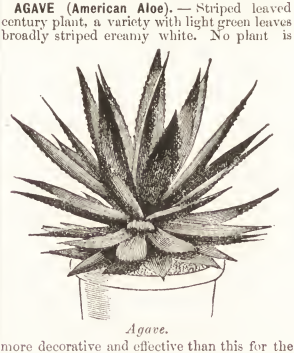
ACACIA.—A genus which supplies, during the winter and spring months, a perfect blaze in the greenhouse and conservatory. They are hardy and evergreen; the flowers are yellow and many of them are fragrant. They continue long in bloom and are generally grown in sandy loam mixed with a little peat and leaf mold; require good drainage, an abundant supply of water, and the soil moist at all seasons. Being liable to become leggy, the best plan is to cut them in after flowering in spring. The plants should be well furnished with shoots from the base, keeping them plentifully branched by frequently stopping the shoots; plant the seeds in March in a hot-bed, soaking the seeds in water at 90° for 24 hours before sowing; or cuttings of the young shoots taken off at a joint, in sand over sandy loam and peat, placing in a hotbed.

ACROCLINIUM. — One of the finest and most beautiful of the everlasting flowers, growing freely in light garden soils, and blooming in August and September; flowers pink and white with yellow centre; very desirable for the flower garden, and a great acquisition for winter bouquets, for which purpose they should be cut as soon as they begin to expand, and carefully dried in the shade. They grow about 1 foot high, and should be planted about 4 in. apart.

AGAPANTHUS (African Lily). — A tuberous rooted plant with recurved leaves. The handsome blue flowers are produced at the top of the flower stems, which grow about 3 ft. high, often bearing from 20 to 30 flowers. The seed produces small tubers which will require two seasons' growth to become of sufficient size to flower. Plant in sandy loam in greenhouse, and transplant to open ground when weather is warm. Secure the tubers from extreme cold.

Acroclinium.

AGAVE (American Aloe). — Striped leaved century plant, a variety with light green leaves broadly striped creamy white. No plant is more decorative and effective than this for the



Agave.

conservatory in winter and lawn or garden in summer. They succeed in 2 parts fibrous light loam, 1 part leaf soil, and ½ part sandy peat, pieces of charcoal, and sand in equal proportions.

ALLEGHANY VINE (Adlumia). — A most beautiful and graceful climber, thriving in a sheltered situation. It is sometimes known as mountain fringe and wood fringe. The beautiful pink and white flowers are produced in abundance during the three summer months. It is biennial, and makes but little growth the first season. Sow the seed in April, and the following autumn transplant to the place where they are to blossom.

ALMOND, DOUBLE FLOWERING. — A shrubby plant, bearing beautiful rose-like flowers in the spring. It is propagated by suckers.

ALTHEA (Rose of Sharon). — This is really one of the most showy and beautiful flowering shrubs; the flowers are of large size, very double and full, and of various brilliant and striking colors. It blooms freely during August and September when scarcely any other tree or shrub is in bloom.

ALYSSUM, SWEET. — A small pure white fragrant flower; grows freely from seed, either under glass or in the open ground, and makes a pretty border. Sow the seed in May or June.

Alyssum.

AMARANTHUS. — An annual plant, with a beautifully variegated foliage of red, green, and yellow. The name means "never withering" and embraces a large class of flowers, including *Love Lies Bleeding, Fountain Plant, Princess Feather, etc.* It requires a rich soil. The seed is found in little tufts about the stalk, and may be sown in April or May.

AMARYLLIS. — This blooms in August; has a strong flower stem 18 in. high; bears in succession from 4 to 8 brilliant purplish scarlet flowers, 2 to 3 in. in diameter; continues in blossom a long time. The bulbs should be potted in a rich sandy loam, with good drainage. They require abundant moisture when growing, but at their season of rest water should be given sparingly.

Amaryllis.

ANEMONE. — A most beautiful flower, both double and single; the single is the most brilliant. It is plain looking during summer, with dark green foliage; but in the latter part of summer flower stems appear, growing 18 in. high, with white flowers. It requires a pure loamy soil well mixed with sand, and is raised from seed or from pieces of the roots. Sow the seed in spring. During the summer, it sends out young roots, which must be taken off and planted out, to become blowers.

ANIMATED OATS. — An annual plant, resembling the common oats while growing. The seeds are clothed with a stiff down, and have appendages like the legs of some insects, with apparent joints. They are affected by the changes of the weather, and are continually moving. If they be wet, they will turn over several times, and twist about. If wet, and held to a lighted lamp, they exhibit such motions of apparent agony as an insect would, placed in a like situation.

ASTER, CHINA. — An annual, producing many splendid flowers. There are several varieties, as red, white, purple, yellow, striped, quilled, etc. The seed should be sown early in the spring. It flowers late, but is destroyed by severe frosts. It requires deep, rich soil, and may be grown in a hot-bed and transplanted, or in an open seed bed; large varieties should be 12 in. apart, and small half that distance.

AZALEAS. — Spring flowering shrubs, universally esteemed for their beautiful flowers, which are produced in great profusion from April to June. The flowers are of all conceivable colors, and for brilliancy are unsurpassed. They need hot-house culture, and the seed should be planted in April in a cold frame, in a turfy peat soil, with a good proportion of sand intermixed; transplant out the seedlings the year following, in beds, 4 in. apart, to remain till they flower. It is well to cover the plants in the fall, with straw or mulch, as the late frosts sometimes destroy the young, early shoots.

Azaleas.

BACHELOR'S BUTTON. — A perfectly hardy border plant, succeeding finely in any common garden soil, but the flowers are more brilliant if grown in gravelly ground. Under cultivation, it is a handsome flower, blooming into varieties of white, purple, pink, parti-colored, etc. It is a hardy annual, 2 to 3 feet high.

BALLOON VINE (Cardiospermum). — A curious half hardy annual, remarkable for its inflated membranous capsules, and sometimes called *Love-in-a-Puff*. The flowers are insignificant, but the plant is a rapid and graceful climber. Sow in open ground, from 1st to 15th of May, and give the plant support to run upon. It is suitable for low trellises and greenhouse decoration; succeeding best in a warm situation.

BALSAM (Lady Slipper). — A beautiful annual plant, with great abundance of flowers. To have them in perfection the plant should be set 12 in. apart and trained to 3 stalks, which will be as thickly laden with flowers as the hyacinth; or the plants can be set 5 or 6 in. apart and trained to only 1 stalk by nipping off every other branch but the centre one, and keeping

every straggling shoot down. Thus trained, all the strength of the roots is concentrated into a very small space, and the flowers will be very large and double. The soil should be very rich and loamy, and the plants will grow better if mulched with strawy litter in July or with grass from the lawn mower.

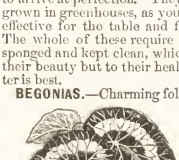
Balsam.

BARTONIA.—A very showy, half-hardy annual. The leaves are somewhat thistle-like in appearance, gray and downy. The flowers of a very bright metallic yellow, and exceedingly brilliant in the sunshine. It likes considerable moisture, and young plants suffer sometimes in a dry time. Sow the seed where it is destined the plants should bloom, as they are transplanted with difficulty; thin to 6 in.

Bartonia

BEAR GRASS (Yucca).—Splendid, showy, hardy plants, with aloe-like foliage, bearing a close panicle of cream-colored, drooping, tulip-like blossoms; plant the seed where it will remain undisturbed, as the plant takes some time to arrive at perfection. They are, however, best grown in greenhouses, as young plants are very effective for the table and for vases in rooms. The whole of these require to have the leaves sponged and kept clean, which adds not only to their beauty but to their health. Soft tepid water is best.

BEGONIAS.—Charming foliage plants. There are many flowering sorts, varying in color from pure white to scarlet. Sow in heat, in February; pot the young seedlings off as soon as large enough, and repot when necessary. In 3 or 4 months the plants begin to display their splendid and continuous bloom. They require a rich soil and an abundance of water at the roots. They may be propagated by cuttings.



Begonia.

BITTER SWEET (Celastrus).—A hardy, deciduous climber, producing yellow blossoms early in the season, and later ripened fruit which is very ornamental, and remains on the vines nearly all winter. Grows about 20 ft. high.

Bitter Sweet.

BLEEDING HEART (Dicentra Spectabilis).—A native of China, with heart-shaped deep pink flowers, a dozen or more borne on a graceful drooping branch. Pot before frost in autumn for blooming in the house.

BOX.—A low, delicate shrub, which may be pruned to any shape to please the fancy. It is an evergreen, hardy, and suitable for borders, and is grown by cuttings, or by dividing the roots. If a plant be placed deep in the earth, and the soil be brought in close contact with the small branches (being spread as much as possible), they will send out roots, and furnish a large number of small plants. In trimming this shrub, let the operation be done well, using the proper utensils.

Browallia.

BROWALLIA.—A lovely little flower; grows wild in South America. It germinates quickly from seeds and is a constant bloomer. If the flowering branches are picked when the frost threatens and are kept in vases of water, they will continue to bloom for weeks, and will also throw out tiny roots, so that they can be planted and kept during the winter. The blue flowering varieties are preferable to the white because blue flowers are much rarer. Although the flowers are quite small, they are peculiar in shape and unsurpassed for vases and bouquets.

CACTUS.—There are several kinds of cactuses: prickly pear (*Opuntia*), with spines ¾ of an in. long; quadrangular stemmed cactus, like the most familiar one in greenhouses; a cactus with rounded ribbed stem, growing in candelabrum-like form (*Cereus*); and a large dome-shaped cactus, 1½ ft. high, and bearing a crown of small red flowers. By their structure the cactuses are especially adapted to a long season of drouth, and in a dry time they take their rest, the same as our plants do during the winter. They need very little water during the winter, and should be kept in a warm place, and where they will not get near the freezing point. In spring, when they start to grow and bloom, they should be freely watered. The exceptions to this treatment are the *Epiphyllums*, Crab's Claw cactuses, and the Rat-tail cactus, *Cereus flagelliform*.

CALADIUM ESCULENTUM.—One of the largest and grandest of the ornamental plants, with leaves 1½ ft. long, and 1 foot wide; of a beautiful variegated or mottled green. It will grow in any good garden soil, and is easy of culture. Roots obtained in the spring will make good plants in the summer, and in the fall they should be taken up and stored in a cellar.

Caladium Esculentum.

CALANDRINIA.—Fine, dwarf plants for grow-

ing in masses, having fleshy leaves and succulent stems like the portulaca, and producing an abundance of blossoms, which, when fully expanded, make a beautiful appearance, and suitable for edgings, rockeries and clumps; in bloom a long time. The seed should be sown in hot-bed, early in spring, and planted out in June, in rich, sandy loam, in masses. They are a tender annual, but perennial if protected in winter, and grow ½ to 1 ft. high.

CALCEOLARIA.—Remarkable for their large, beautifully spotted blossoms, which are very showy, and from which an almost countless number of hybrids have been raised. They are perennial, and are grown in pots in the conservatory, greenhouse and garden. Sow in a temperature of 50 or 60° from January to April, in shallow boxes, in light soil, merely pressing the seed into it and covering with light leaf mold or sifted moss. Transplant into similar boxes as soon as the tiny plants can be handled, and when strong enough into pots. For winter and spring blooming sow from August to September. They are propagated from seed or cuttings. The best time for making cuttings is as soon as the young shoots can be had after flowering. Some of them are herbaceous perennials, others shrubby evergreens.

Calceolaria.

CALIFORNIA POPPY (Eschscholtzia).—Finely cut leaves of a glaucous color, and blossoms about 2 in. in diameter, of many brilliant and showy colors. Sow the seed where the plants are wanted to bloom, as they do not bear transplanting. Thin to 6 in. apart. As the stalks and branches are delicate, they will do better if supported by small sticks. It requires a light rich soil, and is a hardy annual.

CALLIOPSIS.—This is a hardy annual, 2 ft. high, and is a very showy border plant, producing flowers in nearly every shade of yellow, orange, crimson, red, and brown. If the seed pods are removed as soon as they appear, the plant will remain in bloom much longer. Sow where they are to remain, and thin to 2 ft. apart.

Calliopsis.

CALYCANTHUS (Spice Shrub). — This is one of the sweetest of our hard-wooded shrubs. The leaves are slightly fragrant, the bark and flowers exceedingly spicy. The plant makes a bush several feet in height, is hard-wooded, the leaves large, and the flowers abundant, and of a brownish or cinnamon color.

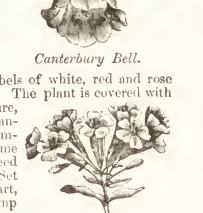
CAMELLIA. — One of the earliest of spring flowers, valued for beauty of color. The best soil is an equal quantity of good sandy loam and peat. They are propagated by inarching, cuttings, grafting, and from seed, the latter being the only method of obtaining new varieties. When the plants are not growing, they should receive but little water, and when growing freely, can scarcely receive too much. A regular succession of flowers may be obtained from autumn till July, if attention be given to removing the potted and growing plants from a warm to a cooler atmosphere. When the growth is completed and flower buds formed, a cool, sheltered situation is best, for they will be seriously injured if exposed to the rays of the sun.

Camellia.

CANNA (Indian Shot). — Stately and highly ornamental plant, desirable not only for the beauty of its spikes of flowers, but for its elegant foliage. The leaves are a rich, deep green, 3 ft. long and 6 in. wide, very handsome as they unfold themselves. Start the plants in hot-bed in pots, and transplant in June, and blossoms will appear in July or August. Soak the seed thoroughly before planting, and keep in a warm spot. The roots can be kept in the greenhouse from year to year, and then it becomes perennial. They are a tender annual, in open ground, 4 to 6 ft. high.

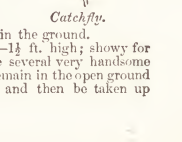
Canna.

CANTERBURY BELL (Campanula).—A biennial plant, bearing large blue flowers which are much admired, and make a fine appearance. Sow in open ground early in the spring; thin out to about 6 in. apart; propagated by division of roots or by seed.



Canterbury Bell.

CATCHFLY.—This is a hardy annual, 1 ft. high, and produces dense umbels of white, red and rose pink-like blossoms. The plant is covered with a glutinous moisture, from which flies cannot disengage themselves; hence the name catchfly. Sow the seed in spring or fall. Set flowers 6 to 8 in. apart, so as to form a clump or border. After having been once grown, the seed will sow itself in the ground.



Catchfly.

CHRYSANTHEMUM.—1½ ft. high; showy for large beds. There are several very handsome varieties. They may remain in the open ground until late in the fall, and then be taken up

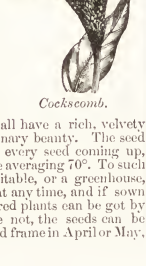
and placed in pots. When the frosts appear, keep them in a warm room until after flowering, and then put the roots in the cellar or open ground. They will flower in the garden, if carefully attended to. Raise by dividing the roots. The ordinary soil is formed of good loam and well decomposed dung, in the proportion of 2 parts of the former and 1 of the latter. The flowers determined upon to save seed from should be protected from wind, rain, and insects; their own pollen must be dusted upon the stigma; and the seeds gathered as soon as they are ripe, and sown in the February following in a gentle hot-bed, in shallow pots, and light, sandy loam. When the seedlings are high enough to be handled, transplant them into the smallest pots, and repot as soon as the pots are moderately filled with roots.

CLARKIA.—An effective, hardy annual, 1½ ft. high, with bright pink, red, white, purple and lilac flowers. It is better to sow the seed in September, and the plants will be large enough by spring to make good bloom.

COBOEA SCANDENS.—A climber of very rapid growth; has large purplish bell-shaped flowers; will grow in the garden during summer, but will not stand frost. Put the seeds in moist earth, edge down, and do not water until the young plant appears, unless in a warm place and the earth is very dry. In the autumn plants can be taken up with care, potted and removed to the house, where they will flourish and flower during the winter. When it becomes too large in the house turn back a shoot and lay it in the ground to root, when it will become a young plant. It will succeed in any rich soil.

Coboea.

COCKSCOMB, or CELOSIA.—One of the most interesting and singular of annuals. In a rich soil with careful cultivation the heads grow from 6 to 18 in. across. The seed should be started in a hot-bed, or in pots in a warm room, and transplanted in a warm, rich soil.



Cockscomb.

COLEUS.—A universally admired ornamental plant. The leaves are of all shapes, shades and colors, and nearly all have a rich, velvety appearance of extraordinary beauty. The seed germinates very easily, every seed coming up, if sown in a temperature averaging 70°. To such as have warm rooms suitable, or a greenhouse, the seed may be sown at any time, and if sown by January, finely colored plants can be got by May. To such as have not, the seeds can be sown in a hot-bed or cold frame in April or May, and when of sufficient size, grown in pots or planted out in the open ground. Seeds sown in April will produce plants 3 ft. high and as wide by September. Slips should be taken from the finest, which will grow finely all winter, if potted and placed in greenhouse or conservatory.

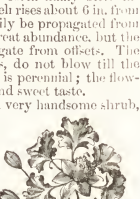
COLUMBINE (Aquilegia).—A very pretty perennial, bearing in June and July red, blue or variegated flowers. It is propagated by seed sown in open border or by separation of the roots in autumn, and thrives best in a strong soil and shady place.

Columbine.

CORAL TREE (Erythrina).—A greatly esteemed deciduous summer flowering plant, producing large spikes of crimson coral-like flowers during the greater part of the summer. The roots are thick and fleshy, but not exactly tuberous, and may be kept in a pit or cellar during the winter. Plants put out in the spring will flower during the summer, and before hard frosts should be taken up, cut back and stored away until the following spring. Start in heat, and transplant out of doors in warm situations, where the plants will grow freely.

COWSLIP (Primula). — This is of a delicate yellow color, and sends forth many blossoms from the same stem, which rises about 6 in. from the ground. It may easily be propagated from seed, which it bears in great abundance, but the easiest way is to propagate from offsets. The plants raised from seeds, do not blow till the second year. The plant is perennial; the flower has a delicate smell, and sweet taste.

CRAPE MYRTLE. — A very handsome shrub, hardy in the Southern States, flowers very freely, almost concealing the plant with blossoms. In the North the plants may be wintered in a cool, dry cellar.



Crape Myrtle.

CRASSULA. — There are many species of this genus, but that which is most generally in cultivation is *Crassula coccinea.* It has showy scarlet flowers in July, and is green in sandy loam, with a mixture of lime rubbish.

CROCUS. — A bulbous-rooted plant, hardy, and early; colors, blue, yellow, white, purple, etc; begins to bloom in March. The yellow are the most vigorous in growth. Plant in the fall, setting the bulbs 3 in. apart and cover with not less than 2 in. of soil. Just before the winter sets in cover the bed with a little straw or leaves, to prevent the bulbs being heaved out by the frost. Beds can be formed by planting different colors, each color in a row. This makes what we term ribbon beds, and the effect is pleasing. Circular beds look best—say 4 ft. in diameter. A few crocuses planted in the lawn at different places (simply by raising the sod with a trowel and inserting the bulb) will give a pretty appearance in early spring.

CROWN IMPERIAL.—Very early in the spring the strong flower stem of the crown imperial begins to appear. Nearly at the top of the stem appears the flowery crown of bell-shaped flowers, and above these a tuft of glossy-emerald leaves, which completes the crown from which its name is derived. Plant the seed 4 in. deep and 1 ft. apart. They do not usually flower the first spring after planting, but once planted they will last a life-time, growing and increasing from year to year.

Crocus.

CUPID'S EAR (Monk's Head).—A fine, vigorous annual, bearing a profusion of pretty blue flowers, during the summer and fall. Propagated by a division of the roots. A very neat plant for the flower garden.

CYCLAMEN. — Well known and universally admired bulbous rooted plants producing exceedingly handsome red and white flowers. The leaves are heart-shaped, while the flowers are of one petal, but deeply divided into 5 segments. After flowering the flower stalk coils itself up in a spiral form, with the seed vessel in the centre, and bends itself towards the ground, in which position the seeds are ripened. The seed should be sown in spring, and by autumn will produce a bulb, which, if potted and placed in conservatory or greenhouse, will blossom the following spring. Propagated only from seed. The soil should be very light and rich, containing a good part of peat and sand, with well-rotted cow manure. They require frequent watering while growing.

Cyclamen.

CYPRESS VINE. — One of the most delicate and beautiful of the tender annuals; foliage very fine dark-green; flowers small, star-shaped, and exceedingly brilliant; vine will grow from 4 to 20 ft. Sow seed in circle 2 or 3 ft. across; set a 10 ft. pole in the centre and run strings 3 in. apart from circle to top of pole, forming a striking cone of great beauty; do not sow until after danger of frost is past; make the soil rich.

Cypress Vine.

DAFFODIL. — A very common flower, but its early blossoming and color make it always welcome in the garden. It looks well in the shady parts of small shrubberies or borders, and if planted in tolerably large numbers makes a great show. It is frequently grown also in pots for the conservatory or greenhouse The soil should be a rich, sandy loam, with a little leaf mold intermixed with it. Should it be required to force any for early flowering, they should be moved out of the ground as soon as the leaves begin to decay, and be kept in a dry place until potting time arrives.

Daffodil.

DAHLIA. — This exceedingly beautiful genus comprises an almost endless number of varieties, all more or less showy in the flower garden in the autumn, when most other flowers have faded. They are all of easy cultivation, grow ing freely in almost any soil, from seed sown in spring. The seed should be sown in shallow pans, in March, and the seedlings transplanted to small pots. As soon as danger of frost is over, plant out, 1 ft. apart. These plants will make a tuber, which should be taken up in the fall and kept through the winter in a cool, dry place, away from frost, and planted out in the spring, when it will blossom the following autumn.

Dahlia.

DAISY. — A small, delicate, perennial plant, producing small but attractive flowers. It is hardy, and will bear flowers through the winter, if kept in pots or boxes, in the house. Not all will come double from seed, and the single ones should be pulled out. Sow early in hotbed, and when large enough, transplant to a rich, cool, partially shaded situation. Set the plants 6 in. apart. Roots can be divided any time. Flowers are most abundant in spring.

DAPHNE. — Evergreen shrubs, with white or purplish pink flowers in April to June. Require to be under rather than over potted. Good drainage is necessary, and equal parts peat and loam, both sandy and fibrous, with a sixth of silver sand; keep moist, but avoid making the soil sodden. Rather moist and slightly shaded when growing, otherwise light and airy position. Propagated by cuttings of firm shoots in sand under a bell glass in a close frame, at the end of summer, or by grafting on a hardy stock. The berries of this plant are highly poisonous, while the juice of it is so acrid as to blister the skin.

DAY LILY (Funkia).—A superb autumn flower, with beautiful, transparent, white trumpet-shaped flowers, one of which opens every day. The blue variety has smaller bell-shaped flowers.

DRAGON TREE (Dracaena).—Very ornamental pot plants, grown for their beauty of form and foliage. They require re-potting about 3 times a year to keep them in a healthy condition. The leaves should be washed with a damp sponge weekly. They are also especially adapted for using in hanging baskets, or vases, as centre plants, for which purpose they are without an equal. In winter keep moist, but not too much so. Use 3 parts fibrous loam, ½ part each sandy peat and leaf soil, with ⅛ of silver sand, and a few pieces of charcoal; supply good drainage. They are better kept rather close and moist when making fresh growth.

ECHEVERIAS (House Leek).—A splendid house plant, also well adapted for rockeries, carpet beds or outer edge of ribbon beds. For pot culture they require a good drainage, small pots, plenty of sand, but not too much water. They will stand all the sun you can give them. After the flower stem is done blooming (or before if you are in a hurry), twist off the leaves which are on it, and insert them slightly in moist sand or sandy earth. These will in a week throw out a young plant which, when strong enough, can be shifted into a small pot and richer soil. From where the leaves are taken off the stem, young plants will now appear, which, if treated the same as above, will soon make fine specimens. Should any old plant get lanky, cut the top off, with part of the stem, and root it in sandy soil.

FERNS.—Ferns require a moderately airy and shaded part of the greenhouse, and are suited to positions which, from shade, moisture and little air admitted in the immediate vicinity, are ill-suited for flowering plants. They need light, but the fierce scorching rays of the sun should be broken by climbers or a light canvas shading from April to September inclusive, there being no sun to hurt them during the winter season of the year; and without air they become drawn and weak, and yet if too dry the growth is stunted and sometimes dries up. In gardens of large extent, the situation of the fernery should be some retired place, with a dense shrubbery or plantation to the north of it. In small gardens, in the suburbs of towns, the habitation for ferns should be in some retired part, the south side of it. to be shaded either with a north wall or shrubbery. Ferns are propagated in three ways: by division, by the viviparous plants, and by spores. Division may be of the crowns, some occasionally having more than one, and these may be separated at the time of potting, and be potted separately. Those with creeping stems are readily increased by taking off the stems or rhizomes, with a branched joint or two, and some roots with soil adhering to them at the time of potting, or when they are beginning to grow, placing them in or on the soil, according to their habit of growth; and those with clustered crowns are readily divided in spring when repotting. The viviparous plants forming on the fronds will in some cases form roots on the plants, in which case there is nothing needed, only to remove them and plant out in suitable positions, or they may be potted and kept rather closer and shaded until established. Those viviparous plants not forming roots on the plants or parent frond should be taken when they are beginning to be shed, the whole frond or part, and pegged to the surface of a pot or pan closely, scattering a little soil over the frond so as to partially cover it, and keeping rather close, moist, and shaded; the young plants will in a short time form roots, and may, when well rooted, be potted off. Ferns may be satisfactorily cultivated in pots plunged in coal ashes, under a wall facing the west, where they will thrive very well. The larger-growing species do not send up such fine fronds as they would do if they were planted out in a proper situation, and in the right soil. Some of the more delicate kinds do exceedingly well in pots, in a compost of peat-earth, light loam, and sand, mixed with very small pieces of broken garden pots. The larger pieces can be used for drainage. Those delicate kinds are such as grow naturally in the crevices of rocks in exposed situations. Should the rains fall ever so abundantly and frequently, the roots of those ferns are never over-supplied with moisture, if the drainage in the pots is so perfect that the superabundant water will readily pass off from the plants. Ferns may be grown on rock work. A nicely put together rockery is a beauty in itself quite independently of its being employed for plants. Another method of rearing ferns is in what is called a Wardian case. For mode of treatment, see *Plant Cases* in HOUSE CULTURE.

Ferns fit for open-air culture.—Male Shield Fern, Mountain Shield Fern, Marsh Fern, Lady Fern, Hard Fern, Oak Fern, Brake or Eagle Fern (*north aspect*); Broad Shield Fern, Common Hart's Tongue, Royal Fern, Parsley Fern, Limestone Polypody, Common Polypody (*south and east aspect*); Crested Shield Fern, Spreading Shield Fern, Soft Prickly Shield Fern, Black Spleenwort, Maiden Hair Spleenwort, Scaly Spleenwort, Moonwort, Common Adder's Tongue (*west aspect.*)

Ferns adapted for culture in pots.—True Maiden Hair, Crested Shield Fern, Mountain Shield Fern, Holly Fern, Marsh Fern, Black Spleenwort, Lady Fern, Smooth Rock Spleenwort, Lanceolate Spleenwort, Sea Spleenwort, Wall Rue, Forked Spleenwort, Maiden Hair Spleenwort, Scaly Spleenwort, Common Hart's Tongue, Hard Fern, Parsley Fern, Limestone Polypody, Brittle Bladder Fern, Mountain Bladder Fern, Beech Fern, Alpine Fern, Oblong Woodsia.

Ferns adapted for culture in close cases.—True Maiden Hair, Alternate-leaved Spleenwort, Lanceolate Spleenwort, Sea Spleenwort, Wall Rue, Maiden Hair Spleenwort, Common Hart's Tongue, Brittle Bladder Fern, Mountain Bladder Fern, Filmy Fern, Wilson's Filmy Fern, Bristle Fern, Beech Fern, Oak Fern, Black Spleenwort.

FEVERFEW (Pyrethrum).—A hardy perennial, producing large quantities of white flowers and continuing in bloom a long time. Sow in box-

es of prepared soil, as early as the season will permit, and transplant to 16 in. apart whenever the plants are large enough. The young seedlings are small and of slow growth, but the older plants hardy and vigorous. The largest crop of flowers is produced the second season. They should be gathered when in full bloom, dried carefully and stored in paper bags. Before using, the flower should be powdered as fine as possible.

Feverfew.

FICUS (**India Rubber Tree**). — Large, smooth, leathery leaves; one of the finest house plants grown; it grows to a large size and produces enormous green leaves; requires plenty of light, and should never be exposed to draughts. Sponge the leaves frequently, to keep them free from dust.

FLAX (**Linum**).—One of the handsomest and most effective and showy of all bedding plants, producing a profusion of beautifully saucer-shaped flowers, of a rich, brilliant scarlet, with crimson centre. Grows 18 in. or more in height. Seeds germinate best in the hot-bed, but do well if sown in the garden in a light soil. Set plants 1 ft. apart.

Flax.

FORGET-ME-NOT. — A hardy perennial, and as it grows very freely it requires, when once planted, only to be thinned out; when it needs transplanting the smallest piece will root. It is exceedingly useful for making a border, and when in blossom the brightness of its blue color forms a pretty variety. It also looks well planted in large masses in shrubberies or large borders, and if well watered will keep in flower a long time. It may be grown in pots for the window or conservatory, and when so done water should always be kept in the saucers. It is propagated by seed or cuttings. The latter should be placed under a hand-glass.

FOUR O'CLOCK (**Mirabilis**). — Fragrant flowers of various colors; open about 4 o'clock in the afternoon, remain open all night, and generally perish before noon the next day. Some of the varieties have beautifully variegated leaves. Plant the seed in the spring, 2 ft. apart. The roots may be taken up in autumn and preserved like dahlias.

FOXGLOVE (**Digitalis**). — Ornamental plants of much beauty, producing dense spikes of flowers on stems 3 to 5 ft. high. The blossoms are thimble-shaped, purple, white and spotted, and very striking. Seed can be sown in spring or autumn, and large roots can be divided. Blossoms the second season.

FRINGE.—A handsome shrub, much admired for their curious fringe or hair-like flowers that cover the whole surface of the plant. They grow from 10 to 12 ft. high, and are very showy. The white variety has large, glossy leaves, and produces its flowers in drooping racemes, about the time the foliage starts. The purple variety flowers later and in erect spikes that remain on the plant all summer.

FUCHSIA.—A well known half hardy perennial plant. Sow or set in March in shallow pots, and in 3 weeks transfer to 4 in. pots. When the plant attains a height of 8 or 10 in., pinch out the centre, and in place of the 1 there will be 3 or 4 branches grow out. Let their branches make about the same growth; then clip the points out, keeping the side branches of equal length, or tapering like a pyramid. Or clip off all the lower limbs and allow the upper ones to droop over, as they are sure to do when loaded with flowers, and you are sure to form a handsome umbrella. Fuchsias, after being exhausted with blooming, should have the terminal shoots of all their branches clipped off; then set aside for 2 or 3 weeks, giving very little water; repot in soil composed of well decomposed leaf mold, mixed with a sprinkle of good garden soil, a few rusty nails and a layer of charcoal at the bottom of the pot to secure good drainage. Water and light should be given freely while flowering, avoiding too strong heat.

Fuchsia.

GERANIUM.—There are many varieties of this much-admired plant. Some give flowers, with little or no leaf; others possess beauty of leaf, as well as of flowers; some give no perfume; others are delightfully fragrant. It is easily propagated by cuttings from any part of the plant, old wood or young, and placed in pots. In a greenhouse, or parlor, they will bloom in winter. Geranium slips should be planted in May, June or July, taking only the last year's shoots, from which the leaves must be stripped. When planted, give them water, and place them in the shade; when they have taken root, let them have the sun in the morning. The slips chosen for cutting should not be such as bear flowers, and they should be inserted about half their length in the earth. Geraniums, except the shrubby kinds, require shelter from frost only, and should have free air admitted to them when the weather is not very severe. In sultry weather they should all be watered liberally every morning, except some few of a succulent nature which must be watered sparingly. Do not let the plants flower too soon, but pinch off the first appearing bloom, and pinch out the eyes of all straggling branches, which will immediately throw out side-shoots, thus forming very healthy and strong as well as good-shaped plants. Give preference to those plants which have their branches close to the surface of the soil. They must have a season of rest during the summer, if they are expected to bloom in winter. Keep the plants in pots out of doors, under the shade of some tree, till September, and water sparingly. In the beginning of September shake the soil from the roots, replant them in rich, sandy loam, and bring them for-

ward to the sun and air; place them in a sunny window, indoors, when there is danger of frost, and when they begin to grow give them an occasional watering with liquid manure.—*Scarlet Geraniums.* Require a light rich soil of loam, leaf mold, and rotted manure and sand. They root readily without glass or bottom heat. —*New Life Geranium.* Each flower on the whole truss is of a beautiful vermillion color striped irregularly with white, but very often the same bunch or truss will be composed of striped flowers, solid red ones, and of flowers of a beautiful salmon color; some of them are often half red and half salmon. It makes a good winter blooming geranium, and any one can increase their number of plants by taking slips and rooting them in sandy soil or water.—*Lady Washington Geranium.* The flowers are large, with deep blotches on the upper petals, and bright spots on the lower. While in bloom during the months of May and June, they are very beautiful and ornamental, either as pot plants or in the garden.

GLADIOLUS (Corn Flag).—Magnificent plants, with sword-like leaves, and long spikes of flowers, of every conceivable color and shade. The plant and flower are from a bulb, which requires 2 or 3 years to produce from seed of sufficient size to flower well. The *Cleopatra* and *Marguerita* are said to be the finest varieties. The one is a fine fresh rose color tinted with lilac with large and effective flowers and broad shaded lines, and the spikes are unusually long; the other is an enormous flower, white, rose and cerise with dark carmine spots and beautiful, softly-shaded throat. Each of these has upward of 20 flowers to each spike. Sow in the open ground (thickly) as soon as the ground is warm in the spring, pressing the seed down 1 in. or so. By planting at intervals, from May first to middle of June, a succession of flowers can be had from July to October. Weeding must be carefully done, or the tiny plants will soon be choked up. If carefully tended they will have formed small bulbs by fall, which must be lifted when ripe and kept under cover like onions or potatoes, to be planted out again the next season.

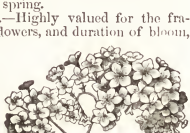
GLOBE AMARANTH (Gomphrena). — A well-known flower, shaped like a clover blossom, purple, white, or flesh-colored. Seed had better be started in hot-bed if possible; transplant to 1 ft. apart. It grows 18 to 24 in. high; fine for garden, as well as for drying; pick for drying only when flower is fully developed.

GLOXINIA. — A choice hot-house, bulbous-rooted plant, producing in great profusion its bell-shaped flowers, of the richest and most beautiful colors, during the summer months. They thrive best in an equal mixture of peat, loam and sand. Sow in March, on the surface, in a warm, moist atmosphere. When the second leaf appears, transplant into shallow pots to grow through summer. Allow them to rest through autumn, and keep in same pots through winter, giving little water. In spring, repot and water freely. They will blossom the second season; bulbs must be kept warm and dry during the winter.

Gloxinia.

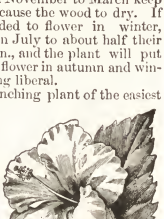
GOLDEN EVERLASTING.—A somewhat peculiar plant, bearing a late, bright yellow flower, which, if taken off before the seed ripens, will retain its brightness for many years. Plant the seed early in the spring.

HELIOTROPE.—Highly valued for the fragrance of their flowers, and duration of bloom, and are to be met with in most gardens. They succeed in any rich, light soil, and cuttings of the shrubby kinds, taken off while young, strike readily. It is a half hardy perennial, 1 ft. high. Plant in March, and water as often as the soil becomes dry, but not till then, giving good supplies. From November to March keep dry, but not so as to cause the wood to dry. If the plants are intended to flower in winter, shorten the shoots in July to about half their length, or to 3 or 4 in., and the plant will put out fresh shoots and flower in autumn and winter, the watering being liberal.



Heliotrope.

HIBISCUS.—A branching plant of the easiest culture, with rather pretty foliage, and large blossoms which are exceedingly showy. It continues to bloom from June till Oct. The seed should be planted early, and the plants thinned to 1 ft. apart each way. If grown in pots will flower well in the house during winter.



Hibiscus.

HOLLYHOCK. — A hardy, perennial plant, showy for a shrubbery. There are several varieties—the single, double, white, red, yellow, dark, etc. Plant the seed in spring; when the leaves are 2 or 3 in. across, transfer the plants to their permanent beds. Hollyhocks serve admirably to crown a knoll, or to form a background, with other stately plants. A bed of pure whites is one of the most charming sights ever seen on a lawn. The latter part of August, in the second year, is the time they should receive careful attention. The stalk should be cut down and the roots carefully divided with a sharp knife; plant them out in a warm, light soil. In this way plants may be kept blooming every year.

HONEYSUCKLE. — This blooms in clusters. There are several varieties. It may be propagated by seeds or cuttings, but best by layers; put into the ground in spring and treat like other wood cuttings.

Hollyhock.

HYACINTH. — A bulbous-rooted perennial plant. It is an early, beautiful, and fragrant flower, and will bloom in glasses filled with water, in a room. If the bulbs show a disinclination to throw out roots, they may be planted for a few days in earth to coax them forward. But they must not remain long there, or the roots will spread laterally, so that they cannot afterwards be forced into a glass. The water should be changed once, and, as soon as the flower has protruded, twice a week. When the water is changed, do not draw the roots out of the glass, but tilt the bulb a little on one side, and so pour the water out and in. If the bulbs are inclined to become soft and putrefy, add a teaspoonful of powdered charcoal, and change it every alternate day. For spring flowering, hyacinths should be planted outside in September, October or November. Plant 3 or 4 in. below the surface of the soil in ground that is well drained, and not likely to thaw and freeze often; give a good covering of leaves before winter sets in. The flowers can be cut freely without injury to the bulb. When the leaves begin to turn yellow after flowering, the bulbs may be taken up, dried and packed away in paper bags or boxes for planting again in the fall. It requires a light but rich soil, sandy loam, well dressed, and mixed with thoroughly rotted manure; but if the soil is not sandy, add $\frac{1}{3}$ of silver sand. The soil for a hyacinth bed must be deeply dug, well mixed and turned over.

Honeysuckle.

HYACINTH BEAN (Dolichos).—A twining evergreen plant, with pea-shaped flowers, purplish red; requires to have the shoots well thinned out in summer after flowering, removing the old and weak growths. Water should be abundantly given, with occasional supplies of liquid manure. Soil 2 parts fibrous loam and 1 part leaf soil; good drainage, and frequent syringing in summer so as to keep down red spider. In winter keep the plant rather dry, but not too much so, otherwise the aftergrowth will be enfeebled. Propagation is best effected by seed sown in spring in a hot-bed, or cuttings of the young side shoots after they become rather hard, in sandy soil, under a glass, affording slight bottom heat.

HYDRANGEA.—A plant much esteemed for its great profusion of elegant rose colored flowers, which under certain circumstances of culture become blue. If grown in brown loam with a little sand, they will preserve their original color; but if grown in swamp earth with a little mold of decayed leaves, they will become blue. It must have a plentiful supply of water when in flower, and be kept in the shade. It is a house plant—will bear some frost, but should be kept, during the winter, in a greenhouse, parlor, or a cellar where there is some light. Propagate by cuttings.

ICE PLANT (Mesembryanthemum). — This is a handsome and curious plant for hanging baskets, rock work, vases, and edgings. The leaves and stems are succulent and fleshy, and appear as though covered with ice crystals, and look like rock candy. The whole plant is peculiarly brilliant in the sunshine. The flower is white, and not conspicuous. Succeeds best in dry, sandy loam, and in a warm situation. Can be grown in pots or open border, the former having preference. Plant the seeds in spring.

IRIS (Flowering Flag). — A hardy perennial plant, comprising many varieties, both large and small; raised by dividing the roots. There are many very useful for borders or rockwork, as their stiff, spear-like leaves contrast agreeably with plants of different habits.

IVY.—A creeping plant with a long branched stem; proper time for trimming is in May. English ivy will succeed better in dry, warm rooms than almost any other plant, and requires very little care. Good, rich loam and plenty of water are all that is required; move the pot as little as possible; once a week wipe off all the leaves carefully with a large wet sponge, fastened to a long stick. As the ivy does not require sunlight it can be grown anywhere, and makes a charming frame-work for doors, windows and pictures. It requires to be watered often, yet the water must not be allowed to stand about the roots. There are varieties with golden and silver variegated leaves; others with lobed, or palmate or heart-shaped leaves.

JASMINE, or JESSAMINE. — A favorite genus of shrubs, for the exquisite fragrance of its flowers, which are white and sweet-scented. Plant in soil 2 parts fibrous loam, and 1 part each of leaf soil and sandy peat. It requires free watering in summer, and to be kept rather dry in winter. It flowers

Jasmine.

early in summer, after which the flower stalks should be cut off, and the old wood thinned out or cut back, encouraging growth by frequent sprinklings overhead. Propagated by cuttings of the half-ripened shoots in summer, in sandy soil, under a glass, in a hot-bed.

LARKSPUR (Delphinum).— An annual plant, blooming from May to September. The leaves are much divided; the flowers are blue, purple, red, white and yellow, with various shades. Sow in autumn or very early spring; thin to 18 in. apart. It prefers a rich soil, plenty of moisture and a little shade. When the plants become large, divide and plant in fresh soil.

LEAD-WORT (Plumbago.)—Flowers are pale blue, produced at the end of summer (August, and later). Its flowers are very fine, but the plant is of straggling growth, for which there is no remedy except stopping, but if that be resorted to after June the flowers will be few. The plant should be cut in rather closely in February, keeping it rather dry for about a fortnight, and then encourage growth by copious waterings and free syringings. A good growth being made, water sparingly, and this check will generally induce flowering. After November keep it dry. Soil, turfy loam 2 parts, 1 part leaf soil, and 1 part sandy peat, with a free admixture of sharp sand, and good drainage. Propagated by cuttings.

LILAC.—A large shrubby tree, hardy, and handsome when in bloom, having large bunches of fragrant flowers. The white and purple may be easily grafted or inoculated into each other, and when the shrub, with a handsome head, is thus managed, some branches producing purple and others white flowers, the show is very fine. It is raised from suckers, of which it sends out a great many, but from which it should be freed as much as possible.—The *Persian* lilac is a neater shrub, bearing delicate white flowers. It is propagated by suckers.—The *Chinese* lilac has much darker flowers than the other varieties and its leaves are dark glossy green.

LILIES.—Autumn is the most favorable time for procuring and planting. The lily does not always flower the first season after being transplanted, but the chances of flowering are much greater if planted in the fall than if removed in the spring. Make the soil deep—say 2 ft.—and in its components put either a lot of well-rotted barnyard manure, or fresh, rich, loamy soil.

Japan Lily.

Lilies, in deep, rich soil, will grow from 5 to 7 ft. high, and give from 7 to 15 flowers on a stalk, while in shallow soil they will only reach 2 ft., 6 in. high, and give 3 to 5 flowers on a stalk. —*Calla Lily* has large wax like flowers, deep green leaves. In spring after frost, set out in the garden, giving plenty of water during the summer and repot in the fall.—The *Japan Lily* has flowers from 10 to 12 in. across, composed of 6 delicate, white, ivory-like petals, each being thickly studded with rich chocolate crimson spots, and having a bright golden band through the centre of each petal, with an exquisite vanilla-like perfume. As the bulbs acquire age and strength, the flowers obtain their maximum size and number. Upwards of 12 flowers have been produced on a stem. It is perfectly hardy in dry soils; also admirably adapted for pot culture.—*The Valley* is a sweet little plant, thriving in any common soil; it will do well in any shaded situation, where few other plants will thrive; can be multiplied by dividing the roots, or by seed.—*Tiger Lily* grows 4 or 5 ft. high, producing gaudy spotted flowers.—*Water Lilies* can be grown in any swampy piece of ground, and even in tubs of water sunk in the ground, or on the surface, and even in aquariums in the house. For ponds, if a soft, muddy bottom, tie the root close to a stone large enough to sink it, and drop it in near the shore in 2 or 3 ft. of water, as the bloom is much better in shallow water. If a hard bottom, dig a small hole and cover it lightly. For tubs, take any strong barrel free from oil, tar or salt (molasses barrels are best); saw in two, put in 6 or 8 in. of fine loam or pond mud, if handy; lay in the roots, being careful to straighten out the small fibers, and cover 2 in. deep; fill the tub gently with water and keep full. This is all the care they need; paint the outside of tubs to suit fancy, and set on a brick or plank platform in any locality you may desire. These tubs should be put in a cellar in the winter, to keep from freezing; fill with water when put away, and they will come out all right in the spring. In warm climates, where the surface of the water will not freeze more than 1 in. or 2, they can remain out of doors the year round.—*Pink Water Lilies* are one of the specialties of Boston culture. Their habits are similar to the white, from which they vary only in color, greater intensity of odor, in being of larger size and remaining longer in blossom.

LOBELIA.—A very interesting genus of flowering plants, alike pleasing to the eye, and useful to the pharmaceutist. Varieties are blue, white, scarlet, pink, and purple blue. The greenhouse, hot-house, shrubby and herbaceous kinds, grow well in a mixture of peat and sand; the shrubby kinds being readily increased by cuttings, and the herbaceous species by division as well as by seeds. The hardy, herbaceous varieties flourish in a light, rich earth; but in the cold weather of the winter season, most of them require the protection of a frame. The greenhouse annuals and biennials must be sown in pots; but those of the hardier plants may be sown in the open border. To propagate lobelias the first bloom should be picked off, and the branches as they extend should be pegged down closely to the surface of the mold. The branches will then take root as they lengthen, and by thus drawing a large amount of sustenance from the soil, they will bloom very freely and cover a large space.

LYCHNIS.—Deservedly popular for the brilliancy of their flowers and ease of culture. The flowers are produced in clusters, and are constantly coming out all summer. Sow the seed in spring, in rich loamy soil, and the following

spring transplant to the border, one foot apart; flowers the second season; hardy perennials; 1 to 3 ft. high.

Lychnis.

MADEIRA VINE.—A beautiful, thrifty climber, with thick, glossy, light green, almost transparent leaves; grows 12 to 20 feet in a season; does equally well in house or out-doors. Bears a small, white fragrant flower in autumn. Plant the tuber where it is to grow, in spring in a warm sheltered place; grows very rapidly on strings; dig tubers and store in the cellar over winter. They are excellent for house climbers.

MAGNOLIA.—A very elegant and showy plant when in flower, and one which deserves extensive cultivation. Being a remarkably handsome shrub, it should be planted in a conspicuous situation, where it will bear a profusion of flowers when it attains a good size. The *Chinese Magnolia* has large pure white flowers, which expand in spring before the leaf buds burst, and the effect produced by large bushes or trees 30 ft. high with, perhaps, 500 white flowers on, may readily be believed to be grand.

MARIGOLD (Calendula).—Tall coarse plants often more than 2 ft. in height. Flowers large, double, in color yellow, orange and brown. There are several dwarf varieties, growing only about 1 ft. in height; easily cultivated and makes a good show. They need a light rather poor soil and plenty of sun. Sow from April till June; when 3 in. high thin or transplant, and in the following May or June they will be in full bloom.

Marigold.

MARSHMALLOW.—A beautiful shrub, requiring a warm and sheltered situation in the Northern States. It is raised from seed or suckers. There are several sorts, as to colors. They should be mixed to make a variety. Save the seed in November or December, and sow in the spring. Seeds produce the handsomest shrub.

MIGNONETTE.—An old and universal favorite; emits a pleasant odor from its flowers. It is usually an annual, but, by greenhouse cultivation and constant pruning, it may be rendered perennial, and even shrubby. Seeds may be sown in all seasons, so as to produce flowers in succession. To obtain a tree mignonette take a vigorous plant of mignonette sown in April, and place it in a flower-pot by itself. As soon as the blossom-buds appear, they must be carefully picked off, and in autumn all the lower side shoots should be removed; cut off so as to shape the plant into a miniature tree; then transplant into a larger pot, with fresh soil formed of turfy loam, broken up very fine, and mixed with sand. When this has been done, remove to a greenhouse, or warm room, and water it regularly every day. It will thus be kept in a growing state during the whole of the winter, and its stem will then begin to appear woody in the spring; treat it in the same manner the following year. Carefully cut off the side branches as soon as they appear, leaving only those that are to form the head of the tree, and by the third spring it will have bark on its tree, and become a complete shrub; then allow it to blossom, and its flowers, which will be exquisitely sweet, will continue to be produced every summer in succession for several years.

MIMULUS.—Beautiful, tender-looking plants, with almost transparent branches. Comprises numerous varieties with white, sulphur and yellow grounds, spotted crimson, scarlet and pink. They luxuriate in damp, shady situations and freely bloom in the early summer months. Culture required about the same as that given for the Aster.

Mimulus.

MOCK ORANGE (Syringa).—A shrub, bearing flowers quite similar to those of the orange, and making a very pleasing appearance when growing with other shrubbery. Propagated by suckers.

MOMORDICA. — A curious annual climber with yellow blossoms, and foliage similar to the Canary Bird Flower. The fruit is the chief curiosity, is egg and pear shaped, and covered with warty excrescences, and when ripe bursts suddenly open, scattering its seeds and showing a brilliant carmine interior. Fine for trellises, fences, stumps, etc.

Momordica.

MORNING GLORY (Convolvulus).—The oldest and best annual climber known; endless in variety and easily cultivated. Sow the seed early in the spring, and provide strings when young.—*Convolvulus Minor*, or *Dwarf Morning Glory*, is a plant of trailing branching habit, occupying a space of 2 feet. At midday it is completely covered with a mass of most brilliant many colored blossoms, which remain open till evening in dry weather. The colors are pure white, blue, passing into white, yellow, red, purple, etc. Will do well in any common garden soil. Thin to 3 ft. apart each way.

MOURNING BRIDE (Scabiosa). — Handsome flowers in hemispherical heads on long stems; of exceeding sweetness, and sometimes called sweet scabious. The colors are deep and light purple, scarlet, white, and dark mulberry red; some of the dark shades are tipped with white. With proper protection of the roots they will bloom

2 or 3 years. Very useful for bouquets, as their long stems work easily, and their striking colors, as well as fragrance, are desirable. Plant in hotbed, and transplant 1½ ft apart.

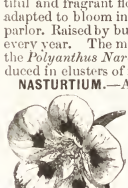
MOSS (Portulaca).—A hardy annual; flowers are both single and double, and are white, orange, yellow, crimson, red striped and pink. Double varieties look like roses and are very handsome. Once make a good bed for this plant and the work is done for years; only keep out the weeds, and give a light top-dressing of manure every autumn. The ground must be warm before planting seed, or else it will not germinate. The first of June is early enough to plant in the open ground.

MUSK PLANT (Nycterinia).—Small half-hardy annuals, about 8 inches in height, with sweet-scented, star-shaped flowers, and during the evening are very fragrant. They produce richer, larger, and more blossoms in light soil. Start in hotbed, and transplant 6 in. apart. They will blossom very early in spring and remain in bloom the whole season.

MYRTLE (Myrtus).—An evergreen vine including several species bearing a pretty blue flower. A favorite plant for ornamental purposes. Prune if needed, after flowering, to form a good plant, and repot in spring before it begins to grow. If much cutting be needed to bring them into form, it should be done in March or April, keeping rather dry until the plants are breaking afresh; and having shoots 1 or 2 in. long, repot, removing most of the old soil and place in the same size pot; succeeds best in sandy loam 2 parts, 1 part each sandy peat and leaf soil, and ⅛ of silver sand.

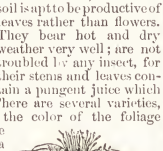
NARCISSUS.—A bulbous rooted plant, managed like the hyacinth. It bears an early, beautiful and fragrant flower. It is hardy, and well adapted to bloom in a pot in the greenhouse or parlor. Raised by bulbous offsets, which increase every year. The most beautiful of the family is the *Polyanthus Narcissus*. The flowers are produced in clusters of from 6 to 18.

NASTURTIUM.—A half hardy annual, requiring but little care. Seed sown in the spring of the year in any fair garden soil will produce plants 10 or 12 ft. in height before autumn. They do not require even a rich soil, for a rich soil is apt to be productive of leaves rather than flowers. They bear hot and dry weather very well; are not troubled by any insect, for their stems and leaves contain a pungent juice which they do not like. There are several varieties, differing as well in the color of the foliage as in the flowers. The leaves of some are a very light transparent green, while in others they are very dark, almost purplish.



Nasturtium.

NIGELLA. — Sometimes called *Love-in-a-Mist*, or *Devil-in-a-Bush*. Hardy annuals with odd showy flowers and finely cut leaves. Sow the seed in spring in open ground.



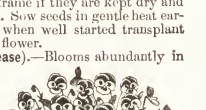
Nigella.

NOLANA. — Beautiful trailing plants, with prostrate stems, much branched; almost equal to the portulaca for growing in masses, and unsurpassed for rock work, pots, baskets, or vases, as the branches hang pendulous over the edge of vase or basket. The blossoms are convolvulus shaped, brilliant, freely produced, of various colors. Sow in open ground, in light, sandy soil, early in spring; plenty of sun, and a dry situation are essential.

OLEANDER (Nerium).—A noble-looking, evergreen shrub, easily cultivated and flowering freely during the greater part of the year. It prefers a fine, mellow, turfy loam and peat, with a little sand, and to be abundantly supplied with water when in bloom. The best way to root them is in a bottle of rain water set in the window. The cuttings should be no deeper in the water than half way up to the second joint, and when the rootlets get to be ½ in. long, carefully pot in rich sandy loam. After the plant blooms, cut back to within 1 ft. or 15 in. of the ground, when three branches will come out; let them grow until it again blossoms, after which cut them all back about 6 in. from the main stalk, and every time it blooms repeat cutting back, and in a few years a very beautiful plant will be the result.

OXALIS.—Pretty herbaceous plants with rich, rose colored blossoms. They thrive well in a mixture of loam and sand; they should not be watered after they have done flowering, until they begin to grow afresh. They are desirable for greenhouse decoration, rock work or baskets out of doors. The plants can be wintered successfully in cold frame if they are kept dry and the frost excluded. Sow seeds in gentle heat early in spring and when well started transplant where they are to flower.

PANSY (Heartsease).—Blooms abundantly in all colors, and is among the first to bloom in the spring. Seed may be sown in open ground in spring or summer, or in a hotbed early in the spring. Young plants produce the largest and best flowers. The plants should always occupy a cool, partially shaded situation, and the ground cannot be too rich; coolness and moisture are necessary. Transplant when 1 in. high. Seed sown in July will blossom late in autumn; if sown in October, will bloom the following spring.



Pansies.

Passion Flower

PASSION FLOWER. — A beautiful and celebrated flower, growing on a perennial vine; the name originating from the large cross in

the middle of the flower, surrounded by appendages resembling a glory. The plant has a succession of flowers for a long time. It is tender, suitable for the greenhouse, but will not endure a northern winter in open ground. It is best raised from cuttings. *Passiflora cerulea*, a species with white and fine flowers, is hardy. *Passiflora Colvillii*, with variegated flowers, and *Passiflora glaucophylla*, having blue flowers, are also hardy varieties.

PEA, FLOWERING.—Flowers ranging in color from white to deep purple. Plant the seed 4 in. deep, early in the spring. It thrives in a moist soil; in rich soil it will grow 5 ft. high.

Flowering Pea.

PEONY. — A perennial plant, bearing a gorgeous but short lived flower. There are several species that are perfectly hardy, and will succeed in any ground, unless water lies on the surface or near the roots in winter. They may be planted in the autumn or spring, and are increased by division of the roots. These divisions should be made either in the autumn, or very early in the spring, and not until the plant becomes large. In Southern countries the peony grows well, but the buds often blast unless grown in partial shade, and liberally supplied with water.

PETUNIA.—The varieties are many. From pure white the flowers shade into pink, some with white throats, and others with white edges, crimson, and a deep rich purple. The plants begin to blossom when quite young, and are never without flowers from that time till cold weather comes. They spread rapidly, often forming clumps 4 ft. across, with dozens of stems sent up from one root, each seam branching freely. The plants form more compact masses, and produce more and better flowers if the ends are cut off. Seed may be sown either in the open ground or earlier in a frame or in boxes in the house. When the plants are transplanted to the bed where they are to bloom, they should be set at least 18 in. apart in order that they may become fully developed. They should never be mixed in beds with other flowers if the best effect would be obtained from them. Sandy soil is the natural home of the petunia, but it takes kindly to richer food, and its colors are brighter, its flowers larger, if it is occasionally treated to a little soluble guano or very weak liquid manure. The single varieties seed plentifully and when hybridized with the double varieties produce many new varieties. But the quickest way to grow double petunias is by cuttings, which should be taken from fresh shoots when they break easily from the plant, and single varieties can be propagated in the season. Take the slip off just below a joint, and remove the lower leaves; then set the shoot firmly into wet sand; do not let more than 4 leaves remain upon the slip, and nip off all incipient buds so as to make 2 shoots grow from the top; keep it shaded from the sun for 3 or 4 days; as soon as the rootlets are well developed take it from the sand and plant, either in the border or in a pot where it will bloom all winter.

PHLOX DRUMMONDII.—These flowers are of extreme beauty, and are greatly admired by all; their long duration in bloom, combined with their almost unequaled richness of color, renders them of invaluable service in the general flower garden. The colors range from the purest white to the deepest blood purple or crimson. Seed may be sown in the open ground in May or in hot-bed or cold frame earlier, or it may be planted in the autumn, but it must be sown so late that the seed will not start in the fall, for the plants will not bear frost. Early spring is generally the best for sowing. In a good rich soil it will grow 18 in. or more in height. Set the plants 1 foot apart.

Phlox Drummondii.

PINK. — A well known perennial plant, fragrant, and embracing many varieties; easily grown by seeds, layers, etc. The beds require shelter in winter, plenty of good manure and frequent stirring in spring. Sow the seed in April; transplant seedlings in June, and have them tolerably strong before the autumn; protect through the winter with hoops and mats, or some other cheap covering. The time for obtaining cuttings depends upon the growth of the plant. As soon as the side-shoots are long enough, they may be taken off and planted. This generally happens about the end of May, or beginning of June. The earlier it can be done the better plants the pipings will make, and the finer they will flower the following season. The Carnation comes into flower about the end of May or the beginning of June and lasts about 1 month or 6 weeks. If sown it does not blow till the second year and is usually propagated by layers. While it is in flower it sends out several side shoots near the root; these are pinned down in August, a little under the earth, leaving the extreme part erect; in a little time they take root, and the new plant must be severed from the old and transplanted. They are rather tender as to frost, and must be covered in the Northern states, to live through the winter; put them into large pots, and keep them in a greenhouse or parlor, or in some place where they can have air and light during winter. *Clove-Scented Carnations* are hardy and charming. The fragrance is delicious. The plants may be kept for years by covering lightly in the winter; but it is best to keep a constant supply of new plants on hand.

POMEGRANATE.—Deciduous shrubs, flowering in summer. Keep dry in winter, and give a light, airy position, and near the glass, repotting in spring after pruning, leaving a majority of the twiggy shoots; keep under rather than over potted; water freely when growing, encourag-

ing growth with a moist atmosphere, and frequent sprinklings overhead. The soil should be sandy loam 3 parts, 1 part leaf soil, and a free admixture of sand; drainage good; cuttings of firm shoots, in gentle heat, are best for propagation; the best plants are those grafted, as it dwarfs them, and they flower more freely and longer. Plants should be removed to the cellar in the fall, and remain dormant until spring.

Pomegranate.

POPPY (Papaver).—An annual plant, admired for its great variety in size and in flower. The double are very showy, but of short duration. The plant grows 3 or 4 ft. high. Sow the seed in open ground; will bloom the first year from seed if sown early; will not bear transplanting well.—The *Oriental* has an intense scarlet flower with blackish or purplish blotch at the base of the petals, and is often 6 in. in diameter.

POPPY, PRICKLY (Argemone). — A curious, free-flowering plant, with large, poppy-like flowers, succeeding well in common garden soils. The leaves resemble those of the thistle, and are of a bluish-green color, with white veins. The plants grow about 2 ft. in height, and make very good low screens or hedges, for which purpose set the plants about 10 in. apart in rows. The foliage is large, pretty in form, and of a pleasant light green color.

PRIMROSE, CHINESE (Primula).—This has pink flowers and blooms almost constantly during winter and spring. Sow the seed in May of each year, in a box or pan, covering lightly, and place in a cold frame. When 2 leaves have formed, transplant into pots having good drainage. Set out the plants during June, in a cool, shady border, where they will continue to blossom nearly all summer. A compost between rich light loam and peat soil is most suitable. The leaves should not be wet in watering.

PRIMROSE, EVENING (Oenothera). — Produces large, showy blossoms, which are fully expanded only towards and during evening. The blossoms are 3 to 4 in. across, usually yellow or white, and very freely and constantly produced. They all do better if seed be started in hot-bed, and the plants transplanted.

ROSES.—Four things are absolutely essential in high rose culture—a rich and deep soil, judicious pruning, freedom from insects, and watering when requisite. They thrive best in a mixture of well rotted manure, sand and garden loam. To raise them in perfection feed well and place them in the full sunlight, and not where they will be shaded by trees and shrubs. After they have bloomed prune them closely, also when they commence to leaf out in early spring. Roses designed for winter blooming, out in the borders, must be carefully supplied with water during the hot or dry days. If allowed to wilt, the white working roots are dried up, and new ones must be formed before the plant will recover. All roses may be propagated from seed; but as the seed seldom comes up until the second year, the usual mode of propagation of all sorts, except the *China* rose, is by suckers. These come out near old stems, during the summer; they are dug up in the fall and planted out. In the spring they are cut down near to the ground, and the next year they blow. Choice roses may be propagated from the slip by rooting them in water and then transferring them to small pots where they can remain until large enough to take their permanent places. The water should be put in black or dark-green bottles, and a little raw cotton wrapped around the slip. The water need not be changed except occasionally, but the bottles must always be kept filled up to the neck. The best season for taking rose slips is in June, just after the profuse bloom of early summer is over. Choose from a good vigorous branch of last year's growth a fresh shoot, containing two or three buds, such as will always be found more or less swollen at the base of the leaf stems; cut the slip from the parent branch diagonally, with a smooth, clean cut that will bring off a little of the old bark as well, in order to make the condition as favorable as possible for the formation of roots; have ready a box or pot of rich mold; with a round, pointed stick make a hole several inches deep, and fill it up with clean sand; insert the end of the slip in this sand to the depth of 1 or 2 inches; be sure to make it firm in the soil; the sand acts as a percolator for moisture, and the slip may be kept well watered; do not remove to a permanent place until it has put out several sets of new leaves. From the last of June to the last of August is the best time for budding roses, as the bark can then be more easily raised from the wood. Take a smooth stalk and make a horizontal cut across the bark through to the wood, but not into it; from the centre of this cross cut make another cut straight down the stem, an inch or more in length; (these 2 cuts should resemble a T); slice off the bud you desire to propagate with 1 cut of the penknife, cutting it close to the main stalk; then, with the edge of the spud, turn back the bark on each side of the straight cut and insert the bud on the wood of the branch to be budded, fitting it tightly to the crossed cut; with a bit of soft yarn bind down the bark, leaving the point of the bud exposed; then bind a handful of dampened moss round the stem, taking care to leave the tiny point of the bud exposed to the air. In six weeks the wrappings can be removed, but all other shoots must be kept from growing on the budded branch. By this means a rose-bush can be made to bear half a dozen different colored roses. Mulching roses in pots to force flowers for the holidays with common moss mixed with a good portion of bone dust, say 1 part bone dust to 30 of moss, has a wonderful effect in bringing forth early roses. In two weeks after the mulch is first ap-

plant a change will clearly be seen, and by the end of May the plants will attain from 4 to 6 ft. in height. They may be protected during the winter, except in the extreme north, by being bent to the ground and a covering of 6 in. of leaves or straw (leaves are best) thrown over them, and a little brush on this to keep them from blowing off. Defer covering for winter until cold weather fairly sets in, as moderate freezing will not injure them. To prevent mildew on roses see *Mildew* in PESTS. The following are the principal classes of roses: *Banksian.* Nearly evergreen, requiring a warm wall and dry border. They should be trained with long shoots, to bloom on the short branches these shoots make, and will then flower very freely and beautifully. The older they are the more flowers they will produce. Any long, strong, extra shoots they may produce, that are not wanted, should be cut away towards the end of June. — *Bourbon.* Not quite as hardy as the *Hybrid Perpetual Roses*; require a slight protection. They are constant bloomers, of vigorous, rapid growth and rich foliage. The last of summer and autumn is the season of their greatest beauty. — *China* (*Bengal*). Dwarf growers, blooming freely and constantly throughout the summer and autumn, making fine plants for pot culture, and for bedding out in flower garden. They can be protected through the winter by a covering of leaves, or removed to the cold frame. — *Climbing Hardy.* Very gorgeous, of rapid, vigorous growth, blooming in large clusters. They are admirably adapted to cover arbors, walls and any unsightly objects, and are always ornamental in every situation. To prune them rightly, thin out the branches severely, but do not shorten much those you leave. — *Evergreen.* These bloom in very large clusters of from 10 to 50 flowers in each. They retain their fine shining foliage the most of the winter; are free growers, and very hardy. They form beautiful weeping heads if on tall standards. Prune them so as to leave the largest previous year's shoots, which will flower in the extreme ends. — *Hybrid Perpetual.* These are entirely hardy. The flowers are of immense size, often 5 to 6 in. in diameter, and of the most beautiful colors, from pure white to the darkest shade of crimson. They flower freely in June and at short intervals during the summer and fall. They are of easy culture, not requiring but benefited by protection at their roots with a mulch of leaves or evergreen boughs during winter. They thrive well in any rich soil. In the spring, cut them back pretty close, and they will send up new shoots, which will make a very strong growth and give abundance of bloom. — *Many Flowered.* The varieties are rather tender, requiring a warm, sheltered situation, and a very gentle use of the knife in pruning. "The seven sisters," is a splendid variety when it has proper treatment. — *Monthly or Everblooming.* These are undoubtedly the most satisfactory, as they bloom continuously from the time they are set out until frost. They are not hardy, north of Maryland, requiring a good covering of straw or leaves, which should be put on about December. This should not be removed until all danger of severe frost is over in the spring. They should then be cut well back, which keeps the plants in good shape and induces stronger shoots. — *Moss.* This class, most beautiful in bud or flower, to succeed well, requires high cultivation in rich loam, and will fully repay this care by their beautiful mossy buds. They require but little pruning, and are perfectly hardy. — *Noisette or Climbing Monthly.* Bloom generally in large clusters throughout the summer and autumn. They are free growers, and fragrant. In a mild climate they become magnificent climbers. — *Tea.* These are celebrated for their peculiar and delightful fragrance, and the delicacy of their coloring. In this class are found the greater part of the roses that are called everblooming; in color they range from the purest white to bright crimson.

SENSITIVE PLANT (Mimosa).—An interesting and curious plant, with globular heads of pink flowers, well known for the extreme irritability of its leaves and foot stalks, which close and droop at the slightest touch, or in cloudy, damp weather, and during the night. The plant is most irritable in the greatest heat, and if the upper branches be touched and droop, touching the lower ones, the whole plant will appear as if wilted and dying. Start in hot-bed, in pots, and transplant into a warm situation, 6 in. apart. A plant or two reserved for the house will afford a good deal of pleasure during the winter. Start a young plant in a pot, and the pot in the earth to the rim, removing to the house in autumn.

SHELL FLOWER (Molucca Balm).—A strong annual, 2 to 3 feet in height, having but few leaves, but such numerous branches that its width is often as great as its height. Within the calyx a button shaped bud appears, which unfolds into a shell shaped flower of a white and purple color. Sow in hot-bed in spring, and about the end of May transplant into dry, warm border, where it will flower freely.

SMILAX.—In cut flowers and for wreaths, etc., this is indispensable. Soak the seed in warm water for 12 hours; plant in pots in February, and keep in a warm, moist place. One plant in a 2 in. pot is enough. After they have completed their growth and the foliage begins to turn yellow, withhold water until August, when the little bulb can be repotted and watered freely, and it will grow all winter.

SNAP-DRAGON (Antirrhinum).—An old favorite border-plant, with dark and glossy leaves, and large, curiously-shaped flowers with finely marked throats. They will blossom the first season from seed sown in spring, but the blossom will be much stronger the second season. When the seedlings have attained 1 or 2 in. in height, plant them 5 in. apart every way, keeping the sorts still separate. If it is desired to have a long season of bloom, cut down the first flowering spikes before the seed is formed; then fresh flower-spikes will push forth from the base of each plant, and there will be a succession of bloom. Succeeds best in a dry, loamy soil.

SNOWBALL.—A well known shrub; attains the height of 8 or 10 ft.; produces its snowy

white flowers in large balls or masses in June.

SNOWDROP. — Blossoms in February or March, the flowers being white, drooping, and having their inner segments of a greenish color. Should be planted in masses, about 2 in. apart, and about the same depth.

Snowdrop.

SUN DIAL (Lupinus).—Pea shaped flowers in long spikes; leaves compound and very pretty. Colors white, blue, and variegated. They are hardy, and seed must be sown in the open ground, having a tap root, and not transplanting well. They will bloom a long time if the seed is removed as soon as the pod forms.

Sun Dial.

SUNFLOWER (Helianthus).—Adapted by its stately growth for a back ground to a lawn, or a screen to hide unsightly places. It is also raised as an absorbent of miasma in damp or ill-drained situations, thus preventing fevers. Plant the seed in spring, where desired, and thin to 4 ft. apart in rows. Large quantities of seed are produced by the single varieties, and they are of considerable value for oil as well as feeding.

SWEET ROCKET.—A very hardy perennial, bearing clusters of single flowers, and fragrant during the evening. The best colors are purple and white. The plant, with fair culture, will grow 18 in. in height, and seed will germinate readily in the open ground. Grows freely in any light rich soil; unlike most plants, they do better if transplanted every second season.

SWEET WILLIAM.—A very beautiful class of plants, of extreme richness and diversity of color. The seed can be planted very early in the spring in open ground, and will blossom the following autumn; or it can be sown in August, and will make fine blooming plants for spring. The plants will bloom several years, but young plants bloom better, and seed should be sown every year.

TASSEL FLOWER (Cacalia).—A showy plant of easy culture, producing beautiful scarlet and golden yellow, tassel shaped blossoms, from July to October. It is sometimes known as *Flora's Paint Brush*. Looks best when grown in clusters. Succeeds best in a mixture of fresh loam and leaf mold. Sow seed under glass, if possible, though they do pretty well in a warm bed in the garden; set plants 6 in. apart. They keep in bloom from early summer until autumn, furnishing flowers for cutting every day; particularly valuable for small bouquets.

TEN WEEKS' STOCK.—Comprises those varieties which, being sown in spring, flower during the summer and fall. The *Pyramidal* probably produce more double flowers than any other sort, and its dwarf habit renders it unequaled for bedding-out work. They delight in cool, dewy nights and moist days. To have them bloom early, start in hot-bed, and transplant when small into pots, and turn out in June to open border, planting 12 in. apart. They will blossom late in the season if planted in open ground. They may be sown in pots late in the season for house use.

THOROUGHWORT (Eupatorium). — Winter blooming plants, with clusters of white and blue feathery flowers. Propagated by dividing the roots. The plants should be plunged in the open ground in the summer. When growing freely they should be topped, as they are apt to grow straggling. They will grow in common soil.

TIGER FLOWER.—A very showy Mexican bulb, growing about 18 in. high. Its flowers are 4 in. in diameter, and of the most gorgeous coloring and curious form. In bloom from July to the first of October. The bulbs may be planted any time in May, or the first of June, about 2 in. deep, in any garden soil, and require no particular care. In autumn, after the tops are killed by frost, take up the bulbs and keep them in a dry place away from the frost until the time of planting in the spring.

TRUMPET FLOWER (Datura).—An ornamental genus of plants, many of which possess attractions of the highest order. In large clumps or borders of shrubbery, they produce an excellent effect. The roots can be preserved in a cellar, like dahlia roots. Plants 3 ft. in height; set the plants 3 ft. apart.

Trumpet Flower.

TRUMPET VINE (Bignonia).—Hardy, rapid, strong grower, with glossy foliage, bright red, trumpet-shaped flowers, 3 in. long; blooms in August. This plant is not only an admirable climber, but on the lawn makes a pretty bush if the tops are cut back, having the appearance of a strong, drooping shrub.

Trumpet Vine.

TUBEROSE.—A beautiful pure white, wax like, sweet scented, double flower; stems 3 ft. in height, each with 12 or more flowers. To cultivate the tuberose, pot the bulbs in 6 in. pots, 3 in each, and use a mixture of equal parts turfy loam, peat and leaf mold, and place in the pit. Give very little water at first, and as they commence to grow freely increase it and keep near the glass. When they begin to push up their flower-spikes they will of necessity require to be placed where they will have sufficient space for the proper development of the tall spikes. These will come into bloom from August to October, when they will require a temperature ranging from 60° to 70°, the latter being preferable. The offsets are ready for bloom after one year's growth. In lifting from the bed the large bulbs

which are to bloom next year, throw them in heaps; cut off the leaves, and put in a dry place; if in the greenhouse, let it be near the heating pipes. For early flowering, in January, put 3 bulbs in an 8 in. pot, and place them in a very warm place, behind the stove if possible. They will stand 100° Fahr.; keep the soil dryish until the green leaves start; then use all the water they want and they will come on rapidly; plant outdoors when it becomes warm, for late autumn flowering. Start some in July and August for flowering at Christmas or New Year's. The later ones planted will not need much care, although a little bottom heat will assist in starting them at any season.

Tuberose.

TULIP.—Perfectly hardy, flourishing under very ordinary care, and has a range of brilliant colors. It is desirable even as a single specimen, but when grown in masses the finest effect is produced. A very rich soil is not necessary, though well rotted manure, rotten sods or leaf mold may be applied when the earth is poor. The ground should be well drained before planting. The usual time for planting is October and November. Spade the soil deep and work it mellow; plant the early sorts 5 in. apart, and the late varieties 6 in.; cover 3 in. deep. After they are done flowering in the spring, they can be taken up and planted close in any corner of the garden until it is time to replant again in the fall, or bedding plants can be set between rows, and before they cover the ground the tulip will be ripe enough to be removed. When the plants show flower, protect them by an awning from the midday sun, but still let them have plenty of air. When the seed-pods form they should be removed; and when the leaves die down and turn yellow, it is time to take up the bulbs and carefully dry them. When it is desired to cultivate tulips from the offset, the latter should be broken from the parent bulb about the middle of July, after the drying has taken place. The old bulbs should be stowed away in bags, but the young ones had better be planted before November. The offset bulbs take fully a year to reach maturity. Care should be taken not to bruise the bulbs in any way.

VALERIAN.—A beautiful perennial border plant, bearing large clusters of small, brilliant, scarlet, white, blue and red flowers. It grows 2 to 3 ft. high, and will bear shade and moisture. Sow in the spring, under glass or in open ground, and transplant. An old, standard border-plant, often called Jacob's Ladder, blooms in June; is of easy cultivation, perfectly hardy and may be increased by dividing the roots.

VERBENA.—A beautiful tender annual, varied in color and much used for bedding; those grown from seed usually give much better satisfaction than those from cuttings. Plant in open border in May, or the seed may be sown in February, March and April, in boxes in the house for early bloom, or in hot-beds. Cover about ¼ in. deep and take care to keep the soil moist and warm until they germinate, which will be in about 2 weeks from sowing. Do not set the plants too thickly in the beds, especially seedlings, which should have at least 2 ft. of space, or even more if the soil is rich, as it should be to produce an abundance of fine flowers. In order to keep verbenas in good flowering condition during the season, pick off the seed vessels. When the flower fades the strength of the plant goes to the seeds, and if they are permitted to remain the number of the flowers will become less and less. A soil composed of 2 parts loam, 2 parts well rotted manure and 1 part sand suits them best. Keep the surface soil loose and porous, to allow air to reach the roots, and provide good drainage.

VIOLETS.—This little plant is perennial; the flowers blue, double, and fragrant, blooming early and long. Propagate by dividing the roots. The soil best suited is a sandy loam and peat. Succeeds best in a shady, sheltered place.

VIRGIN'S BOWER (Clematis Virginiana).—One of the most beautiful and hardy climbers; thrives in almost any situation, and produces masses of beautiful flowers and foliage. They are grown in sandy loam, with a little leaf mold, and are best propagated by dividing the roots.

WALL FLOWER.—Very conspicuous in beds and borders, and very useful in making bouquets; deliciously fragrant; perfectly double, and combines many shades of color, the orange, purple and chocolate predominating. Sow the seed early, in hot-bed, and while the plants are small, prick them out into pots, and sink the pots in the earth. On approach of cold weather, remove the pots to the house, and they will bloom all winter. Cuttings ought to be taken in August, and for a time placed under a hand-glass, and as soon as rooted put in a sandy loam or leafy mold. In spring they ought to be planted in open border.

Wallflower.

WATER CRESS.—An annual plant with showy flowers. The seeds are enveloped in fleshy pods, and should be sown very early in spring. Support the plants from the ground by bushy sticks.

WAX PLANT (Hoya).—An evergreen twiner, with dense clusters of wax-like, pinkish-white flowers. It is a first-rate plant for pillars. Water it freely when flowering and growing, but when at rest keep it dry, only do not allow the leaves to shrivel. The plant cannot be kept too dry in winter. Drain extra well, and afford a compost of equal parts of sandy fibrous peat, fibrous light loam, old cow dung, charcoal in lumps from the size of a hazel-nut to that of a walnut, broken bricks, and old lime rubbish, well mixed. Propagate from cuttings of shoots, in sandy open soil, in a hot-bed.

WISTARIA.—One of the most beautiful and

rapid growing of hardy climbers, growing, when well established, in good soil, from 15 to 25 ft. in a season. Frequently blooms both in spring and fall; the pale blue, pea shaped flowers are borne in long, drooping clusters similar in size and shape to a bunch of grapes. It thrives best in a light, rich soil, and should be trained against a south wall or veranda. Seeds should be sown in mellow loam early in the spring; if a greenhouse or hot-bed is available, start in winter, and when plants are 1 ft. high, transplant into situations where they are to remain.

WOODBINE (Virginia Creeper).—This is hardy, very ornamental, of rapid growth, and the foliage is luxuriant and beautiful. It is often made to cover the walls of houses 40 or 50 ft. high, clinging by its tendrils. The flower is reddish green, not showy, but is succeeded by clusters of nearly black berries, at which time the tendrils and stalk turn to a rich crimson color. It is exceedingly ornamental and conspicuous in October, after the first frost. It can be transplanted at almost any time of the year, though early spring is best, since it blooms in April and it would not be desirable to transplant it after the buds have started.

FRUIT CULTURE.

GARDEN FRUITS.

BARBERRY.—There are several varieties, but the common red is the best known. Its color, when fully ripe, is a deep scarlet with a slightly dark tinge. Its fruit, made into a preserve, is relished by some. It forms a beautiful single shrub or hedge, and may be propagated from seeds, from cuttings, by layering, or by budding or grafting. The seeds are best planted in the fall, as, if kept till spring they are apt to become dry and fail to germinate. If propagated by cuttings or layers, the spring is the best time; grafting is seldom done. If the barberry is left to itself, it forms a dense shrub, with many stems; but when cultivated for its fruit, a portion of the shoots should be annually removed to allow the sun and air to more readily reach all parts of the plant, and assist in developing the fruit-buds. It may be trained to a single stem, and when treated in this manner, some of the varieties will form shrubs 10 to 15 ft. high. The fruit will also be larger and more abundant.

BLACKBERRY.—Any rich, deep soil, well plowed, will suit this fruit. Allow plenty of room and set the plants every 4 ft. in rows 8 or 10 ft. wide. The ground should be well cultivated, and the suckers kept down by cutting them between the hoe whenever they appear between the rows. It is best propagated from cuttings of the roots, which, if carefully kept through the winter in damp sand or soil, grow readily and need no special care. The terminal shoots should be pinched off in August, to check the growth. Prune severely once annually, choosing the early spring. Cut the old canes out as near the ground as possible. The bearing canes should be headed back to 4 ft. and the lateral branches to 1ft. Varieties: *Kittatinny.* Large to very large; deep, glossy black; sweet and rich; plant strong, vigorous and very productive. — *New Rochelle*, or *Lawton.* Yields enormous crops of the largest sized berries and keeps in bearing 4 to 6 weeks. — *Taylor's Prolific.* A new variety, said to be perfectly hardy. A very vigorous grower and exceedingly productive; fruit large and of good quality. — *Wilson, Jr.* The fruit is very large, early and of excellent flavor. If unprotected, zero weather will kill it.

CRANBERRY.—These require a subsoil or bottom of peat, or peaty matter; no cold spring, but a head of water, so that the bog may be quickly flowed at all times, to prevent it from the ravages of insects. The turf or top soil of roots, grass, etc., must be removed down to the peat. Ditches must be made so that the water can be drained to at least a foot below the surface during the growing season; especially the cold water from the borders must be drawn off. The surface of the peat, after the soil is removed, must be covered 3 to 12 inches deep, according to the depth of the subsoil, with sand that contains no loam, grass nor weed seeds; such sand as will not adhere when pressed in the hand. Make holes 4 ft. apart, into which plant the sods, or square bunches of the cranberry roots. Planting by cuttings may be resorted to, the vines being passed through a straw cutter, and chopped into pieces about an in. long; they are then sown like oats upon an evenly prepared surface and harrowed in. This must be done early in the spring, and upon moist ground, so that the cuttings will become well rooted before the heat of summer. To grow them from seed requires a long time for the vines to become productive. Great care should be taken in selecting the vines to procure those which yield large berries. The shape of the fruit is of little consequence. There are some varieties that do well on rich uplands, as the Mansfield Creeper. A northern exposure suits them best.

CURRANT.—A strong, rich, deep loam brings the fruit to its highest state of perfection, but it will thrive in a much poorer soil. High cultivation increases the pulp and lessens the seeds. Wood-ashes make the best fertilizer for the currant. In making the currant cuttings, use only the growth of the present year, cutting it into 6 in. lengths. The cuttings should be set quite close together in a sheltered spot about the end of August or the first of September, and about ¾ of their length. A soon as severe cold weather comes on the cuttings should be covered with a mulch, to be removed early in the spring. The permanent planting should be attended to as soon as the ground can be stirred, as the cur-

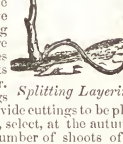
rant buds early. After that keep down all weeds and cultivate thoroughly during the summer. The same autumn or the following spring they may be transplanted into a bed of deep, rich soil, about 4 ft. apart, and receive a mulching about the roots of coarse manure, and the following summer give clean culture, cutting out all the dead wood, etc. Varieties: *Black Naples.* Considered the best of the black varieties, being larger and more prolific. It is not so well suited to a southern clime. — *Fay's Prolific.* Equal in size to a cherry; has very large clusters of a bright red color. — *Lee's Prolific Black.* Large and beautiful; large clusters; hardy, and very productive. — *May's Victoria.* A newly-introduced sort, bearing a large berry, of a brilliant red color. The flavor is very superior, and it is very productive. — *Red Dutch.* An old, well known, thrifty, upright sort; very productive; color red; grows in long clusters. — *Versailles.* Of all reds perhaps the best. It bears well and the fruit remains a long time on the bush. The fruit is larger than the Red Dutch; also more acid, but the flavor is not so curranty. — *White Dutch.* Size large; skin slightly yellowish; flavor mild; quite hardy. A variety much esteemed for dessert. — *Victoria.* Large, bright red, with very long bunches; late, and a good bearer.

GOOSEBERRY.—Cultivated the same as the currant; but while the currant will do under the shade and drip of trees, the gooseberry must have an open, airy situation and northern exposure to avoid the fierce rays of the sun. There are 2 classes of gooseberries, the foreign and native. The foreign varieties seldom succeed, on account of mildew. Only 2 of them can be cultivated for a few years. They are as follows: *Wellington's Glory.* Large, pale yellow, oblong; of fine quality. — *Whitesmith.* Large, white, round, of fine flavor. Native varieties:

Downing.

American Upright. A variety of Houghton's Seedling, but more upright. — *Downing.* Very large, handsome, pale green, and of splendid quality; bush a vigorous grower; very productive, and free from mildew. — *Houghton's Seedling.* Grows very thrifty, and said not to mildew under any circumstances; bears abundantly; though the berry is not so large as some; the fruit is fresh, soft and sweet; skin delicate; color dark. — *Mountain Seedling.* Large, roundish, oval, pale red, thick skinned, medium quality berries; plant a free grower, and very productive.

GRAPE.—Vines are propagated by layers and cuttings. The former is the readier mode. It is accomplished by bending down a vine, or side-shoot of a plant, and burying the middle portion of it in the soil to the depth of 6 in. Roots will strike from the buds of the buried portion. If the shoot is split or cut immediately under a buried bud, the roots will form more rapidly. A slight excavation should be made near the parent plant, in which the layer may be buried and fastened down by a small forked branch. 1 or 2 buds only at the extremity of the layer should be above the ground. Layering should be done before the young wood becomes too hard, if good plants are required the first year.



Splitting Layering.

Propagation by cuttings is the better way. To provide cuttings to be planted at the proper season, select, at the autumnal pruning, a sufficient number of shoots of the preceding summer's growth, such as are well ripened, of a medium size, and moderately short jointed; cut them into convenient lengths of 3 or 4 buds each, cutting square off, close under the lowest bud, and leaving 1 in. of the blank wood for the protection of the terminal bud. Stick these cuttings in the ground, leaving the last bud above the soil, in a warm and sheltered situation, where they will be protected from the severity of the winter. The months of March and April are usually selected for planting out grape vines. Dig the ground deep, but plant shallow. The vines may be set out 8 or 10 ft. apart on almost any good garden soil, spreading out the roots well. Only 1 cane or shoot should be allowed to grow the first season, removing the other buds or shoots when small. The second season cut this cane back to within 2 or 3 ft. of the ground, and allow from 1 to 3 canes to grow. Grapes can be propagated also by means of single eyes, so as to save wood, each eye furnishing a new shoot; cut off the shoot about ½ in. from the eye on each side, so as to leave a cylinder of wood about ½ in. long, with the eye in the centre. In April they are to be laid down, at a depth of 2 or 3 in., in furrows about 6 in. apart, and covered with a little manure, watered in dry weather, and the earth about them occasionally loosened. Grapes grown in a damp, rich, heavy soil are larger, more juicy, and the vines more vigorous and productive than those grown in a porous, dry soil. A deep, loose, red soil, intermixed with rough stones, and a porous subsoil, will produce grapes that will make a wine of the highest excellence and greatest durability. The best exposures are those which slope gently towards the east or south, the northeast or southeast. The southwest or west is the worst exposure, from the action of the winter sun. This is especially the case in the Southwestern states. In pruning the vine, always cut upwards, and in a sloping direction; always leave 1 in. of blank wood above the last bud; leave as few wounds as possible, and let the surface of every cut be perfectly smooth; in cutting out an old branch, prune it even with the parent limb, that the wound may heal quickly; prune so as to obtain the quantity of fruit desired on the smallest number of shoots possible; never prune in frosty weather, nor when frost is expected, but as soon after the first of October as the gathering of the fruit will permit. To graft grape vines, select scions of the present year's growth, and from canes ½ to ⅝ in. in diameter; cut into lengths of 3 in., with a bud near the upper end;

make the lower end into a long, slender wedge; remove the earth about the stock 4 to 6 in.; cut off the vine a few inches below the surface and square off; split it with a chisel or knife, making as smooth a cleft as possible; place the outer edge of the scion even with the outer edge of the wood of the stock; after fitting the scions to the stock, wind a strong cord about the two; pack grafting wax about the stock, entirely covering the wound and the lower end, but leaving the bud uncovered; after the scions have been inserted, invert a flower-pot over them; upon this place a quantity of leaves; cover all with earth, fine sand, powdered charcoal, pine needles, or coffee grounds; early in the spring remove the covering a little back of the bud. Another method, called *inarching*, is as follows: Plant close together 2 plants, 1 each of the variety which is to form the stock, and of the scion; as soon as the young shoots become sufficiently hard and woody to bear the knife, take a shoot from both the stock and scion vine, and at a convenient place, where they may be brought in contact; take a shaving from each of these, on the side next to the other, 2 or 3 in. in length; then fit them snugly together, and wrap securely with some old calico torn in strips; place 1 tie a little below and 1 above the grafted point; tie the united canes to a stake or trellis; look over the grafts after a few weeks; replace such ties which have burst; loosen others which may bind so as to cut the wood; in about 6 or 8 weeks, remove the bandages; leave the grafted portion exposed to the sun; in the fall, cut close below the union of the cane with the stock, which cut close above the connection. Varieties: *Bacchus*. Bunch medium; compact, shouldered; berry below medium, black, with blue bloom; half tender, sprightly, juicy; an excellent wine grape. — *Brighton*. Bunch large, compact and shouldered; berries medium, dark red; skin thin; flesh tender and sweet; vine a vigorous grower and healthy; productive, and ripens early; when fully ripe becomes nearly black. — *Catawba*. Bunches of good size, rather loose; berries large, round; when fully ripe of a dark copper color, with a sweet, rich, musky flavor; requires a long season to arrive at full maturity; excellent both for table and wine. — *Clinton*. Bunches small and compact; berries round, black, pulpy, juicy, of medium quality; valuable for wine and culinary purposes. — *Concord*. A large, purplish black grape, ripening about the middle of September; vine remarkably vigorous and free from disease. — *Delaware*. This is undoubtedly the best table grape, ranking pre-eminently above all others in its pure, rich, sugary, wine-like juice; bunches small, compact, shouldered; berries medium size, fine wine color, translucent; vines hardy, moderately vigorous and very productive; ripens about the 15th of September. — *Duchess*. Bunch medium to large, shouldered; compact; berries medium, pale greenish yellow with a whitish bloom; flesh tender, juicy, sweet, spicy, rich, and of excellent quality, lasting a long time after being gathered; ripens soon after Concord. — *Early Dawn*. An extremely early black grape of superior quality; berry, medium round; flesh tender, juicy, sweet, slightly vinous; ripens a week before Hartford; hangs on well, and is a good keeper. — *Hartford Prolific*. Bunches large; berries large, round and dark, of medium quality. Ripens about 3 weeks earlier than the Isabella. Hardy and prolific. — *Highland*. Bunch large, long, compact; berry large, round, black; flesh soft, juicy, sweet, somewhat vinous; ripens between Concord and Catawba. — *Iona*. A grape of very fine quality; much larger than the Delaware, and as hardy; color a fine red; one of the best. — *Isabella*. Large bunches and berries, not compact, very dark purple; tender, sweet, and juicy; ripens from middle to last of Sept. — *Jefferson*. A pure native; a cross between Concord and Iona, resembling Concord in growth, vigor and hardiness, with fruit much like Iona in color, texture and quality; ripening about with Concord. — *Lady Washington*. A showy and beautiful white grape; bunch and berry large; skin pale yellow, with a tinge of delicate pink; flesh soft, tender, juicy, sweet, very slightly vinous, of good quality; ripens about with Concord and continues a long time in use. — *Moore's Early*. Bunch large; berry large, round; color black with heavy blue bloom; vine exceedingly hardy, entirely exempt from mildew or disease; its earliness makes it desirable for an early crop, and its hardiness particularly adapts it to Canada and the Northern portions of the United States. — *Pocklington*. A white grape; moderate grower; hardy, healthy; with fair sized clusters and large berries; very compact, shouldered; ripens soon after the Concord; has a strong foxy aroma. — *Prentiss*. A new white grape, very prolific; bunches large; grapes medium large; hardy and healthy. — *Vergennes*. Early, healthy, hardy and of good quality; foliage healthy, and vine a rank grower.

HUCKLEBERRY, or WHORTLEBERRY.—Select bushes that produce large sized and good flavored berries; set them near enough to shade the ground; cut off a large portion of the top; mulch the ground with a heavy coat of leaves; keep well mulched until the bushes are thick. When the bushes seem to have too much old wood to bear well, cut them down to the ground; select a moist ground. In many places in the west the ground abounds in limestone, which produces very richly flavored fruit. There are some white fruited varieties.

RASPBERRY.—The raspberry requires a rich and deep loamy soil to be grown to perfection. Thorough preparation of the soil before planting is very important. The modes of propagation are by suckers, by the tips of the canes, or by seeds. The suckers are separated in autumn, either by taking up the whole plant and dividing it, or by slipping them off from the sides and roots of the main stock. Planting in rows and then restricting the plants to hills or stools is the usual method. Make rows 6 ft. apart, and set the plants 3 ft. distant in the rows, which requires 2,500 to an acre. The tops should be cut off within a few inches of the ground when the plants are set. In planting the smaller growing kinds, 2 plants may be set in a hill, placing them about 6 in. apart. A plow or cultivator may be used among the plants for keeping the

weeds down in summer, but keep the soil as nearly level as possible. If they are to be grown in poor sandy land, open during autumn deep furrows with 2 horses, 6 to 8 ft. apart; dig and haul enough tidewater muck to fill in the furrows, which will be thoroughly frozen before spring, and at the approach of warm weather will crumble and become mellow, so as to spread evenly; then apply a good coat of ground bone or hair manure along the rows, and set the plants 2 or 3 ft. apart. Prune the bushes in the summer; pinch or cut off the shoots as soon as they are 4 ft. high; this causes them to branch out with strong laterals, and these are to be cut back, according to their strength in winter; at the same time cut away all redundant branches. During the winter lay the canes down, and cover with earth, where the climate is severe or the variety tender. Varieties: *Amazon.* A very large and finely flavored berry, and one of the most vigorous growers. — *Brandywine.* A large and bright red berry of very beautiful appearance, which makes it a favorite market variety, although not of the highest quality. It does well on all soils, and endures the drought and heat of the south better than most varieties. — *Cuthbert.* A remarkable strong, hardy variety, said to stand the northern winters and southern summers better than any other variety. Berries very large, measuring 3 in. around; conical; rich crimson; very handsome, and so firm they can be shipped hundreds of miles by rail in good condition; flavor is sweet, rich and luscious. — *Delaware.* Medium size, bright red; originated in New Jersey, where it is spoken of as one of the most delicious of berries. — *Doolittle.* Although one of the first introduced, it still holds its place as one of the most valuable.

Gregg.

— *Gregg.* This is decidedly the largest and most prolific black cap, far surpassing in size the famous Mammoth Cluster; averaging when grown side by side, with the same treatment, from ½ to ½ larger. — *Hansel.* Medium to large; color highest crimson; quality best. — *Highland Hardy.* This is an early, strong growing, and very productive variety, thriving in almost any soil. Berry medium, bright red; its earliness, great productiveness, and bright, handsome appearance, make it a favorite market variety. — *Lost Rubies.* Very profitable and delicious; exceedingly vigorous and hardy, enduring severe winters. — *Seneca Black Cap.* Larger than Doolittle, a week later in ripening; firm, sweet and rich; hardy and very productive. — *Shafer's Collossal.* Described as the largest raspberry in the world, and very hardy; it is of the class called hybrids; color of a purplish hue; ripens late. — *Souhegan.* A week earlier than Doolittle; as large as the Gregg; perfectly hardy and enormously productive.

Hansel.

Lost Rubies.

STRAWBERRY.—The best soil for strawberries is a sandy loam containing sufficient clay to prevent leaching. The best artificial fertilizer is Peruvian guano. New plants are best propagated by striking runners in small pots plunged in the soil. As soon as the plants are well rooted, they may be set out in permanent beds, and next season will produce good crops. They may be set out any time during growing season, but the best time is in spring. Strawberries may be grown in hills, in rows or in beds. The latter is the common method, and the beds are formed by planting 2 or more rows 1 ft. or 15 in. apart, setting the plants 12 in. one from another in the rows. In the beds the runners are allowed to grow, and to increase the number of plants indefinitely, so that they are often injured by being crowded too closely together. When planted in hills, they are set 18 in. apart; the space between them is kept perfectly clean, and the runners are cut as soon as they appear. The best way to move old strawberry plants is to wait till after a heavy rain when the ground is soaking wet, and take up clumps of them with the earth attached and carry them where you want them. Stirring the surface of the soil frequently is of prime necessity, and should be continued until the fruit begins to set and mulching is required. Then mulch the whole surface between the rows and up against the hills. When water is applied, let it be done so as to soak the ground well down, lasting for several days. Among practical growers strawberries are classed as European and native, and as having *pistillate* or *imperfect* (female) blooms, that require another variety to fertilize them (marked P), and the *perfect* or *hermaphrodite* blooms. The P varieties are good growers and have large fruit, but are troublesome. Varieties are: *Bidwell.* The plant is a very strong grower and very hardy and exceedingly productive; the number of berries a well-grown stool will grow and mature is almost incredible; the fruit is very large, regular, and handsome in shape; color very bright and showy; flesh very firm,

Bidwell.

and quality of the best; succeeds well on all soils. — *Crescent Seedling* (P). Large, conical, quite uniform in size and shape; bright scarlet; a remarkable grower; very productive; does well on all soils. — *Crystal City.* The earliest variety in cultivation; fruit of medium size, conical; color deep red; flesh moderately firm, good quality; very desirable for early home use. — *Cumberland Triumph.*

Jersey Queen.

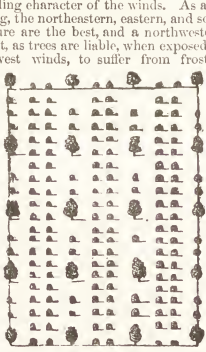
A magnificent variety; berries immense, fine, perfect form, and of fine flavor; plant very vigorous and productive. — *Charles Downing.* Soft, rich, productive, good; bears neglect well; succeeds almost everywhere. — *Glendale.* So far the best late market berry that has been tested; plant very thrifty, with tall, rank foliage, and very productive; succeeds well in both light and heavy soils; fruit of large size, regular, uniform, conical, bright scarlet color; fair quality; very firm, being equal to Wilson for shipping and keeping. — *Jersey Queen* (P). Exceedingly large and beautiful, very firm and of superior quality. It ripens late, continuing until very late; a healthy grower. — *Longfellow.* A variety from Kentucky. Large, late, firm berries. — *Manchester* (P). Vigorous grower, very productive; berries large, uniform size; very firm; ripen medium to late. — *Miner's Great Prolific.* Large to very large; deep crimson; strong grower, and so enormously prolific that the fruit is heaped about the plant. — *Monarch of the West.* Well tested variety; will grow on almost any good soil; stands drought and wet; berry very large, firm, and of delicious flavor. — *Mt. Vernon.* A large, late, very productive variety; a strong, healthy grower, with strong fruit stalks; fruit conical, bright red, uniformly large, and of excellent quality.

Longfellow.

ORCHARD FRUITS.

GENERAL CARE.

ASPECT.—This depends a great deal upon the prevailing character of the winds. As a general thing, the northeastern, eastern, and southern exposure are the best, and a northwestern the poorest, as trees are liable, when exposed to the northwest winds, to suffer from frost. The



Orchard Plan.

banks of lakes, streams or gullies are better locations for trees than any other. For the orchard a sloping surface is an advantage, provided the slope is very moderate and inclines to any of the points from southeast to southwest. The illustration shows a good way to plant orchard dwarf trees, using larger trees as a protection, when hillside shelter is not obtainable.

BUDDING.—Budding or grafting by detached buds, consists in transferring a portion of bark containing a bud, and forming the scion, to the wood of another plant, forming the stock, a portion of the bark of the stock being raised up or taken off to receive the bud. It is performed in

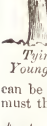
Budding.

the late summer or early fall. A sharp penknife can do duty for a budding knife, and a small piece of goose or large chicken quill, cut like a pen, but without a slit, will answer for a spud to aid in lifting the bark. Take a smooth stalk and make a horizontal cut across the bark through the wood, but not into it. From the centre of this cross-cut make another cut straight down

the stem 1 in. or more in length; these 2 cuts should resemble a *T*; slice off the bud you desire to propagate with one cut of the knife, cutting it close to the main stalk; with the edge of the spud turn back the bark on each side of the straight cut and insert the bud on the wood of the branch to be budded, fitting it tightly to the crossed cut, and pressing firmly into the bottom of the slit; with a piece of soft yarn bind down the bark, leaving the point of the bud exposed; in from 8 days to 2 weeks, according to the growth, the ties should be examined and loosened a little, and in about 6 weeks the wrapping can be removed; all other shoots must then be kept from growing on the budded branch. Next summer, if the bud has pushed and grown well, in July or August, the stock should be cut off close to the shoot. *Annular* budding consists in removing a ring of bark from the stock and a corresponding ring containing the bud, slit open on one side. The ring with the bud is made to fit the denuded space. This method is appliceable to trees of hard wood or thick bark. *Terminal* budding may sometimes be used to advantage. The cut in this case is sloped downward and the insertion made as usual. Care must be taken to apply the whole of the ligature below the bud.

Tying the Young Shoot.

Stick with Bud.



Annular Budding.

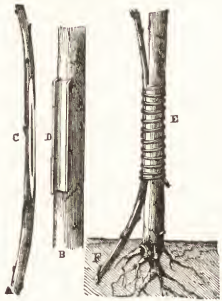
Terminal Budding.

CUTTINGS.—*Green Wood.* Take green shoots 3 to 6 in. long; cut clean off below an eye or joint, and pinch off most of the leaves, but a sufficient number should be left on for the purposes of vegetation. When cuttings are set in pots, they should be placed so as to reach to the bottom and touch the sides throughout their whole length. Green wood cuttings are usually started under glass. In the case of tubular stalked plants, it is advantageous to insert both ends into the soil, each of which will take root, and may then be divided, when 2 plants will be produced instead of 1. The cuttings should be placed in the earth in a slightly sloping position, bottom end down, with but 1 bud above the ground; place 2 at each point where 1 plant is wanted, and if both grow, 1 should be removed. No cutting requires to be planted deep, though the large ought be inserted deeper than such as are small. In the case of evergreens, the leaves should be kept from touching the soil. — *Ripe Wood.* The choice of cuttings should be made from the side shoots, observing to leave a little wood of a former year or season's growth attached to them, as such are found to take root more readily than when they are wholly composed of new wood. The time to take cuttings is before the sap gets into motion. Before setting them they should be cut across, just below an eye or joint, with as smooth a section as possible, observing not to injure the bud.

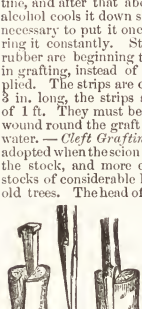
GIRDLING.—This is usually done to fruit trees to promote early and full bearing, by preventing the sap from returning into the roots and forcing it to expand itself among the fruits and flowers. It is done by taking out a rim of bark entirely around the tree, limb or vine, not over ¼ in. wide. Sometimes this space is healed up the first year, but certainly the second year, if the tree be not too feeble and sickly. Another method is to take coarse twine or fine wire and wind it several times around the tree above the lower limbs and tie it as tight as possible. Girdling is also performed in clearing new ground of timber when there is not time to remove it entirely. A portion of the bark 1 or 2 ft. in length is cut out all around the butt in spring. This kills the tree.

GRAFTING.—The objects and advantages of grafting are as follows: *a.* The propagation of varieties which are not increased freely by any other mode. *b.* The quickening of the fruitification, especially of trees which are naturally a number of years before they come into flower. *c.* To increase the vigor of delicate species by grafting them on robust stocks. *d.* To dwarf or diminish the bulk of robust species. *e.* To increase the fruitfulness of trees. *f.* To preserve varieties from degenerating, which are found to do so when propagated by cuttings and layers. *g.* By choosing a stock suitable to the soil, to produce trees in situations where they could not be grown if on their own roots. *h.* To produce several kinds on one kind. *i.* To renew the heads of trees. Thus, if a fruit-tree is cut down to the ground, or headed in to the height of 10 or 12 ft. and left to itself, it will develop a great number of latent buds, each of which will be contending for the mastery; and the strength of the tree, and the most favorable part of the season for growth, will be in some degree wasted, before a shoot is singled out to take the lead; but, if a graft is inserted either in the collar or stool, or in the amputated head, it will give an immediate direction to the sap, the latent buds will not be excited, and the whole concentrated vigor of the tree will be exerted in the production of one grand shoot. Of the many modes of grafting, *whip* or *tongue*, *saddle* and *cleft* grafting are the most common; but no matter which mode is adopted, the graft must be inserted in the stock so that the line of division between the inner wood and bark of the stock and scion shall correspond. The implements necessary are the common knife, for heading down stock; the chisel; a grafting-knife; ligatures of different kinds for tying on scions, and grafting-clay or grafting-wax for covering them.

The ligatures in common use are strands of bast matting, or other flexible bark; but sometimes coarse worsted thread is used, or occasionally shreds of coarse paper, or cotton cloth, covered with grafting-wax. When bast mat is used, it may be rendered waterproof by passing it first through a solution of white soap, and next through one of alum; by which a neutral compound is formed, insoluble in water. These prepared shreds, before being put on, are softened, by holding them over a vessel of burning charcoal, which the grafter carries with him; and when grafting wax is employed, instead of grafting-clay, it is kept in an earthen pot, also placed over live charcoal, and the composition taken out and laid on with a brush. Grafting-wax is universally used in this country instead of grafting-clay. It may be made as follows: Melt 1 lb. of common resin over a gentle fire; add to it 1 oz. of beef tallow, and stir well; take it from the fire, let it cool down a little, and then mix with it a tablespoonful of spirits of turpentine, and after that about 7 oz. of alcohol; the alcohol cools it down so rapidly that it will be necessary to put it once more on the fire, stirring it constantly. Strips of very thin India-rubber are beginning to be used as a bandage in grafting, instead of the wax commonly applied. The strips are cut about $\frac{1}{2}$ in. wide and 3 in. long, the strips stretching to the length of 1 ft. They must be applied dry and tightly wound round the graft so as to exclude air and water. — *Cleft Grafting.* This mode is chiefly adopted when the scion is a good deal larger than the stock, and more especially when grafting stocks of considerable height, or heading down old trees. The head of the stock being cut over horizontally with a saw, a cleft is made in it, from 2 to 3 in. in length, with a stout knife or chisel, or with the splitting-knife. The cleft being kept open by the knife or chisel, or the pick end of the splitting-knife, 1 or 2 scions are inserted, according to the diameter of the stock; the scions being cut into long wedge-shapes, a little thinner on the inside edge than the outer edge, and inserted into the slit prepared for them, when the knife or chisel being withdrawn, the stock closes firmly upon the scions, and holds them fast. The graft is then tied or clayed in the usual manner, and the whole is frequently covered with moss, or some similar substance. — *Layer Grafting*, or *Inarching*, consists in forming a hollow place in the side of the tree into which the scion is to be placed. The side of the scion which comes in contact with the tree must have a piece shaved off, it is then placed in the hollow and tightly bound or clayed. (See *Grapes* in GARDEN FRUITS.) — *Root Grafting.* This method is chiefly used for the apple. The stocks are taken up by the roots, cut off down to the crown of the roots, and the graft inserted in the crown. The grafted root is then covered with wax, and replanted, leaving the bud of the graft just above

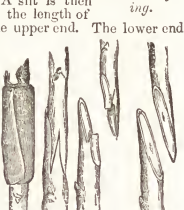


Layer Grafting.


Cleft Grafting.

ground. — *Saddle Grafting* is only applicable to stocks of moderate size, but it is well adapted for standard fruit trees. The top of the stock is cut into a wedge-shape, and the scion is split up the middle, and placed astride on it, the inner barks being made to join on one side of the stock, as in cleft grafting. The tying, claying, etc., are performed in the usual manner. — *Whip* or *Tongue Grafting*, is applicable to small stocks, and for root grafting. The stock is cut close to the ground with a sloping cut. A slit is then made about $\frac{1}{3}$ of the length of the slope from the upper end. The lower end of the graft is then cut so as to match the sloping end of the stock, and a slit made in the end similar to that made in the stock. The sloping surfaces are pressed together, the tongues formed are inserted into the slits in each other, then closely bandaged and sealed. The illustration represents the successive stages of whip or tongue grafting from the sloping cut of the scion and stock to completion of the operation by covering with wax.


Saddle Grafting.


Whip or Tongue Grafting.

MULCHING.—Young trees and plants recently set should be mulched with decaying matter, as straw, rotten wood and leaves. This prevents evaporation from the ground and keeps the soil moist. The gradual decay also furnishes food to the roots.

PLANTING TREE SEEDS.—All nut and hard shell seeds should be soaked in warm water, or milk and water, until the rind is softened, then placed in the ground as follows: Take of good rich loam ½, sand ½, very old decomposed manure ½; mix them thoroughly; then prepare boxes with holes in the bottom for drainage; fill these boxes ⅔ full of this compost and plant the seeds, each in separate boxes and in thickness according to the size of the seed; then sift over them good sand and loam only, about 1½ to 2 in., and over this cover about 1 in. of sawdust; then sprinkle with a fine syringe or water pot; the sawdust keeps the surface from baking. Keep the boxes in a light and cool place, free from the sun till the seeds are up and show 2 or 3 leaves, then bring gradually into the sun and air. When 6, 10, or 12 in. high, transplant to where they are to grow. Or, they may be sown at once in well prepared beds.

PRUNING.—This varies according to the kind of plant or tree operated on and the particular object in view, and its skillful performance must, therefore, greatly depend on the experience and knowledge of the gardener. Fruit trees above all others are benefited by pruning. The object of pruning is to create an abundant supply of sap during summer, by the production of leaf shoots, by which the general strength of the tree is augmented, and to limit the distribution of this sap when it ascends from the roots in the following spring, by diminishing the number of buds. The effect of this is to increase the vigor of the shoots or fruits produced by these buds. In shoots which produce their buds alternately the cut is made at the back of the bud sloping from it, so that it may be readily covered by the bark in the same or in the following year; but in the case of branches where the buds are produced opposite each other, either one bud must be sacrificed or the branch must be cut off at right angles to its line of direction, which is most conveniently done with the pruning shears. The seasons for pruning vary according to the object in view. Where wood is to be cut out or buds removed, so as to throw strength into the remaining parts of the tree, the sooner the operation is performed, after the fall of the leaf, the better. Next to autumn, winter is to be preferred, for the same reason; in this season mild weather is always to be chosen, because the frost, if severe, will seize on the moisture of newly-made wounds, and rupture their surface. For disbudding and ringing, spring is the most suitable season. The summer season is found better than any other for pruning trees which gum, such as the cherry and the plum, provided too much foliage is not thereby taken away; and it is also considered favorable for resinous trees. The autumn, on the other hand, is considered the best for trees that are apt to suffer from bleeding, such as the vine, the birch, and some species of maple. The principal modes of pruning are as follows: *Bruising and Tearing.* This consists in tearing off the sprouts from the stems of the plants at their roots, and in some cases is found to be more effective than cutting them off with a smooth section. — *Close Pruning.* Cutting off shoots close to the branch or stem from whence they spring, leaving as small a section as possible, in order that it may be speedily healed over. In performing the operation, care should be taken to make the wounded section no larger than the base of the shoot, in order that it may be healed over as quickly as possible; and at the same time to make it no smaller, because this would leave latent buds, which would be liable to be developed, and thus occasion the operation to be performed a second time. — *Disbarking.* This includes two distinct operations; the removal of coarse, loose, outside bark, to admit of the swelling of the inner bark and the alburnum by the returning sap, and the removal of a ring of both inner and outer bark, with a view to the interruption of the returning sap. — *Disbudding.* The removal of buds in spring or summer, just when they are beginning to develop their leaves, and is commonly performed with the finger and thumb, the object being to lessen the number of shoots or of blossom buds to be produced, and is the easiest and safest mode of pruning. — *Disleafing.* The leaves by this process are taken off a growing shoot as fast as they are unfolded, in order to throw the growth more strongly into another portion of the plant to maintain a symmetrical balance. — *Foreshortening.* A portion of the extremities of the lateral branches of a standard tree are cut off when they extend too far, the cut being always made close above a branch of such thickness as to form a leader of sufficient strength to keep the branch alive and healthy. — *Heading-in.* All the branches which form the head of a tree are cut off close to the stem, leaving only their base to produce buds. — *Lopping.* A term which is very generally applied to heading-in, but it is generally used to signify the cutting off of large branches from the sides of stems. It is done by shortening the branches to a sufficient size. — *Root Pruning.* This is performed with a sharp spade, and generally only on the main roots, at the distance of several feet from the stem, according to the magnitude of the tree. — *Shortening-in.* A term applied when side-shoots are shortened at the distance of from 2 to 4 or 5 feet from the stem, the cut being always made to a bud. — *Spurring-in.* A lateral shoot of the 1st year is shortened to 2 or 3 visible buds; the 2d and 3d years, the shoots are re-shortened.

SEED, To Preserve.—1. Put them in a sack of coarse material, or in a box or barrel full of small holes, and keep them under water until ready for planting. — 2. Place them with alternate layers of sand in trenches lined with boards. — 3. Store the freshly gathered acorns in a well ventilated room, stirring them frequently, and when tolerably dry, put them in heaps and cover them with a coat of leaves, another of branches and moss, and the whole with straw.

TRAINING.—Training a plant to support or conduct its stem and branches in some form or position, either natural or artificial, for purposes of use or ornament, is effected partly by pruning and thinning, but chiefly by pegging down to the ground, tying and fastening to rods, stakes or trellises, or nailing to walls, and is

termed *Espalier* training. The articles more immediately required are hooked pegs, ties, nails, and lists, with props of various kinds, and ladders. The tie or the list, by which the shoots are fastened to the wall or trellis, should be placed in the space between the points of the stem from which the leaves arise, and always immediately behind a bud or joint. The bast ties are gently twisted before being tied into a knot, in order that it may be the firmer, and not liable to be torn during the operation of tying. Osier ties, which are frequently used for espalier-trees, are fastened by twisting together the two ends, and turning them down. In fastening shoots with nails and shreds, when any restraint is required to retain the shoot in its position, the pressure must always be against the shred, and never against the nail. The shred ought not to be placed in the hollow of a bend in the branch to be attached; for there it is worse than useless. Shreds of woolen are preferred to those of any other cloth, or to leather, as being softer, and less influenced by the weather. The length should be such as to contain a shoot double the size of that for which they are intended, in order that they may never compress the shoots so much as to impede the returning sap, and their breadth may be from ½ to ¾ in. to 1 in. They should be folded up a little at each end, so that in driving the nail through the shred it will pierce four times its thickness, and be in no danger of tearing. The different modes of training bushes and trees in the open garden are chiefly the conical form for tall trees or standards, and some modification of the globe or cylinder for dwarfs. — *Conical Standards* may be produced from trees partially spurred-in; cut in the side branches. — *Fan Training.* Head the maiden plant down to 4 eyes placed so as to throw out 2 shoots on each side; next season head down to 3 eyes, 1 leading shoot and 1 on each side; the 2 lowermost shoots are to be headed down to 2 eyes, so as to throw out 1 leading shoot, and 1 shoot on the uppermost side; there are now 5 shoots on each side; each shoot must now produce 2 shoots on the uppermost side, and 1 on the undermost side; the next season each shoot should produce 1 on the upper and 2 on the under part. — *Horizontal Training* is practiced either with 1 or 2 stems, and either with the upright stem straight or in a zigzag direction, to stimulate the lateral buds to develop themselves. From this upright stem, the branches proceed at right angles—generally at 9 in. apart for apples, cherries and plums, and from 10 in. to 1 ft. or 18 in., for pears. A maiden plant with 3 shoots having been procured, the 2 side ones are laid in horizontally, and the centre one upright; rub all the buds off except 3, 1 next the top for a vertical leader, and 1 on each side, as near the top as possible, for horizontal branches. In the autumn of the first year, the 2 laterals produced are nailed in, and also the shoots produced from the extremities of the lower laterals, the centre shoot being headed down as before. But in the second summer, when the main shoot has attained the length of 10 or 12 in., it may be stopped. — *Spiral.* Prune and manage the tree so as to have from 3 to 6 branches within 6 in. of the ground; fix 6 rods or stakes into the earth in a circle about the roots; bring down each branch; fix it to the rod near its base; carry the branch around in a spiral manner; let all move in the same direction, 1 above the other.

TRANSPLANTING.—The autumn is the most convenient time for transplanting; for the soil is dry and warm and there is time to do the work well. Have the ground ready; never plant where an old tree stood before; dig the hole at least 2 ft. in diameter and have 1 ft. of good, rich soil under the roots; prune off the ends at least ½, with a sharp knife; after digging the hole, make a little mound in the centre, then a little basin; and after the tree is on it, carefully adjust the roots, so that each one is spread out in its natural position; the fine, rich soil is then filled in so that each little root will come in contact with the solid soil. A pair of large wheels and an axle make an apparatus for transplanting large trees. A piece of 4x4 in. studding is tied to the tree with cloths, straw, or something to prevent bruising the bark of the tree, and a rope attached to the upper end. A trench has previously been dug around the tree. When ready to move it, fasten the axle firmly to the studding or timber, seize the rope and pull the tree into a horizontal position, when it is ready for transportation. Some skill is required in digging trenches. They should be cut as far away from the trunk as convenient, in order to destroy as few roots and rootlets as possible. The more earth moved with the tree the more apt will be the tree to survive the transplanting. A good plan is to dig 2 trenches, the first about 2 years before the removal, leaving 3 or 4 strong roots uncut to keep the tree standing, and the second the autumn before moving. Fill the first trench with rich surface soil as soon as dug. Into this myriads of little roots will grow, to give additional insurance of life after the tree is transplanted. The second trench should be cut outside the first, so as not to disturb the rootlets. To water a newly-set tree, dig the earth away down to near the roots; pour in water enough to last a week of dry weather; put the dry soil back over the wet. If the roots are wet, no matter how dry the surface is.

WINTERING.—*Heeling-in.* If the supplies of trees are procured in the fall, choose the driest and cleanest spot in the garden; clear away all rubbish from the vicinity, to save trouble from mice; dig a trench long enough to admit a layer of 10 or 12 trees side by side, and wide and deep enough to let the roots below the surface; throw the soil forward at a right angle from the trench, so the tops can rest upon it; this will raise the tops just a little above the level of the ground; when the first layer is properly placed, proceed by shoveling fine earth among the roots, extending the trench for another layer at the same time; fill carefully all spaces and pack the ground firm, by pressure with the foot; place another layer in the same position, with the roots projecting a little forward of those of the first, but no deeper in the ground. Varieties may be separated by placing small willows across and between, as put in, and a register

should be kept of the whole. To preserve labels distinct, wind them with paper, which should be tied on.

KINDS.

THE success of orchard fruits depends upon climatic conditions. Some fruits that are successfully cultivated in the East will not grow in the West, and those cultivated in the North will not grow in the South, and *vice versa*. It would take more space than can here be spared to give the climate favorable to each kind and variety. The American Pomological Society has published, and will doubtless continue to publish, from time to time, lists in which the latest approved varieties are given, with the localities in which they thrive best. These can be had at any time by applying to the veteran President, Marshall P. Wilder, of Boston, or to whoever may be Secretary of the society for the term.

ALMOND, Hard Shelled. Sweet.—Will succeed where the peach will, and requires the same soil, culture and methods of propagation. It is extensively cultivated. The soft shelled is suitable for the South.

APPLE.—The apple will grow in any common soil neither too sandy, gravelly, nor clayey, on a dry subsoil and free exposure. Any soil that will produce good crops of grain and potatoes will be adapted to the growth of apple trees. The apple may be propagated by seeds, cuttings of the branches and roots, by layers, suckers, grafting or budding; the last two modes are principally for continuing varieties (See *Budding* and *Grafting* in GENERAL CARE), and seeds are used to obtain new varieties. In planting apple seeds, the ground should be plowed, harrowed, rolled and well pulverized. It should be moderately rich, but use no green manure. To get the seed, pick out good, ripe apples from strong growing trees; crush them and wash and sieve the pulp. The good, plump, seeds will fall to the bottom, while the light seeds and pulp will float. The seed should be planted in rows about 3 ft. apart. After the seeds are sown and covered about 3 in. deep, they may rest undisturbed until about December, or till the first slight freeze, when they should be covered in the row with a light covering of barn-yard manure or any mulch. This keeps the ground from cracking, and makes the soil soft in the spring, so that the little sprouts can easily get through the ground; it will also keep the weeds back. After they are up, keep the ground well cultivated and the seedlings weeded; when they are 6 in. high, just after a rain, thin out the weakest where too thick. For the first 3 or 4 years the weeds should be destroyed and the ground kept in good condition by cultivating some low growing hoed crop. Salt hay makes a good mulch. Put a hundred weight or a little more to each tree, extending it 6 or 8 ft. from the trunk all around the tree; it will keep the surface mellow, retain the moisture for a long time and keep down the grass. After the trees have been several years planted the soil should be sown with grass and annually enriched with good stable manure as a top dressing or mulch. October or November are the best months to apply the manure and to give the trunks of trees a good scraping-off of all old bark. To remove suckers, allow them to grow until they are in leaf, then take each separately in the hands; place a thick boot upon it near the tree, and they are quickly separated. If done at that time they will not be likely to sprout again. To make apple trees bear the odd year, enrich the ground heavily in the spring of the even, or full of the odd year, as suits convenience; this treatment induces a set of fruit buds for the odd year. Or, during the even year, when the apples are about the size of a hickory nut, knock them all off with a long pole, breaking the little twigs as well, and the trees for many years will bear full crops. Apple trees should be pruned sparingly; the tops should be kept sufficiently open to admit sunshine and air. Apples may be divided into *Cider, Crab, Fall, Summer*, and *Winter* kinds.

Cider.—The most valuable varieties for the manufacture of cider are the *Harrison* and *Camfield*, extensively raised in the Middle States, being rich in flavor, and bearing very abundantly; *Hugh's Virginia Crab*, small size, but very productive; and the *Red Streak*.

Crab.—*American*. The common wild crab apple of the U. S., growing in glades and frequently forming extensive thickets. — *Chicago*. Fruit small; yellow, with a vermillion cheek; flesh crisp, slightly sub-acid; December to March.— *Gen. Grant*. Fruit large, round, oblate; warm, yellow ground with broken stripes of dark red on sun-exposed side, with light dots; flesh white, not juicy, very mild, sub-acid; late autumn. — *Hyslop*. Large; skin rich purple, covered with a velvety bloom; fruit hanging until heavy frost. — *Lady Elgin*. Medium; skin whitish yellow, nearly covered with bright red and light gray dots; September to December.— *Marengo*. Tree vigorous; fruit red, on yellow ground, with a few russet dots; flesh yellowish white, crisp, juicy; when fully ripe, pleasant sub-acid; carly winter to late spring. — *Montreal Beauty*. Large; bright yellow, shaded with rich red; flesh yellowish, rich and acid. — *Red Siberian*. A beautiful tree, and a great bearer; fruit small, about the size of a cherry, growing in clusters; color bright red; when matured, globular form, long and thin stem; excellent for preserves; September.— *Transcendent*. The largest of the Siberian Crab apples, beautifully colored, red and yellow; tree a very strong grower. — *Van Wyck*. Large; skin mottled with red; sweet and firm; tree vigorous. — *Yellow Siberian*. Similar in habits and appearance to the Red Siberian; fruit a fine clear yellow or a rich golden color; September to October.

Fall.—*Alexander*. A Russian apple, very hardy; fruit large size; deep red or crimson; flesh yellowish white, crisp, tender and pleasant flavor; October. — *Fall Jennetting*. Large, roundish, oblate; greenish yellow with a blush; tender, juicy and very good; October and November. — *Fall Pippin*. Large size, round, oblong; skin smooth, bright greenish yellow,

slightly speckled; flesh white, tender, juicy and of excellent flavor; October to December. — *Gravenstein.* Vigorous tree, and very productive; fruit large; color clear straw or yellow, with stripes of red; flesh pale yellow, crisp, delicious flavor; vigorous, erect, and productive in all localities. — *Jefferies.* Medium size; skin yellow, shaded and striped with crimson, and thickly covered with large whitish dots; flesh white, tender, juicy, with a rich sub-acid flavor; September and October. — *Jersey Sweet.* Medium; greenish yellow, thickly striped with red; very sweet, juicy and tender; good in all localities; fine bearer; September and October. — *Lowell, or Orange.* Large, roundish, oblong; green, becoming rich yellow; surface oily; valuable for its fairness, good quality and great productiveness; tree very hardy; September and October. — *Maiden's Blush.* Medium to large, oblate or flat, with a beautiful blush cheek; fine grained and tender, but not rich; uniformly productive; September and October. — *Porter.* A large and popular variety, very productive, skin bright yellow, with a blush; flesh fine-grained and juicy; last of September to October. — *Primate.* Medium; pale yellow; fine-grained, tender, juicy, mild and sub-acid; August and September. — *Rambo.* Medium, oblate; yellowish ground, streaked with dull, yellowish red, and somewhat dotted; tender, rich, mild and very excellent; fine in nearly all localities; October to January. — *Red Bietigheimer.* A rare and valuable German apple, ripening in early fall; extra large, pale cream ground, mostly covered with red and purplish crimson, very beautiful. — *St. Lawrence.* Large, roundish; striped with dark red on yellowish ground; rather acid, moderately rich and agreeable; a handsome, good and productive apple; tree very hardy; October. — *Sops of Wine.* Medium; color dark crimson; juicy and sub-acid; August and September. — *Stump.* Medium, roundish, conical, smooth, white, shaded with bright red, splashed and striped with crimson; flesh white, tender, juicy, and pleasantly sub-acid; September and October. — *Twenty Ounce.* Very large, roundish, striped with red on yellowish ground; crisp, sub-acid; very productive and excellent for cooking; very profitable market apple; October to January.

Summer. — *Benoni.* Medium size, nearly round; yellow ground, striped or overspread with deep red; tender, rich, sub-acid, and with an agreeable flavor; ripens August. — *California Red June.* Medium size; deep red; flesh white, tender, juicy, sub-acid; tree hardy and productive; bears early. — *Early Harvest.* Medium size, roundish; pale yellow or straw color; tender, rather acid; tree moderate grower and productive; July and August. — *Early Joe.* Medium size; deep red on yellow ground; tree slow, but erect grower and profuse bearer; flesh tender, juicy and excellent; August. — *Early Red Streak.* Below medium size, roundish ovate; skin greenish yellow with dark red stripes; flesh white, sub-acid, rich, agreeable flavor. — *Early Strawberry.* Medium size, striped with deep red; tender, sub-acid and pleasant; erect grower and productive. — *Golden Sweet.* Rather large, roundish; greenish to pale yellow; flesh very sweet and good; tree very hardy, free grower and good bearer; fine for cooking; ripens in August. — *Juneating.* An old, favorite variety, of small size, flat form, long and thin stalk; color a pale green, turning to light yellow when ripe; the skin has an oily feel; the taste is pleasant; bears abundantly in good ground; last of June to the middle of July. — *Keswick Codlin.* Above medium, conical; straw colored; juicy, acid and of pleasant flavor; superior for jelly, and in use from July to October. — *Red Astrachan.* Rather large, roundish; brilliant deep crimson, with a thick bloom, juicy, crisp and acid; a beautiful apple; tree a vigorous grower, very hardy and productive; August. — *Summer Queen.* A popular apple, of the finest quality and appearance; large size; color fine, rich, yellow ground, mixed with red striped; long stalk; large tree; great bearer; flesh rich, yellow, and agreeable flavor. — *Summer Rose.* Medium size; light yellow with a red cheek; tender and delicious; August. — *Sweet Bough.* Large, roundish; pale greenish yellow; tender, delicious, sweet; a moderate and regular bearer; August. — *Tetofsky.* An early Russian apple; fruit handsome, medium to large; yellow, striped with red; juicy, pleasant, acid and aromatic; bears extremely well; July and August. *Williams' Favorite.* Moderate grower and good bearer; large and handsome; skin smooth, nearly covered with a fine dark red; flesh yellowish white, mild and agreeable flavor; July to first of September.

Winter.—*Baldwin.* Large, roundish; bright red; mild, juicy and rich; tree productive but rather tender; it is, on account of its productiveness, one of the most profitable varieties to cultivate, while trees that bear the odd year are doubly valuable; December to March. — *Bellflower, Yellow.* Large; pale yellow, with a deep blush on the sunny side; crisp, juicy and excellent; November to April. — *Belmont.* Tree vigorous, healthy and very productive; fruit medium, of a waxen yellow color, often with a bright vermilion cheek; flesh yellowish, crisp, tender, juicy, of a mild, agreeable flavor; very good; November to February. — *Ben Davis.* Large; very handsomely striped with red; good quality and late keeper; a very popular apple in the West and Southwest. — *Esopus Spitzenberg.* Large, round, ovate; skin deep red, faintly striped and covered with bloom; rich, crisp, and high flavored; December to April.— *Fallawater.* Large, roundish, smooth; yellowish green with a brown blush, tender, juicy, mildly acid and agreeable; December to January. — *Fameuse.* Medium size, round, striped and blotched with deep crimson; juicy, sub-acid, spicy and pleasant; highly esteemed in Canada; tree very hardy; November to January. — *Grimes' Golden.* Large; golden yellow; juicy, sprightly, sub-acid; very good; January to April. — *Hubbardston Nonsuch.* A superior variety; the tree grows large, vigorous, and handsome; bears early and abundantly; fruit large, globular, or conical; color yellow, with stripes of pale red; flesh yellow, juicy, rich, sweet, relieved by a slight acid; November to

January. — *King of Tompkins Co.* A large, handsome fruit, striped red and yellow; crisp, juicy, sub-acid, and of excellent quality; tree rather tender; October to January. — *Lady.* Small and attractive; color red and yellow; flesh crisp, juicy and pleasant; November to May. — *Lankford Seedling.* Fruit large and heavy; color rich red with a tinge of yellow on one side; flesh fine grained, juicy, pleasant and sub-acid; January to April. — *Newtown Pippin, Yellow.* Medium size roundish, a little flattened; when fully ripe, it is yellow, with a lively red cheek; flesh firm, crisp, juicy, with a very rich and high flavor; one of the finest. — *Northern Spy.* Large, roundish; handsomely striped with red; juicy, rich, mild and agreeable; vigorous grower and fine bearer; December to June. — *Ortley.* Large; white or very pale yellow; tender, rich and juicy; very large hollow core; October to February. — *Peck's Pleasant.* Large, roundish; light green, becoming yellow; very tender, with a mild, rich, fine clear pippin flavor; good bearer; tree very hardy; December to March. — *Pewaukee.* Medium size; bright yellow, splashed and striped dull red; sub-acid, with rich, aromatic flavor; perfectly hardy; December to March. — *Pryor's Red.* Rather large, roundish, deep dull red on greenish yellow ground; very tender, mild, rich, sub-acid and agreeable; highly esteemed in the Southwestern States; keeps till spring. — *Rawle's Genet.* Medium size, roundish oblong pale red stripes on light yellow ground; crisp, juicy, rich and mildly sub-acid; keeps through the spring; tree very hardy. — *Rhode Island Greening.* Large, roundish; green, becoming greenish yellow; tender, juicy, rich, rather acid and slightly aromatic; very crooked grower. In the South it becomes an autumn fruit; in the North it matures in March and April. — *Russet, Golden.* Full medium size, tinged with red on the exposed side; flesh crisp, juicy, high flavored, resembling a fine pear when ripe; January to June; tree very hardy, and bears every year. — *Russet, Roxbury.* Very popular, and extensively grown; medium size, roundish, somewhat flat; skin dull green or brownish-yellow; flesh greenish white, compact, slightly acid, but rich flavored; December. — *Swaar.* Large, roundish; greenish yellow, a little russeted; tender, with a very mild rich, agreeable flavor; January to May. — *Talman's Sweeting.* Medium, roundish; clear light yellow; firm, rich and very sweet; fine for the kitchen; vigorous and productive; tree very hardy; November to April. — *Wagener.* Medium or large; yellow ground with dull red stripes; very fine grained, tender, aromatic, mild and excellent; November to April. — *Wealthy.* Fruit medium, with whitish yellow ground, shaded with deep crimson in the sun, broken stripes and mottlings in the shade, covered with light dots; flesh white, fine grained, stained with red, tender, juicy, lively, vinous, sub-acid; very good; December to February. — *Westfield Seek-no-further.* Medium to large, roundish; slightly russeted with dull, red stripes; tender, rich, spicy, and of a fine flavor; great bearer; November to February. — *White Winter Pearmain.* Large; light yellow, very handsome, and good quality; January to April. — *Wine Sap.* Medium size, rather oblong; smooth, dark red; flesh firm, crisp, with a rich, high flavor; December to June. — *Winter Sweet Paradise.* Large, roundish; fair, dull green with a brown blush; fine grained, juicy, sweet, sprightly and very good.

APRICOT.—The soil which suits apricots best is a good sound loam, which will readily crumble by the action of the weather. It must be prepared about ½ yard deep; if a light soil, 2 ft. with turfy matter mixed with it. The apricot tree may be raised from the stone, or by budding, either on its own, plum or peach stocks. In pruning the coarse breast shoots should be pinched off in summer. All immature looking sprays which tend to shade the blossom-buds should be cut away. Young trees should be shortened in order to produce more shoots. Varieties: *Breda.* Small; dull, orange, marked with red; juicy, rich and vinous; good bearer and hardy; August. — *Early Golden.* Small; pale orange; juicy and sweet, hardy and productive; July. — *Large Early.* This is a fine fruit, which also ripens in July; fruit medium size, somewhat oblong; color orange, rather pale; flesh straw color, rich, juicy, easily leaving the stone; an excellent sort. — *Peach.* This is the largest, and by many considered the finest of all varieties; form round, with compressed sides; color a yellowish fawn on the shady side, slightly colored with red towards the sun; flesh yellow, sprightly, juicy and high flavored; August. — *Henskirk, Moor Park, Red Masculine, St. Ambroise* and *Turkey* are also recommended varieties.

BANANA.—The fruit of a handsome plant now grown almost everywhere in the tropics. It is a variety of the plantain, the fruit of which is much like it. Bananas have generally spots on the stems, with dark purple stripes, and the fruit is smaller, less curved, and of a more delicately luscious taste than the plantains. Bananas are generally 4 or 5 in. long, and the plantain from 8 to 12 in. long. The best land for growing bananas is on a side hill, where the sun has great force. After the land is cleared the bananas are planted in rows about 15 or 20 ft. apart. On ground that is used for the first time for bananas, vegetables of various sorts are planted between the rows. These help to keep down the grass. Each tree bears a single bunch, which is ready to cut about 9 months after setting out the plant. After removing the bananas the trees are cut off close to the ground, and from the old stumps 3 or 4 more trees will spring up, each of which will in about 9 months yield a bunch. The trees grow about 15 ft. high. In setting out a new field, the roots of old trees are taken. The bunch of roots is cut into a number of pieces, each piece containing about 1 eye, and from each one of these pieces a new tree starts. The usual time for setting out new plants is the beginning of the wet season. The first crop is always the best. The bananas are larger, and there are more on a bunch. They usually average about 250 per bunch, and yield about 175 bunches per acre.

The second crop is a little poorer in quality, and so each time the trees are cut off the fruit becomes smaller and yields fewer to the bunch, until, in 4 or 5 years, the land runs out. There is no particular season for the fruit, it being as plenteous at one time as at another. Bananas should be cut from 24 to 48 hours before shipping, as they will not keep if cut earlier.

CHERRY.—Cherries will thrive in almost any soil, but prefer a light loam in a free exposure. The soil should not be too rich, as it will then become thrifty in wood, without corresponding fruitfulness. The cherry tree is propagated by seeds and suckers, when stems are wanted; by seeds alone when new varieties are wanted; by scions, when working on old subjects; and by buds, when the trees are young. Keep the ground mellow, spading up for 3 or 4 ft. from the body of the tree. Be careful in digging and grubbing about the trees that no injury is done to the roots or bark, as the least bruise will cause damage that the tree will never outgrow. In the Southern States the stem of the tree should be protected from the direct rays of the sun on the southwest side in winter, by wrapping with sacks or straw, or shielded by two boards nailed at right angles, and set up to shade the stem. Varieties: *Belle De Choisey.* Medium; pale amber, mottled with red; very tender, juicy, melting, sweet and rich; last of June. — *Belle D'Orleans.* Medium size; pale red and white; very juicy, tender and delicious; middle of June. — *Bigarreau* (*Yellow Spanish*). Size large to very large, heart-shaped and flattened; color pale yellow, or straw, slightly dotted; flesh yellowish tinge, firm, juicy, and sweet; last of June; a superior sort. — *Black Eagle.* Large, black; tender, juicy and high flavored; vigorous grower and productive; 1st to 15th of July. — *Black Heart.* Fruit large, heart-shaped; color dark purple to deep black; flesh tender, juicy, sweet and well flavored; last of June. — *Black Tartarian.* Very large, purplish black; half tender, juicy, rich and delicious; vigorous grower and very productive; tree very tender; last of June into July. — *Carnation.* Large; light red, mottled with orange; finer than most of this class; tender, juicy and excellent; from middle to last of July. — *Downer's Late.* Fruit large size, oval; skin smooth, light red; flesh firm, juicy, sweet and delicious; early part of July, lasting a considerable time; certain and productive bearer. — *Early Purple Guigne.* Rather small; purple, tender, juicy and sweet; growth spreading; middle of June.—*Early Richmond.* Fruit medium; red, melting, juicy and acid. The great thing in its favor is its freedom from worms; June. — *Elton.* Large; pale yellow in the shade, nearly covered next the sun with light red; half tender, juicy, rich and sweet; growth vigorous; last of June. — *Governor Wood.* Large; light yellow with a red cheek; tender, sweet, juicy and delicious; one of the best; last of June. — *May Duke.* One of the choicest and most thrifty sorts, and very extensively cultivated; fruit roundish, growing in clusters; color red; flesh soft and juicy, rich, and of fine flavor; June. —*Napoleon Bigarreau.* Very large; pale yellow and deep red; very firm with a fine flavor, juicy and sweet; vigorous grower, and very productive; a favorite; beginning of July. — *Reine Hortense.* Very large; bright red; tender and juicy, nearly sweet; vigorous and productive; middle of July.

Black Heart.

Downer's Late.

DATE PALM.—The palm of the deserts; but may be grown at the far southwest in the U. S. Where the atmosphere is humid or the rainfall considerable, there the date palm will not ripen its fruit. Abundant moisture at the roots, great heat, at least, during the summer, much sunshine and little rainfall, are the most essential conditions. Neither the fiercest heat of the sun, nor the strongest winds injure it. The wind may bend the crown to the earth, or even uproot the tree, but is incapable of breaking its trunk, and it will bear without injury 10° or 12° of frost, as well as very low night temperatures succeeding very high day temperatures. The nature of the soil is of little importance, provided always there is plenty of water, which may be either fresh or brackish. Propagation is usually effected by means of suckers, as they not only perpetuate the variety pure, but come into bearing much younger, and the cultivator runs no risk of overproduction of the male plants. In 5 years they produce fruit, though they do not come into full bearing until they are about 30 years old. After they attain 80 or 90 years the crop begins to diminish, yet they sometimes continue bearing until they are 200 years old. The trunk is of very slow growth, and eventually reaches a height of 70 or 80 ft. An old tree that produces fruit of a superior quality is sometimes rejuvenated by banking up the trunk with mud to the depth of 2 yards. In about a year's time it is rooted in the mud; it is then cut off above the old roots and transplanted.

FIGS.—Almost any well drained soil will suit fig trees, provided that, with its porosity, it also possesses that kind of mechanical texture which, whilst it readily transmits moisture, will also retain sufficient to withstand a hot and dry period in the middle of summer. The trees may be propagated by seeds, layers, cuttings and suckers. The seeds do not uniformly produce the same sorts, and are to be employed only for obtaining new varieties. In setting out plants, give them room according to their size. In the South, spring cuttings of last year's growth are taken off and set in February; and summer or green cuttings in August. In the North, hard wood cuttings are taken off late in autumn and kept moist in a cellar till spring, and then set out. Two crops of fruit are produced from the fig tree, each crop being produced on distinct

sets of shoots. The second crop grows from the eyes or buds of the shoots made in early summer, and, if the season be sufficiently warm and long, the fruit will ripen. The second crop is the most prolific and valuable, and is used in drying for exportation. In climates where the winters are severe the trees are so trained that the branches can be tied in bundles and laid along the ground, when they are covered with litter and earth. More commonly they are kept in tubs and boxes. As far south as Virginia the trees are covered with inverted boxes or large barrels, or protected with a mass of evergreen branches. When the small end of the fruit becomes of the same color as the large one, the figs are ripe and ready to gather. All shoots that are not short jointed or compact should be stopped at the end of August or beginning of September, by merely pinching off or squeezing flat the terminal growing point. This will induce the fruit for the ensuing year to commence forming. A too early stopping with some figs would cause them to develop the fruit for the ensuing year too early, and the period of doing this must be determined by the kind and its condition or habit. Figs most suitable for a garden are the *Black Ischia*, *Brown Ischia*, *Early White Murray* and *White Genoa*.

FILBERT.—Filberts are similar to hazel-nuts, but are distinguished from them by their larger size and lengthened form. They require a deep, light, but naturally fertile soil, without putrescent manures. They are propagated most easily from suckers, but bear from seeds, and should be well pruned. They bear in the 4th and 5th year, and are in season during the months of September and October. Varieties: *Barcelona*, *English*, *Frizzled*, *Large Cob*, *Red* and *White*.

Lemon.

LEMON.—A small tree, with ovate-oblong leaves, pale green with a winged stalk; flowers red externally; fruit pale yellow, with a juicy and very acid pulp. Generally raised from seed in Eastern countries. In the Southern States and California it is raised with great success. It is not so hardy as the orange and is improved by being worked upon the bitter orange stock. Varieties: *Gaeta*, *Imperial* and *Wax*.

LIME.—The lime is related to the lemon, has obovate leaves on a wingless stalk, small white flowers, and roundish, pale yellow fruit, with a nipple-like termination. The leaves and general habit of the plant resemble those of the lemon; but the acid of the pulp of the fruit, instead of being sharp and powerful, is flat and slightly bitter. The seeds are generally planted 15 ft. apart early in spring. The trees require regular pruning, and to be freed from the mistletoe, dodder, and other mischievous parasites; so that their cultivation during the years that elapse before they come into bearing involves a considerable outlay.

Lime.

MULBERRY.—Prefers a moist, deep, loamy soil, and a somewhat free exposure to the south. The soil should not be cold, or wet, and should be well drained. It may be trained against a wall, but this requires much space. It may be propagated by seed, sown in a warm border, but this mode is rarely pursued; by layers; by cuttings, having $\frac{3}{4}$ of their length old wood, and $\frac{1}{4}$ yearling; or by lopping off a straight branch, 8 ft. long, from a large tree—the nearer the trunk the better. Make it clear of every little stem, then dig a hole 4 ft. deep; plant the naked branch firmly in the ground, leaving around it a cavity to hold water, when the season is dry. In 2 years it will bear fruit. The black mulberry requires no pruning, and needs very little care. Varieties: *Black*. A native of Persia, but thrives in a northern climate. It is late in putting forth its leaves, but the fruit forms very quickly. The berry is large, long, black and of a rich aromatic taste. It is used in making wine or cider mixed with apples. — *Downing's Everlasting*. An American variety of great excellence. Color black; sprightly.— *Johnson*. Large, oblong fruit of a mild and pleasant flavor. — *Red*. A native of N. A., and grows wild. The fruit is of a deep red color, but is not as pleasant as the black. — *Russian*. Fruit large, about the size of Kittatinny blackberries, mostly jet black, about 1 tree in 20 producing flesh colored berries; sub-acid to sweet, with a fine, aromatic flavor; immensely productive; perfectly hardy. The original trees were imported from Western Russia. Fence posts made from the timber of this tree lasts as long as red cedar or catalpa. — *White*. A tree on which the silk worm lives. It is grown in China, Europe and N. A., but can not stand frost.

Mulberry.

NECTARINE.—The nectarine is a variety of the peach, but has a smooth, shining surface and is more highly flavored. It is propagated and grown the same as the peach. Varieties: *Boston*. Fruit very handsome, of medium size, and heart-shaped; color bright yellow and red; flesh firm, sweet, pleasant; one of the best varieties for general cultivation; 1st of September. — *Early Newington*. Large; pale green, red in the sun; juicy and rich, with a fine flavor; 1st of September. — *Early Violet*. Medium size; green, and purplish red; flesh pale yellow, and pinkish; soft, rich, sweet, agreeable flavor; good bearer; very superior; last of August. — *Elruge*. Medium; pale yellow, with a dark red cheek; juicy and high flavored; much esteemed; 1st of September. — *Red Roman*. One of

the most hardy; large; handsome, red clingstone; color dark next the sun, the shaded side yellow; flesh juicy, sweet, and vinous; August and September; a good bearer. — *Stanwick.* Resembles in size and shape the Elruge; pale, with a violet tinge next the sun; exceedingly tender, juicy, rich and sugary; in form and appearance surpasses all others; 1st of September.

OLIVE.—The olive grows on a branchy, low, evergreen tree. It has lanceolate or lance-oblong leaves, which are pale green above and rather whitish beneath. The fruit is used for various purposes, but principally as a pickle and for oil. It varies in size from an acorn to a large plum. It requires a warm climate and a dry soil, and is generally propagated by suckers; but when great care is bestowed on it, inarching is practiced. It grows from cuttings. The crop matures at the same time as cotton.

Olives.

ORANGE. — The orange thrives only in a warm climate, though it is quite generally raised in hot-houses in cold latitudes. It rarely grows to any considerable height; has deep green leaves, and, when fruited, makes a fine appearance. May be raised by seed or cuttings. The seeds are planted in early spring or in hot-beds in January. When 1 year old, they are transplanted in a nursery arrangement. At the age of $2\frac{1}{2}$ years they are budded; i. e., the seedlings are of the sour variety, and to produce sweet oranges fully matured buds are taken from bearing trees and inserted. This is done to render the tree more hardy, since the sweet seedlings are subject to a root disease called heel, while the sour seedlings are not. Hence orange growers resort to this means to produce sweet oranges. The trees are transplanted at the age of four years into orchards. At the age of 6, flowers first appear, and at 10 years the trees are called full bearers. Pruning should be done in February, and should be limited to thinning out the wood where too thick, cutting out that which is old and weak. Nothing is gained by crowding the shoots. Varieties: *Bergamot, Bitter* or *Seville, Blood, China, Egg, Mandarin, Portugal* or *Lisbon,* and *Tangerine.*

Orange.

PAWPAW, Common.—Grows in the South and Southwest in rich soil; is of small but most pleasing tropical growth. The fruit is very rich. The bark makes a tie for budding equal to bast, and the poles make fine light handles for hoes.

PEACH.—Peaches thrive best on a rich, deep, sandy loam, but will grow on almost any soil. They may be propagated by seeds and by budding. To raise seedlings plant the stone in the fall, at a depth of 2 or 3 in., and in 1 or 2 years they will be of sufficient size to transplant. Seedling trees are the longest livers, and the most prolific and profitable. Good varieties are obtained by budding. Trees should be transplanted at 1 year old from the bud. By growing low to the ground and heading back well, it is not necessary to set the trees more than 12 to 15 ft. apart. After the trees have attained to a proper size cut back and prevent them bearing; this will cause the roots to spread in the soil. In shallow soils top dressing with manure in the fall, and frequent harrowing, will be found advantageous. Apply lime and ashes before the manure; fork it in and around the trees. To keep the trees from blooming early spread manure, coal ashes or sawdust deeply upon the roots when the ground is hardest frozen, and do not remove until late in the spring. If a tree ceases bearing, dig around the base of the stem a hole 4 or 5 in. deep, scraping away all the worms that can be found burrowing at the junction of the stem and root, and fill the hole thus made with wood ashes from the fire, which retain all their potash; as the defective power of growth is believed to be owing to a deficiency of potash. If this be supplied so that it shall reach the small roots and be absorbed, the fruit bearing power will be restored. In order to harden or ripen the shoots of young and rapidly growing trees, the cultivation of the soil should cease in August. Otherwise they would be likely to keep on growing till frost, and would be left in a green and succulent condition, unfitted to withstand the cold of winter. But bearing trees should be cultivated till the fruit is about to ripen, as the crop continues to consume the strength of the tree after the cessation of the growth of the shoots. Pruning is the life of peach culture. By cutting in the excessive growth at the extremities, the tree is made stronger, and the fruit of better size and flavor. Peach trees on prairies should be permitted to branch near the ground, say from 18 to 30 in., and never more than 3 ft. above it, and should be caused to grow in as compact form as possible. Endeavor to keep the lower branches trimmed and trained at an angle of about 30 or 35°; keep the top rounded up to a flat, conical shape, observing as much as can be, without marring the shape of the tree, to cut back most on the north side in order to balance against

the effect of the south wind that blows so much during the growing season. The centre of the tree should be well pruned so as to admit a free circulation of the air. Thinning out the fruit not only largely increases the size of the fruit, but entirely transforms its character, making it rich, juicy and melting. The thinning should be done before the stone is formed, when the fruit is about the size of cherries, leaving the peaches 5 or 6 in. apart on the limbs. Early varieties as a rule require the most thinning. A few kinds do not need thinning, the late Crawford for instance, which thins itself sufficiently. Varieties: *Alberge.* Size medium; yellow skin, with dark red cheek; flesh yellow, tinged with red, melting, rich, sweet and vinous flavor; deeply indented by a seam running from the stem to the blossom end; last of August. — *Bergen's Yellow.* Large size, round, slightly depressed; freestone; color red and orange, dotted; flesh yellow, tender, rich and luscious; good bearer; first of October; valuable sort. — *Blood Cling.* Most valuable for canning. Is a good bearer, hardy, and the fruit is less liable to be preyed on by insects — *Cole's Early Red.* Medium; free-stone; red mottled; juicy, rich with a pleasant flavor; vigorous grower and good bearer; August. — *Cooledge's Favorite.* Above medium, and nearly white, with red dots, and brilliant scarlet cheek; free-stone; very melting and juicy, with a rich flavor; middle of August. — *Crawford's Late.* Fruit large, round, and handsome; yellow in the shade, deep red towards the sun; freestone; flesh yellow, reddish near the stone, juicy, tender, rich, finely flavored; last of September or first of October. — *Crawford's Early.* Large, round; freestone; yellow in color; juicy and vinous; ripens middle of August; very popular everywhere. — *Early Beatrice.* Very early, ripening about the 10th of July; free-stone; fruit medium size, with a marble red cheek; melting and very juicy. — *Early Louise.* Medium; free-stone; bright red; melting, juicy, and fine; ripens a few days after Early Beatrice. — *Early Tillotson.* Medium size, round; color yellowish white, red, with dots; free-stone; flesh white, red near the stone, juicy, melting, excellent flavor. — *Early York.* One of the earliest and most generally cultivated; free-stone; medium, roundish, slightly oval; skin thin, somewhat dotted; color red; flesh greenish white, tender, rich, lively flavor; middle or last of August. — *George IV.* Large; nearly white, with a red cheek; free-stone; melting, juicy, rich and excellent; crops moderate, one cause of its excellence; last of August. — *Grosse Mignonne,* or *Royal Kensington.* Large; free-stone; white, with a pale, red cheek; juicy, with a very rich, high vinous flavor; good grower and bearer; latter part of August. — *Hale's Early.* Medium size; free-stone; white flesh, juicy, rich and delicious; very early; fine orchard variety. —*Heath.* Large, oblong, terminating in a point at the head; cling; rich cream-colored white, sometimes faintly blushed; flesh rich, tender, juicy and melting; hardy; September to November. — *Jacques Rareripe.* Very large; deep yellow, shaded with red; free-stone; has a high reputation; last of August. — *Large Early York.* Large; nearly white, with a deep red cheek; free-stone; fine grained, very juicy, mild and rich; vigorous and productive. — *Lemon Cling.* Large, lemon shaped; yellow cling, with a brownish cheek; rich, vinous and sub-acid. — *Morris White.* Medium; free-stone; creamy white, tinged red; flesh white, juicy, and delicious; middle of September. — *Noblesse.* Large and handsome clingstone; skin white with a pale blush and dark brownish spots; flesh rich and highly flavored; September. — *Old Mixon Freestone.* A beautiful, large, flat peach, with a white skin and red cheek; flesh rich, juicy and luscious; latter part of September. — *Red Cheek Melocoton.* A large yellow clearstone, with a red cheek; flesh rich and juicy; September—sometimes earlier. — *Red Rareripe.* An excellent fruit, frequently called Morris' Red Rareripe; size quite large, round; color red and white; flesh tender, rich, melting and highly flavored; August. — *Smock Free.* Large; light orange yellow, with red cheek; flesh yellow, red at stone, juicy, rich; September to October. — *Stump-the-World.* Very large; creamy white, with a bright red cheek; freestone; flesh white, juicy and high flavored; last of September. — *Troth's Early.* Little above medium; free-stone; red; flesh white, juicy, sweet and rich; one of the best early peaches; middle of August. *Yellow Rareripe.* Size large, globular; free-stone; color yellow and purplish red; flesh yellow, red near the stone; tender, juicy, vinous flavor; September. — *Waterloo.* Medium to large; whitish green marbled with purple; juicy and vinous; the best flavored of the earliest peaches; August.

PEAR.—The pear will exist in a variety of soils, but clay loam is best adapted to it. If dry, the ground should be rolling; if wet, underdrained and subsoiled. Soils of a sandy or gravelly character are not well adapted to the pear. Seedling stocks are the best to graft or bud. To plant seedlings, the soil should be deep, fertile, moist, and well manured with lime and ashes, and supplied with peat or muck, if not in the soil. Sow the seed by drills, in lines 2 ft. apart. Seedlings taken up in the fall may be kept safely all winter by burying them in a cellar. Or, without taking them up, cover the ground several inches deep with forest leaves. Budding is preferable to grafting, as it can be repeated in case of failure. In 2 years after grafting or budding, the plants may be removed to the places where it is intended they shall stand. Set the plants so that the point from whence the stem and roots proceed in opposite directions will be about 1 in. below the level of the surface of the ground. Dwarfs should be set 12 ft. apart, and standards 25. Animal manure, wood ashes, and farm compost are the best fertilizers, and these should be applied in fall. When thinning pears, they should be left till somewhat grown; as they often fall after they are pretty well advanced. Pears of all varieties are best when ripened off the tree. Some varieties, such as Clapp's Favorite, are worthless, if allowed to remain too long upon the tree, but if picked as soon as mature, and allowed to ripen, are among the best. Late pears, which do not rip-

en until winter, should remain on the trees until hard frosts begin. Varieties: *Bartlett.* A general favorite; fruit large, pyramidal; color yellowish at maturity; skin thin and smooth; flesh white, delicate, buttery, sweet, juicy, highly flavored; hardy and productive; September. — *Beurre Bosc.* An esteemed late sort, high flavored, and much in demand as a market pear; fruit large and long; color light cinnamon russet; flesh white, rich and tender; September and October. — *Beurre Clairgeau.* Very large; clear cinnamon russet, with reddish tint on sunny side; melting, juicy, sprightly, perfumed and excellent; very handsome; tender; October. — *Beurre d'Anjou.* Large, greenish yellow; buttery and melting, with a high, rich flavor; tree very hardy; fruit ripens in November and December. — *Beurre Diel.* Large size; dull yellow and much dotted; sugary, rich and juicy; November and December. — *Beurre Gifford.* Medium; pyriform; fine yellow, with red cheek; buttery, juicy, sweet, high flavored and delicious; a poor grower in the nursery, but one of the best early pears; August. — *Bloodgood.* Large size; form oval; color dull yellow, with darkish spots; flesh soft, melting, agreeable flavor; early and prolific; August. — *Brockworth Park.* Large; pale yellow, flushed, streaked with red on the sunny side; flesh white, buttery, melting; very juicy, vinous and rich; September. — *Clapp's Favorite.* Large and handsome; resembles the Bartlett in all its qualities, except the musky flavor peculiar to that variety; September. — *Dana's Hovey.* Medium size; skin a yellowish russet; flesh yellowish white, juicy, tender, honeyed sweetness, high flavored; productive and hardy; November to December. — *Dearborn's Seedling.* A valuable early sort; small, symmetrical; color light yellow, with a few dots; flesh white, tender, sweet and sprightly flavor; productive; early, ripening from the middle to the last of August. — *Doyenne d'Ete.* Small; clear yellow, with a bright red cheek; juicy, sweet and melting; bears well even when young; August. — *Duchess d'Angouleme.* Large, greenish yellow; sometimes a little russeted; does best grafted on quince; fine market fruit; October and November. — *Flemish Beauty.* Fine large fruit; color, dull yellow and brownish; flesh yellowish tinge, sweet, tender, juicy, sugary, musky flavor; October. — *Howell.* Large and handsome, color yellowish green with a dull red cheek; melting, juicy, with a delicate, perfumed flavor; October and November. — *Keiffer.* Fruit large and very uniform in size; color rich yellow; October and November. — *Lawrence.* A large, rich flavored, melting pear; color golden yellow; pleasant, aromatic flavor; stands among the best early winter varieties; November to February. — *Louise Bonne de Jersey.* Large; yellowish green, with a red cheek; very juicy, buttery, melting and rich; very productive; September and October. — *Seckel.* The richest and highest flavored pear known; small, yellowish brown, with deep brown cheek; sweet, very juicy, buttery, melting; September and October. — *Sheldon.* Large; russet and red; melting, rich, delicious, with a high musky flavor; October. — *Tyson.* A medium-sized fruit; color light straw, with brownish blotches; flesh lightish-white, rich, sweet, fragrant; September. — *Vicar of Winkfield.* A large and long pear, of good quality and great productiveness; does best grafted on quince; tree very hardy; November to January. — *Winter Nelis.* A fine winter variety; size rather above medium; roundish-obovate; color pale straw, slightly brown; flesh white, soft, sugury, rich, musky flavored; November to January.

PERSIMMON.—The persimmon requires but little cultivation. Prune when the branches get too thick. Varieties: *American.* A tree 2 to 3 ft. in height. — *Black Persimmon.* A shrub or middle sized tree. — *Japanese.* An extremely interesting and beautiful fruit; as large as tomatoes, of various forms and colors. Has been fruited in several parts of New Jersey, and in southern New York, but not entirely hardy north of the latitude of Washington, D. C. There are a few seedless varieties that promise to be of great value, not only as dessert fruit, but to dry as dates. The ripe fruit made into a preserve is a specific in summer complaint; the bark and green fruit are employed as astringents, and the wood is used for inlaying.

PINE-APPLE.—Grows in the tropical climates; the best soil is a rich and rather sandy loam, which is often formed from the turf of old pastures, in which dung, peat, and sand are thoroughly mixed. The pine-apple has a number of long, sharp-pointed, rigid leaves, growing from the root, in the midst of which rises a short flower-stem, bearing a single spike of flowers, and later a single fruit. From the top of this fruit springs a crown or tuft of small leaves, capable of becoming a new plant, which is generally used for planting; pine-apples are propagated entirely by crowns and suckers, as in a state of high cultivation, perfect seed is almost never produced. The universal practice, till a late date, was to grow the plants in pots plunged to the required depth in tanner's bark or other fermenting matter, and these were transferred from one department to another according to the stage of advancement, 3 years' culture being considered necessary for the production of ripe fruit. But is now often planted in beds, and fruit of the finest quality is sometimes obtained in 15 months. In the cultivation of the pine-apple great care is necessary, as without it, it is fibrous and coarse, with little sweetness or flavor; but with it is one of most delicate and richly flavored of fruits. The size also depends very much on cultivation, and varies from 2½ to 12 lbs. in weight. Ventilation must be given from time to time, care being taken to keep the atmosphere moist. Apple-pine which has borne fruit is cast away as useless.

PLANTAIN.—(See *Banana*).

PLUM.—The best soil for the plum is a rich loam, though a good, sound mellow loam will suit the majority. Like other stone fruit it is mostly propagated by budding, the stocks being the free growing plum or the peach, raised from seed, or, more commouly, from layers or suckers. Trees should be planted 20 ft. apart. They require but little care save to prevent the ravages of the curculio. All the varieties produce their blos-

soms on small spurs, which are protruded along the sides of the shoots of 1, 2 or 3 years' growth, generally in the course of the 2d or 3d year. These spurs, if duly thinned, and, when necessary, cut in, will continue bearing for 5 or 6 years, or longer. Among all the fruits there is none that require thinning more than the plum. The fruit should be thinned so that each plum shall hang by itself; to do this, oftentimes five plums must be cut off where one is left. Varieties: *Bleecker's Gage.* Medium size, nearly round, very regular; color dark yellow, with deep red spots; flesh yellow, sweet, finely flavored; ripens in September. The tree is hardy, productive, and the fruit much esteemed in some parts. — *Bradshaw.* Very large; dark violet red; juicy and pleasant; tree very vigorous and productive; middle of August. — *Coe's Golden Drop.* Thrifty growth; good bearer; fruit large and handsome, oblong; color greenish yellow, with violet and crimson dots; flesh orange color, rich, juicy, fine flavored; September. — *Chickasaw.* Red; of pleasant, sub-acid flavor; early; quite ornamental; native. — *Damson.* A favorite much used in cookery. The tree grows to a great height, and has a very full, bushy appearance; yields a great quantity of fruit, which varies in color, some of the plums being dark purple, others yellow, blue and black. — *Duane's Purple.* Large, oval or oblong, bulging on one side; color reddish-purple toward the sun, palish-red in the shade, with a few yellow specks and a lilac bloom; flesh light brown, juicy, lively, slightly acid; middle of August. — *General Hand.* One of the largest of the native varieties; pale yellow; juicy, sweet and good; a sure bearer and of high reputation; beginning of September. — *German Prune.* Large oval; dark purple; juicy, rich, sweet and good; very productive; September. — *Green Gage.* Of this there are several varieties. The size in good soils is large; form round; skin green; flesh green, melting, juicy, and exquisitely flavored; August and September. — *Huling's Superb.* Very large; yellowish green; firm, rich, brisk and excellent; good grower and moderate bearer; tree very tender; middle to last of August. — *Imperial Gage.* Large; greenish yellow; juicy, melting and rich; fine grower and great bearer; 15th of August. — *Jefferson.* A superior dessert sort; fruit large, oval, contracting towards the stalk; color bright, deep yellow, with a purplish-red cheek, and a whitish bloom; flesh orange, quite juicy, richly flavored; middle to the last of September; a good bearer. — *Lawrence's Favorite.* Large, yellowish green, melting, juicy, rich and excellent; vigorous and productive;

Bleecker's Gage.

August. — *Lombard.* Medium, roundish oval; reddish purple; good; tree productive; end of August. — *McLaughlin.* Large size; round; color brownish-yellow, with a red tinge; flesh melting, juicy, fine flavor, though not superior; August. — *Purple Favorite.* Large size; roundish; color light brown, with a shading of purple, and bright yellow dots; flesh greenish, soft, sweet; last of August to 1st of September. — *Washington.* Large; green, somewhat reddish; juicy, sweet and fine; vigorous in growth, and very productive; liable to rot on the tree; August. — *Wild Goose.* Skin purple, with fine bloom; flesh, juicy and sweet; well adapted to peach stocks; the last of July. — *Yellow Egg.* Large size; oval, narrow at both ends; color yellow, whitish dots, and a thin white bloom; flesh somewhat coarse, yellow and slightly acid; September; better cooking than eating. — *Yellow Gage.* Medium; golden yellow, juicy and rich; middle of August.

QUINCE.—The tree will grow in any good soil; yet, like the pear, a deep, damp soil, free from stagnant water, suits it best. Quinces are best cultivated from cuttings. These should be from 12 to 15 in. in length, and, unless those of last year's growth are strong and vigorous, it is better to use the 2-year-olds. They may be as large around as the finger. The larger ones give earliest results. To gain time, and also to utilize worthless trees, budding may be done either on the worthless quince-bush or on the thorn. Plant the trees from 10 to 12 ft. apart in full or early spring. The quince needs pruning in order to make the greatest thrift in growth and fruit. In training, if the bush form is preferred, let the limbs start close to the ground; thin out but never cut off the large limbs. Water-sprouts and suckers should be cut back or off, and the bush kept in a close, compact shape. — *Angers.* Large; a little elongated; skin greenish yellow; very fragrant; fine for preserves; also used for stock to graft the pear on; season December to February. — *Apple-shaped.* Also called *Orange*; a well known favorite variety; fruit large, much resembling an apple in shape; color brilliant yellow; flesh solid, and of fine flavor; a very good bearer, and much esteemed as an excellent cooking variety, on account of the flesh becoming soft when stewed. — *Champion.* An early and abundant bearer of large size, fair fruit; quality of the very best; keeps till January. — *Chinese.* Does well in the South, and promises well in the southwest. — *Japan.* Hardy, ornamental variety, with scarlet or white blossoms in the very early spring. — *Portugal.* This variety is more juicy, less harsh, better colored and flavored, than the two preceding; fruit large, oblong; color mild yellow; not very productive; a superior variety. — *Rea's Golden.* Superb fruit, ½ larger than the *Orange Quince*; same form and color and equally as good. — *Rea's Mammoth.* A seedling of the *Orange*; superior in size and equally as good in quality.

PESTS.

DISEASES.

BLIGHT.— 1. Wash the trees with an infusion of about 1 lb. of quassin chips to 8 gal. of water. — 2. Cut the diseased limb out completely and all parts affected by the blight. — 3. Place dry salt near the trunk of the tree, a few in. below the surface. — 4. Root pruning is also performed as a preventive.

MILDEW.—Indicated by the presence of certain minute plants of the order of *fungi*, which grow upon the stem and leaves, and doubtless feed upon and exhaust the juices of the plant. The prevalence of heavy fogs or mist, drizzling rains and sudden changes of temperature, have been assigned as the cause of mildew, and it has been found that open, airy situations are much less subject to it than low sheltered lands. — *Gooseberry*. 1. Sprinkle a weak solution of saleratus, strongly tinctured with alum, over the bushes. — 2. Put 1 qt. of hard wood ashes in a vessel holding 5 gal.; pour 3 gal. of boiling water over them; stir a few moments, and fill with cold water; use as hot as the hand can bear without scalding; throw the hot liquid forcibly into the bush with a garden syringe, drenching every leaf, both upper and lower side; early in the morning while the dew is yet on, is the best time to do this; commence when the fruit is first formed and continue from time to time as signs of mildew appear. —*Grape*. If this appears on the vines, dust them thoroughly with sulphur; their presence is known by white spots. — *Peach*. Affects some varieties of white peaches. A wash of soap-suds will cure it, or lime water and suds.

ROT.—*Apple*. Apples on the trees are affected by a fungus known to botanists as *Sphæropsis malorum*. Small pale spots make their appearance on the apple and in a few days more numerous black pustules or papillæ will appear, and thickly scatter over nearly the whole surface of the fruit. When microscopically examined each one of these black papillæ is found to contain several oblong pale fungus spores, supported on a short stem or foot stalk, from which they soon separate. When this fungus rot makes its appearance remove the affected apples at once from contact with the others.— *Grape*. The cause and cure for this are still unknown. The best preventive is to inclose the bunches in bags of paper. Fumigating with sulphur in the evening will also prevent its appearance.

SUN SCALD.—When apple trees are commencing to open their leaf buds, the terminal ones frequently already opened, there is susceptibility to sun scald. The edges of the terminal leaves will turn to a dark color and the bark from green to black, on the south or southwest side first, and from hour to hour curves around the tree. The best relief is to at once severely crop off below the part affected.

YELLOWS.—Found in peaches and is caused by a minute fungus growth at the roots, gradually spreading through every part of the trees. It is peculiar to the peach and nectarine, and is so poisonous and contagious that a knife used in pruning a diseased tree will communicate the malady to a healthy tree if it is afterwards pruned with it. To cure peach trees of yellows: 1. Apply potash salts to the surface under the tree and rake it in; then mulch with old hay leaves or straw. The German crude muriate of potash will be the least expensive. Use 1 or 2 lbs. according to the size of the tree. Apply 1 lb. in the late fall and same quantity in the spring.—2. Pour boiling hot water over the limbs and body of the trees afflicted with that disease, the remedy to be applied in the spring, summer and autumn. It will not kill the bark.

INSECTS.

APPLE CHERMES.—The eggs are laid in September, on different places of the twigs of the apple tree, usually in the furrows of the knots. In the formation of the body it resembles the pear chermes, but is different in color. The eyes, instead of being red, are of a snowy white, with a black pupil; the back of the thorax is of a light-green, the abdomen is marked with yellow rings, and the membranous wings with strongly-marked snow-white veins. The snout, which contains the bristled tongue, is situated, like that of all the species of chermes, in the middle of the breast. To secure the blossoms and fruit of trees in pots, or dwarf trees, brush away the young chermes with a fine brush, when they appear, or at latest when the first changing of the skin takes place in April. It is also necessary to examine the small apple trees in spring, when the blossoms begin to appear, to ascertain if any insects are upon them, and if so, to destroy them.

APPLE-ROOT PLANT LOUSE.—Forms wart-like excrescences upon the roots of apple trees, which contain in their crevices the insects which suck their juices; is said to be destroyed by an application of boiling hot water. Mulching around the infested trees has been found to have the effect of bringing the lice to the surface of the ground, where they can be more easily reached by the hot water.

APPLE-TREE LOUSE.—Feeds on leaves and twigs of apple trees. The wingless female is pale green, with yellowish head and dark green stripes on the back. The winged ones of both sexes have black heads, green abdomens, and a row of black dots on each side. A mixture of tobacco juice and lime will kill them.

BARK LICE. — Judicious pruning of the branches, draining the land where the trees stand, manuring the soil and keeping it free from grass and weeds—all have the effect to promote vigorous growth, and are therefore useful in preventing the depredations. For killing the lice, the best things are strong lye made of wood ashes, a solution of caustic soda of potash, diluted soft soap, or a mixture of lime whitewash and kerosene oil. If the latter is employed, the proportions of the mixture should be 1 pt. of kerosene to 1 gal. of whitewash. Whatever sub-

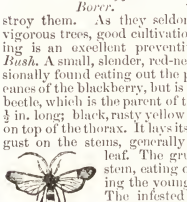
stances are chosen, they should be applied thoroughly. To insure complete destruction of the insect, a second application should be made some days after the first.

BORERS.—*Flat Head Apple Tree.* The larva of a dark green beetle, and is pale yellow in color. The egg is deposited under the loose bark of the tree, from whence the young ones bore into the tree. The presence of the young borer is usually indicated by a discolored spot, a cracking of the bark, or the presence of saw-dust like excrement. To destroy them wash the tree with strong soap suds during spring and early summer.—*Round Head Apple Tree.* Fleshy, whitish grubs, with small, brown heads, and infest the apple, quince, pear, crab apple, hawthorn, mountain ash and juneberry. Kill the grubs by thrusting a wire into their holes. August, September and October are the months to destroy them. As they seldom attack smooth, vigorous trees, good cultivation and low heading is an excellent preventive.—*Blackberry Bush.* A small, slender, red-necked beetle, occasionally found eating out the pith of the young canes of the blackberry, but is not common. The beetle, which is the parent of the borer, is about ½ in. long; black, rusty yellow on the breast and on top of the thorax. It lays its eggs early in August on the stems, generally at the base of a leaf. The grub penetrates the stem, eating out the pith, causing the young canes to wither. The infested canes should be pruned off in the fall and burned.—*Currant.* These are whitish, with brown head and legs, and bore into the stems of currant bushes. The moth is blue black, with yellow on the tips of the fore wings. All infected stems should be cut and burned.—*Gigantic Root.* Pale yellowish white, partly translucent, with bluish shadings. They are 3 in. long and bore in the roots of grape vines and fruit trees, cutting a root entirely off. Difficult to extirpate. If their presence is suspected, they must be searched for and destroyed.—*Grape Root.* Little can be done in the way of extirpating these underground borers, as their presence is only indicated by the approaching death of the vine. Still, every vineyardist should make it a rule to search for them wherever they find vines suddenly dying from any cause unknown to them, and upon finding such a borer should at once put an end to his existence. The beetle, which may frequently be found during the summer months, should also be ruthlessly sacrificed wherever met with. Do not plant a vineyard on land covered with old oak or hickory stumps, nor use oak stakes where those made of cedar can be had as conveniently.—*Peach.* This works on the tree just under the surface of the ground. Scrape away the bark and kill the worm with a probe. Wash with a thin alkaline solution, as far up as the branches, and also apply a small portion to the hollow where the lower branches unite with the stem. Prepare a sheet of brown paper by painting it with grafting wax or coal tar; clean the dirt from the tree as low as possible without interfering with the roots; then wrap the paper around the trunk about 1 ft. from the root; take 1 qt. of slacked lime, and apply to the crown of the tree, heaping a small mound of earth to the trunk. Young trees should be wrapped before they are planted.

Flat Head Apple Tree Borer.

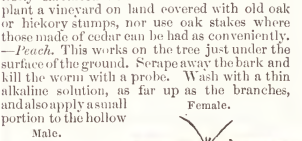
Round Head Apple Tree Borer.

Moth of Currant Borer.



Gigantic Root Borer.

Male Grape Root Borer.



Peach Tree Borer.

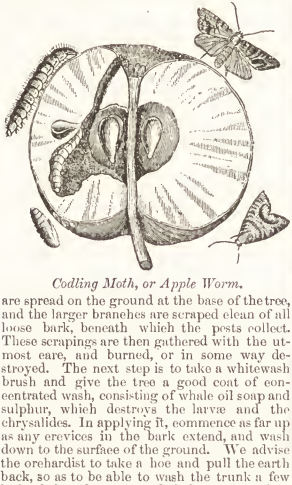
CATERPILLARS.—*Bush.* The ordinary mode of disposing of this pest is to shake the bushes and collect the caterpillars; hellebore powder and foxglove are good destroyers. The latter is made into a strong tea by boiling it in water; water or syringe the bushes with this. As a precautionary measure, open a trench 1 ft. in depth at the extremity of the roots, and then scrape or shovel the surface soil from over the roots for nearly 3 in. in depth into the trench, in the hopes of burying and destroying the chrysalis; the paring of soil should be well trampled down, and the occasion may be seized for manuring the roots in the circle or line excavated; salt and soot might be used to cover the parings before trampling them down, or other strong matters, which are at once fatal to insect life, and a manure to the bushes.—*Apple Tree.* Forms large, cob-

web-like nests in the forks of the limbs of apple and cherry trees during May. Destroy the nest and worms by pressing into the fork of the limb with a rough stick until the nest and the worms are ground to pieces.

Moth of Apple Tree Caterpillar.

CHERRY SLUG.—When quite young they are white, but afterward become olive colored and sticky, with a dark chestnut head. They feed on cherry and pear leaves. Destroy them by dusting with dry lime or fine ashes.

CODLING MOTH, or APPLE WORM.—The codling moth is, perhaps, the most destructive pest to apples known. It lays its eggs in the blossom end of the apple and pear when the fruit is small, and the small white worm eats its way to the core; then the apple falls; the worm escapes, goes through its transformations, matures, and lays eggs upon the half-ripened fruit or remains a chrysalis until spring, where it may then be found in a thin shell beneath loose bark. Provide a triangular bit of steel, some 4 in. in length and width; then grind 2 of the sides in segments of a circle, so that they will fit about the trunk of the trees. These scrapers are then fastened to wooden handles; old sacks

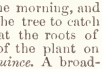


Codling Moth, or Apple Worm.

are spread on the ground at the base of the tree, and the larger branches are scraped clean of all loose bark, beneath which the pests collect. These scrapings are then gathered with the utmost care, and burned, or in some way destroyed. The next step is to take a whitewash brush and give the tree a good coat of concentrated wash, consisting of whale oil soap and sulphur, which destroys the larvæ and the chrysalides. In applying it, commence as far up as any crevices in the bark extend, and wash down to the surface of the ground. We advise the orchardist to take a hoe and pull the earth back, so as to be able to wash the trunk a few inches below the surface. Or hollow cones of tin or zinc, shaped like the body of a funnel, are placed on the stem of a tree to prevent the insects ascending. Still another way is to fasten pieces of light wood together on the flat; lay these at the base of the tree as traps; then kill the insects.

CURCULIO.—*Cranberry.* A troublesome insect found on cranberry bushes. The female deposits its eggs about the middle of May, in the buds of the cranberry. Selecting a bud not quite ready to open, and clinging to it, she works her snout deep into its centre; an egg is then deposited in the hole thus made; the beetle climbs the stem, and cuts it off near where it joins the bud, and the shoot drops to the ground. The larva feeds inside the bud, and the weevil, when mature, eats its way out. The perfect insect is also said to eat into the fruit. The only remedy that could be suggested, should the insect become troublesome, is to flood the cranberry patch, if possible, for a short time, provided it does not occur at a period when the future crop might be injured by being under water. — *Plum.* Dark brown with white yellow shining spots. The wing-cases are adorned with 2 shining black lumps; behind this is a broad band of yellow and white. It measures about 1-5 in. in length, and attacks nearly all important fruits. They begin their work in May or June. — 1. Mix 4 oz. of sulphur and 1 lb. of whale-oil soap; stir well together 4 pk. quicklime in 4 gals. water, and when it settles pour off the clear liquid, and add it to the soap solution, to which 4 gals. of tolerably strong tobacco water are also to be added. When the first mark of the curculio is seen upon the young fruit, take a syringe and drench the foliage thoroughly with the mixture, and in case rain occurs within 3 weeks to wash it off, repeat it. — 2. Jar the beetles from the tree by striking it with a heavy maul, cushioned with leather. This should be done early in the morning, and a white sheet placed beneath the tree to catch the insects. — 3. Plant tansy at the roots of plum trees, or hang branches of the plant on the limbs of the trees. — *Quince.* A broad-shouldered snout beetle, larger than the plum curculio. Ash-gray in color, mottled with ochre-yellow and whitish, with a dusky almost triangular spot at the base of the white thorax above, and 7 narrow longitudinal elevations on the wing covers, with 2 rows of dots between each. Iron plugs stuck into the trees and struck soundly with an ax or hammer, is said to be the most effective way of bringing down the curculio, and is much better than the padded mallet.

Plum Curculio.



Quince Curculio.

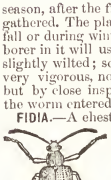
CURRANT WORM.—This is the larva of a saw fly, and is destructive to currants and gooseberries, devouring the leaves and often killing the bushes outright. They may be destroyed and damage prevented by close watching and picking off the leaves when the larvæ are newly

hatched and too young to be injurious. Sprinkling powdered white hellebore upon the leaves will kill the worms that eat it, but when this poisonous substance is used care must be taken to wash the fruit before it is eaten. The 1st brood appears in May, and the 2d about a month afterward. A 3d brood appears later in the

Currant Worm and Fly.

season, after the fruit has matured and has been gathered. The plants should be examined every fall or during winter, and every shoot that has a borer in it will usually be of a brown color, or slightly wilted; sometimes when the shoots are very vigorous, no difference can be observed, but by close inspection the small hole where the worm entered can be found.

FIDIA.—A chestnut-brown beetle, about ¼ in. long, and is densely covered with very short whitish hairs, which give it a hoary appearance. Feeds upon the grape vine. It cuts straight, elongated holes of about ⅛ in. in diameter in the leaves, and when numerous they reduce the leaves to mere shreds. They fall to the ground on the slightest disturbance and can be caught on a cloth.



Fidia.

FLEA-BEETLE.—The color varies from steel-blue to metallic-green and purple. Feeds on the grape-vine, and is found on the upper surface of the leaf. The larvæ can be destroyed by an application of dry lime.

GALL-CURCULIO.—Found on the canes of the Concord grape-vine, in the shape of an elongated knot, just below the joint. It is minutely wrinkled transversely, and covered with minute white bristles; cut off and burn these gall-bearing canes during the winter.

GRAPE CODLING.—The larva of this is distinguished by having 6 scaly legs near the head, 8 fleshy ones in the middle, and 2 at the extremity. Its presence is indicated by a reddish brown color on the side of the grape which it enters. The only way to get rid of these is to keep on the lookout for them and remove the infested parts.

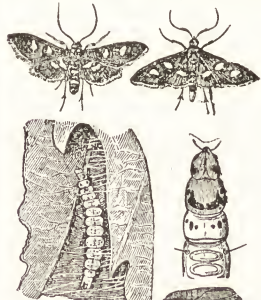
GRAPE VINE WORM. — Distinguished from all others by having a pyramidal hump near the end of its body, of a delicate green color, marked

Grape Vine Worm.

with pale yellow or cream-colored lines and spots; it is easily kept in check by hand picking.

HOPPER.—Attacks grape vines; very small; of a pale yellow color, with 2 red blood bands and 1 dusky band across the wing covers. As larvæ, or when very young, they do not possess any wings, and it is only in the adult state that the perfect wings are acquired. The leaves injured by these insects, appear at first flecked and spotted with whitish marks, showing where the sap has been drawn out by the leaf hopper. They then assume a sickly appearance, and if the insects are very numerous the foliage will finally turn brown and fall to the ground. To destroy them, syringe the vines with strong tobacco water. Dusting the vines with lime, wood ashes, lime and sulphur, is said to be beneficial, and fumigation with strong tobacco, when under glass, will destroy many of them. Light attracts these insects at night; if a lantern were placed immediately over a pail or tub nearly filled with water, on the surface of which a little oil had been poured, whenever the vines were disturbed the insects would immediately fly toward the light and fall into the vessel below and perish by hundreds.

LEAF FOLDER.—The moth of this expands almost 1 in.; length of the body ½ in.; color black, with an opalescent reflection; the under surface is less bright; all the wings are bordered with white; the front wings have 2 white spots on each; the hind ones have only one; the body



Leaf Folder.

has one transverse band and a white dash longitudinally at its extremity. The worm folds rather than rolls the leaf, by fastening 2 por-

tions together by its silken threads; the chrysalis is formed within the fold of the leaf, and by going over the vineyard in October, or any time before the leaves fall, and carefully plucking and destroying all those that are folded and crumpled, the supply for the following year will be cut off.

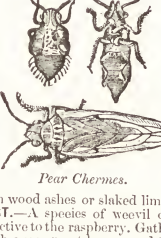
MIDGES.—Gooseberries, attacked by these, turn red prematurely and become putrid, having in them small, bright yellow maggots, of an oblong-oval form, and slightly divided into segments by fine impressed transverse lines; changing to pupæ in the berries, and in the latter part of July giving out a small, 2-winged fly, resembling a mosquito, of beeswax yellow color. The berries should be gathered as soon as they show signs of premature ripening, and destroyed.

NEW YORK WEEVIL.—Ash-gray beetle, marked with black; on each wing case are 4 whitish lines interrupted by black dots, and 3 smaller ones on the thorax. It is from 4 to 6-10 of an in. in length, and damages fruit trees. It gnaws off the tender bark before the buds have put out, and later in the year destroys the tender shoots which start out from the old wood. It cuts out the buds, and frequently gnaws off the leaves at the base of the stem, after they have expanded. It prefers the tender growth of the apple, though it will make free with that of the peach, plum, pear and cherry, and of other fruit, as well as forest trees. This insect is more active at night than day, and is often jarred down upon a sheet or curculio-catcher, for it falls about as readily as the plum curculio.

PEACH WORM, Blue Spangled.—A caterpillar which, entering the twig near the bud, eats out the interior. After the insect leaves the twig, the injured part dries up and breaks off. To destroy them cut off the shoots that appear to be withering, and burn them.

PEAR CHERMES.—Besets the young shoots and bearing wood of dwarf pear trees. It has wings, and is about the size of a large aphis; it has a broad head, terminating in front in 2 cones; but there is no opening for the mouth in the head, it being situated in the middle of the breast. The rostrum stands out perpendicularly, and ends in a point, from the latter issuing the very long delicate tongue with which it sucks its food. To clear the trees from them, brush off the young with a stiff brush, and tread upon them; or, search out and take away the winged chermes from the dwarf pear trees as soon as the blossoms appear and the shoots begin to grow. Their red color and long wings discover them, and as they are not shy, they are easily caught by the hand.

QUINCE WORM.—The principal enemy of the quince is the worm at the root. Remove the earth from around the stem of the tree each spring and fall, and probe for the grub in his hole in the bark with a stiff wire, and fill up around the tree with wood ashes or slaked lime.



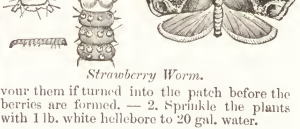
Pear Chermes.

RASPBERRY PEST.—A species of weevil or snout beetle, destructive to the raspberry. Gathering the beetle with a sweep net has proved to be the most efficacious mode of removal.

SAW-FLY.—The green gage and round plums are sometimes attacked, when hardly the size of a pea, causing them to fall off, by a saw-fly, which makes use of the pulp as food for her offspring. It resembles the house-fly, but has 4 wings; the head and body are black, and the feet reddish-yellow. To diminish the number of this insect, take the plums infested by the larva from the tree, and destroy them; these are known by a small black opening in the plum; and convey away all the plums that fall.

SPOTTED PELIDNOTA. — The largest beetle that attacks the grape vine; it subsists on the leaves, and is kept in check by hand picking.

STRAWBERRY WORM.—The larva of a black fly; of a yellowish color. They feed on strawberry leaves and blossoms. 1. Poultry will devour them if turned into the patch before the berries are formed. — 2. Sprinkle the plants with 1 lb. white hellebore to 20 gal. water.



Strawberry Worm.

FORESTRY.

COMMON TREES.

REMARKS.—The universal intelligent opinion, borne out by statistical facts, is that the timber trees of the U. S. are rapidly diminishing. This fact the public at large become convinced of only as rising prices for all kinds of lumber touch its pocket. Whenever the touch is felt with disagreeable strength, Congress and the States will be called on to regulate and encourage the cutting of trees, and forestry—the increase of timber tree culture—will become a regular industry. But it is already a profitable industry. Wild lands at cheap prices still abound, and there are few fields of agricultural effort more promising to the shrewd and far-seeing speculator. A proper study of the lumber market will show any one what timber is in de-

mand at high prices, and an investigation of the conditions of propagation and growth will point to the selection of such rapid growing sorts as will quickest reward the labor and capital expended. The planting of forests also has a most beneficent effect on the rainfall of any region, increasing or diminishing, or regulating, it to the wants of other vegetation, a result fully as important as the timber harvest itself. The general laws observed in the successful growing of field crops extend to trees and other vegetables, and are the foundation of profitable cultivation. Trees appear to have some deleterious influence upon the soil in which they grow, rendering it unsuitable during some time for the growth of the same species on the same ground, and the benefits of rotation of crops are just as evident after a timber harvest as after any other from the land.

To Measure Height of Trees: 1. Place a 10 ft. pole upright against the trunk; then go to a distance from the tree, and employ the breadth of the hand as a measure by holding it out at arm's length; the distance from the tree should be such that the breadth of the hand shall just cover the 10 ft. pole; then remove the hand successively upward, thus measuring 10 ft. at a time, the last portions being measured by the fingers and thumb 2 ft. each. — 2. For determining the height of tall forest trees, where a few rods of open level space can be had, measure them by the shadow of the sun's rays; the length of the shadow is determined, and a 3 ft. pole held upright, and its shadow also measured, then, as the length of the shadow of the pole is to its height, so is the length of the shadow of the tree to its height. — 3. There are instruments made for measuring with great precision. The following is a good and simply made one: A quarter of a circle is made of some light wood, and a small plumb-bob is suspended from what would be the centre of the circle, and a mark made just $\frac{1}{2}$ way of the curved side of the quadrant; 2 small eyes for sights attached to one of the straight edges makes the implement complete; the quadrant is held by the operator, moving backward or forward until he can see the top of the tree through both sights, the plumb-line at the same time hanging over the mark; the distance of the observer from the tree, when he can see the top of it in this manner, will be the height of the tree; allowance must be made for the height of the eye from the ground, and for any difference in the level of the ground between the tree and the observer.

AILANTUS. — Grows very fast; wood hard, heavy, glossy, and susceptible of a fine polish. It is very valuable for interior work and cabinet-making. The wood is at first of a pale straw color, but grows somewhat darker with age. Grows about as rapidly in a poor soil as in a rich one. It will even grow in blowing sand and on the sea coast. It is very easily propagated from seed; the seeds, having a broad wing, are carried to a distance by the wind, and the young plants come up in all sorts of unwelcome places. The tree is also a nuisance from its habit of springing from the root.

ASH.—Belongs to the olive family. It prefers a deep, damp soil and is best raised from the seed, which should be gathered in the fall and kept in a damp, cool place till spring; plant like corn, an inch deep; plant in rows 3 ft. apart and 2 ft. between each tree; the alternate trees will afford fine hoop-poles at the end of 10 years. There is a beautiful weeping form much admired as an ornamental tree. The *European* ash seldom grows alone. Its leaves are gathered as foliage and its timber is valued in carriage making. The wood of the *White* ash has no equal for lightness, elasticity and strength. The *Black* ash is distinguished by the great number of its leaflets and the blunt appearance of its leaves. The *Blue* ash is a large timber tree. Its bark has a bluish tinge when macerated in water.

BASS-WOOD, or AMERICAN LIME.—A highly ornamental tree and sometimes rises to more than 80 ft. in height. The wood is very white when green, but becomes of a light brown hue when seasoned. It is soft, easily worked, and is often sawed into boards, which do not warp like those which are formed of resinous trees. The wood is almost useless as fuel. In cultivation it requires a loose, rich, deep soil and will thrive where the sugar maple, white ash and hemlock spruce grow. All the varieties of this species may be propagated from seeds, by cuttings and by grafting; but, from the facility with which they can be multiplied by layers, the former mode should be rarely adopted.

BLACK WALNUT.—The trees are of large size with alternate unequally pinnate leaves. It is valuable for its timber, which is hard, of a rich deep brown and beautifully marked. It is much used for ornamental furniture, handles of tools, and gun-stocks. Put the seeds in the ground in the fall, or keep them in a damp place through the winter and sow in the spring, but where neither of these things have been done, and the sowing is desired, they will grow very well the coming season if put into cold water until they have become thoroughly soaked. Plant the seeds in rows about 1 ft. apart and from 4 to 6 in. apart in each row. As soon as they are 6 in. high, spade them up and transplant where it is desired they should grow. In digging be careful to leave the nut on the root when it is to be transplanted. They are quite difficult to transplant and it is perhaps best that the seed should be placed in the permanent position at first. The nuts of this tree are much liked by some people; the green ones are used to pickle.

CATALPA.—A fine wide-spreading tree which attains the height of 50 ft., with a diameter of 2 ft. In color, the bark is a light shining gray. It possesses a durability and power of resistance to the influence of the elements possessed by no other wood. The young trees should be set 2 ft. by 4, cut back and cultivated like corn for 3 years. The common or southern form, *Bignonioides*, is tender north of 40°. The western form, *Speciosa*, is quite hardy. The Japan variety, *Kempfers*, is a small growing, hardy, early blooming variety. The *Teases* is a hybrid of great value.

CHESTNUT.—This is a deciduous tree of con-

siderable size. The timber is coarse-grained, strong, elastic, light, very durable, handsome and easily worked. Its natural home is a barren soil. It may be sown in autumn or in spring, and if delayed till the latter season, the chestnuts must be kept from moisture and frost, which is done by placing them, after taking from the burr, in a large box, the bottom of which is covered with straw. They are then put in with alternate layers of straw and sand, till the box is full. The fruit will sprout a little during the winter, and as early as the season will allow, they are carefully taken out without breaking the radicle, and placed in baskets or upon hurdles, to be carried to the place ready for planting, which should be done with as little exposure as possible. Place 2 chestnuts in each hill, and at a time when the soil is not wet, for the chestnut gathers dampness very easily. If planted in autumn they should be covered with some 3 in. of earth. Almost every chestnut that comes up from seed grows but a few years before it begins to show signs of decay and a sprout comes up from the bottom which is better than the parent; cut off the seedlings and let these sprouts grow.

CORK.—A native of Europe; though it may succeed on the Pacific slope and in the states south of 36°, but does not stand our dry inland climate. It is a species of the oak and grows to a height of 30 ft. The wood is of a reddish brown and very tough. It does not begin to bear acorns before it is 12 or 15 years old, and the acorns are not fertile nor the yield abundant until they are 30 or 40 years old. The seeds are fertile when the cork is sufficiently good to make bottle stoppers. The trees which yield small oblong or round and bitter acorns, produce coarse cork; those bearing large and sweet acorns, fine cork. A southern exposure is the most favorable to its growth. Granitic lands and sandy silicious soils are very favorable to the rapid growth of the cork tree, which seems almost to absolutely reject those which are purely calcareous. It grows spontaneously in virgin soils, where silica or silico-argillaceous compounds are abundant. The acorns should be gathered, if perfectly ripe, in the latter part of November or the 1st of December. To protect the young plants from the cold, heat, and excess of light, mix other kinds of seeds with the acorns. About the 12th year, the alien trees may be cut down, and 2 or 3 years later the cork trees should be pruned. Repeat the pruning every 4 or 5 years. Transplanting the young trees should be done in damp or marshy places. This can be done at any time the young trees can be taken up without hurting any roots. As soon as possible after taking from the ground, cover the roots with moss or straw, if they are to be carried far. They should be planted in belts or squares, which is done by cutting out squares measuring 4 ft. each way, in the existing growth of shrubs and young trees, and planting a few acorns in the center of each square. It will not do, however, to follow this latter plan with close soils, for the water would accumulate in the centre and injure the young plants or seed.

COTTON-WOOD.—This is a species of the poplar. For characteristics see the *Poplar*.

CYPRESS.—Next to the yellow pine in importance. It is evergreen, of a conical figure, tapering upwards, with close set branches growing upright. Its lumber finds a variety of applications. It is mostly sawed into planks for exportation; much of it is used in the manufacture of doors, window sashes, and other cabinet work, and in that of shingles. For posts it is scarcely rivaled, resisting the action of water for ages. It grows in immense quantities in the low swampy grounds contiguous to large rivers in the warmer parts of the U. S. The *White Cedar* is a variety of the cypress.

ELM.—A native of the forest, but often grows spontaneously in open fields. The trunk, with a diameter of 3 ft., towers to the height of 30 to 70 ft., perfectly straight and naked, when it divides into 2 or more primary branches. These ascend, gradually spreading and dividing into other long, flexible limbs, bending in broad, graceful curves. The wood is tough and strong, but not easily wrought; used for the naves of wheels, etc. The finest kind of elm wood, that which is hardest and closest in grain and consequently takes the highest polish, is largely used for furniture. The seeds should be sown as soon as ripe; these are mature in the spring or early summer. Cover lightly; keep the ground moist and partly shaded; they favor a soil rich with potash; the seed is easily gathered and requires no skill in handling or planting. There are several species, the chief being the *Cork, English, Red, Rock, Small-leaved* and *White*.

EUCALYPTUS.—The wood is hard, durable, takes a good polish, and is rather pale in color; it is used in ship-building, carriage-making, and the manufacture of poles and railway-ties. The lower leaves are broad and heart-shaped; the upper ones turn edge-wise, long pointed and curved flatwise; leaves emit a strong aromatic odor when rubbed. The trees have the power to absorb moisture to such a remarkable degree, that if a swamp be planted with them, it will be entirely dried up and the malarial influences dissipated. The trees sometimes grow to the enormous size of 400 to 500 ft. in height, and over 80 ft. in circumference. The seeds should be started in wooden boxes large enough to hold 12 or 24 seedlings. When grown enough, carry to the place to be planted; take them out with a curved trowel, and set without disturbing the soil; press down the earth in the hole; cover the roots with fine rich soil; water as soon as planted, and from time to time, until the leaves are well started. It will not endure a temperature much below the freezing point. The blue-gums are the best known species, but the iron-bark withstands frost best.

HICKORY.—Large, beautiful trees, attaining a height of 70 to 80 ft., with pinnate leaves. The timber is very heavy, strong and tenacious, but decays speedily when exposed to heat and moisture. Great quantities are used to make hoops for casks; also for handspikes, musket stocks, shafts of carriages, handles of whips, large screws, etc. It is greatly valued as fuel. The nuts of many species are excellent eating. In planting the seed, plow the ways 4 ft. apart;

follow the marker with a roller which will not efface the mark; do this the first week in October, or maybe earlier; take a sack of nuts with the hulls on, as soon as they get ripe enough to grow; take a hoe, and at each crossing of the check-rows plant a nut about 1½ in. deep, stepping hard upon it; next spring run a harrow over the ground as soon as the frost is well out; when the trees come up cultivate them the same as corn, being careful not to bruise in any way; mulch in the fall sufficiently to keep the weeds out the next spring; if any should come, keep them pulled. To transplant with success, the tap-root must be cut off underground with a long sharp chisel, to cause it to throw out small rootlets; after they are established, the young tree may be removed. The *Pecan* is a variety of the hickory, and requires similar treatment.

HOLLY.—Grows in gravelly, stony soil. It does not need much care after planting. The family includes 3 genera, of which the Ilex is the most important. It embraces 145 species. The *Common Holly* is an evergreen tree. The *Dahoon* grows 25 ft. in height. The *Yaup-on* is a shrub. It is much used for inlaying. The *Mahonia* is the American representative of the family and a shrub of much beauty.

Holly.

HORSE CHESTNUT.—A highly ornamental tree of the largest size. The wood is white, very soft and unfit for use where much strength and durability are required. It requires a deep, free loamy soil, and is always propagated by the nut, sown in autumn or spring, and covered with from 2 to 3 in. of soil.

IRON WOOD.—Grows in the tropics and the warmer parts of the temperate zone. Wood very white, hard and strong, and much used for levers and ship building. In burning it gives out an intense heat, and charcoal made from it is nearly equal to anthracite. It is propagated by seed sown in the spring or early summer. It needs little care, but grows well when a little sheltered by other trees. There are but 2 species, *Ostrya Virginica*, found in the New World, and *Olneya Tesota*, found in the Old.

JUNIPER.—A bushy shrub with evergreen, sharp-pointed leaves; all parts of the plant, when bruised, exhale a more or less agreeable odor. The wood has a reddish color, used occasionally for veneers; also in the manufacture of wooden-ware; soft, light, easily worked, pleasant hue, and of a fine grain, admitting of high finish. Varieties differ greatly. Some require a fertile soil; some grow on hills, in valleys, on open sandy plains, or in moist or close woods. Start them in a nursery; set them in spring with the slightest possible exposure of the roots to the air; water well; in a dry climate protect them on the south side; when old enough, transplant with care. The seeds are hard to germinate and should be placed in a box and mixed with damp wood ashes during the winter before beginning to sow. There are 25 species widely distributed over the northern hemisphere. The principal ones are as follows: *Red Cedar.* Largest and most widely spread; much used for posts on account of its non-decay.—*Western.* Loose, reddish bark.—*California.* A stout shrub or small tree; rarely 30 ft. high.—*Savin.* A prostrate shrub, found in northern latitudes; spreads in dense masses over the rocks and sand. The *Irish, Swedish* and *Chinese* Junipers are beautiful ornamental shrubs that succeed well over a wide range.

LARCH.—A species of the pine and fir family. It attains the height of 60 to 100 ft., and an age of 200 yrs.; ovate-oblong cones 1 in. long and erect; grows rapidly; very resinous; does not readily rot; apt to warp; scales of cones attenuated at the top and do not fall off from the axis of the cone when fully ripe; leaves deciduous and in clusters; wood is remarkable for its durability, and may be used without seasoning when newly cut. If the soil and situation are likely to produce this tree, plant it as a pure crop; but if there is any fear of its being overtaken by disease, plant larch and Scotch fir in equal numbers, 4 ft. apart. Elevated positions are preferable to low ones; the ground should be sufficiently level for tillage. Prepare it, and mark out rows; in planting press the earth firmly over the roots; keep down all vegetation likely to interfere with the growth of the young trees; plant very early in the spring before the leaves begin to appear; if they assume a straggling form, when young, prune severely; cut off all side branches; when 10 or 12 ft. high, cut off all dead or sickly limbs; thin when necessary, at first slightly, removing only worthless or least valuable trees. There are 8 species. The most important are the *Tamarack, Western* and *European.*

LOCUST.—The wood is fine grained, yellowish, hard, and durable; the bark possesses anthelmintic properties. Keep the seed until May, then scald with boiling water, which will cause them to swell, when they will come up in a few weeks; sow in drills pretty thickly, and transplant into nursery rows when one year old, or plant at once where they are to remain. There are many species of this tree The principal varieties are the *Common Locust, Clammy, Rose, Honey, Water,* and *Red Bud.* Some varieties are upright and others have pendant or twisted and deformed branches.

MAGNOLIA.—One of the most highly ornamental trees, growing from 60 to 100 feet in height, in cool, shady places, where the soil is deep, loose and fertile, flourishing best near the great swamps found on the borders of the rivers of the South. It may be propagated by seed or layers. When propagated by layers, the shoots are put down in autumn, and require 2 yrs. to become sufficiently rooted for separation; they are then potted and kept in pits, or under glass, where the climate requires it to be protected, or set in the open air, in a shady place, if the climate is too hot, till wanted for final planting. In whatever manner this tree is treated, all the pruning it will require, after it has begun to grow freely, will be to cut out the stumps from which the flowers have dropped off.

MAPLE.—There are 12 varieties of this tree indigenous to America. The kind known as the *Greater Maple* is most serviceable in arts and manufactures, is extremely hardy in its nature, and grows to a great height. The wood is of a close fine grain, can be cut with ease, and is not liable to warp with heat or moisture. When it displays beautiful markings, with a mottled appearance arising form knots, it is technically called bird's-eye maple, form the supposed resemblance of such knots to the eyes of birds. The *Red Maple* is a rose-colored wood which is admirably suited for cabinet-work; but it is not strong, and when exposed to alternations of temperature and dryness rapidly decays. The *Sugar Maple* is cultivated for the sap, from which maple sugar is made.

MAPLE SUGAR, To Make.—Clear the woods of logs, brush, and other obstructions to the free passage of a team in collecting sap. The boiling house should be so the sap may be drawn down hill. If possible, place near a stream of water, so the vessels can be easily cleaned, etc. The boiling house should be well lighted, so that dirt of any kind may be quickly seen; the boilers should be placed in the centre, so that the attendant can readily pass on either side; have a good supply of seasoned wood, so that steam can be made rapidly, as quick evaporation is a very essential matter; have a reservoir for holding the sap, the bottom of which should be a little higher than the top of the boilers, so that the sap may run into them, with a faucet. It may be made either a square plank vat, or in the form of a broad hooped tub, and should hold at least a gallon for each tree. To prevent the wood from absorbing the sap, and thus producing sourness, the inside should be well painted. It should be covered, to exclude dirt; and for convenience the cover of a trough or vat should be in sections, opening by hinges. In large establishments it will be most convenient to have the reservoir a large tub or cistern, placed low down, so as to be easily filled, from which the sap may be pumped or ladled into a smaller feeding trough placed over the boilers. A partition of thick flannel, set vertically, should be placed near the end of the feeding trough, to strain out leaves, bits of bark, dust, etc., before the sap flows into the boiler. The worst kind of boiler is of cast iron, in the form of cauldron or kettle. The best are made of sheet iron, flat and shallow, so that the fire only reaches the bottom, as they rest at the edges for $1\frac{1}{2}$ in. on the brick or stone walls forming the fireplace. Spouts may be made of tinned sheet iron or of wood. When the former are used, hang the pail up against the tree just beneath the spout on a nail. The spouts should then be 3 in. long; let them be widest where they enter the tree and also concave; drive $\frac{1}{2}$ in. into the sap wood. Wooden spouts can be made of 1 in. board, 4 in. long and shaved large enough at one end to fit the hole in the tree; bore a hole lengthwise through them and $\frac{3}{4}$ in. into the tree. The pails may be tin or wood. If tin they should be largest at the top. The top should be stoutly wired, with a hole under the wire to hang on the nail or hook. Never allow the sap to stand in the vessels 24 hours. The fresher it is boiled the purer will be the sugar. If the sap sours in the wooden vessels at any time, they must be scalded again before using. When the sap is collected by means of horses and sled, simple open barrels or high tubs answer every purpose; if a circular board, 1 or 2 in. less in diameter than the inside of the barrel, float on the sap, it will entirely prevent it from splashing out. In districts of the country where there is much deep snow in the woods, it is sometimes easiest to collect sap in a cask placed on a hand sled, with runners 5 in. wide, made of thin boards, shaved thinner where bent. These are somewhat flexible, and on this account run over the snow with a load more easily. The collector should have snow-shoes, if necessary. Some good manufacturers use lime water to neutralize the minute portion of acid that exists in the fresh sap from the tree; 1 qt. of lime water to a barrel of sap is enough. Where brass or copper vessels are used for boiling, the lime water is indispensable in preventing a slight action on the metal, and dangerous consequences. It should be applied to the sap in the reservoir, before it is run into the boilers. The sap must now be boiled. In the morning fill 2 pans, and then build the fire. The sap in 1 pan will be boiling before that in the other; when it is, put the syphon in its place and gauge it so that it will just keep the first pan full; then start the cold sap from the holder so as to keep the other pan full also; strain it through a flannel, when reduced to 1-20, into a clean barrel; let it stand 12 to 24 hours. Draw it off carefully, through a faucet, leaving the sediment. To save all the sugar in this sediment, more sap is then applied, to dilute the syrup, which in a few hours is drawn off to be returned to the boilers. The next process is to convert the syrup to sugar. This may be done in one of the pans, but many prefer a separate brass kettle. In either case, the fire should be controlled easily, either by a damper in the flue or by hanging the kettle on a crane. When placed in the pan or kettle, to every gallon of syrup add a beaten egg and 1 gill of milk to clarify it, keeping it hot but carefully from boiling till the scum has risen and been skimmed off. If eggs cannot be readily obtained, then milk alone may be used. If it boils, the scum is broken and mixed again with the syrup. In 1 or 2 hours most of the impurities will have risen and been removed by a constant use of the skimmer, the fire having been allowed to slacken. The scum, which contains much sugar, should be saved, the sugar dissolved in sap, and the latter drawn off, as in the case of the sediment, already mentioned. Before the final heating is applied, again strain through flannel. The remainder of the boiling should be carefully but rapidly performed. The precise point of time when it will best granulate, is determined in various ways. When the bubbles rising to the surface burst with a slight or just perceptible explosion, from the tenacity of the thickening liquid; or if a drop hot from the kettle into 1 in. of water forms a distinct solid globule slightly flattened when it strikes the bottom; or if a drop between the thumb and finger will draw

out into a fine thread ¾ in. long—the process has gone far enough. It is then poured into vessels to granulate. To obtain dry sugar, place it in a tub, barrel, or hopper shaped box, with holes for draining off the molasses. To make white sugar, lay a few thicknesses of flannel on the top of the sugar while draining, these flannels to be wet and washed daily with cold water; they thus absorb and wash out the coloring matter.

OAK.—This tree grows on hillsides, along the banks of streams, on the prairies. To raise a good crop of oak trees, it is only necessary to plow the land or dig up portions of it; drop the acorns, and leave them to germinate and grow. They will come up without any pains being taken to prepare the seed, and will require no care. The acorns should be gathered about the month of October, or at the time when they begin to fall of their own accord, and carried to well-aired places where they may be spread evenly and raked 2 or 3 times a day until the dampness is off, when they may be formed into piles a foot deep and left till used. Varieties: *White Oak*, employed in ship building, and regarded as the best of all woods for fuel. The *Turkey, European, Red, Black,* or *Yellow,* are used as timber. The bark of many kinds is astringent and largely employed for tanning purposes.

PINE.—The soils in which the pine thrives are silicious, but not always to the exclusion of the calcareous, when associated with sand and clay. It grows very well in dry soil, but best in soil a little damp, covered with dry heather, where any arborescent growth other than of resinous species would refuse to live, or be of stinted growth, leaving the better soils for trees with deciduous foliage, such as the chestnut or the oak, that require a better soil, and bring an incomparably higher income. Of the 3 modes of forest sowing, in trenches, in drills, or in alternate rows, that should be selected which would best serve the end to be attained. The sowing in successive belts on terraces should be preferred for sloping grounds, and the clear spaces should be sufficiently wide to allow of complete forest growth. The belts should be narrower and the spaces wider as the slope becomes steeper. On level or slightly inclined surfaces, the whole surface may be sown upon a ground that has been worked; or, better, upon that which has been dug from 2 to 3 ft. deep, according to the soil. This may be done either broadcast or in lines spaced from 8 to 10 in. apart; the latter will facilitate the labor of weeding and dressing that will be necessary during the first year of the sowing. Upon maritime coasts and in all places exposed to violent winds, it will be necessary to set these rows in such a way as to break the wind, and not so that it shall take them lengthwise of the lines. Instead of sowing *in place*, the plants may be taken from a nursery and set where they are to grow, when they are 2 or 3 years old. As the young pines come up, they should be thinned out, leaving only those that appear strongest. The plants that are pulled up may be again set elsewhere in holes pricked in the ground, always remembering that evergreen trees should never be transplanted in winter, but before the stopping of the sap, or after its return, that is to say, in September and October, or in April and May. It is barely possible to raise the pines from seeds in the Central States south of 40°, without artificial shelter from the scorching rays of the sun. The best known species of this are the *Cluster, Maritime, Scotch, Riga, Mountain, Pitch, White* and *Yellow.* From the pitch pines are obtained turpentine, rosin and other resinous products, so important in commerce and the arts.

POPLAR. — Grows in a moderately damp soil, and is propagated by seeds, by cuttings of the young wood or roots, and from layers and layers and grafts. The seeds are ripe in the spring or early summer; when planted, cover them thinly with soil, and shade from the sun. All the species are rapid growing timber trees; broad, heart-shaped, ovate, triangular, deciduous leaves. There are about 20 species; the *American, Aspen, White, Lombardy, Large-toothed,* and the *Cottonwoods,* are the chief.

SEQUOIA.—Requires a heavy clay soil, a damp climate and moist subsoil, but prefers high lands to low; likely to be injured by severe frosts and east winds. It is only adapted to the Pacific and Southern coasts. Propagated from seed. Sow the seed in seed-beds in spring; it requires sufficient depth for its penetrating roots, and will not endure their mutilation; it also requires the greatest care in transplanting, which should never be attempted in cold weather, but toward the end of spring or beginning of autumn, and it should then be abundantly watered. There are but 2 species of this genus, the *Giant Tree* of California and the *Red Wood.* They grow to the height of 250 to 300 feet, and have a circumference of 40 to 64 ft.; bark reddish brown, 2 ft. thick; wood soft, strong and durable.

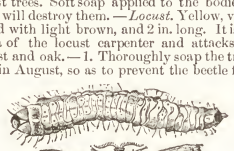
SPRUCE.—Requires a dry soil and southern exposure. Started from seed in the nursery and transplanted, it does not need any more care, with the exception of thinning the trees now and then, to allow the immature to grow to their full size. There are about 12 species of this genus. They have pendulous cones, with the bracts shorter than the scales. The *White* and the *Black* Spruce are the most important species; the wood of both is white, strong and elastic, but coarse-grained; much prized for flooring, building timber, yard arms, and small masts in vessels. *Engelmann's Spruce* much resembles the black; a tall, pyramidal tree, with a thin, scaly bark of a reddish or purplish brown color and a white, soft wood. *Blue Rocky Mountain* is another chief variety, grown to a large size.

TULIP.—An ornamental tree, attaining the height of 60 to 80 ft., with a diameter varying from 18 in. to 3 ft. The wood is fine grained, easily wrought, and polishes well; when employed in wide boards and exposed to the weather, it is liable to shrink and warp. The tree requires a deep, loamy, and extremely fertile soil, such as is found in the rich bottoms, lying along the rivers and on the borders of great swamps. It is seldom propagated except by seed. If the seeds are sown in autumn, they generally come up in spring; but sown in the spring they generally remain in the ground 1 yr.

WILLOW.—In regard to location, the best is that having a deep soil near a stream, where it will be generally soft and humid. The ground should be thoroughly broken up by a plow in February, if the season permits, and then planted at distances of 3 or 4 ft., with cuttings 15 or 16 in. long, and as large around as a finger. These cuttings are put in with the aid of a planting tool, and pressed down $\frac{2}{3}$ of their length. The cuttings of the first year yield sprouts of little value for use; but they should nevertheless be carefully cut, for if neglected they will be good for nothing the next year, except for brush-fires, because they will be too branching for any other use. When, on the other hand, care is taken to cut them down to the level of the roots, the shoots of the second year will be several in number, 4 to 6 ft. high and fit for use. Willows should be cut in February, or at least in March. The finest shoots are often 8 to 10 ft. long. They are cut with a strong cutting hook at a little above the root, which thus becomes a kind of pollard. The rods are used for common work with the peel on, but for fine ware are peeled by hand or machine. It is of utmost importance in peeling that no portion of the wood of the rod is scraped with the peeling tool, as it breaks there in working up and is unsalable. All the varieties are used as fuel, and in the manufacture of willow ware, hoops, poles, sheep-fences, etc. For wagons and wheelbarrows they are much esteemed, as they will not fracture, but will stand the hardest bumps. The *Bedford* is of a rapid growth; wood equal to the white. — *Redwood.* Light, tough and durable wood. — *Round-leaved* or *Goat.* Grows to a large size, with a tough, elastic wood; the bark is used for tanning leather. — *Russell.* Rapid growth; wood much used for poles, basket-making, etc.; the bark also abounds in tannin, and is medically an astringent and a tonic.

PESTS.

BORERS.—*Carpenter Moth.* A large, livid, reddish caterpiller, nearly 3 in. long; greenish beneath, and the head shining black; body somewhat flattened, and with scattered long fine hairs. Bores large holes and galleries in the trunks of locust trees. Soft soap applied to the bodies of trees will destroy them. —*Locust.* Yellow, variegated with light brown, and 2 in. long. It is the larva of the locust carpenter and attacks the locust and oak. — 1. Thoroughly soap the trunk late in August, so as to prevent the beetle from



Locust Borer.

laying its eggs early in September. — 2. Whitewashing and covering the trunks of the trees with grafting composition will prevent the female from depositing her eggs upon isolated trees. Young trees may be headed down to the ground, so as to destroy the grubs boring in them, and also to promote a more vigorous growth. An excellent preventive remedy is to collect these beetles early in September when engaged in eating the flowers of the golden rod. — *Pine.* These attack only dead or decaying trees, into which they bore deep oval tunnels that destroy their value as lumber. The eggs are laid in the rough crevices of the bark. In a few days the larvæ hatch out, and begin to cut their way into the heart of the tree or log. In a few weeks the larvæ are full grown, and assume the pupa form at the closed end of the tunnel, which is near the bark. The beetles soon emerge and cut their way out. Trees kept green and vigorous are safe from attack. Trees burned or cut in August are safe from injury during the same season, but should be sawed or got into water the next spring. Trees cut or killed before August will need attention the same season, and if killed in June are liable to serious damage. Trees can be saved either by peeling off the bark or by immersion in water. Cutting the bark from off the top of the logs only will be effectual, as it causes the bark to peel off. Dampness will not destroy the borers, but if exposed to the hot rays of the sun they die at once. Peeling off the bark not only secures against the attack of the borer, but helps to insure against fire, in case a little pains is taken to remove the bark a short distance from the logs.

ELM-LEAF BEETLE. — A pale, yellowish beetle, more than $\frac{1}{2}$ in. long, with the wing-covers twice spotted with blue; laying its yellow eggs in a cluster on the under side of the leaf in June, the grub appearing a week later, being brown, or yellowish brown, and eating the leaves into rags; towards the end of July or early in August entering the ground, forming an oval cavity a few inches below the surface; assuming the pupa state a week before they appear as beetles in June. Encase the base of each tree in a low, open box, about 1 ft. or 18 in. in height, placed at the same distance from the main trunk, having its lower part sunk 4 or 5 in. below the surface of the soil, the top capped with strips of bright tin, sloping inwards and projecting on both sides like the eaves of a house; paint the upper half of the inside boards every morning with coal tar or some other viscid substance; the larvæ will not be able to crawl over it, and the helpless and motionless pupæ will be found collected in heaps within the inclosure, and can be killed by thousands.

Elm-Leaf Beetle.

OAK PRUNER.—A long-horned, brownish

beetle, which cuts off the branches of the oak, apple, peach, hickory and chestnut. Does not make the incision from the outside of the branch, like the twig-girdler, but the larva cuts the twig from the inside. The egg is deposited in July, on a twig near the extremity of a branch. The larva when hatched penetrates into the wood, and forms a cylindrical burrow several inches in length in the interior of the branch, and, when full grown, eats away parts of the wood of the branch in which it resides, from the inside, leaving only the bark untouched, so that these branches are broken off in autumn by the first strong wind. Destroy it by gathering up all fallen branches under the trees in winter or spring and burning them.

SAW-FLY.—From midsummer until October, and sometimes as late as November, clustering on the twigs and smaller branches of the white pine,

Saw-Fly.

these are soft, smooth-bodied, yellowish-white worms about 1 in. long, with 3, and posteriorly 4, longitudinal rows of large black dorsal spots; late in the autumn transforming in tough brown pod-like cocoons attached to the twigs, within which they hybernate, changing to pupæ about the middle of May, the 4-winged fly with broad pectinated antennæ appearing about the 1st of June. Destroy the slugs by showering with a solution of carbolic acid, petroleum or soap.

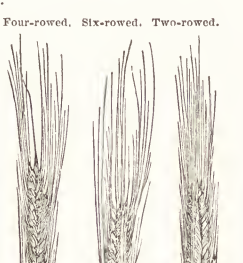
SKIPPER BUTTERFLY.—The larva is a large pale green caterpillar about 2 in. long, with a red neck and a large red head, with a large yellow spot on each side of the mouth, feeding by night on the locust, sometimes pupating between the leaves, and transforming into a stout-bodied, brown butterfly with a skipping, rapid, strong, low flight, and antennæ flattened and bent over at the end; the butterfly is brown; the fore wings are brown with a transverse semi-transparent band across the middle, and a few spots towards the tip of a honey-yellow color; hind wings with a short rounded tail on the hind angles, and a broad silvery band across the middle of the under side; the wings expand from 2 to 2½ in. They may be gotten rid of by hand-picking and collecting the leaves in autumn and burning them.

WEEVIL.—Rolls up the leaves of the oak late in April, forming compact, cylindrical cases containing a single egg; the case dropping to the ground, the larva after hatching feeding on the food around it, and finally transforming into a long-snouted weevil, which is small and highly polished black, with 2 large orange-red spots at the bases of the wing cover. The same methods of catching this weevil may be employed as with the curculio.

FIELD CROPS.

GRAINS.

BARLEY.—This succeeds best on sandy loam, but will adapt itself to almost every soil except a very moist one. It endures drought better than excessive moisture, but requires good tillage. The time of sowing varies with the locality. September is probably the best month in autumn, as the plant becomes in ordinary seasons sufficiently strong to go through the winter. When necessary to sow in spring, sow as early as possible. Drill culture is preferable to sowing broad-cast. Use 2½ to 3 bus. per acre. Barley ought to be reaped before it becomes dead ripe, as the husk then becomes thick and difficult of separation. The time for harvesting may be judged by the yellowness of the straw or drooping of the heads. In favorable weather it soon becomes dry after being cut. Care should be exercised that it does not get wet while curing, for stained barley is worth far less than that well cured and of a bright yellow color. There are 30 kinds of barley; they are divided into 3 sections, 2, 4, and 6-rowed. The 6-rowed is the variety usually sown, as it is hardiest and most prolific.



Barley.

BUCKWHEAT.—This requires a light, warm,

mellow soil; when planted on rich soil the straw is more abundant than the grain. The sowing of buckwheat must be deferred till all danger of cold is over. The middle of May is a good time; if sown later it is apt to be attacked by the white frosts of autumn, before its seed is ripe. Sow ½ to 1 bu. of seed to the acre. By sowing it in 3 or 4 different portions, at different times, a crop may be made sure of. The seed should be covered up with a harrow, and not in furrows, and requires no further attention than guarding it against the depredations of birds. The ripening of the grain is very unequal, for the plant is continually flowering and setting. It must be cut at the time when the greatest quantity of grain is ripe. It sometimes happens that the first flowers do not set, or that they produce nothing but barren seeds, destitute of farina, while those which come out later yield better seed. But the grain will ripen, and even the flowers set, while the crop is lying on the ground after cutting, especially if rain fall. Where it must be threshed by hand, a floor may be prepared in the field by scraping and sweeping a piece of ground, or laying down sheets. Lay over this a bed of rails 1 or 2 in. apart, raised from the ground sufficiently to make room for the grain when it is threshed. On these rails throw the straw as it is brought from the stacks, and thresh out the grain, which falls through the openings between the rails. The straw can thus be removed and separated from the grain very quickly. When all is threshed, remove the rails, and the grain may be cleaned on the ground if desired, without moving it to the barn. It is absolutely necessary to clean buckwheat as soon as threshed, or the chaff, being damp, will heat and spoil the grain in a few hours. There are 2 varieties, the *Broom* or *Black*, and the *Silver Hull*.

CORN, Indian.—Corn will not flourish on a very wet soil, no matter how rich it may be. Manure may be spread broad-cast upon the land previously to plowing, or applied in hills. Wood ashes are an excellent manure, and may be dropped upon the hills. It is common to make a mixture of these with lime and plaster; but no doubt the main benefit of the mixture proceeds from the live ashes. Poudrette is also applied, 1 gill to each hill. Deep plowing is not necessary; use the roller and pulverize thoroughly with the harrow. The closer the planting follows the plow and harrow, the better. Before the soil is dry it should be marked out, either for hills or drills. (For *Corn Markers* see WORK ON THE FARM.) The best results will be found in planting in drills about 3½ ft. apart, and 8 in. in the drill. As soon as the corn begins to push through the ground start the harrow. Go over the piece at least once a week until the corn is of such a height that the harrow will break it off; then use a wheel cultivator, or any of the various implements. Keep the field clear of weeds and the ground loose; begin as soon after planting as possible and harrow until the corn is 1 ft. high; then use the cultivator. The corn is usually cut off at the surface of the ground, as soon as the grain has become glazed, or hard upon the outside, and, while the blades are still green, put immediately into shocks, and thus left some time standing in the field. The corn, after becoming sufficiently dry, is husked and cribbed, and the stalks, with all the attached fodder and husks, are used for provender. Northern varieties: *Early Yellow Canada*. Small, 8-row. — *Holden*. Same as last, but more productive. — *Kingsbury's Excelsior*. Early, 12-row, yellow, growing larger every way than the others. — Southern and Western varieties: *Early Galena* (one of the best for late planting), *Chester County Mammoth, Illinois Yellow, Long John Evans, Proctor Bread, Southern Big Yellow*, and *White Gourd-seed*.

OATS.—This does best on a stiff, loamy soil. Plow deeply and harrow until the pulverized surface soil is 2 in. in depth. Then sow after a single plowing. In regular rotation, oats are chiefly sown after grass. One plowing is generally given to the grass lands, which should be done as soon in spring as the state of the weather and the other labors of the farm will allow. When oats succeed a green crop, the preparation of the land is the same as that for wheat. The seed should be sown just as early in the spring as the soil can be cultivated without lumping. Use the grain drill, and put in from 2 to 3 bus. to the acre. Cover 1 in. deep by thorough harrowing, then roll well. Cut just before the grain is fully matured. The longer it stands, the heavier will be the grain, but the poorer the straw for fodder. It must be cut before the danger of shelling becomes too great. If oats ripen unevenly, the best time to cut is when the latest grains may be shelled by the hand. They are sufficiently matured after passing the milk state, when the straw has turned yellow. Oats may be stacked like wheat, though they keep better in the barn. All that has been said regarding the harvesting, threshing and storing of wheat, applies to oats. They should not be allowed to get wet after cutting, as they discolor easily, and this injures their selling value. The following are the principal varieties: *Dutch Oat*. This is plump, thin-skinned, has white grains, mostly double, and the large ones sometimes awned. — *Egyptian*. This is grown in large quantities in the South.—*Georgian*. Large grained and very prolific.—*Houterson Winter*. This has a heavy grain, with a thin husk. — *Imperial*. A clean, bright, plump, heavy grain; it is hardy, and the heaviest raised. — *Pedigree Poland*. Early and prolific.— *Poland*. Thick, white husk, awnless chaff, solitary grains, short, white kernel, and short, stiff straw. — *Potato*. Large, plump, rather thick-skinned, white grains, double and treble, and with larger straw than any other variety. — *Red*. Brownish-red husk, thin and flexible stem, and firmly attached

Oats.

grains; an early variety. — *Siberian.* Black or brown grain, thin, rather small, straw large, and reedy.

RICE.—There are 2 modes of culture: the water and dry culture. Water culture: Commence planting about the 25th of March; trench the ground shallow, but wide; scatter the seed in the rows in the proportion of 2 bus. to 1 acre; hoe about the close of April; cover the field now with water; if the planting be late, and there is danger of grass, flood before hoeing; the usual depth is 3 in.; when the water is of proper depth, make a notch in the frame of the feed-trunk; if the rains raise the water above the notch, or it leaks out, let it off, or raise it accordingly; if seum or froth appear in 8 or 10 days; change the water by allowing it to run off with the ebb-tide and refilling at the next flood; keep the water on 15 to 17 days; allow the water to leak off for 2 days; then run the whole off and allow the field to dry; in 4 or 5 days hoe the field a second time; then stir up the ground; comb the fallen rice up with the fingers; about the 1st of July hoe the third time and pick it clean; again flood at the same depth as before; if the rice is flaggy and likely to lodge, support it by flooding it deeply. Dry culture: The ground must be thoroughly pulverized; sow the seed in June, in drills 30 in. apart, and cover lightly; after culture same as for any drilled grain. The time of ripening depends on the character of the season. The crop is ready to harvest when the grains at the top have turned yellow, are pretty hard, and the bottom grains still in the dough state. Cut the grain with sickles, bind it in bundles, and stack; in a week or two it will get through the stack-sweat and be ready for cleaning. The husks and grain are very difficult to separate. On regular rice plantations this is done by large stones, but in small quantities warm water and the hominy mortar are used. The operation is effected by means of a machine, which not only divests it of the husk, but polishes it at the same time. There are 4 varieties of rice, the *Clammy*, *Common*, *Dry* or *Mountain*, and *Early*.

Rice.

RYE.—The soil for rye may be inferior to that chosen for wheat, and it will succeed with less culture and manure. The soils best suited to its growth are those which contain the greatest proportion of sand. Those soils which contain a less proportion of sand are preferable; for, though it will grow upon ground of the poorest description, yet the produce will be more abundant upon good land, if it be not of a clayey nature. Any kind of manure serves well for this crop—green, rotted, or chemical. Rye exhausts land less than other grain. It may be sown either in the autumn or in spring, and, as in the case of wheat, the period of ripening is affected by that of sowing. The quantity of seed may be 2½ bus. to the acre, but, when grown for straw phait, this quantity is more than doubled. As it vegetates more slowly than wheat, it should be sown when the soil is dry; otherwise, the grain is in danger of rotting in the ground before it has completely germinated. Rye may be cut once or twice for green fodder before the joints are formed; cut it for grain before it is dry enough to shell; the general directions for raising wheat suit rye also. There is but 1 species which has produced 2 varieties, spring and winter. These are produced by the different periods of sowing, and resemble each other so much, that, when sown together, they cannot be distinguished.

Rye.

WHEAT.—The soils best adapted for the culture of wheat are the rich clays and the heavy loams. The soil should be well manured on a previous crop; then pressed down as compactly as possible with a heavy roller; the surface may be plowed and harrowed to make it mellow, but the ground under it must be compact; before plowing apply salt liberally to the field. For seed select the best heads, shell; then grade them, throwing away all the small seeds. Plant the selected seed in drills about 20 in. apart, dropping the kernels 2 or 3 in. apart in the drills; cover about 1¾ in. deep, and press the covering gently over the seed. Planting broadcast is objected to, because a uniform thickness cannot be obtained in the covering. The ground should be hoed just before planting. To get the best results, it is a good plan to use a machine that both hoes and sows the seed at the same time. The season of sowing wheat depends on the latitude, whether winter or spring wheat, and on the crop to which it succeeds. Where winter wheat is liable to suffer from freezing, spring wheat is much the safer variety; and by the new process of grinding the best quality of flour is obtained from spring wheat. Winter wheat is perfectly hardy, and will endure any amount of frost and cold, but freezing and thawing often play havoc with the crop, resulting in winter-killing. Stable manure with plenty of straw or other litter used as top-dressing serves well as a protection. It is sown before winter, when the land can be then prepared for its reception, as after fallow or potatoes; and it is sown in spring after cabbages, turnips, and such other crops as are not removed from the land till that season. The time of sowing must depend on the state of the land as well as the season. Put it into the ground as early as may be convenient in autumn; on strong soils sow in the latter end of September, in the course of October, and the beginning of November; 1 bus. to the acre of clean, plump seeds, on good land, in good condition, sown broadcast, is ample. When the seed is sown broadcast, cover it by the action of the harrow sufficiently to cover the seed. A double turn along the ridge, a double turn across, and again a single turn along, will generally suffice. As soon as the seed is harrowed in, water-furrow, to carry all excess of moisture off the land, by means of the double mold-board plow, with one horse, passing along

the furrows of the field and the furrows of the head-lands. Open furrows are also to be drawn through such hollow parts as the water might stagnate in, care being taken to sink all inequalities, that a passage may be afforded for the water to run off. The intersection of the furrows of the field with the e of the head-lands are also to be cleared out, and cuts made occasionally through the head-lands. On the lighter class of soils, plowing in the seed may be adopted. The seed is sown broadcast; after which a shallow plowing is given to the land, and, perhaps, a slight harrowing. The grain should be cut immediately after the lowest part of the stalk becomes yellow, while the grain is yet in the dough state, and easily compressible between the thumb and finger. If cut at this time, it will yield more in measure and weight, and a larger quantity of sweet, white flour. If early cut, a longer time is required for curing, before storing or threshing. The latter operation is usually done, by extensive wheat-growers, with a large machine, taken into the field, and driven by horse-power; with small farmers, a small single or double horse-machine, or hand-threshing in winter. If the grain is perfectly ripe, the straw thoroughly dried, and the sheaves free from grass or weeds, the wheat may be cut and shocked. Place the butts of 12 to 16 bundles on the ground; crowd the tops together as much as possible; break 2 bundles over at the band so as to bend them at right angles and place them, reversed, on the top of the shock to shed the rain. When placed in a stack, it should be well elevated from the ground. If the stack be large, a chimney of lattice or open-work should be left from the bottom, extending to the top, to produce circulation. The straw or chaff yields good fodder, when cut or mixed with meal or roots; it is also good for bedding for cattle, for manure, and should never be wasted. The stack must be of a good form in order to shed the rain. A good foundation should always be built at the bottom of the stack out of rails or timber for the grain to rest on. Whenever the butts of the bundles reach the ground it has a tendency to make the grain or that portion of it musty. Place the bundles close together on the outside courses, and then put the loose straw and rough bundles in the middle. Within a few days after the wheat is stacked it may be threshed; much depending upon its condition when stacked; but it is safer to let it go through the sweat in the stack. When it is threshed on the day it is cut, it is generally done by steam; hand threshing is not now much resorted to. The opinion is gaining ground that too new wheat is being used for seed, and that seed a year old, and specially grown and preserved for seed, will be more healthy and productive. The following are the principal varieties of wheat: *Clawson*. A white variety; large heads; large kernel; beardless; straw of medium height and stiff at the bottom. — *Fultz*. A smooth wheat, very evenly 6-rowed; straw stands well; chaff very close and adherent; grains short and plump, of a dark amber color. — *Hard No. 1*. Very hard; wheat giving more satisfaction than the softer grains. — *Harmon's White Flint*. Bran very thin, superior flour. — *Indiana*. White chaff; bald; white and large berry; thin bran. — *Kentucky White-Bearded*. White chaff; bearded; short, but heavy heads; well filled; straw strong; litters a little. — *Mediterranean*. Light red chaff; bearded; red berry and long, flinty, thick bran; inferior flour. — *Old Genesee Red Chaff*. Red chaff; bald; long straw; white and large berry; thin bran; superior flour. — *Red Bearded*. White berry; red chaff; beard standing out from the head. — *Virginia White May*. White chaff; bald; resembles White Flint in its growth and straw, but the heads are more clumped, the berry stands out more and shells easier; berry white and hard. — *Wheatland Red*. Red chaff; bald; heads of medium length; red berry; bright and large straw. — *White Provence*. Heads middling and bald; chaff bluish; large berry; thin bran; straw long, soft, small and liable to fall. — Besides these the *Amber* and *Rice* are new and promise to be very productive and fine sorts. *Dallas* is a fine wheat for the South, being very free from rust. It is somewhat tender in the Middle States. The *Clawson*, *Fultz*, *Mediterranean*, also the *Diehl* and *Golden-straw*, are excellent winter varieties; the *Black Sea*, *Rio Grande*, *Champlain* and *Defiance* are among the best spring varieties.

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GRASSES.

ALFALFA, or LUCERN.—Alfalfa will not thrive in a compact clay, or in any shallow soil with a hard pan subsoil. It prefers a rich sandy loam well drained, with a permeable subsoil. Plow, harrow, roll and pulverize it until you have a fine, mellow, seed-bed. Sow the seed as early as possible and cover slightly. Near the latitude of St. Louis it is proper to sow it from the 10th to the 30th of April; south of the Ohio it can be sown earlier. From 15 to 30 lbs. should be sown per acre. It is very important to get a full stand at once, as its growth is so rapid after it is established that it shades the ground too much for self-seeding to do any good; thick seeding makes fine stalks and thin seeding coarse ones. Broadcasting and drilling are both practiced; but if the soil is foul, drilling is preferable, as it admits of careful culture until the crop is able to displace the weeds. It has two characteristics which adapt it to regions subject to long-continued hot and dry weather. These are its very prolific and rapid growth, by which, after being cut, it quickly shields the surface by a thick green coat, and the astonishing depth to which it sends down its carrot-shaped tap root. Either crop will produce seed if you let it stand, but as the second crop will be freest of weeds and come at the best season of the year to perfect the seed, utilize that crop for seed. Cut when in early bloom, and as often as it comes in

bloom for hay, or yet still oftener for soiling.

BROOM CORN.—This crop takes a rich soil, as free from weeds as possible. A clover sod, turned under early, makes a first-rate bed for the broom corn. When sod is to be planted, some prefer to turn it the June before planting, and then give it a replowing in the spring. On poor soils any well rotted manure will benefit the crop. The fertilizer, whatever is used, should be thoroughly harrowed into the surface soil before planting. A rolling surface should be chosen rather than a flat one, on which water might collect and stagnate during the wet seasons. Broom corn should be planted at the same time of Indian corn, when the ground is warm. Whatever seed is selected it must possess strong vitality, which should be tested before sowing; and it should be chosen from the finest growths. 1½ gals. will plant 4 acres, which will produce on the avearge a ton of corn. Thoroughly pulverize the ground in spring; mark out the row 3½ or 4 ft. apart; distribute the seed with regularity and at equal depths to obvinte cutting a second time. It is sometimes planted in hills, but for general cultivation drill planting is generally practiced. The planting may be done with a drill or by hand. In hand-dropping, shallow furrows are marked out with a small plow, and the seeds dropped in a continuous row 2 in. apart, or at intervals, 5 or 6 seeds every 15 in. Cover with a light harrow or brush. A planter drops and covers the seed at the same time. When the plant is 2 in. high, run backwards and forwards between the rows with a 2-horse harrow, to kill the weeds, loosen the soil, and give the corn a start; then the rows require hand-weeding and thinning out to the proper distances. To prevent the brush falling down and growing crooked, bend down the corn as soon as the heads shoot out; be careful not to bend the stalks so low that the tops will touch the ground, or so much that the joints fracture, else the corn will be ruined; go over the ground and repeat the process until the heads are all out. The stalks left in the field should be plowed well under, to rot for the benefit of future crops. To obtain brush of a bright greenish color the corn should be cut while still green, and when at slight pressure milk exudes from the seed; if left later the tips turn red or brown, and should the ripe standing corn receive a shower, may even become black. Cut off the heads just above the upper joints. As they are cut off, lay the heads in the vehicle all one way, and haul to a dry shed where shelves should be arranged about 18 in. apart. Place the heads in dry stacks, where they may remain until the seed shall be separated. The stalks should be left 4 to 6 in. long, and the brush selected by handfuls and divided into long or short, crooked fine, medium or coarse straight brush. This facilitates scraping and also baling the various grades separately. Broom corn should be cured under cover, as exposure makes it brittle. From 2 to 4 weeks is long enough for curing. A covering and free circulation of air is all that is necessary. The seed may be separated by an ordinary threshing machine. The motion of the machine should be reversed, and the bunches should be held to the cylinder, turning them back and forth till all the seed is removed. Or they may be separated by means of a comb such as is used for flax. Or by means of a spiked wheel moved by a treadle. To prepare the brush for market, after the seed has been extracted, cut it 2 ft. from tip to butts, and pack in bales with the brush lapped in the middle and the butts to each end. The bales are pressed by a lever and are tied by 5 wire bands; weight about 200 lbs. each. Of the various varieties the *Chinese*, *California* and *Missouri Evergreen* are most in demand.

CLOVER.—Sow in February or March, and, if practicable, when snow is on the ground, which, melting, carries the seed down and into crevices left by the frost, there to germinate. Seed frozen will become imbedded in the soil as it thaws, and is soon covered. If not sown early it is better to wait until the frost is out of the ground, and then sow, harrow and roll. The harrowing and rolling will cover the seed and do good to the plants; any disturbed by the teeth of the harrow, will be pressed back in their places by the roller. As a fertilizer, 50 lbs. of plaster per acre will often have as good effect as the larger doses of 100 and 200 lbs. that are recommended. Wood ashes on many soils will be found a useful application. While the quantity of seed depends much upon the weather, the crop is largely increased by mowing or feeding off the first, or hay crop, as early as possible. Clover is frequently turned under in the fall, to enrich the ground preparatory to a crop of wheat, or in the ensuing spring for the benefit of Indian corn. The best time for turning down is in the rankest and most juicy stage of its growth. Clover leaves the field after the second year, unless allowed to seed itself. When timothy has been sown with it, it obtains possession of the field, where it is generally allowed to remain 2 or more years longer. The proper time to cut clover is after it has blossomed and begins to turn brown, about the last of June. It should be cut when dry, free from dew, allowed to wilt, and then turned over until it is evenly wilted all through. The harvesting of the seed crop may be effected with a machine for the purpose, which simply removes the heads, or the cutting can be done the same as it is with the grass crop. Dew or rain will not hurt grass while it is green. The next morning, after it has been cut and the dew is off, rake the partially dried grass into small windrows. Turn them immediately after dinner, and toward night rake into larger windrows and put into cock. Turn or spread out the cocks the next morning, and draw in the hay in the afternoon. When thoroughly cured the crop should be taken to the threshing floor or barn and the seeds beaten out with light flails, or, better still, with a threshing machine, especially a clover huller and separator.

COMMON GRASSES. — To seed down land to any of the well known pasture and meadow grasses, put the land into the best possible condition either by thoroughly summer fallowing, or by growing upon it the previous season some crop, like potatoes or corn, that requires

clean cultivation, in order that all weeds, and the inferior kinds of grasses, may be destroyed; then, at the usual time of sowing grain in the fall, sow on the grass seeds desired and nothing else. The more the ground is harrowed and pulverized, the better. A seed bed for the smaller grasses would be better than for any of the ordinary kinds of grain. Bone dust or tankings or some fertilizer in which the nitrogen is not in the form of ammonia, and not soluble, is the best for late autumn application to grass. Such a manure has some immediate effect, yet is not washed away in solution by heavy rains, but shows its potency in the spring. Leached ashes are also an excellent application on poor grass land. From the middle of August to the middle of September is the best time to sow grass seed. If sown early enough to get the full benefit of the fall rains, the grass will become sufficiently well established before winter sets in to yield a fair crop of herbage the following season, either for pasture or hay. Timothy should always be sown in the fall, and may in some climates be sown with safety as late as the middle of Oct. It seldom does well when sown in spring. All the other grasses must either be sown in spring or not later in fall than the last of August or the 1st of September. The following quantities per acre should be sown; Clover and timothy (alone or together), 1 bus. to 8 acres; clover and orchard grass (together), 1 bus. of the former and 5 bus. of the latter to 10 acres; orchard grass alone, if the seed is perfectly clean, 1 bus. to the acre, otherwise 2 bus. to the acre. The same proportions are observed for Randall grass. Clover, 1 qt. per acre; orchard, 1 pk, per acre; Randall, 1 gal.; red top 1 gal. per acre. Under the term meadow is included all such lands as are kept in grass chiefly for the sake of hay-crop. Meadows situated along the banks of rivers and streams are the most valuable. If the land is liable to the oozing out of springs, it can be remedied by draining. Upland meadows require more attention than valleys and low lands, being more difficult to drain, and requiring frequent manuring, as the roots of grasses never strike deep into the soil. Boggy land is least valuable, but when thoroughly drained and tilled, large crops may be obtained at comparatively small expense. Do not leave any one seeding to lie more than 2 or 3 years before breaking and tilling, so as to thoroughly overhaul the land, and then reseed it, giving it a change of crops and a change of condition, which well agrees with almost any soil. Grass will hold in longer when the land is cultivated a year or two in hoed crops. Sowing turnip seed with grass is sometimes a good practice, if the work is done very early and the turnips are not too thick. By judicious flooding the yield of grass land may be doubled. (For method of flooding, see *Irrigation* in Tillage.) Do not pasture meadows the first season, except slightly by young cattle, as the weight of heavy animals destroys the crowns of the plants. Sheep should never be allowed to run on young grass, as they nip so closely as to kill the plant. If a meadow has been used for years without being manured, either break up the field and cultivate grain or root crops; or loosen the soil by running a subsoil plow 1 ft. deep at intervals of 2 ft.; apply manure generously, and then roll the field. Broken and uneven land often makes very excellent pasture. If a portion of a pasture is high and a portion low, a good supply of feed may be secured from the time the frost leaves the soil in the spring till it enters in the fall. Pastures of nearly uniform surface generally fail to afford a supply of grass during the entire grazing season. The cheapest and most practical manner is to have 2 pastures. Let the grass have a good start in the spring, say 4 in., before turning on the stock, and change pastures as often as the pasture appears to be closely grazed. A variety of grasses and other fodder plants is essential to good pasture. The greater the variety, the larger will be the amount of food produced. The pasture requires constant care. As grasses disappear from any cause, seed should be sown that the full amount of feed may be supplied. The hand-scythe or mowing machine should be used to cut weeds and tall grasses that run to seed. Cultivated grasses should be cut as soon as they are in full blossom. They may yield more lbs. of hay if allowed to remain uncut a few days longer, but it will be of inferior quality. Early cut grass and clover will make more milk and flesh than when they are allowed to remain in the field until the seeds are nearly or fully ripe. When grass and other forage plants are cut while they are yet tender and properly cured, a large proportion of them will be digested. By cutting rank grass and clover early, danger of injury by lodging is avoided, and the prospect of securing a second crop increased. Cut red top, June and orchard grass, and possibly a few other varieties, first. Red clover should then follow, letting the cutting of timothy come last. All the grasses cannot be cut at the same time, for they do not flower at the same time. Close mowing of upland meadows is injurious, as the action of the hot sun and dry weather following harvests affects the roots of the grass most unfavorably when left without some protection. Wet mowing grounds will bear cutting close and be benefited by the same influences which would dry and burn up an upland meadow. Where the practice is followed of top-dressing the meadow immediately after taking off the grass, close mowing is also permissible. Grasses which are cut 2 in. high will start much quicker and thrive much better than when shaved close to the ground. Fine grasses, when the season is not a very dry one, may be cut lower with safety than the coarser kinds. Grass made into hay in such a manner as to retain the most possible of all its natural juices, makes the richest and best hay. In order to do this, it should be exposed to the sun as little as possible, as a bright, clear sun is apt to burn and reduce the quality. Curing hay in the cock is preferable to sun drying. The sweating and fermentation improve and prevent heating in the mow or stack. Put up the hay after the dew is off, in moderately large cocks (4 ft. wide and high), after it has lain spread in the sun 1 full day. It may thus stay safely for a week, if necessary, and a hay cap will protect it from a 24 hours'

rain. The day it is drawn in cocks it should be opened early so as to get a final airing for 2 or 3 hours before it is taken up. The coarser grasses require still longer time to cure than timothy grass. Timothy will dry sufficiently in one day, if the weather be propitious. During the early part of the season 2 days are usually required for properly curing heavy grass. Care should be taken not to cure hay too much, but to get it in stack or in the mow as soon as it will bear it. Hay should be stacked just as near as possible to where it is going to be fed out. Substantial supports, made of iron or timber, and elevated at some distance from the ground, will insure stacks against moisture in the ground, protect them against vermin, and allow a free circulation of air beneath them. Stacks of hay, cornstalks, etc., may be ventilated by making a hole perpendicularly through the centre, with apertures through the base and top of sides of the stack to admit a current of air. The orifice should be constructed when the stack is being built, which can be done by filling a bag of the requisite size with hay or straw, placing it upright in the centre of the stack, drawing it upward according as the stack rises. In this way a chimney will be formed in the centre of the stack, which will carry off the steam, if the hay or corn-stalks should ferment, and by admitting air will prevent damage from mold. The top of the air-tunnel should be protected by a roof, to keep out rain. By the use of a hay elevator, a load of hay may be transferred from a wagon to the mow or stack in a very few minutes. In forming the stacks, a layer of straw is usually spread over the bottom, or stand, and the hay is then regularly spread and trodden down, observing to keep the middle of the stack well raised. In this manner it is carried up to the height of several feet, projecting slightly to the eaves, so as to overhang the sides, to guard the lower part from rain. The roof is then raised to a considerable height in a slanting form, with gable ends, and, being thus formed, the loose hay which projects from the sides and ends of the stack is pulled, until all is smooth and regular, and the stack is then bound down with ropes. Salt, in small quantity, is sometimes strewed upon the hay, as the building of the stack proceeds, to stop fermentation, and render the hay palatable. Varieties: *Annual Spear*. An early, sweet grass, much relished by cattle, but it will not stand drought. — *Barn*, or *Barnyard*. Flourishes on moist, rich, or well manured soils; is very succulent and nutritive. Flowers in the latter part of summer and beginning of autumn. *Black*. Grows luxuriantly along the margins of salt marshes liable to periodical overflow by the tides. When cut early and well cured, it makes a very excellent hay, although not equalling in weight that of many other varieties. — *Crab*. A native of India; is an early grass, which requires a moist, rich soil. — *Crested Dog's Tail*. Grows well in upland pastures, and affords a wholesome food for sheep. It flowers somewhat late, and makes a beautiful covering for lawns in the latter part of summer, forming a close turf and having rather fine foliage. — *Crow-foot* succeeds well in a moist, rich soil, and makes excellent hay. — *Darnel-spiked Fescue*. One of the most valuable grasses in cultivation, either for permanent pasture or lawns; it springs early, is very productive, very nutritious, and improves by age; it thrives on all good soils, and increases in bulk if pastured for many years. — *English Blue* or *Meadow Fescue*. A valuable pasture grass, as its long and tender leaves are much relished by stock. It succeeds well, even in a poor soil, and as its roots penetrate the earth 12 to 15 in., it is not affected, except by exceedingly dry weather, and is as valuable a fertilizer as red clover. When cured like timothy, it yields a very superior quality of hay. — *Evergreen* requires a light soil which is subject to wash with heavy rains, as the roots form such a compact mass as to render injury from this cause almost impossible. It forms a heavy sod, and its long, fibrous roots strike deep into the ground. It grows rapidly from early spring until winter, and remains green and fresh all winter. — *Floating Fescue*. Flowers in June, and delights in very wet grounds. Horses and cows are very fond of it, and the superior excellence of some kinds of cheese is said to be caused by the peculiar richness and flavor which it imparts to the milk of cows fed upon it. — *Foxtail*. Very much resembles timothy, for which it is sometimes mistaken. It is extensively grown in the Middle states, and flourishes on any fertile soil which is not wet. — *Guma*. One of the most prolific grasses under cultivation, and will bear drought when all surrounding vegetation is destroyed. If suffered to go to seed it becomes too coarse for hay; but in its green state, it is eaten by cattle with avidity. — *Guinea*. A most prolific and nutritive grass. It is a perennial plant, and may be cut 4 or 5 times during the summer. — *Italian Rye*. Flourishes best on fertile, well-watered soils; but does not equal timothy in its nutritive qualities. — *Kentucky Blue*. This is known in some sections as *Green Meadow Grass*, and *June Grass*. It makes excellent pasture, succeeding finely on hill lands, and producing the most nourishing food for cattle; retaining its qualities till a late period in winter, and further south affording abundant food throughout the winter. — *Meadow Foxtail*. A perennial grass of early growth and hardy nature. It grows well on soils which are in good condition, and is very productive, continuing to shoot forth flowering stems until late in autumn. — *Meadow Spear*. Flowers late in June; and, being a hardy plant, succeeds as well on low, wet grounds, as it does on light upland soils. It is eaten readily by cattle during the winter season, though it is not much esteemed because of its coarseness. — *Narrow-*

English Blue.

Kentucky Blue.

leaved Meadow. Forms a fine permanent pasture. It flowers in June, and before that time, its leaves, which are soft and succulent, attain the length of 12 in. — *Orchard.* Generally known in England as *Cock's-foot*, and the seed is sold as such in foreign seed stores. It comes to us from Europe, and adapts itself to all varieties of soil. Its stems are very leafy; it does well in the shade of trees; it gives a heavy aftermath; and it is in its best condition in blossom, at the same time as red clover; all of these being in its favor as a meadow grass. For pastures it is quite as valuable, starting quite early in spring; pushing a new growth very rapidly after it has been grazed over; lasting late in the fall, and enduring drought better than almost any other. — *Perennial Rye.* A very valuable variety for permanent pasture, and makes a large return in hay; very nutritious, and stock are very fond of it; succeeds best on moderately moist land, for which it is peculiarly adapted. — *Pony.* Considered one of the best winter grasses for the Western States; grows in close, thick, elevated tufts, and continues green through the cold season. — *Red Top.* A favorite grass on wet, swampy meadows. Its thick, interlacing roots consolidate the sward in such a manner as to prevent the feet of animals from sinking through. As a pasture grass, it is only valuable when mixed with other varieties. — *Reed Meadow.* Grows in wet soils; contains much nutriment, and is greedily eaten by cattle. It is too aquatic in its habits to allow of an extended culture. — *Ribbon.* Well adapted to boggy grounds; yields a large product, either in hay or pasture, and is much relished by cattle; it requires a soil well saturated with water. — *Rice.* This flourishes in swampy lands in the South; may be cut several times during the summer, and furnishes a hay fully equal to the best timothy. — *Salt Marsh.* Grows in muddy spots, overflowed by sea-water. Cut green, and made into hay, it furnishes good food for horses and cattle, which eat it with a relish, on account of its saline flavor. — *Sheep's Fescue.* Forms an excellent pasturage for sheep. It grows from 6 to 10 in. high, and flowers in June. — *Smooth-stalked Meadow.* Makes an excellent hay, and affords the richest of pastures. It delights in a moist soil, but thrives most luxuriantly in rich meadows. It is useful for making a straw plait which very closely resembles Leghorn. — *Sweet-scented Vernal.* Delightfully fragrant. It is of dwarfish habit, and is sown on grounds intended for pasture on account of the early feed it affords, and for its rapid growth after being cut. — *Tall Fescue.* A native perennial; very luxuriant and productive, but not a favorite on account of its coarseness. It grows well in boggy meadows, and flowers in July. — *Tall Meadow Oat.* Blossoms in May. Is preferred by horned cattle before all other grasses, and yields an abundance of good, sweet hay. Mixed with clover, it makes a good upland meadow. — *Timothy, Cat's Tail*, or *Herd's.* Flourishes in all soils except such as are wet, too light, dry, or sandy; is easy of cultivation, hardy, and very productive. For milch cows and young stock, it should be cut while it is juicy. May be sown upon wheat or rye, in the spring or early fall. — *Wood Meadow.* Grows from 1½ to 2 ft. high; has a perennial, creeping root, and an erect, slender, smooth stem. Its chief value is, that it will produce a crop of hay in moist, shady situations, where it frequently grows quite tall. Cattle are fond of it; it is succulent and nutritious, and is perhaps the best variety for sowing in orchards, under trees and shaded situations, either for hay or pasturage.

Orchard.

Perennial Rye.

Red Top.

Sheep's Fescue.

Timothy.

HUNGARIAN GRASS. — This is a species of millet. It has a close head, and millet a looser and more broken one. It will grow on any soil of sufficient richness to raise good corn and potatoes, the richer the better, provided the manure has been applied to previous crops. The ground before sowing should be thoroughly pulverized by harrowing and made smooth and level, that the seed may not be buried too deep. Sow when the ground is warm and dry, or immediately after corn planting. If portions of the field are sown with a few days' interval between, it will not be ready to cut all at once, which may prove a convenience in a large field. Cover the seed with a fine or smothering harrow and then roll the surface. 3 pks. broadcast are enough for an acre. Cahoon's sower is well adapted to doing the work evenly. Hungarian grass smothers all weeds and leaves the land in good condition for wheat. It makes good hay, and a good deal of it if the land is rich. It is a good crop to plow under, to enrich the land. For feeding green, Hungarian grass should be cut as soon as large enough for a good swath. For hay, it should be cut as soon as it is all headed, and before the seed is formed. 2 or 3 days may be required for thorough curing of Hungarian grass, including turning or shaking up before raking, and opening the cocks.

MILLET.—This requires a dry, rich, well pulverized soil. The seed should be sown at the time of sowing corn, and not earlier, in drills 4 ft. apart; when well up the plants should be trimmed out to 2 ft. apart in the rows. 2 lbs. of seed will plant an acre if properly sown. The soil should be tilled to a considerable depth for its reception, and plowed 3 times, besides harrowing, rolling, and weeding. Pearl millet requires light, sandy soil. It may be cultivated in drills, or sown broadcast, and on the richly manured land the yield has reached 100 tons of green or 16½ tons of cured fodder in a season. When cultivated for fodder the seed should be dropped in drills and given plenty of room. As soon as weeds make their appearance among millet which is just shooting above the ground, they must be eradicated; thorough weeding is an indispensable operation in the culture of millet. Millet grows very fast and is ready for cutting in 6 weeks when sown on good soil. If used for green fodder it should be cut before the first seeds have begun to ripen; if for grain, just before the seeds begin to fall. Pearl millet is matured in 45 days after planting, and 3 crops may be cut from the same planting. The fodder is in the best condition for cutting when the stalks are 5 or 6 ft. high; but if used for soiling it can be cut earlier or later. Millet may be cured like hay. That portion of millet which is intended for seed should be preserved in a dry and airy place, and should be threshed when wanted. Varieties: *Golden*, or *German*. Close panicle, broad leaves, and grows very rank and high, giving a heavy burden of fodder. — *Pearl Millet*. Seed larger than any other variety; on very rich lands the stalks grow to ½ in. in diameter.

SAINFOIN. — Sainfoin is best adapted to limy soils, but will grow upon any light soil which has a free or open subsoil. It may be sown with a crop, in the same manner as clovers and grasses. It should be sown broadcast, rather than cultivated in rows, and the seed should be of a good and tried kind, perfectly fresh. If ground is to be mown for successive years for forage, then, on such soils as are suited to it, it is a good crop, being easily grown, hardy and productive. When sown merely to produce 1 crop of hay, and then to be depastured for such a period as may be thought suited to the nature of the soil, it answers well; but in this case it is better sown with a proportion of white clover and rye grass. When used for soiling, it may be cut twice; when used for hay, it should be cut once, and the aftermath depastured. It may be used for herbage as well as for forage. When made into hay, it should be cut just when it comes into full flower. It is not very apt to be injured by heating, and may be put up more quickly than other hay plants.

TARE.—It is regarded as a pest, but is sometimes grown for fodder. This is a hardy annual, best adapted to clay soil, but will grow in any rich soil, not over dry. In a moist climate, the stalks grow so luxuriant, as to rot at the bottom; and in one over dry, it is deficient in length. For an autumnal sowing 1 plowing is sufficient; but for a spring sowing a winter and spring plowing is necessary. The winter variety is sown in September and October; the spring variety should be sown as early as the season will permit. Sow broadcast. The quantity of seed to an acre is from 2½ to 3½ bus., according to the time of sowing, and whether they are to be consumed green or left to stand for a crop. When intended for seed, less is sown than when grown for soiling or drying the stalk. Varieties: *Spring*. Where the land is foul, and requires to be 2 or 3 times plowed in spring, or where a late crop is desired, or crop for seed, this is the better variety. — *Winter*. If the object is to have early feed, the winter variety is to be preferred.

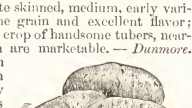
ROOTS.

FOR the cultivation of Beets, Carrots, Horse-radish, Parsnips and Turnips, see same in VEGETABLES, ETC.

PEANUT.—A light, clayey soil, filled with pebbles, is best for peanuts. As the soil affects the color of the peanut, the brighter the clay and pebbles the more valuable the crop. Uplands are better than bottom-lands. Peanuts require a clean soil; they will follow any hoed crop to advantage, with the exception, perhaps, of sweet potatoes. Corn land is generally preferred. Plow the ground with a 1-horse plow, in March or April, to a depth not exceeding 4 or 5 in. If the land is thin and needs manuring, open furrows 3 ft. apart, and strew in 100 to 125 lbs. of Peruvian guano, or from 150 to 200 lbs. of superphosphate of lime; mix intimately with the soil; then ridge over the furrow and throw the whole surface into 3 ft. beds, reduced to within 2 or 3 in. of the general level of the field; mark off rows 2½ or 3 ft. apart; drop 2 kernels, carefully hulled by the hand, at the intersections of the rows, and cover from 1½ to 2 in. deep with a hoe. Fine dirt only must be used in covering, as the plant is very tender at the outset. If the plant does not appear within 10 days of favorable weather, replanting must follow, because the cut-worms or moles have probably destroyed the hill. Red peanuts are generally planted in ridges, the kernels being from 8 to 12 in. apart and 2 in. deep. Keep the ground mellow and clean; throw the soil up to the red, but leave the white level. Cultivation ceases usually about the 1st of August. The time for harvesting the crop is from the 15th to the 30th of October, immediately after the first frost. When the crop is forward, or when it is an object to get a portion of it early in the market, the operation may be commenced in the latter part of September; but the longer the vines continue to grow, the greater will be the number of sound pods. Select a time when the weather is settled and favorable, and with pronged hoes loosen the vines along the rows; pull up the vines, shake the dirt from them, and leave them in the same place. In dry

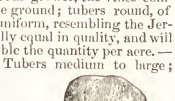
weather they will be sufficiently cured in 2 days to be stacked. Showery weather, though it may somewhat delay the curing, does no injury. Stack around a pole 8 ft. high, the roots inside; place logs, with the ends on poles, on the ground, to prevent mold from dampness; leave a little space around the pole, that air may circulate from bottom to top; cap with hay or corn-fodder. Put up in this manner, the nuts may be securely kept all winter. After remaining about 2 weeks in the stack the picking should be begun, taking off none but the matured pods, which should be picked off by hand. They are then screened in a cylinder, sunned a few hours, and put into sacks containing 4 or 5 bus., and are ready for market. Varieties: *Red.* Erect stem and few roots; adheres more closely around the stem than the white. — *White.* Grows flat upon the ground, spreading out and forming a rigid and deflexed stalk, from which the forming pods grow into the ground where the nut is formed.

POTATO.—A rich sandy loam is best suited to the potato. In all heavy soils, it is more subject to disease, and the flavor is much inferior. Manure is applied either in rows or hills, or broadcast over the hills and plowed in. If the soil is good but little manure is required. The best fertilizers are plaster, lime and superphosphate of lime. Very early potatoes are sometimes forced by laying tubers in a warm moist cellar; there they grow and form tubers which sometimes obtain high prices in winter and early spring. Or they may be started in a hot-bed, setting them out in rows in open ground after they are furnished with green leaves. Select for seed none but the best. Cut a large potato into pieces of 1 eye, leaving a due proportion of the potato with each eye. Plant as early as the ground can be had in fair working condition, in hills or ridges about 3 ft. apart; covering in light, warm soils about 4 in. deep, but in cold, wet situations, 2½ or 3 in. will be sufficient. Thorough cultivation during the early season is necessary. After the vines begin to bloom, when the potatoes are near the surface, cultivation should cease beyond pulling out any weeds that may make their appearance. Strawing is being adopted to save hoeing and secure immunity from the Colorado beetle. After the potatoes are up 3 to 6 in., straw is put on the ground 4 in. deep. This keeps the ground cool and moist and in dry seasons secures a good crop. The straw leaves some soils in bad condition. Potatoes should be harvested as soon as they are ripe; otherwise the tubers may start into a new growth. They are much more apt to be affected by rot if left long in the soil. The spading fork or the pronged hoe are the most desirable implements for digging potatoes by hand. They do quicker work, and do not bruise or cut as the hoe is apt to do. Allow them to lie on the ground until thoroughly dry. Early potatoes should be marketed as soon as dug, or placed in thin layers or small heaps in a barn or cellar, and turned occasionally if there are signs of heating. If this cannot be done, it is better to leave them in the ground until cool weather sets in. The expense of handling potatoes is so great that, as a rule, those farmers make the most profit, especially in the case of early potatoes, who ship them directly from the field. Varieties: *Beauty of Hebron.* Very productive; white skin and flesh; a good keeper, and excellent for table. — *Burbank's Seedling.* A white skinned, medium, early variety; flesh of fine grain and excellent flavor; produces a large crop of handsome tubers, nearly all of which are marketable. — *Dunmore.* Tubers medium to large; skin white, slightly russeted; eyes few and small, quite even with the surface; very productive. — *Early Ohio.* A few days earlier than the Early Rose, and similar in color and habit of growth; is more productive, and equally as good for table and market purposes. — *Early Rose.* A standard variety for earliness, quality and productiveness. — *Early Vermont.* Similar in color and form to the Early Rose, but much more hardy; a better keeper, more productive, better quality, and from a week to 10 days earlier. — *Improved Peach Blow.* One of the best late varieties; a very vigorous grower, the vines completely covering the ground; tubers round, of medium size, very uniform, resembling the Jersey Peach Blow; fully equal in quality, and will produce nearly double the quantity per acre. — *Magnum Bonum.* Tubers medium to large; very uniform in size, with very few eyes, quite deeply set at the seed end, which is almost square; produces few small tubers, and is of excellent quality. — *Mammoth Pearl.* Skin white; tubers medium to large; eye quite even with the surface; very productive, and for table use or marketing is an excellent variety, being exceedingly flowry and well-flavored. — *Pride of America.* Very productive, growing to a large size; flesh exceedingly fine grained and of snowy whiteness; cooks quickly and evenly, dry and flowry, and has no hard centre or core. — *Snowflake.* Ripens about the same time as the Rose; tubers of medium size, oblong, somewhat flattened, very uniform, eyes quite even with the surface; skin



Early Ohio.

Early Vermont.



Magnum Bonum.

Mammoth Pearl.

White Star.

white, with a russety tinge; either baked or boiled it is dry, mealy, and of the finest flavor. — *White Star.* An excellent white potato, with slightly russeted skin; tubers large, long, and of the finest quality; a strong grower, very productive, and may be classed among the best varieties for table use or marketing.—*White Elephant.* Tubers very large, long; color light pink, with a white blotch around the eyes, which are quite numerous and slightly depressed; grows to an immense size; not hollow, very productive, and of good quality.

White Elephant.

SWEET POTATO.—Sweet potatoes succeed best in a light, rich, warm, sandy loam, and are propagated by tubers or by cuttings of the stem. Prepare the soil by plowing and harrowing The latter part of May or the first of June is soon enough to plant sweet potatoes. If the plants are to be set in hills mark out the ground with a plow in rows 3 ft. apart each way; otherwise let the rows be at least 3½ ft. distant. For hill planting apply 1 shovelful of good, very finely composted stable manure at each intersection of the furrow and cover it with 2 or 3 hoefuls of soil. When the plants are to be set in rows, scatter the manure as evenly as possible along each row and cover by turning 2 furrows directly over it. Apply the manure liberally and be certain that it is fine and mellow. Plant in the evening, the plants to be 15 in. apart. With the right hand make a place for the plant; set it so that not more than 2 in. of the top will remain above the surface; press the earth firmly about the roots, leaving a little depression, into which pour 1 pt. or less of water, and when it has settled entirely, go back and draw the dry earth over all. Or simply water the hole thoroughly first, and plant as above. The season must be very dry and hot if the plants need any additional watering. Keep the sides of the ridges clean until the vines cover them. Do not cut deeply in the ridges with any implement. Their shape must be kept intact, for here it is the potatoes form, standing upright in a cluster about the stem, the tops next the surface. If weeds appear after the vines have run somewhat, they may be turned over with the handle of a rake, the weeds killed and the vines replaced. If weeds appear after the vines cover the ground they must be pulled by hand. If wet weather causes the vines to take root at the joints, they may be raised by running a rake-handle under and lifting them up. In the fall the potatoes should be dug before frost kills the vines. If they should happen to be killed by white frost, they must be cut next the root before the sun strikes them to thaw them, if possible, and the crown covered with a mound of earth. In this way the potatoes will continue to ripen for some time if the weather holds moderate. If the blackened vines are allowed to remain when thawed, the potatoes will become blackened, spotted and worthless. Dig the potatoes on some dry, warm day. Allow them to dry somewhat in the sun, and remove them to some moderately warm, dry, airy room, without bruising, to season for 1 or 2 days. They may then be packed in barrels, either with or without dry sand. Thus, if placed where the temperature will not vary much from 50° F. and is dry, they may be kept for use until midwinter. There are numerous kinds of sweet potatoes, chiefly distinguished by size and color, which ranges from a rich yellow to white and red. Varieties: *Brazilian.* A very large, short, thick, truncated sort; often weighs 12 lbs.; of good quality; productive, but from its great thickness difficult to cook. — *Chinese Yam.* Well adapted to the deep, sandy, alluvial soil of the South. It is perfectly hardy; stem 12 to 20 ft. long; blooms small, profuse, fine cinnamon odor; leaves finely heart shaped; produces numerous bulblets at the axils of the leaves which are planted to renew the crop; tuber 2 to 3 ft. long and 2 to 3 in. in diameter, white, brittle, mucilaginous; of the quality and flavor of boiled rice; can remain in the ground for several years, increasing in size. — *Red Bermuda.* Old, and extensively grown; root long, tapering, and of good quality; requires deep, free soil. — *Red Spanish.* Pale red; root small, but good; an old variety, now often sold as *Red Nansemond.* — *West Indian Yam.* A type of the white sorts; has a long root of fair quality; stands drouth well, but requires deep culture; in wet seasons is apt to be boggy. The *Yellow Nansemond, Early Peabody,* and *Southern Queen* are also profitable varieties.

SPECIAL CROPS.

BEVERAGE & STIMULANT PLANTS.

COFFEE.—These plants can be grown in but few of the most southern places in the United States; in Mexico and South America they do well. The soil must be kept moist by means of small artificial canals. It is raised from seed in nurseries, and transplanted when about 6 months old. Plant the trees closely together, so that the thick foliage shelters their roots from the hot rays of the sun; a dry climate produces a better flavored bean than a moist; rocky ground, with rich, decomposed mold, agrees with it best. Place the plants 8 ft. apart, in holes 10 or 12 in. deep. First, clear the land thoroughly; make the soil as friable as possible; divide into beds with narrow paths between; put in the seed row by row; leave the holes

open for some time; when pulled up, throw the plants with crooked roots away; trim the roots with a sharp knife, then press down firmly in the hole; when plants are free from suckers and are 12 or 18 months old, begin tapping; regular pruning and scarching are necessary; no branch should be allowed to bear more than 2, or at the most 3 crops; then remove it to make room for a fresh one. Manures, consisting of bone dust, poonac, guano, lime, salts, wood ashes, burnt clay, pulp and cattle manure, are the best. The next thing is the picking; have the pickers provided with a gunny bag, holding 2 to 3 bus., and similar sacks fastened round their waist; into these the berries should be first put, and then into the larger vessels; the fruit should be gathered when resembling ripe cherries. After being gathered, they should be measured and thrown into a loft above the pulper in a heap; submit it to first process of machinery, the pulper, 24 hours after; let them remain 1 day and night for the process of fermentation; then wash off the mucilaginous matter; in 1 hour remove for the curing; spread out thinly and expose to the sun; in 8 hours it is ready for housing; milling is the next process, by machinery; the parchment and silver skin is removed by means of the friction of a large roller passing over the produce in a wooden trough; now submit it to the fanner; pass it through 2 or 3 sieves, when it comes away perfectly clean. Varieties: *Mocha, Java, Ceylon, Bourbon, Martinique, Rio,* and *Maracaibo.*

HOPS.—The soils most favorable are clays, and strong, deep loams, with a dry and friable subsoil. In preparing, destroy all weeds and have the ground well pulverized. The ridges should also be made level, and dung liberally applied. The most effectual preparation is trenching. Plant generally in rows, making the hills 6 ft. distant, giving a free circulation of air, and admitting the sun's rays. Plant in February or March; but if bedded plants, or those nursed for one summer in a garden, are used, by planting in autumn, some produce may be had the succeeding year. When root sets are used, October is the right time. The cuttings are procured from the old stools, and each should have 2 joints or eyes; from the one which is placed in the ground springs the root, and from the other the bind. Use the most healthy and strong binds, each being cut to the length of 5 or 6 in. Those to be nursed are planted in rows 1 ft. apart and 6 in. asunder, in a garden, and the others at once where they are to remain. In commencing picking, gather those first that are ripe, and not those that are largest. The certain indication of picking time is when the lupulin, or small globules of the bright yellow resin, are completely formed in the head of the hop, at the bottom of the leaves, and the leaves are readily rubbed from the stem. The hops should be picked clean, without leaves or stems, and, if possible, without dew on them; nor pressed too close, nor put in too large quantities, before going on the kiln, or they will heat. To dry hops, place them as they ripen in the drying room until a depth of 1½ or 2 ft. is obtained; then start the fire and open all the air holes; keep the temperature at about 180°; when the second fire is built, place some sulphur upon a pan of coals to bleach the hops. It will take from 8 to 10 hours to dry a kiln. When the stems break in bending, the hops are sufficiently dry. Let the fire go down and the kiln cool for 2 hours before throwing open the doors. The patent kiln is a great improvement upon this method. The *English Cluster* and *Grape* hops succeed best in this country, although there are several other varieties grown.

TEA.—There are a number of places in the Southern States in which the tea plant has been tried with a fair show of success, and its culture may yet be established in the U. S. The tea-plant delights to grow in valleys, at the foot of hills, and upon the banks of streams, where it has the benefit of a southern exposure. The soil best adapted to it is a rich, porous loam, containing a considerable admixture of vegetable mold; and the land must be thoroughly drained. The seeds are gathered in October, packed in sand for preservation during the winter, and in spring sown in rows, distant about 4 ft. from each other. From 3 to 5 seeds are dropped in each place, at intervals of 3 ft. along the rows. With the exception of stirring the earth, and eradicating the weeds, the plants remain undisturbed during the first 2 or 3 years, until they are well established, and putting forth strong and vigorous shoots. On properly managed tea plantations, a regular succession is always kept up, so that the failure of old plants is compensated by the constant maturing of an equal number of new. Plucking the leaves should not be commenced until it is in a vigorous condition. When the plants are in their third year, the first crop is usually gathered; and they continue to yield until they are 10 or 12 years old. The best time for gathering tea is while the leaves are small, young and juicy; and the first gathering should commence about the close of February, when the leaves are young and unexpanded; the second about the beginning of April; and the third during the month of June. Leaves intended for green tea are thinly spread out on trays, where they remain for 1 or 2 hours, in order that the superfluous moisture may be evaporated, when they are thrown into the roasting-pans, placed over brisk wood fires. In these pans they are rapidly moved about and shaken up by the workmen until they become quite flaccid and moist, and give off considerable vapor. After remaining in the pans 4 or 5 minutes, transfer them to the rolling table; take up as many as can be pressed together with the hands; work them up into the form of a ball and roll them upon the table until they are greatly compressed; continue this until all the leaves are used; then shake them out upon flat trays; let them remain thus for a few minutes, then again throw them into a pan; place them over a slow but steady fire and keep them in rapid motion with the fingers. In about 1 hour the leaves are well dried, and exhibit a dull green color, which subsequently becomes brighter. When a sufficient quantity of leaves have been thus treated, they are winnowed through sieves of different sizes, by which sev-

eral varieties of tea are made, according to size, and the whole cleansed from dust and other impurities. During this operation the coarse teas are once reheated, and the finer qualities 3 or 4 times, by which the leaves acquire a dull bluish-green color. The leaves which are to be manufactured into black tea are first heated and manipulated as above described; after which they are transferred to a tubular-shaped basket, somewhat resembling a dice-box, and containing a sieve. This apparatus is placed over a charcoal fire, where it remains but a few minutes, when the leaves are taken out, and again rolled; this operation being repeated a second, and sometimes a third time. When all the leaves have thus been treated, they are replaced in the baskets in bulk, and set over a slow fire, and, being covered over with a flat basket, are allowed to remain thus until quite dry; being carefully watched, however, and occasionally stirred, so as to expose them equally to the heat. A black color is thus produced, which subsequently improves. The other processes of sorting, sifting and reheating are similar to those used with the green teas. Teas are classified under 3 heads, *Green*, *Black* and *Scented*. The principal green teas are *Gunpowder*, *Hyson*, *Young Hyson*, *Twankay* or *Imperial Hyson*, *Japan* and *Java*, colored and uncolored. The principal black teas are *Congou*, *Moning and Kaisow*, *Souchong*, *Oolong*. *Orange*, *Pekoe*, *Canton and Foo Choo*, and *Caper*, and *Imperial* tea from Java. Scented teas have a foreign flavor and odor imparted to them by being placed during the process of manufacture with certain aromatic flowers. The blossoms of the sweet-scented olive are extensively used for this purpose, and impart to the tea a very fragrant and delicate scent. They are never used alone, usually being mixed with a variety of either green or black tea.

TOBACCO.—A dry, warm, deep, rich, sandy loam, containing lime, is the best soil. The land must be protected from winds and well drained. This plant is never raised from seed planted in the field where the crop is to grow, but from transplanting. Seed-beds for raising it are generally prepared by burning a brush-heap in a warm, sunny place, any time during February or March. Rake the brands out, leaving the ashes on the ground, then dig the soil 5 or 6 in. deep; rake smooth, lay off into beds 3 ft wide, and it is ready for sowing. Mix a tablespoonful of the seed with ½ pt. dry ashes, and scatter evenly over the bed. This amount will sow a bed 25 ft. square, and raise plants enough for 5 or 6 acres. Do not rake in the seed, but roll or pack the bed pretty solidly; cover it with brush or straw until spring opens, when it should be removed. The plants will soon after start, and in from 4 to 6 weeks be ready to transplant. Keep the weeds out, and if necessary water occasionally. When the largest leaves are 3 or 4 in. long, if the weather is warm, it is time to place in the field. Transplanting is done very much like cabbages and tomatoes. The hills should be about 3 ft. apart, 1 plant to the hill, and flat. Before transplanting, plow from 8 to 12 in. deep; then harrow until the surface is perfectly pulverized. The soil must be enriched with guano, or any kind of manure thoroughly incorporated. Lay off the field in rows 5 ft. 4 in. each way with a shovel plow. A small hill, at the crossing of each furrow, should be made, say 2 or 3 hocfuls of loose soil, to which give a sharp pat with the hoe in order to better retain the moisture after the plant is set. The after culture consists in giving the tobacco 2 hoeings. The first is performed while the plants are small, or as soon as they have commenced growing nicely, and consists in taking away a thin layer of the surface soil between and around the plants, and substituting mellow soil from between the rows; the second hoeing is done about 2 weeks later. Priming is pulling off the leaves next the ground, which, to the number of 4 or 5, have no value. A good rule is to prime 6 in. and top to 8 leaves; if the land is poor, the plant backward, the season advanced, and frost apprehended, the priming should not be carried higher than 4 in. If the soil is unusually rich, and there is danger that the top will come to the ground, then the priming must rise in proportion. *White Burley* requires the removal of but 2 or 3 leaves. Topping is pinching out the bud of the plant, in order to cause it to spread and mature, and also to prevent it running to seed; it should be postponed as long as the circumstances will allow, so as to top as much of the crop at one time as possible. A week after the plant has been topped, sprouts, or suckers, will start from the stalk at the base of every leaf. These must be pinched off, or they will try to produce seed, spoiling the growth of the plant. Keep them pinched off. This process has to be done 3 or 4 times before the plant's efforts to produce seed is finally overcome. Priming, topping and suckering should not be done during a rain, or when the plant is covered with dew, for rust invariably results, injuring the crop. Tobacco is ready to be cut when the leaves held up to the sun show yellowish, reddish, or brownish spots, feel sticky, and will break off short and clean when bent. It is usually cut with a hatchet, severing the stalks at the ground. Lay the stalks smoothly upon the ground and leave them to wilt until the leaves can be handled without tearing. Do not leave the plants out between 11 A. M. and 2 P. M.; load upon a wagon and drive to the tobacco house as soon as possible. Another method of gathering is to have sticks, 4 ft. long, and 4 in. wide; with a string tie 2 stalks together and hang them over the board; when 1 board is full, hang it in the tobacco house. Spearing is very frequently practiced; the laths are made shorter and narrower, and sharpened at once end and thrust through the stem at a short piece from the end. This method aids the drying out of the stem and saves tying. Principal varieties: *White Burley*. The most profitable filler and cutter. — *Sweet Oronoko* and *Flanigan*. Two of the best old-style bright fillers. — *Hester*, *Hyco* and *Yellow Oronoko*. The best varieties for yellow wrappers. — *Yellow Pryor* and *Gooch*. Good manufacturing varieties. — *Medley Pryor*. A good, dark, heavy variety.

Plants Used in the Arts.

CASTOR OIL PLANT.—The best land for the growth of the castor oil plant, is a light, sandy, loamy soil, with a substratum of clay. Almost any soil that will produce Indian corn will answer. The ground should be put in condition for the seed as for other crops. One thorough plowing, and 3 or 4 harrowings, with a heavy harrow, will be a sufficient preparation; full plowing is desirable, as it more fully exposes the particles of the soil to the influence of the frosts and the atmosphere, thereby pulverizing it and preparing it better for the seed. Lay off the ground in rows 5 or 6 ft. apart each way; except that between every 6th and 7th row, a distance of 8 ft. between the rows is left one way to admit a horse and wagon or slide to pass to take the beans when gathered. Hot water, somewhat below the boiling point, should be poured on the seed, and they should remain in this water 24 hours. The temperature of the water will, of course, be reduced to the temperature of the atmosphere. Applying the hot water once will be sufficient. If planted without this preparation, they are a great while in germinating, many of them not making their appearance for 3 or 4 weeks. Good, sound, plump seed should be selected; ½ bus. will plant 10 acres; 8 or 10 seeds should be dropped in each hill; when the plants are 1 ft. high, thin to 1 in a hill. Care should be taken to have the plants clean until 2 ft. high; they will then be able to take care of themselves, and will grow rapidly. After heavy rains, break up the crust between the rows and loosen the soil, to derive a greater benefit from the atmosphere. When the pods begin to turn brown, it is time to harvest castor oil beans. Pick 3 rows on each side of the wagon, the wagon running over 1 row; cut the pods from the stock with a knife. It is necessary to pick these about twice a week when the weather is dry and warm, or they will waste in the field. The picking season lasts 6 or 8 weeks. The pods are taken to a yard with a clean-swept surface and a tight board fence around it, and spread about; as they ripen and burst and the beans fly out, these are caught by the board fence and prevented from being lost. When the pods are emptied, they are raked up, and others are gathered and treated in the same way, until all are ripe. Do not allow the beans, when drying, to get wet; an open shed is best; if you have no shed, when the weather is threatening, rake into a heap, and cover with a tarpaulin or boards. They should be well fanned and winnowed before being sacked for market. The oil is procured by 2 methods, expression and decoction. 1. *Expression.* The seeds are first slightly heated, and subsequently subjected to powerful pressure under a hydraulic press, when a thick, whitish oil exudes, which is boiled for some time in a large quantity of water, until it dissolves out the mucilage and coagulates the albumen. The clean oil is then removed, and boiled with a very small quantity of water, to drive off the acrid principle. 2. *Decoction.* The seeds are bruised first, and then boiled in water until the oil rises to the surface, when it is skimmed off, and again boiled to remove the acrid principle. This oil is usually of a darker color than the first. Castor oil is used for medicinal purposes; for lubricating larger classes of machinery; for mixing with other oils; for burning purposes; as an excellent oil for the hair, and in mixing with paints.

COLZA.—Succeeds best on a rich, light soil, well manured and carefully worked. It flourishes in soils of a slightly clayey nature, if they are light in texture. Spring colza must be sown during the latter part of May, in drills, or broadcast. Winter colza is sown in 3 ways, broadcast, in rows, and in beds for subsequent transplantation. Drill barrows are used for sowing the seed in rows, which are laid off at a distance of 18 in. from each other—thus admitting of the use of a cultivator for clearing out the weeds. The period of sowing is generally from the 15th of July to the 15th of August, and about 6 lbs. of seed are used to the acre, when sown broadcast, but only about 3 lbs. when planted in drills; the seeds being dropped about 1 in. apart in the direction of the rows. If planted in rows, the cultivator is run through them in the month of March, to clean out the weeds, and loosen the soil; after which they require no farther attention until harvest. Winter colza matures about the beginning of July, and, as the seeds are apt to shed, it is necessary to cut the plants when the seed pods begin to turn yellow and become transparent, at which time the seeds, though still tender, are of a dark brown color, and will ripen in the stack or mow. When over-ripe, the plants are cut only in the morning and evening, while the dew is on them. If the crop is a heavy one, the colza, immediately after being bound in sheaves, is stacked in the field where grown, in cone-shaped stacks, so constructed as to exclude rain, where it remains until the grain has fully matured, which is generally in 8 or 10 days. The fermentation which takes place in the stacks, gives the grain a fine color, and adds to its quality. A small crop is taken at once into the barn, and threshed; but large crops are sometimes trodden out in the field by the feet of horses, the ground being covered with stout hempen cloth. If the seed is kept in bulk after it is threshed, it should frequently be turned and stirred to prevent it from heating, to which it is subject. As it keeps better when mixed with the chaff, it should only be cleaned when about to to be sold or pressed. To procure the oil, put the seed in bags and submit it to the pressure of a powerful press. The refuse is called oil-cake. The oil is used to burn in lamps, as well as for many other useful purposes. The cake remaining after the extraction of the oil, forms an excellent article of food for cattle, and is sometimes used as a manure.

INDIGO.—Indigo thrives best in a free, rich soil, and in a warm situation, frequently refreshed with moisture. In the West Indies it may be grown on comparatively poor, dry soils, but to most advantage in those that are fertile. In the Southern States, the plant requires a good, rich, deep soil. After the ground has been thoroughly plowed and harrowed, the seeds may be sown with a drill, in rows, distant from each other about 12 or 14 in. As the plants shoot up,

they must be frequently weeded, and carefully tended until they spread sufficiently to cover the ground; when cultivated in great quantities, the seeds are merely strewn rather thickly in little shallow pits, hoed up at a distance of 6 or 7 in. apart, and immediately covered with earth. Plants thus raised, thrive better than those sown in drills, but require more care in weeding; 4 bus. of seed will sow 20 acres. From rich land the yield in 12 months will average 500 lbs. of indigo to the acre; if kept free from weeds, the plant will yield 3 or 4 crops each year, as it rattoons, or sends up new shoots after each cutting. It must be replanted every season. They arrive at full perfection in 2 or 3 months. When in full blossom and the lower leaves begin to dry, they are ready to cut; while the morning dew is still on them, cut them off with a reaping hook a few inches from the root and tie up in bundles. After cutting, they are immersed in vats, where they remain until macerated. The liquor is then drawn off into another vat, in which it is beat until the fecula separates, when the latter is let off into a third vat, and allowed to stand for some time; it is then strained through cloth bags, and afterwards evaporated to dryness in shallow wooden boxes, placed in a shady situation. Before becoming quite hard, it is cut into square pieces, and packed in cases for shipment. Fermentation is not essential to its extraction, as a mere infusion of the plant in hot water deposits indigo by standing in the air. The only solvent of pure indigo is sulphuric acid, with which it forms a deep blue pasty mass, soluble in water, and largely used in dyeing. For the manufacture of indigo on a small scale, ordinary barrels will supply the place of vats; and holes bored in them at regular intervals from top to bottom will serve to draw the liquor off as required. The coloring matter of indigo is largely used in manufactures, principally for dyeing woolen and cotton fabrics, and for coloring morocco. Varieties: *Wild*, *Guatemala*, and *French*.

MADDER.—Madder needs a rich, deep, loamy soil, containing a considerable infusion of lime and vegetable matter. It will grow in light soils, if they are fertile and of sufficient depth, but they must be well manured. The sets are obtained from the surface roots of the old plants, or from seeds sown in the previous year, and transplanted in June. The selection of sets from the growing crop should be made when it is dug in the fall; those which grow horizontally, and have numerous eyes, are regarded as the best, and should be separated from the lower roots, and buried in the cellar during the winter; previous to planting, they should be cut into pieces containing from 2 to 5 eyes each. Plow the land deep in September and in October; let it lie in ridges during the winter to be acted on by the frost; when the ground is dry and warm in spring, plow again deeply and harrow well; strike the land off into ridges with a plow, making them 3 ft. wide, with water-furrows 4 ft. in width between. If the ground is moist, raise the ridges 10 or 12 in. above the surface; but if dry, 6 or 8 in.; then level and shape the ridges with a harrow. Plant in May, or earlier if there is no danger of frost. Stretch a line lengthwise the beds; with a hoe, make holes 6 in. from the edge, along both margins of the beds, and in the middle, leaving a space of 12 in. between each hole; insert the sets and cover from 2 to 4 in. deep with fine earth, and press it down with the foot. As soon as the plants appear above the ground, carefully hoe and keep free from weeds; when 10 or 12 in. high, cover the tops, except the extreme ends, with fine mold taken from the alleys; bend them outward and inward, so as so fill all vacant spaces, and repeat as often as the plants become long enough, in order to assist the plants to form new roots. The 2nd year the beds must be freed from weeds and the plants covered as before. Keep the edges of the beds as high as the centres, so the rains will not run off and the plants suffer from drought. The 3rd and 4th years little attention is required. Plow out the roots during September of the 3rd year in warm latitudes, and during September of the 4th year in colder climates. Remove the top of the plants with a sharp edged shovel, then with a plow turn a furrow outward, beam deep, around the edge of each bed; plow another furrow as before inside the last, and proceed until the beds have all been turned over. To cleanse the roots take them to a stream or pump; put ½ bus. at a time into a large sieve and wash well; then lay them on slanting platforms to dry. After the 3rd day's drying protect from dew and rain by covering with boards. In 5 or 6 days they will be sufficiently dry. Or they may be dried in kilns like hops. As soon as the roots are thoroughly dried, they may be kroken in a cast-iron bark-mill, and then cleansed by a fanning machine, after which they may be ground fine in a grist-mill, and packed in barrels like flour. If not packed immediately they gather dampness from the atmosphere, which prevents them from grinding freely. The addition of a little carbonate of lime while grinding improves the color considerably. The best coloring matter is prepared from the heart of the root, and the older roots are preferable to the young ones. Madder is a principal ingredient in nearly all the dyes used by calico printers; and for woolen goods it furnishes blue, black, purple, red, buff, orange, olive, yellow, brown, and many other colors.

RAPE.—The soil best suited to rape, is a rich, deep, dry soil. It is cultivated in the same manner as turnips, but requires less culture and manure. Sow the seed in May, in drills or broadcast. If sown broadcast, 4 qts. will be required; but if sown in drills, ½ that quantity will be sufficient. Keep the plants free from weeds and the soil in good condition. The seed ripens in July, and the plant must be harvested with great care to prevent loss of seed from handling. After threshing, the seed should be divided into small parcels and frequently turned. Oil is extracted from the seed by pressure and grinding, and when purified burns with a brilliant flame. The cake left, after the oil is expressed, furnishes a nourishing food for cattle. The seeds are used for the food of domesticated birds. When they are used as a green

food for cattle, its leaves are unsurpassed.

SAFFLOWER, or BASTARD SAFFRON.—Cultivated in various parts of Europe. Thrives equally well in a light soil, or in a rich, friable, black earth. Sow the seed in rows or in patches, 2 ft. distant each way in spring; after the plants make their appearance above the ground, thin to 1 ft. apart; stir the soil well and keep free from weeds until the flowers begin to expand. The petals of the flowerets are cut off as the flowers expand, and are dried. This operation is performed in the early part of each day until October, when the plants are pulled up, sheaved, shocked and threshed, to obtain the seeds. Some beautiful rose and scarlet colors are obtained from this plant, to be used in dyeing. Rouge is also obtained from safflower. The seeds furnish an oil, which is used by painters and in pharmacy.

SUMAC.—The soil best adapted to its growth possesses little clay, an abundance of lime, and a moderate proportion of silica; is naturally mellow, warm and dry after a rain. A hilly place is preferable to a plain, and a southern aspect to a northern one. It also requires to be cultivated alone and in the open sun. It is propagated from sprouts that come up around the mature shrubs. The best sprouts are those from shrubs in a good state of growth, and from regions where they prosper most. Plant them 26 to 27½ in. apart, in soil prepared by spading holes 26 to 30 in. square and 8 in. deep, or they may be planted in trenches. Begin at the head of the lines and fill in the soil upon the roots; work the spaces between so as to bring up the soil in parallel lines on the plantation. When finished, cut off plants to the height of 5 or 6 in. with a large cutting hook, taking care to put the foot down by the side of the stalk to prevent it from being pulled up. Keep the soil soft and porous around the plants and keep free from weeds. The hoe should be used where the culture is not deep. It gives a crop the 2nd year after setting out, and regularly thereafter. For the purpose of tanning white and delicately colored leather, collections are made in June; while for tanning dark colored leathers, and for dyeing and calico printing in dark colors, where the slightly yellow color will have no injurious effect, the collections are made in July. The plant must be cut in clear weather, and spread on a floor in such a manner as to allow it to dry rapidly; for, when fermentation begins in a small portion of it, the whole mass soon becomes seriously impaired. When dry, the plants may be cut up by a straw cutter, and put into sacks for market, or be ground fine in a bark mill.

SUNFLOWER.—The soil for profitable cultivation should be rich and sandy, but it will grow in almost any soil. Sow the seeds early in the spring in rows, leaving 2 ft. between each row. After the plants have attained the height of 3 ft. they need but little cultivation. Where the plants stand some time after the seeds ripen they will be self-sowing. Each flower will furnish about a gill of seed. The seeds, when fed in moderate quantities, are excellent for horses and poultry. The oil extracted from the seed is excellent for table use, being equal to olive oil for burning in lamps, and for the manufacture of soaps. The green leaves, dried and powdered, make excellent fodder for milch cows, when mixed with bran. The seed receptacles are made into blotting paper, and the inner part of the stalk into fine writing paper; the woody portions are consumed as fuel, and from the resulting ash valuable potash is obtained. The plant or flowers are remarkable for absorbing malarial poison, and should be planted near the house in all sections where malarial diseases prevail. Varieties: *Californian.* A handsome variety, bearing large, double flowers of a rich orange color.—*Green Centered.* A very double variety; the plant grows to a height of 4 ft.—*Helianthus Argophyllus.* A very pretty double sort, bearing a bright yellow flower of fine size with silky white leaves. There are other varieties which bear globular formed flowers of a bright saffron color.

TEASEL.—Requires a deep, rich, moist, loamy soil. Sow the seed in spring; but the plants are not available for use until the 2d year. To procure an annual crop, plant the seed in 2 rows, 16 in. apart, leaving a space of 12 in. between the plants in the row; at the distance of 4 ft. plant 2 more rows in the same manner, and so on over the field; 1 pk. of seed will be sufficient for an acre. Keep the plants free from weeds. In Belgium they are sown in spring; in August or September they are transplanted, and 12 months after this the first crop is gathered. Teasel is of a greenish yellow color when ripe. Harvesting is generally done at 3 different times, with intervals of 10 days each. The operator, whose hands are covered with a pair of stout gloves, is furnished with a short-bladed knife, having a string attached to the handle, which is passed around his wrist. He seizes the ripe heads, cuts them off with about 9 in. of the stem, and ties them up in handfuls with a perfectly ripened stem. In the evening they are placed in a dry shed, and, when the weather is clear, they are exposed to the heat of the sun until they become perfectly dry; they are then sorted for market. The burr must be 1½ in. long to be marketable. The burrs are used to raise the nap on woolen cloth. The seed is useful for feeding poultry.

WELD.—Fertile loams produce the best crops, but it will grow on a variety of soils. Plow and harrow the soil well, then sow the seed, either broadcast or in drills, in May, or later, and cover lightly; 2 qts. to 1 gal. are sown to the acre. If sown in drills, make the drills 12 in. apart, and as soon as the plants make their appearance above the ground, thin out until they are 6 in. from each other. Keep the plants free from weeds and the ground well stirred. The plants flower in July of the 2d year. When the bloom has been produced the whole length of the stems, and the plants are just beginning to turn of a light or yellowish color, they are pulled up by the roots in small handfuls, which are tied round with a wisp of straw or one of the stalks, and set upright in stacks of 4 or 5 bundles each, to dry; when sufficiently dry, which is usually in about a fortnight, they are bound up into larger bundles, ready for market. Used in dyeing.

WOAD.—Deep, rich, mellow soils produce the best crops, but a good crop may be obtained upon alluvial soils. Plow the ground deeply in the fall; replow in spring and cross harrow. Sow the seed broadcast, in March; but a better method is to plant in rows, allowing sufficient space to admit of a cultivator. When sown in rows, 2 lbs. are sufficient for an acre, but if sown broadcast, 5 or 6 lbs. are required. Steep the seed some time before sowing. Keep the plants free from weeds, thin and hoe. If sown early, the leaves of the plants are ready for harvesting in July, which is done as soon as the leaves are full grown, and while they retain their perfect green color. The leaves are collected in baskets, which are proportioned in number to the extent of the crop. They are picked off by hand, being grasped firmly, and separated from the stem by a sudden twist. In favorable seasons the plants often yield 2 or 3 crops of leaves. The after croppings should be kept from the others, as their mixture with the first would injure the value of the crop. To save the seeds, the leaves are allowed to remain on some of the plants during the second year; when it ripens in July or August, it is treated like turnip seed. The leaves are dried, ground to a paste, and after being left in heaps for about a fortnight, the crust formed on the outside of the pressed heaps is rubbed and mixed with the interior portions, and then formed into oval balls which are pressed into wooden molds. When required for the purpose of dyeing, the balls are broken into fragments and allowed to ferment, when a dense fetid fume arises. An infusion may be obtained by steeping the leaves in water, which will impart a green dye, and this green will change to blue on exposure to the air. Woad is used for what is termed "sadkening."

Saccharine Plants & Products

REMARKS.—The principal varieties are cane and beet root. The only difference existing between beet root and cane sugars is in the difference of the size of the crystals, those of the beet root being the larger.

BEET-ROOT.—The soil should be deep, mellow, free from stones, and abundantly rich. A deep, sandy loam, with plenty of vegetable matter, produces a profitable crop. A strong clay is not suitable, neither is a soil that is low and naturally wet and cold. Plant in rows at a distance of 2 ft., 6 in., from each other, and at intervals of 12 in. in the rows. Deep plowing and pulverization of the soil are essential to the full development of the root. Put the seed in the ground during March or April, and carefully tend the plants during the early stages of their growth, clearing out all weeds and thinning the plants where necessary. Moist weather is the most suitable for performing these operations, and a cultivator may be used with advantage. An application of phosphoric acid in the spring materially increases the yield of sugar. Harvesting is done largely with the plow. The beets should not be bruised. They should be thoroughly dry before storing, and are profitable for sugar purposes only when grown within easy distance of a factory. Of all the varieties the *White Silesian* is the best known. It is pear-shaped, penetrates about 12 in. into the ground, and throws out a great many rootlets.

BEET-ROOT SUGAR, Manufacture of. — The first step is to free the roots from foreign matters. For this purpose, they are thrown into a rapid current in a stoning machine. The stones are then collected by the machine and fall to the bottom. The roots are taken up by the current and tossed out of the machine. The roots, thus freed from all stones, are passed through a washing machine. The next step is the extraction of the juice, and this may be done either by rasping and pressing or by maceration. Rasping is accomplished by means of a machine, consisting of a revolving drum, armed with teeth. The roots are introduced by a hopper and are forced against the saw-like teeth. Water is injected at the same time, and the pulp falls into a receptacle below. The pulp is placed in woolen sacks, and these are put in the press with their mouths doubled under, and are separated by iron plates, and the pile is put on a movable plate of a powerful hydraulic press, which expresses 50 per cent. The next step to be taken, is maceration. The pulp is introduced into a press and the remaining juice extracted by an agitator. This must be kept in regular motion, not too fast. The juice thus obtained is passed into a vessel whose strainers detain the ligneous matters held by the juice. The juice is then clarified by simply boiling with the addition of a little lime. Raise the juice to a temperature of 122° to 167° Fahr.; then draw off the juice clear, press the scum, and collect the juice in a boiler, and treat with carbonic acid; produce carbonic acid gas by burning charcoal in a small furnace and injecting it into the mass. The next thing to be done, is the concentration of the thin juice; boil the juice until it becomes thick; then pass it into a cistern, where it must be heated to the boiling point; then filter through animal charcoal; remove the matter obtained by boiling in vacuo. The sticky mass obtained from the vacuum pan must now be crystallized. This is performed by centrifugal machines. The operations are now the same as in making sugar from the canes. (See *Sugar Cane Juice, Concentration and Defecation of, etc.*)

GLUCOSE.—This is sugar manufactured from any carbo-hydrates, starch, dextrine, cellulose, etc., but is generally prepared from corn starch, although potatoes are used largely and economically, especially in a productive year. 1. To manufacture it from corn, soak the shelled corn in hot water for a period ranging from 1½ to 5 days; if it is not to be fermented, the water is changed when it begins to sour; it is then ground with the ordinary burr stones, and with a stream of water running into the hopper with the corn. The mixture is then run on fine, vibratory sieves, with more water added; the finer, starchy part of the corn is washed through the sieves, while the hull, gluten and woody fibre go over the tail of the sieves, and after the water is squeezed from it by rollers is sold for

feed. The portion that went through the sieves is run into tanks and settled; the water is then drawn off, and the sediment again mixed with clean water and treated with caustic soda, to separate any trace of gluten from the starchy matter. It is next run into long, metal-lined troughs or vats; these descend slightly, and most of the water runs off at the lower end, leaving the sediment at the bottom. The sediment is left to settle and dry somewhat, and is then shoveled out, and known as green starch, about 50 per cent of it being water. It is now in a condition to be made either into starch, or into glucose. Water containing .01 of sulphuric acid is heated to the boiling point; a mixture of the starch and water is also heated and allowed to flow gradually into the water. After boiling this ½ hour, chalk is added, to neutralize the acid; the clear liquid is now drawn off and evaporated. The sediment forms the sugar. — 2. Moisten linen or cotton cloth, paper, or sawdust with concentrated sulphuric acid, and a gummy mass will be formed. After a few days dissolve this in a large quantity of water and boil 8 or 10 hours; add chalk, and proceed as if made from starch. — 3. Glucose from potatoes is made by a similar process as the above; the raw potato being grated into water and the feculn treated similarly to that of corn.

SUGAR CANE.—A perennial-rooted plant, attaining the height of from 6 to 12 ft., and surmounted by a terminal panicle, 1 to 3 ft. long, of a grayish color. A rich alluvial soil is best adapted to the sugar cane. It is a very exhausting crop, and the rich lands of Louisiana have become much exhausted by a continuous cultivation of it. It is propagated by cuttings. In Louisiana and the West Indies new canes are not planted every year; the roots retain their vitality for years, and continue to produce canes equally as good as those cut from the first planting. This system of culture is called "rattooning." In selecting plants from which to make cuttings, those with healthy, succulent tops should be taken instead of the hard, woody ones. In renewing a field, the canes are usually planted in rows, a space of 6 ft. in width being left between each row; make a series of holes in the ground in a direct line, in each of which place 2 joints of the cane and draw the earth loosely over them. With the exception of an occasional hoeing, the sugar cane requires little attention. To cut the canes seize them with the left hand, draw them forward, and with a single blow of the cane-knife, cut them off close to the root; then strip off their leaves, and divide them into 2 or 3 pieces, and they are ready for the mill. Varieties: *Otaheite*, and *Brazilian* or *Creole* grow in the West Indies; the *Bourbon*, *Red Ribbon*, *Blue Ribbon*, *Yellow Ribbon* or *Java*, *Green Ribbon*, and *Gray* are grown in the Southern States.

SUGAR CANE JUICE, Concentration and Defecation of, Etc.—To obtain the juice, the canes are crushed between powerful rollers. The juice flows into a pan placed beneath the mill, and it is then conveyed to the clarifiers, or pumped up into a receiver, and distributed where required. The canes, after being properly cured, are useful for fuel. The strength of the juice is tested by a saccharometer, which is plunged into it and the height at which it floats carefully noted. The defecation of the juice is conducted in pans, placed over flues so arranged that the heat can be shut off from 1 of the pans without interfering with the others. When the receiving-tank is full, the juice is conveyed into the defecating pans by a wooden gutter, and, when slightly warm, a sufficient amount of cream of lime is added to neutralize the free acid, and to assist in coagulating the vegetable albumen contained in the solution. When the heat is increased all impurities rise to the surface, leaving the clear juice below. On the appearance of ebullition the dampers are closed, and the juice allowed to stand about 20 minutes, when it is drawn off from the bottom, and conveyed to the first clarifier. The process of clarifying is conducted in 2 iron pans, lined with sheet copper, which are placed much nearer the fire, but higher up than the defecators. They are both in a line with the flue; but the first, which is the largest, and most remote from the fire, is placed about 2 in. lower down than the second. Both pans are surrounded by a gutter, and whatever overflows from the second during ebullition, finds its way back into the first, and all the impurities which escaped removal in the defecators, and which are skimmed from the boiling liquid in the clarifier, pass through an opening at one side of the gutter into a scum-kettle, placed alongside of the train. As soon as it settles, all the good syrup is again returned to the first clarifier by the aid of a pump, with which the scum-kettle is furnished. The juice, after being thoroughly purified, is conveyed to the evaporators, 2 in number, both surrounded by a copper curb, that around the smallest pan being the highest. This prevents the syrup from the first evaporator boiling over into the second, while at the same time it allows the overflow from the second to find its way back to the first. If sufficiently boiled to strike, the fire is withdrawn, and the syrup baled into a gutter, by which it is conveyed into the coolers, distant about 10 ft. from the second evaporator. The coolers are oblong troughs, usually about 10 ft. in length, 5 ft. in breadth, and 12 in. deep, made of 2-in. pine-boards. They are arranged in a double row, parallel with the train, and each has sufficient capacity for 3 "strikes," all of which are not run into 1 cooler consecutively, but into 3 coolers alternately, until that number are filled, when 3 more are brought into use. While cooling, the sugar is agitated with a small wooden rake, which is drawn through the mass once after each "strike." This promotes crystallization, and in a few hours the sugar sets or grains. A few days subsequently the sugar is dug out of the coolers, and carried in tubs to the purging-house, where it is emptied into hogsheads, the bottoms of which are perforated, to allow the molasses to drain away. When it enters the purging-house, it is a dark brown mass, containing about 40 per cent. of molasses; but, if the house be even moderately warm, this soon commences to drip into a tank placed beneath the open joists upon which

the hogsheads rest. As the sugar settles down the hogsheads are replenished, either with sugar which has already been purged, or with fresh material from the coolers. At the expiration of 1 month, or thereabouts, the hogsheads are headed up, and stored, or sent off to the place of shipment. Boiling by steam is practiced on many plantations, and has many advantages over the old process, though more costly.

SUGAR CANE, Chinese or Sorgo, and African or Imphee.—Sandy upland soil is best, black bottom soil is worst. New land yields good syrup. Land freshly manured gives poor syrup. Clay land gives good syrup, but not so large a yield. The soil, unless rich, should be well manured in the fall with vegetable or rotten stable manure. This is especially needed with clay lands. Plant in a ridge rather than a furrow; the seed should be soaked in warm water until an appearence of germination is perceived; let the rows run east and west; plant shallow and not thickly; if in rows, 4 ft. apart; if in drills, allow 4 to 6 in. between each seed; keep the ground free from weeds; the seed may be sown under glass, and planted in the open ground when about 1 mo. old. In sections where the cane is liable to frost in the fall, planting should be done early, as soon as the ground is thoroughly warm. As soon as the plant comes up, destroy the weeds and keep clean until ready for the plow. It is especially important to give the plant every assistance in the early stages of its growth, as it is a slow grower at first, and if left alone will be choked with weeds. As soon as the rows can be followed stir the soil about the hills. When large enough plow and cultivate same as corn. When about 30 in. high it may be turned out, as it is then able to take care of itself, and further plowing would only do damage by cutting the roots and injuring the stalks. The suckers should be pulled off, as they sap the strength of the cane. Cane should be cut when the seed is in the dough, and several days ahead of grinding, as it will be more free from impurities if cured a few days before going to mill. Top the cane by cutting off 1 or 2 joints, then cut and throw into windrows. If it is desired to strip the cane, it can be done now, by catching hold of the top end and drawing the stalks from the heaps. Bind the cane with 2 bands, having from 3 to 50 stalks in a bundle. It is believed by many that it is not necessary to strip the cane; unstripped cane yields more syrup and fuel than stripped. After a week or 10 days, if not wanted for immediate working up, the cane should be removed to shelter. The cane should never be left to be overtaken by frost before it is cut, or it will be seriously injured. When a severe frost is threatened the cane should be cut without stripping, and laid in windrows. The blades should not be stripped until the cane is wanted for grinding. By cutting before frost, and curing with blades on, the cane may be kept for a month, or longer, without injury. It should be protected from rain and frost as much as possible. The tops should be laid in piles convenient for gathering to dry, and may be left until the grinding is over. If not intended for use at once, cross pile the bundles, leaving suitable space for the circulation of air through the pile, or stand them up on ends, if by so doing it can be kept out of the dirt. The principal varieties of the Imphee are the *Liberian*, which has a deep red seed, the *Neeazana*, which has cream or wood colored seeds, and the *Oomseeana*, which has dark brown seed. The *Amber* is a variety of sugar cane which has the characteristics of the Sorgo and Imphee; grows quite tall; head not so open and branching as the sorgo. It receives its name from ripening early, and from the bright amber color which characterizes the syrup when properly made from it.

Sorgo, or Chinese Sugar Cane.

SUGAR CANE JUICE, Chinese and African, Concentration and Defecation of. Etc.—When the cane is to pass through the mill, let the butts enter first. Good work requires 3 rolls in the mill, that the mill be strong, and that the rolls run evenly and remain set in place. Immediately after the juice comes from the mill it must be freed from its surrounding impurities. Its quality will depend on the rapidity and skill with which this is done. The rough stuff can be disposed of mechanically by some such device as strainer wire, or coarse cloth, or straw filter, but the acids and other impurities held in solution can be freed only by chemical action and heat. The use of lime is the best method of neutralizing acids. Its application requires care and judgment. It must be pure and fresh, not used in its caustic state, but slacked frequently during the day, being reduced to the consistency of milk of lime. The exact quantity to be used depends entirely on the amount of acid in the juice and must be determined by an experienced eye, or tests with litmus paper. Next to lime, heat is the chief agent in defecation. Its effect depends upon its prompt application and proper distribution, as well as its withdrawal as required. On account of the rapidity with which the juice changes from exposure to the air, it is important that all the process of defecation should progress rapidly. In fact the defecation with lime and purification by heat should be combined, the juice running directly from the mill into the defecator. The lime is then added. There are 3 methods of concentrating or evaporating the sugar cane juice: 1st. By the direct application of fire only (as in kettles, common pans and the evaporator); 2d. By the use of both fire and steam (as in trains composed of fire evaporating pans, and steam defecating and finishing pans); 3d. By the employment of steam alone (as in the ordinary steam trains, or the steam trains with vacuum pan). While the steam train is complete in itself, a vacuum pan is often used, especially on the larger plantations, as an adjunct to it. In operations on a very large scale the use of steam for evaporating cane juice is preferable to

fire, as it allows perfect control of the heat, and is more expeditious. Through pipes the heating surface is immersed in the liquid, and it can not be injured by burning. It also economizes fuel and effects a great saving of labor. The steam train, as used in the most complete modern sugar works, consists of a series of vessels of different sizes, properly proportioned, and arranged in order, and all supplied within with steam heating pipes, connected by branches with a main pipe from the boiler. This places the successive operations of defecating, concentrating and finishing by steam, under the immediate and convenient control of the sugar-maker. The heat is readily increased or diminished or withdrawn from either vessel at pleasure. As sugar-making by a connected steam train is a continuous as well as rapid process, it is important that proper arrangement and proportions of all the parts be provided, including also the even and reliable working of the mill, so that the continuity of the operations may be harmoniously and effectively preserved to the end. The effectiveness of the steam train may be seriously impaired or totally destroyed by ignorant management, or improper proportions of vessels and pipes. In constructing a steam train, experience and skill are absolutely necessary. If the planter has an engine and boiler of sufficient capacity to run his mill and plenty of steam to spare, he can use steam profitably, either with steam pans entire, or with steam pans for defecating and finishing, and a fire evaporator for concentrating. In the practical operation of the latter plan, the juice is defecated by steam, then passes into an evaporator, where it is concentrated nearly to the sugar point, and then on to the *batterie*, where it is finished by steam. After a thorough defecation of the juice, and its rapid concentration to the sugar point, the next object is to secure crystallization. The liquid should be put into shallow coolers, and kept at a moderate warmth and even temperature. Nature will do the rest. After the sugar has crystallized in the coolers, all that remains to do is to separate it from the molasses. This may be done by draining. The best means is by the use of a centrifugal. This rapidly expels the molasses from the sugar by force, leaving the sugar dry and finished.

Textile Plants.

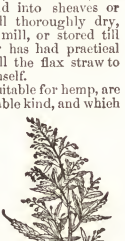
COTTON.—Clay loam and silicious soil, and a clay subsoil, are best for upland cotton. Sea Island cotton grows only on low, wet lands. Deep plowing and underdraining are necessary. Plowing should be done in January, February or March. Lay off rows 4 ft. apart with a shovel plow; double furrow, and put in fertilizers 8 in. deep; ridge with a long scooter, 5 in. wide, where the rows are to be planted; make the beds with a turning plow, and subsoil the furrows with the turn plow; split out the middle with a shallow plow; plant with a cotton seed sower and cover with a board or harrow. The seed should be sown in hills from 8 to 20 in. apart, 6 to 8 seeds to the hill. Planting is generally done after the last frost in spring; 2 to 5 bus. of seed will plant an acre. When the plants are 2 in. high, thin to 2 or 3 stalks in a hill; 10 days after the crop is hoed, or has a little dirt thrown around the plants with a plow; 2 weeks later it is again hoed and plowed, all grass and weeds being removed. In 2 or 3 weeks more, it is again hoed and plowed, after which there is nothing more to do. The bolls of cotton mature and open in July or August. Picking is generally done by the hand as soon as the pods are well open. After picking it is spread out on scaffolds to dry. When a seed pressed between the teeth will crack with some noise, it is sufficiently dry. It should be turned and stirred frequently. In cleansing, the first machine through which the cotton is passed is called a whipper, and consists of a cylinder 6 or 8 ft. in length, made of slats, reeds, or wire. One end is closed, and the other open. The centre of the cylinder is traversed by a shaft, intersected with rods reaching to within 1 in. of the sides. The cylinder is placed in an inclined position, and the cotton fed into it from a hopper resting upon the upper side, near the top, which is closed. The shaft being turned by a crank, the cotton, as it falls from the hopper, is whirled around by the rods until it issues from the lower end of the cylinder—any contained dirt, sand, or leaves having meanwhile escaped through the open sides of the whipper. The cotton is then carried to the gin-house, where the cotton wool is separated from the seed. Gins should not be run with too high speed. As high speed as 450 revolutions may be run without injury to the cotton. A machine should be attached to the gin-house to hull the seed and press out the oil. After ginning it is baled and is then ready for market. Varieties: *Green Seed* or *short staple*, known in commerce by the name of *Upland* cotton. — *Nankin* or *Yellow*. — *Sea Island*, known as *long staple*, from its fine, white, silky appearance, and long fibres. The *Vine Leaved*, *Hairy* and *Spotted-bark* are varieties classified by botanists.

FLAX.—The only soil suitable for flax is a rich, mellow and deep clayey or sandy loam, free from wet. In very dry sandy soils, river bottoms, and wet, low lands, flax will suffer from mildew. Soil that will raise a good crop of grain or potatoes will give a large crop of both seed and fibre, if sown to flax. Flax should not be grown on the same land oftener than once in five years. In the preparation of the soil it should be plowed deeply in the fall; then grub, harrow and roll until the field is in the best state of cultivation. The surface should be pulverized 3 or 4 in. deep. Seeds which are fresh and proper for sowing, should be smooth, slippery, bright, plump, and so heavy as to sink in water; they should also taste sweet, and, on being broken, should appear of a light yellowish green color, and oily. Sow the seed broadcast in April or May; the best time is after a rain when the soil

Flax.

has settled and is warm. Before sowing, soak the seed 2 or 3 hours in water, and then roll in land plaster. The quantity of seed sown will depend on the object in view in cultivating the plant. When the quality of the fibre is regarded rather than the quantity, thick sowing is advisable; but if it be intended to save the seed of the crop for the purpose of reproduction, it should be sown thin, in order that the plants may have room to throw out their shoots, and to have free access of air in the blossoming and filling seasons; 3 bus. of seed may be regarded as the proper quantity; but if fine fibre must be produced, an additional ½ bus. may be added; when the seed is regarded, 2 or 2½ bus. may be sufficient to the acre. Scatter the seed evenly, and cover with a brush harrow. If the ground is wet at seeding time, shallow covering will do; if dry, it will not. If weeds spring up, they should be cut off close to the ground, not pulled up, and be kept down until the flax is 10 or 12 in. high. When flax is grown for seed, cut when most of the bolls and lower parts of the stalks have turned yellow, and the seeds have turned slightly brown, and the lower leaves have dropped off. Be careful not to cut before ripe. Unripe seed can not be properly filled out and must fall short in weight. Use a smooth knife in your reaper. Cut only low enough to get all the bolls. When the seeds are intended to be saved for consumption on the farm, the best period of cutting is shortly after the plants have attained maturity with respect to the formation, but not to the full ripening of the seeds. When grown for fibre, pull by hand or cut very close to the ground. When pulled by the hand the plant should be grasped just below the top and jerked quickly, the different lengths being placed by themselves. When cutting is the method used, set it up as soon as cut in gavels. It may be handled the same as barley or buckwheat; but, better still, bind with the self-binder; shock the same as wheat. Flax cures very fast, and in good drying weather may be stacked the day after cutting. Build a good solid stack, always keeping full in the centre—heads in and butts out—and top off with prairie hay. Stacks must not be disturbed for two or three weeks, or more, until the flax is through the "sweat," which leaves the seed heavier and better. Threshing may be done with a threshing machine, by holding the head of the bundle against the cylinder, but not allowing it to go through the machine. Or by taking the bundle in both hands and whipping the heads upon a large stone. Watering or rotting is the separation of the fibres from the stem by steeping the flax in water, by which the softer part partially undergoes the putrefactive fermentation; the best water being that which is clear, soft, and in standing pools. The bunches of flax should be built in the pool in nearly an upright position, the root-ends being uppermost. They are kept under water by means of stones. When the flax is properly watered, it will sink in the pool, and the fibres will separate freely from the stalk. In warm weather, 8 or 10 days will sometimes be enough, and only a few more, in any case; but if the fibres adhere to the stem so as to be separated with difficulty, it must be continued in the water longer. When sufficiently watered, it is taken out of the pool, and when drained is taken to a grass field, and spread thinly over it in rows, lying on the grass not more than 8 or 10 days; when brittle, it is taken up and again bound into sheaves or bunches, and then left till thoroughly dry, when they are sent to the mill, or stored till wanted. Unless the farmer has had practical experience, it is better to sell the flax straw to the dealer than to rot it himself.

HEMP.—The soils most suitable for hemp, are those of a deep, black, vegetable kind, and which from their location, are slightly inclined to moisture. Mellow, rich, clayey soils do very well, and none answer better than old meadow land. Hemp may be raised on the same ground for successive years without degenerating and without exhausting the soil, especially if the shives are returned to the land in the form of manure. The ground should be plowed in time to receive the influence of frosts, and after a crop of grain; besides a deep plowing before winter, it should be plowed at least twice in the spring, so as to reduce the soil to a fine tilth, as it is important that it be thoroughly pulverized. To insure a good crop the seed must be fresh, which may be known by its being heavy and of a bright reddish color. The best seed is that of the previous year. Sow as soon as danger of a severe frost is past, and just before moist weather. When the object is to make a crop of hemp, the seeds are sown broadcast. The usual quantity is 1½ bus. to the acre. The seed should be plowed or harrowed in and the ground rolled afterwards. The seeds intended to reproduce seeds for the crop of the next year are sown in drills about 4 ft. apart. When they are grown sufficiently to distinguish between the male and female stalks, the former are pulled and thrown away, and the latter are thinned, leaving the stalks separated 7 or 8 in. from each other. The male plant alone blossoms, and, when agitated, throws off farina, a yellow dust or flour which colors the ground or any object with which it comes in contact. A few of the male plants should be left, scattered through the drill, until the farina is wholly discharged. Between the drills a plow is run sufficiently often to keep the ground free from weeds and grass, and between the stalks in each drill the hoe is used for the same object. Hemp should be cut as soon as the blossoms turn yellow and begin to drop their leaves. Cutting may be done with a cradle-scythe; if over 7 ft. with a brush-scythe. As cut, it should be laid on the ground evenly to cure, which will take 3 to 5 days. The seed plants are generally cut after the first hard frost, between the middle or last of September and the middle of October, and carried to a barn or stackyard, where the



Hemp.

seeds are easily detached by the common flail. After threshing, spread the seeds on a floor to cure and prevent their rotting before they are stored for spring use. The next process is rotting the stalks. There are 2 methods of rotting—dew rotting and water rotting. When dew rotted, the plants are usually spread down from the middle of October to the middle of December. Autumnal rotting is more apt to give the lint a dark and unsightly color than winter rotting. The best ground upon which to expose the plants is meadow or grass land. In a very wet and warm spell, 5 or 6 weeks may be long enough for the plants to remain on the ground. If the lint can be detached from the stalk easily, it is properly rotted. If the fibres remain on the ground too long, they lose some of their strength, though a few days longer than necessary, in cold weather, will do no injury. If they are taken up before the lint can be easily separated from the woody part of the stalk, it is harsh, and the process of breaking is difficult. Snow-rotting, that is, when the plants, being spread out, remain long enough to rot (which requires a greater length of time), bleaches the lint, improves the quality, and makes it nearly as valuable as when water rotted. After the operation of rotting is performed, the plants are again collected together, put in shocks or stacks, or under some covering. Breaking and dressing are best performed in February and March; and the best sort of weather is in frosty nights and clear, thawing days. The brake cannot be used advantageously in wet or moist weather.

INDIAN MALLOW. or ABUTILION AVIENCE.—A plant widely extended over the Southwestern States as a pestiferous weed, is taking an important position among textile plants, and gives promise of valuable results. Its culture is as simple as corn, and good corn land is best adapted to its growth. It is handled and marketed much like jute and hemp, and merits attention.

JUTE.—Jute requires a moist, sandy, loamy soil, and is no harder to raise than corn. Sow the seed broadcast in March or April. Cut the stalks as soon as the blossoms fall, before the seed begins to ripen, as the fibre is better than when the plant is older. Tie them in small bundles and throw them into a pond of water; after 5 or 8 days the fibre will fall from the stalk. As soon as dry it is ready for the loom or paper mill.

RAMIE. or WILD HEMP.—Belongs to the nettle family, but is stingless. Its stems grow straight and in bunches filled with pith and surrounded by a fibrous mantle covered by a thick red skin, the fibres themselves bound together by a resinous substance. It is a perennial plant, not annual, like flax and hemp. The strength of its fibre places it in the first rank of usefulness as a textile plant. Age increases its strength and fertility, and it resists drought and wet, though injured by frost except in the roots. It can be produced in any quantity in the South, and can be grown successfully as far north as New Jersey. Except its luxuriant growth requires manuring, its cultivation is simple; hoeing and digging are needed only in the first year, for the plant itself thereafter grows so luxuriantly as to smother all weeds. The process of preparing the fibre is similar to that of hemp. The removal of the glutinous substance inclosing the fibre is the most difficult process, but for that and the separation from the woody tissue, mechanical means are now employed with growing success. The Chinese make the coarsest nets from it and fabrics resembling the finest batiste. Rope and paper are also made from the fibre.

PESTS.

DISEASES.

BLIGHT, Cotton. — Although mistaken for rust, it is of itself a distinct affection. The leaves suddenly wither, droop, change to a brown color, and then fall off; and the bolls shrivel and dry up. The entire plant dies in a very short time; the pith of the root, stem and branches, preserving that blackish-brown appearance which usually accompanies an advanced stage of decay. It may be prevented by a judicious rotation of crops.

ERGOT.—The principal disease to which rye is subject. It is a fungous growth on the heads of the grain, causing them to turn black. This growth is poisonous and used as a medicine; rye affected with it should not be used as food. There is no cure known for it.

ROT.—*Cotton.* Makes its first appearance as a small, dark green, circular spot, on the outside of the boll, and many of them are frequently present on a single boll at the same time. With the advance of the disease, the spots change color, and gradually assume a blackish brown hue, until the entire boll is affected. If suddenly checked, as sometimes occurs from an unexplained cause, only a portion of the boll will be discolored. In the first case the disease has penetrated to the centre of the boll, which ferments, and pours out a white, frothy liquor; after which putrefaction follows, involving the destruction of the seed and immature cotton, when the rind, or the exterior coating of the boll, being exhausted of its juices, hardens and turns black. A careful selection of well ripened seed, from sound and healthy plants, will do much toward eradicating the disease. — *Tobacco.* The sweat, which terminates in rot, takes place after tobacco has partly cured; during continued soft, damp or foggy weather, the outside leaves, which cure out first, become so wilted and soft as to lop down over the green stalk and under leaves, and exclude the air to a great extent; this causes it to heat almost immediately about the stalk, where the under leaves join it, especially if there have been any suckers allowed to remain on the plant at the time of housing. These are unripe, and add greatly to

the trouble, and when the plant comes in contact with the pole, if hung that way, decomposition soon follows the fermentation, when leaf after leaf, and finally the stalk, drops to the ground, or lodges on the tier below, increasing the difficulty wherever they come in contact with each other. The manner of hanging is one of the causes of this disease and should be looked to, for where the plant is kept hard pressed against the pole, with a quantity of bruised leaves between the pole and the stalk, the rot makes its first appearance; this can be remedied by using lath for hanging, a much more desirable way for several reasons; for the stalk is pierced or split through, assisting it to cure out much sooner in time of danger, while it leaves each plant hanging free, touching nothing but the lath it rests upon. If attention is paid to the details of cultivation, rot will not be found on the plant. — *Potato.* This disease is marked by a deepening of color, accompanied by an enlargement of the affected part, and succeeded by weeping or exudation. As the disease advances, the part of the stem affected becomes soft and pulpy, and the color changes to a yellowish-brown. To prevent this, dust over the floor of the bin with lime, and put in about 6 or 7 in. of potatoes, and dust with lime as before, then more potatoes, using about 1 bus. of lime to 40 bus. of potatoes. Or, when the plant blooms, take 2 parts plaster, and 1 part fine salt; mix well together, and put 1 large spoonful of this compound as near the centre of each hill as possible. When ripe, take them out of the ground, have them dry when put in the cellar, and keep them in a dry, cool place.

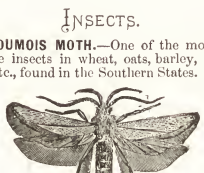
RUST.—*Cotton.* A parasitical fungus grows upon the stem and branches of the plant, which exhausts the sap, and causes the leaves to wither and fall. The leaves assume a yellow color, and are frequently spotted with red. It is generally traceable to defective cultivation, and may be remedied by adopting such a system of agriculture as will restore to the soil its abstracted salts and phosphates. — *Potato.* Affects the leaves and is a preliminary stage of rot. Cut off the tops and burn them. If it appears in the roots, dust them liberally with dry air-slacked lime. — *Wheat.* Appears in June on the leaves of wheat, and is readily distinguished by its reddish-yellow and yellowish-red colors. As a preventive, sometime before sowing prepare a steep of 3 measures of powdered quicklime and 10 measures of cattle urine; pour 2 qts. of this upon 1 pk. seed wheat; stir with a spade until every kernel is covered white with it.

SMUT.—There is nothing in the appearance of wheat to tell of the existence and destructive growth of this disease. If an ear be shelled before ripening, the kernels themselves present a plump green appearance, distinguishable from sound ones only by close comparison when viewed exteriorly; it is only when the kernels are broken open that the enemy is exposed to view, a dark fetid mass, occupying the whole farinaceous part of the kernel. The wheat should be carefully examined before the crop is gathered, by brushing the kernels taken from the heads in different parts of the field, or by having a considerable quantity floured, and watching the results. Whenever this fungus is found to any considerable extent, the grain should be carefully destroyed, for it is unfit and dangerous to use. To prevent smut, dissolve in $3\frac{1}{2}$ gals. of cold water, $3\frac{1}{4}$ oz. of sulphate of copper for every 3 bus. of sowing grain. Throw this quantity of wheat into another vessel, and pour over it the prepared liquid until it rises 5 or 6 in. above the wheat; stir thoroughly and remove all the grains that swim; throw the mixture into a basket so as to drain off the liquid; wash it well in soft water, and dry before sowing.

SORE SHIN.—An affection of the cotton plant, which makes its appearance in the early stages of its growth, during the prevalence of cold nights in a wet and backward spring. The bark of the stem becomes callous, and the sap vessels are dried up, or obstructed, near the surface of the ground. If the plant continues to live, its growth is slow and languid, and it never regains its former strength and vigor. It has been attributed to early planting, but is really caused by the ravages of the cotton louse, which debilitates the plant by abstracting the sap. (See *Cotton Louse* in *Lice.*)

INSECTS.

ANGOUMOIS MOTH.—One of the most destructive insects in wheat, oats, barley, Indian corn, etc., found in the Southern States. It only



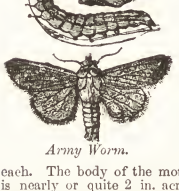
Angoumois Moth.

feeds upon ripe grain, attacking it in the field before harvest, and continuing its operations in the mow and out-door stacks, but being most destructive in bins or granaries, flouring mills and storehouses. The most effective method of destroying them is to subject the infested grain to the heat of about 190° Fahr., without destroying its germinating powers; this will kill all the insects and worms in it.

ANTLER, or GRASS MOTH.—A moth injurious to meadows. It is of middling size; its head and back are yellowish-brown, the collar lighter, almost yellow; the abdomen and legs are brownish-gray, the latter with darker joints; the upper wings are usually brownish-gray, with a darker mixture in the middle; the under wings are yellowish-gray. The caterpillar is brown or blackish, with 5 lighter stripes along the back; the first and last sections are covered with a hard, smooth scale; the stripes meet at the edge of the anus; the abdomen is blackish. The larvæ are 1 in. long, and they undergo their transformation about midsummer, within a light cocoon, under moss, stones,

etc., changing into a blackish-brown, shining pupa. The food of the caterpillar consists of all the soft sorts of grasses. It lives at the roots, and eats all the germs. The only means of diminishing this caterpillar consists in surrounding the attacked pieces, as the ground permits, with shallow ditches, or by means of a plow with deep furrows, as broad as possible, and turning pigs into these places to devour the insects.

ARMY WORM.—The true army worm, when fully grown, is 1¾ in. in length, and is striped lengthwise with black, dull swarthy green, and yellowish lines, intermingled with marginal white hair lines. The head is light or yellowish brown, and has 2 blackish bent lines on the face. It has 16 feet; 6 small black ones in front, 8 fleshy ones along the middle part, and 2 at the hinder end. On the outside of the 8 intermediate feet are conspicuously a black spot on each. The body of the moth is stout, and it is nearly or quite 2 in. across the expanded wings. The front wings are of a dull or dirty yellowish color, faintly sprinkled with blackish dots. The hind wings are partly transparent, with a smoky and purplish appearance. Its ravages begin about the last of May or 1st of June, great numbers of them traveling together. The favorite food-plants of the army worm are grass, the small grains and corn. Timothy, blue grass and winter wheat are more generally injured than any other crop. The worms rarely touch clover, and are not fond of rye; but, when hard pushed, will eat various vegetables, the leaves of fruit trees, and even each other. It is generally more destructive in a wet year following a dry one. The moths are generally called "owlet moths," and belong to the nightfliers, because they usually remain quiet or secreted during the day and fly abroad at night; if luminous traps are set in the fields after the crops are removed, millions of them may be captured. Burning over a meadow, or prairie, or field of stubble, either in winter or spring, effectually prevents the worms from originating in such meadow or field. A ditch with side toward the field to be protected perpendicular or sloping under, will protect a field from invasion from some other infested region when the worms are marching. When they are collected in the ditch they may be destroyed either by covering them up with earth that is pressed upon them, by burning straw over them, by pouring a little coal oil in the ditch, or by crushing with rollers. Where the soil is sandy, so that the ditch cannot be made with a vertical side, it should be dug deeper than in other cases and the side made as nearly perpendicular as possible, so that when the worms attempt to crawl up, the sand will crumble beneath them and cause them to fall back again.



Army Worm.

BLACK-RAT BLISTER BEETLE.—This sometimes appears in swarms upon the potato plant, especially in the more Northern States; it also attacks other plants, but is partial to the potato. The most successful method of destroying them is to place straw between the potato rows and set fire to it. The straw burns very quickly, and does not injure the potato vines.

BOLL WORM.—Color varying from pale green to light brown, striped longitudinally with darker stripes of the same color. It is from ¾ to 1½ in. in length. The moth is pale yellow, or shining ash color. It feeds on green corn in the North, and in the South is found on the tips of cotton plants. The only remedy for corn is to plant it early enough for it to begin to ripen before the appearance of the worm. To destroy them in cotton fields: 1. As the moth makes its excursions only after sunset, large numbers of them may be destroyed by lighting fires on the borders of the fields, to which they are attracted by the light. — 2. Take bottles filled with coal oil, and supplied with a lamp wick; attach them to sticks higher than the growing cotton, with one end stuck in the ground, at suitable distances from each other. The moths will be prevented from depositing their eggs. The lamps should be used as long as it is deemed necessary. — 3. When the moths are frequent over the field, clip off the branches upon which they are likely to have made their deposits. This topping of the plants is believed by some to increase the number of the bolls, and by doing it at the right time great numbers of the eggs may be destroyed.

Boll Worm.

CHINCH BUG.—A small insect less than ¼ in. long; color black and dirty white; body black, covered with a grayish down scarcely visible; legs dark yellow. It attacks wheat, corn and oats. Irrigation is the most effective method of destroying them, but where this is not possible, burn over the infested fields in winter. In timbered sections the leaves should be burned and fence corners cleared out and burned. The practice of plowing land for spring grain the preceding autumn, or if plowed in the spring, rolling it repeatedly with a heavy roller after seeding, is thought to possess advantages for fields pervaded by them. The female bug has to work her way underground in the spring of the year in order to get at the roots upon which she lays her eggs, and the looser the soil at this season the greater the facilities which are offered for the operation. An emulsion of coal oil and milk will destroy them. The emulsion

Chinch Bug.

may be made with soap-suds equally well, 1 lb. soap being added to 10 gals. water, and equal parts of oil and suds being taken. If, then, this emulsion be diluted by an additional quantity of suds, or even of clear water, so that there will be 1 part oil to 19 parts water, the liquid will not injure grain. In its migrations from field to field it may be checked by a line of tar poured on the ground, or by deep furrows or trenches, but the tar must be kept soft and the surface of the furrows friable and pulverized. When congregated on certain spots, dry straw, spread over the place and burned, will destroy numbers; gas lime sown broadcast over infested fields, at the rate of 6 or 7 bus. to the acre, is also recommended; or dropping a handful of gas lime on each hill of corn, when infested.

COLORADO BEETLE.—Body cream colored; 5 black stripes upon each wing case; wings rose color. Both the larva and the perfect beetle prey upon the potato plant. — 1. A few lbs. of carbonate of lime, Paris green, or London purple, dusted from a dredging box, will kill them. — 2. Put ½ bus. dry mandrake root in a barrel; fill with water and let it stand for 2 days, stirring now and then; strain the liquid through a cloth into a garden sprinkler; sprinkle towards sunset those plants on which the young brood hatch, before they scatter to adjacent plants.

CORN MOTH.—A moth injurious to grain laid up in bins. The perfect insect or moth measures, from the head to the tips of the wings, from 6 to 7 lines. The body is brown, with a little white on the back; the head has a thick tuft of whitish hairs; eyes black; upper wings more or less white, with brownish and dusky dots, varying in form and size. This insect appears as a moth in May, June and July, in buildings where grain is stored; it rests in the daytime, and only flies about at night, attacking rye, oats, barley and wheat. To destroy them, fill up the cracks and holes, sprinkle the floor with a mixture of strong white-wine vinegar and salt before laying up the corn, sweeping the floor and walls thoroughly before storage, and, if the moth has laid her eggs on the grain, common salt may be mixed with the grain.

COTTON ARMY WORM.—Color green; 2 black stripes on the back and sprinkled with black dots along a yellowish sub-dorsal line. This worm is furnished with 6 fore, 8 middle, and 2 hind feet; the 2 first of the middle feet being small, imperfect, and apparently useless for the purposes of progression, which is effected by alternately stretching out the body, and again contracting it in the form of an arch. When touched, the worms double themselves up, and spring to a distance several times their length; but if undisturbed when not feeding, they rest on the leaf with the forepart of the body elevated and slightly curved, sometimes varied by a sidelong swinging motion. They appear from June to September, and may be destroyed as follows: 1. Dissolve ¾ lb. London purple in 40 gals. water; sprinkle on the bottom of the leaves during the infancy of the worms, and it will effectually destroy them. — 2. Mix 1 lb. Paris green in 40 gals. of water, and apply to the under surface of the foliage, where the poison will not be washed off by the rain. — 3. Add to 5 gals. water, 5 lbs. arsenic and 1 lb. soda; boil until the arsenic is dissolved. This makes a solution of arsenic that will keep for any length of time without the slightest depreciation; put 1 qt. of this in 40 gals. of water, and sprinkle over the infected field. — 4. Kerosene and other oils are very deadly to the insects in all of their stages, and are the only substances which effectually destroy the eggs. The oils should first be made into an emulsion with fresh or spoiled milk, and this emulsion can then be diluted as much as one pleases with water, as the oils will be held well distributed in suspension. A fountain pump, or hydronette, is the best instrument with which to apply the solution, as the under side of the leaves can then be sprinkled.

COTTON STAINER.—A very destructive insect on a cotton plantation, as it clusters in large numbers on the opening boll, and so discolors the cotton as to render it unfit for the fabrication of white goods. They may be collected from the plants by depositing in their vicinity small slips of sugar cane, on which they will cluster; and they may also be reduced in numbers by burning out all stumps and dead trees standing in the fields.

GRAIN WEEVIL.—The true wheat or grain weevil is a slender beetle about ⅛ in. long; preys upon all kinds of grain in the bin and the corn-crib. This weevil being quite small, is liable to be overlooked, particularly in a dark bin. Its mode of operation consists in piercing minute holes in the kernel and there depositing its eggs, from which are hatched small maggots that eat out the heart of the grain. In due time these grubs undergo transformation and come out of the hulls in the beetle state to lay their eggs for another brood. When possible avoid storing grain in bins that have been infected. When it is inconvenient to change the place of storage, fumigate the granary thoroughly with burning sulphur. Fumigation should not only be done before the grain is placed in the bins, but repeated in the course of 1 or 2 months after it has been stored. The larvæ of the weevils that are in the grain may be destroyed by heating the grain where one has ovens or kilns at hand for the purpose. Scattering lime among stored grain may be practiced, if care is taken to remove it when the grain is taken out for use. Running it through a fanning mill, if the grain is dry, will blow out the dry lime. Grain that is stored in a cool place, if well ventilated and frequently moved, is said to be exempt from attacks.

Grain Weevil.

HESSIAN FLY.—Tawny or black body, with pale brown or red eyes and black feet; wings blackish or tawny. It deposits its eggs on the young wheat plant at the first joint or crown; maggots are hatched, which work between the leaf and the stalk, live on the sap and destroy the plant. If the fly is present, burn over the stubble as soon as possible after the wheat is

eut; thresh out the wheat before stacking and before it enters the sweating stage; then scatter the straw over the stubble and burn as

Hessian Fly.

thoroughly as possible, and follow after with the plow. Another way of destroying them, is to turn the horses and cattle on it while the ground is frozen; let them graze it down close to the ground. Quicklime strewed over the field, immediately after the grain is eut, will destroy the pupæ. If an attack of the fly is threatened, delay the time of sowing.

JOINT WORM FLY.—Little more than $\frac{1}{8}$ in. long; pale yellow color, with the exception of the jaws, which are dark brown. It preys on

Barley and Joint Worm Fly.

the stalks of small grains, which, when attacked, present a blistered appearance. To destroy them, burn the stubble after the grain is cut, and the straw after threshing.

LICE.—*Corn.* The wingless are dark green in color. The winged have head and thorax of shiny black; abdomen pale greenish yellow, dotted along the lateral margin with black. In larvæ they prey upon the roots of corn and upon the tassels. Tobacco

Corn Louse.

will destroy them.— *Cotton.* A species of aphis which pierces the outer coatings of the leaves, principally on the under side, and, by constantly draining the sap from the plant, enfeebles it and causes the leaves to curl up, turn yellow, and drop off. Brisk cultivation, and a top-dressing of ashes and plaster of Paris are the best remedies. — *Wheat Plant.* Inhabits corn crops, barley, oats and wheat. In July and August it

Winged Wheat Plant Louse.

is sometimes very abundant on the ears of wheat, sucking the stem and impoverishing the grain. No remedy has yet been found, but there are a number of insects which slay and feed upon it.

MAGGOTS.—*Seed-corn.* Small, white maggots. The fly is yellow or dusty brown. The larvæ destroy the heart of seed corn soon after planting. Soaking the seed in gas-tar is a preventive. — *Wheat.* Works in the stems of the wheat next the joint; it is less than $\frac{1}{4}$ in. long, rather slender; footless; largest at the anterior end, and tapering to the other extremity; of a pale cream yellow color, and easily recognized by the 2 brown triangular hooklets on the under side of the longer or head end. Burning off the stubble is a remedy.

Wingless Wheat Louse.

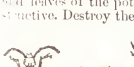
Corn Maggot.

RYE GRASS MOTH. — A moth injurious to the different species of grass and other meadow herbage. The moth is of middling size; the male, with extended wings, is nearly 1 in. broad, and black, with yellow notches on the abdomen; the wings are thin, black, and fringed with the same color. The female has a thick, long abdomen, which is whitish-gray, and woolly at its exterior; wings small, slender, brownish-gray, and not adapted for flying. The caterpillar is found in April and May, living on rye grass and many other plants in meadows; its ground color is velvety-black, yellow at the incisions and sides, with a black head and small yellowish warts, having ash-gray hairs on them. The destruction of this caterpillar is very difficult, as it prefers living in long grass in the daytime, or in the ground. Breaking up the meadows in autumn is the best method of destroying the pupæ concealed there.

STALK WEEVIL.—Bluish or ash-gray color, distinguished by having 3 shiny black impressed spots at the lower edge of the thorax. Burn all the potato vines which wilt from its at-

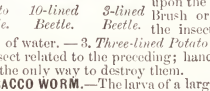
tacks, roots and all, for it always works below ground.

STRIPED POTATO BEETLE.—1. Dull yellow, striped with black. They feed upon young shoots and leaves of the potato vine, and are very destructive. Destroy them by placing dry straw on the ground between the rows; drive the beetles into it, and then set it on fire. — 2. *Ten-lined Potato Beetle.* An enemy that preys upon the leaves. Brush or shake the insects into a pan of water. — 3. *Three-lined Potato Beetle.* An insect related to the preceding; hand picking is the only way to destroy them.

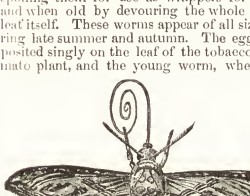


Potato Beetle. *10-lined Beetle.* *3-lined Beetle.*

TOBACCO WORM.—The larva of a large moth which is very destructive to the leaf of the tobacco plant, by eating holes in the leaves, thus spoiling them for use as wrappers for cigars, and when old by devouring the whole of the leaf itself. These worms appear of all sizes during late summer and autumn. The egg is deposited singly on the leaf of the tobacco or tomato plant, and the young worm, when first hatched out by the heat of the sun, commences to eat holes in the leaf of the plant, and sheds its skin several times before attaining its full size; it then goes into the earth, and the pupæ is formed in a subterranean cell, the late broods remaining as pupæ all winter, and coming out as the perfect moth the following spring. There are several parasites, and one in particular, that is very useful in destroying the potato and tobacco worm; it is a minute, 4-winged fly, which deposits its eggs in the caterpillar, and eventually kills it. The eggs of this parasite, to the number of 100 or more, are deposited in the back and sides of the caterpillar, in small punctures made by the ovipositor of the fly. The simplest and best way of disposing of the tobacco worm, is to pull their heads off as quickly as possible. The following is also a successful method: A number of artificial jimson flowers; made of tin, and stuck upon poles in different parts of the tobacco field. Bait the flowers with sugar and arsenic, and the tobacco fly will eat it and fall dead close by; but this plan has the fault of killing friendly insects.



Tobacco Worm.



Tobacco Worm Moth.

UNSPOTTED LADY BIRD.—An insect injurious to many of the artificial grasses. It has been observed on the common tare, sainfoin, and the different sorts of clover. This larva is only ⅛ in. long; yellowish-white, with single green spots, and the upper side of the body covered with prickles. Its transformation takes place on the leaves. The pupa is light yellow, covered with minute hairs of the same color. The perfect insect is almost globular, yellowish-red on the upper side, with a brownish-red spot on the thorax. The abdomen is brownish-black, and the legs reddish, or reddish-brown. A good soil and moist weather which will cause the herbage to grow quickly and luxuriantly, and to be often mown, are the chief requisites for diminishing the insect. By often removing the cut fodder from the field, the insect will be disturbed in its propagation.

WHITE-LINE DART MOTH.—A moth injurious to buckwheat and autumn-sown grain. The caterpillar is upwards of 1 in. long, and of the thickness of a slender writing-quill. On the back it is dirty-olive green, with a mixture of yellow. The head is brown; the abdomen and feet are dirty yellow. It lives in the daytime in the earth, coming out only at night. To destroy them, hand-pick, and apply a strong dressing of lime to the land in the spring; or strew the ground with ashes, rolling the fields with heavy rollers, and lastly driving flocks of sheep over the field.

WINTER, or DART MOTH.—A moth that injures winter grain. The caterpillar attacks both the leaves and the roots of the corn; also the roots of lettuce, turnips, and spinach. It appears generally in August, sitting quietly on the ground in the daytime, and flying about and pairing at night. When at rest, its wings are folded together flat over the body, and is then nearly 1 in. long and ⅜ in. wide. Its colors are dirty-gray, and dark brown, or earth color, except on the under wings, which are covered as it sits, and which are sometimes whitish-gray, sometimes cream color. On the upper wings, a faint blackish ring-like mark is seen, and a cone shaped spot on a wavy line, a kidney-shaped stain almost in the middle, and towards the lower edge 2 other wavy or notched transverse lines. The most simple and certain mode of extirpating them is to repair to the fields, and collect the caterpillars as soon as they appear. They lie in the daytime under stones, clods or buried in the earth; these must be carefully turned up in search of the enemy. When they are changing their skins, they come out of their lurking places, even in the daytime, and can easily be gathered. Immediately after sunset they come

out in great numbers, and feed greedily on the young corn. At this time, the work must be carried on vigorously, and even until late at night with an artificial light.

WIRE WORMS.—These are the larvæ of the snapping beetle, which is covered with short, fine, prostrate, ash-gray hairs, its wing covers having rows of punctures resembling the stitches of a garment; they are hard, shining worms, of various sizes and colors, that breed in manure and in decaying vegetable matter, and gather under stones, clods, and lumps of manure. They attack corn, wheat, potatoes and other plants, but are especially destructive to corn and potatoes. 1. An easy way to kill them, is to poison them in traps, consisting of pieces of board or shingles laid upon the ground with a few small pieces of potato sprinkled with Paris green or other poison under them.—2. When very numerous, summer fallowing thoroughly done so as to permit no weeds of any kind to grow, is the most effective and cheapest remedy.

Wire Worm.

KITCHEN GARDEN.

HERBS.

ANISE.—A half-hardy annual, used for garnishing or seasoning. Sow during April, in pots buried in a hot-bed; remove to a warm light border, in May; thin to 6 in. apart; the seed is ripe in August and September.

Anise.

BALM.—A hardy plant, with square stems, rising 2 ft. high or more, with large leaves growing by pairs at each joint; propagated by parting the roots, preserving 2 or 3 buds to each piece, or by slips, either in autumn or spring; plant in common earth, from 18 in. to 1 ft. apart, watering in dry weather; gather when coming into flower; when the leaves are entirely free from moisture, dry them; and when cool, press into packages.

Balm.

BASIL.—The *Sweet-scented* and the *Dwarf Bush* are the varieties. A rich, light soil is the best; sow the seed in a gentle hot bed, early in April; thin, and those removed prick out at the close of the month in a similar situation, to be finally removed when the weather is settled, in open ground; when thinned, the seedlings must be kept at 3 in. apart, and those removed pricked out at a similar distance; water at every removal, hoe, and keep clear from weeds; gather seed from the earliest raised plants.

Basil.

CAMOMILE.—A creeping plant, cultivated for its flowers. The double-flowered variety is the most common, but the single possesses more of the virtue of the plant, according to its weight; it requires a poor soil, planted in rows 1 ft. apart, and hoed between, and produces an abundance of flowers annually, from June to Sept.

CARAWAY.—A biennial plant, with taper root, stems rising from 1½ to 2 ft.; spreading branches, and finely-cut deep-green leaves; a clayey loam is the best soil, which should be well plowed; sow in March, directly after the plow, harrowing well. In 10 weeks after, hoe, and repeat hoeing 2 or 3 times before cutting, which may be done in July; after which, thresh it upon a cloth.

Caraway.

CORIANDER.—A small rooted annual, with branchy stems. Sow in a light, rich soil, in the fall, with fresh seeds, 20 lbs. to an acre; thin the plants to 6 or 8 in. apart every way; stir the soil with a hoe; the seeds ripen in August, when they must be carefully cut and gathered; a few strokes of the flail will get the seeds out clean.

Coriander.

DILL.—Cultivated for its leaves and blossoms, which are used for pickling, and in soups and sauces. Soil rather dry; sow as soon as the seed ripens, in drills 1 ft. apart; thin to 10 in. asunder, after 3 or 4 weeks' growth; keep clear of weeds; and, for seed, cut in September.

FENNEL.—Resembles the dill, but is larger; grown for its stalks and leaves. 3 or 4 plants are sufficient for any garden. The variety called the *Finochio* may be grown in rows, on light, rich soil, and earthed up to the height of 5 or 6 in., which blanches the stalks in 10 days or a

Fennel.

fortnight; may be watered in very dry weather.

FOXGLOVE.—A perennial medicinal plant, comprising two varieties, the *Large* and the *Small*; when raised in gardens, it is easily propagated by seed; it prefers a gravelly, sandy, or chalky soil; every part of it is poisonous.

HOARHOUND.—A perennial, 2½ ft. high; stools somewhat; sow seeds in early spring, thinly; a few stools will furnish a supply after the first or second season; gather when in bloom and dry in the shade; when dry, put in paper bags or boxes; it is readily increased by divisions of the roots, or by seeds.


Hoarhound.

HYSSOP.—There are 3 varieties, the *White*, *Red*, and *Blue*, distinguished by the color of the flowers. A dry soil is the most appropriate. It is propagated by seed and slips of the shoots, as well as by offsets; may be sown from early spring until June; rooted offsets may be planted in March, April, August, and September; cuttings of the branches in April and May, and slips of young shoots in June or July; sow broadcast, or in drills, 6 in. apart, and not deeper than an inch.

LAVENDER.—A dwarf, odorous shrub, of 3 or 4 years' duration. The soil should be a poor, dry, limy gravel; the seeds being sown in a garden in spring, may be transplanted in September or March following, in rows 2 ft. apart. The second season they will yield flowers, and a full crop the fourth, after which the plants will continue productive for years; the spikes are gathered in June and dried in the shade. In many localities it is tender and treated as a house plant.

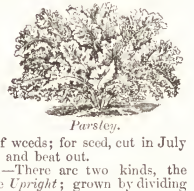
LICORICE.—A deep-rooting plant, with stems 4 or 5 ft. high; use a deep, sandy loam, trenched 2 or 3 ft. deep, and manured; the plants consist of side roots, having eyes or buds; plant in the fall or spring, in rows 3 ft. apart, and from 18 in. to 2 ft. in the row; hoe, stir, and weed, and carry off the stems every autumn, after they are completely withered.

MARJORAM.—The *Sweet Marjoram* is a biennial, and long in use for many culinary purposes; this species, being somewhat tender, is commonly sown on a slight hot-bed towards the end of March, or on a warm border about the middle of April; in the former case, transplanting into rows 1 ft. apart, and the plants 6 in. distant; and in the latter case, thinning out, without transplanting.


Marjoram.

MINT.—The *Common* or *Spear Mint* is a creeping-stemmed plant, the leaves of which are used in salads, soups, etc.; propagate by dividing the roots before they begin to grow in the spring, and bury in shallow drills, or slip off the young shoots when they are 3 or 4 in. long, and plant in beds a few inches apart; to produce tender stalks and leaves, water liberally; to dry, cut the stalks when just coming into flower.

PARSLEY.—A biennial, with a large, sweet tap-root. There are 2 varieties, the *Plain-leaved* and the *Curled-leaved*. Sow at monthly intervals, from February until middle of June, in drills 9 in. apart; when of tolerable growth thin to 9 in. asunder, and keep clear of weeds; for seed, cut in July or August; dry, and beat out.

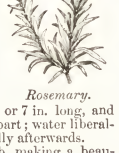

Parsley.

PENNYROYAL.—There are two kinds, the *Trailing* and the *Upright*; grown by dividing the roots in the spring; the best soil is one that is strong and moist; of very easy cultivation.

PEPPERMINT.—A well-known creeping-stemmed plant, growing spontaneously; propagated by dividing the roots early in the spring, and planting in a soft, rich soil; the stalks are gathered when in full flower.

PURSLANE.—There are 2 sorts, the *Green* and the *Golden*, the latter being used mostly as a garnish, the former for a salad; also for potherbs and pickles. In most of our soils this is a troublesome weed that forms good food for cows and pigs. Where a constant supply is required, the first sowing should be made on heat in February, and the others monthly, on a warm border, till August; the shoots are gathered when from 2 to 5 in. high, and well leaved.

ROSEMARY.—The *Green*, *Golden-striped*, and *Silver-striped*, are the varieties cultivated, the first-named being the most used. It has a fragrant aromatic smell like camphor, of which its oil contains ½. The best soil is a poor, light limy one; propagate by cuttings and rooted slips, during the spring, or by layers in the summer; sow in March or April, in drills 1 in. deep, and 6 in. apart; the slips and cuttings must be 5 or 7 in. long, and planted in rows 8 or 10 in. apart; water liberally at planting and occasionally afterwards.


Rosemary.

RUE.—An evergreen shrub, making a beautiful garnish for table dishes, but of very strong odor and taste; thrives best in a poor, clayey soil, and is propagated by slips, cuttings, and seeds in the spring, the seed being sown in drills 1 in. deep and 1 ft. apart; the slips or cuttings may be planted on a poor, shady border, and watered occasionally.

SAFFRON.—Also called the *Autumn Crocus*; a bulbous-rooted perennial, of medical and culinary uses. Plant the bulbs on a prepared soil, not poor nor a very stiff clay, in July, in rows 6 in. apart across the ridges, and 3 in. distant in the rows; the flowers are gathered in September, the stigmas picked out, together with a portion of the style; these are dried


Saffron.

between layers of paper, under the pressure of a thick board, to form into cakes.

SAGE.—A half shrubby plant, seldom more than 2 ft. high, with wrinkled leaves, and a very strong aromatic smell. In cookery its chief use is in stuffings for subduing the richness of certain kinds of meat, such as goose and duck; the common red and the green variety are most employed; for medical purposes the small-leaved sages are used. Propagated by seeds or cuttings, the plantation being renewed every 2 or 3 years; otherwise, the winter may destroy it; grows best in a dry soil, shaded from the sun.

Sage.

SAVORY.—Known commonly as summer savory; annual; grows 12 to 15 in. high; leaves opposite; branches in pairs; flowers flesh-colored, growing from the base of the leaves near the upper portion of the plant; seeds small, retaining germinative properties 2 years; sow seed in May, in light mellow soil, in shallow drills, 16 in. apart, and thin the plants to 6 in. in the drills; gather by cutting the plants by the ground when they begin to show flowers, and dry in an airy, shady place. If the dried leaves are pulverized and put up in junk bottles corked tight or in sealed tin cans, they will preserve their aroma for a long time.

Savory.

TANSY.—A perennial plant, from 2 to 4 ft. high, with a profusion of deep green leaves and small yellow flowers; both leaves and flowers possess a strong aromatic smell and a bitter taste. The *Curled* or *Double Tansy* is the kind chiefly grown for culinary use. It is raised by rooted slips, or divisions of its roots, planted in spring and in autumn, in rows 1 ft. apart each way.

TARRAGON. — A hardy perennial plant, grown for its leaves and the tips of the young shoots; used for flavoring. It seldom produces seeds; therefore it is generally propagated by division of the roots; set these out in any good garden soil, in April, in rows 15 in. apart, and the plants 10 or 12 in. apart in the row, covering the sets 2 or 3 in. deep. Sow the seeds in April or May, in cold frame or in a nursery bed; the drills should be 6 or 8 in. apart, and when the plants are 3 or 4 in. high, they should be set out as directed for the roots.

Tansy.

THYME.—The *Common* and *Lemon Thyme* are the 2 varieties principally cultivated, but the *Golden* and *Silver-leaved* are quite ornamental and useful. They are increased by seeds, cuttings, or divisions, and the plants should be renewed by one or other of these modes, every year, in the spring; the lemon is a trailing evergreen; sow seeds in April or May, in shallow drills 12 in. apart, and thin to 2 to 4 in.; roots may be divided and reset in April; make as many parts as the roots and tops will admit of; cut and dry the leaves and shoots, in August or September.

WORMWOOD.—This is a flowering herb of a disagreeable odor and intensely bitter taste. It contains a volatile oil of a green color, and a bitter tonic principle, called absinthium. It is propagated by seeds, cuttings, or division of roots. Sow in March; transplant in July to 18 in. apart. A dry, poor soil is best suited for growing this plant.

Wormwood.

VEGETABLES, ETC.

ARTICHOKE.—This requires a deep, rich loam; manure should be applied every spring. It should always have an open exposure, and is best propagated from seed or from offsets; if by the former, sow in rows 1 ft. apart, as soon as the frost is out of the ground; thin the plants to 1 ft. apart, in the row; and in the autumn, put out in clumps of 4, in rows 3 ft. apart, and the rows 6 ft. asunder. In winter, when the frost sets in, cover 5 or 6 in. thick with leaves, seaweed, or long manure to protect from frost, and keep free from stagnant water. When the plants are about 9 or 10 in. high they should be transplanted where they are to be permanently grown. As the roots penetrate deeply and require very rich soil, the soil should be heavily manured, deeply spaded, and well pulverized. There are 3 distinct kinds, viz.: *Conical or French.* These are of a milky green color, with scales spreading. — *Globe.* A thistle-like plant which grows on a stem from 2 to 3 ft. high. The head of the flower only is eaten, and is regarded as a great dainty.—*A small sunflower,* with nutritious tubers less in size than potatoes, and treated similar to them.

ASPARAGUS.—Raised by sowing the seeds in September or April. The seed bed should be composed of good, rich soil, well pulverized and manured with well rotted manure. The seed, of which 1 oz. will produce about 1,000 plants, or be sufficient for 50 or 60 ft. of drill, should be thinly sown in drills 12 in. apart and 1 in. in depth; it is best to keep them in water 180° to 200° for 24 hours, before sowing. After the plants come up, the bed should be kept thoroughly clear of weeds by repeated hoeings; the

plants, if well cared for, will be large enough to plant out in permanent beds when a year old, but some prefer to let them remain until 2 years old. It will succeed in any rich, deep, dry and porous soil, through which water can readily drain away; but does not succeed well in heavy, close soils. The end of March or early in April is the best time to make the bed. Trench the space intended for the bed, and mix with the soil as much rich, thoroughly decayed dung as can be worked in; have only 2 rows of plants in each bed, as this enables them to be cultivated and cut from easily; set the rows out 2 ft. apart, and the crown of the plant 3 in. deep. Every spring give them a top dressing of rotted manure, superphosphate of lime or guano. A liberal application of liquid manure may also be used to great advantage. A spading fork is preferable to a spade in turning in the manure, as it is less liable to cut or injure the roots; even this should not be inserted more than 5 or 6 in. deep. In forcing asparagus, such plants may be inserted in hot-beds as are 5 or 6 years old, and of sufficient strength to produce vigorous shoots; the first plantation should be made about the first of October, and, if it works well, will begin to produce in the course of 4 or 5 weeks, and continue to do so for about 3. The hot-bed may be made in the usual way, and topped with 12 in. of light rich earth, and kept at about 60° in the day time, and never below 50° at night. In planting, a furrow is drawn the whole length of the frame; against 1 side of it the first row or course is to be placed, the crown upright, and a little earth drawn on to the lower end of the roots; all round on the edge of the bed, some moist earth must be banked close to the outside roots.

Asparagus.

BEANS.—The following are the principal varieties of *Bush* or *Dwarf* beans. These will grow in any good garden soil moderately enriched; if too highly manured it will cause them to run to tops too much. The proper time for sowing is after the 10th of May until the beginning of August; sow them in drills about 2 in. deep, and from 2 to 3 ft. apart. The beans should be dropped from 2 to 3 in. apart on the row: *Black Wax.* The pods, when ripe, are of a waxy yellow, transparent, very tender and delicious; an excellent variety.—*Crystal White Wax.* A variety of very rich flavor; pods waxy white, transparent and stringless. The pods, although growing to good size very rapidly, do not harden soon, and snap beans of this variety can be had tender and sweet for a long time.—*Early China.* A very excellent variety both for string and shelled beans, green or dry; pods medium size and full; seeds white, with a bright red eye; round oval shape.—*Early Mohawk.* Considered the hardiest bean, for first planting; will endure a light frost, and continue a long time in bearing if the green pods are gathered often. Pods pale green, long and flat; seeds large, kidney-shaped, brown and purple marbled.—*Early Red Valentine.* A most excellent variety, used principally for snaps, having round, fleshy pods, which remain a long time brittle and tender; beans long, light red and salmon-color marbled; very early, a good bearer, and extensively cultivated.—*German Wax, Black Seeded.* An excellent variety for cooking in the pods, which are delicious when fully grown; beans nearly round, black; pods white; a good bearer.—*German Wax, White Seeded.* The color of the seeds being white, it is by some preferred to the preceding for cooking. With the exception of the color, it is identical with it.—*White Valentine.* A selection from the Red Valentine, it possesses all the good qualities of its parent and of more sturdy growth; the pods are green, round, stringless, succulent, curved in form and of highest excellence; pods reach maturity 35 days after germination.

Pole Beans require a light, somewhat sandy soil, well enriched with manure in the hills; sow the seed deep in hills 3 to 4 ft. apart, with a stake or pole 8 or 9 ft. high set in the centre of the hill at the time of planting. The planting should not be done before the 15th of May and may be continued until the end of June. If planted too early they will rot in the ground; 5 or 6 beans should be sown in each hill, and when they have attained their second leaf, all but 3 or 4 should be pulled up. The after cultivation consists in one or two hillings up and keeping them clear of weeds; nipping off the ends of the shoots after they have reached the top of the poles makes the plants fruitful. If it is desired to have them earlier than they would produce in the open air, plants can be raised from beans sown 1 each in ½ pt. pot in April and kept in a cold frame; these will be ready for transplanting by the end of May. Good ways to train pole beans are as follows: Plant the beans about 4 ft. from the fence; take common poles or laths long enough to reach to the top of the fence; stick one end in the bean row, and with a single nail fasten the other end to the top of the fence; after the vines reach the top pinch off the terminal shoots and the side shoots will grow rapidly.—2. Plant a sunflower or corn by each hill of beans; the stalks will answer the same purpose as the ordinary pole.—3. Take 3 good common laths to every 2 hills, 2 for the beans, and the 1 for a brace, set in the form of a tripod, letting the tops cross about 1 in. or more, and 1 four-penny nail will hold them together. The following are the principal varieties of pole beans: *Butter or Large White Lima.* Vines vigorous but tender and late; seeds white, veined with green, very large, broad, thin, and surpassed in quality by no other variety. A general favorite wherever the season is long enough to mature it.—*Deer's Improved Lima.* The distinctive improvements are its earliness, remarkable productiveness, delicious flavor, and the forming of the bean closely in the pod.—*Dutch Case-knife.* The earliest variety of pole beans. Pods long and flat; beans white, flat, kidney-shaped, and of excellent flavor; good green or dry.

BEETS.—A deep, rich soil is best for beets. They may be sown as early as the first week in April, and should be gathered before severe frost occurs, and pitted or put in cellars for winter use. The thinning of beets must be done while they are young, and the young plants are excellent for greens. The ground should be prepared by deep plowing and harrowing, until it is fine. Open 2 furrows 2 ft. apart, and put in a sufficient quantity of manure, according to the state of the ground; cover the dung with the plow by throwing a furrow of earth upon it, ridging as high as can be well done; level the surface of the ridge over the dung, taking care that there is a full proportion of earth over the manure for the seed to vegetate in. Drop the seeds about 2 in. apart; then cover in, and roll or press down to set the earth firmly about the seeds. For succession crops, sow every 2 weeks, from the first of April until the first of June. The crop will be more tender and delicate when thus sown in succession, as those first sown become harder and not so well flavored as the hot weather approaches. The principal varieties of beets are: *Bassano.* An early, good beet, tender and juicy; flesh white and rose; grows to a good size; when sown late, it keeps well in the winter.—*Blood Turnip.* Turnip-shaped, smooth, tender and good; about 10 days after Bassano.—*Egyptian Blood Turnip.* The earliest variety grown, and valuable on this account; not very productive.—*Henderson's Pine-Apple.* Compact, short-top variety, roots medium sized and of a deep crimson.—*Imperial Sugar.* The sweetest and best sugar beet.—*Swiss Chard.* This variety is cultivated solely for its leaves. The midrib is stewed and served as asparagus, the other portions of the leaf being used as spinach. If often cut, new and more tender leaves will be reproduced. — *White Sugar Beet.* Attains a large size and is extensively grown for feeding; largely cultivated in France for the manufacture of sugar. — *Yellow Globe Mangel Wurzel.* Roots of large size and globular form; very productive; keeps better than the long red, and is better adapted for growing in shallow soil.—*Yellow Turnip.* Similar to the blood turnip, but differing in color; flesh yellow, tender and sweet.

Blood Turnip Beet.

White Sugar Beet.

BORAGE.—A light, dry soil is best suited to this. It is propagated by seed, sown in March or April in shallow drills ½ ft. apart. Transplanting is not advantageous or necessary.

BROCCOLI.—Similar to cabbage; requires a cool manure and very rich soil. A top dressing of lime and salt or a mulching of seaweed, is very useful. Sow the seed rather sparingly in drills ½ in. deep, and from 4 to 6 in. apart in seed beds in the open air. ¼ oz. of seed will sow a piece of ground 4x4 ft. and produce about 1,000 plants. The varieties are: *Large Early White.* Large white head resembling cauliflower.—*Purple Cape.* Head purple in color.—*Purple Sprouting or Branching.* These do not form a solid head, but numerous distinct purple heads, sprouting out somewhat after the manner of Brussels Sprouts.

Borage.

BRUSSELS SPROUTS.—Cultivation same as cabbage. Cultivated for the small heads, which are produced in great numbers on the main stem of the plant, and are in perfection in the autumn. They are very tender, and of fine flavor. As soon as the plants reach their height, and the top begins to cabbage, cut out the cabbage; this throws all the strength into the sprouts down the stem, making the bottom ones as good as those on the top.

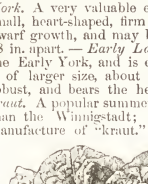
Brussels Sprouts.

CABBAGE.— The best soil is a strong, rich, substantial one, more clayey than sandy, though it will grow in any soil, if it be well worked and manured. They may be grown either from hot-bed plants, or from seed planted in the open ground. If the seed of the earlier sorts has been sown in a hot-bed, they will be ready for removal when 2 or 3 in. high. In this case, as soon as the season will permit, prepare a bed, by digging out the ground 1 ft. deep, 4 ft. wide, and to as great a length as the extent of your operations will require. Fill this up with dung, cover with earth to the depth of 4 in., and set your plants upon it in rows 4 in. apart, and 2 in. apart in the row. Water them lightly, and, if convenient, shade them for a day or two, and shelter them at night. For the late or autumn crop, the seed should be sown in a prepared bed in the open ground during the month of May, the drills being 3 or 4 in. apart. In all sowings, see that the plants do not stand too thickly together, so as to guard against their being drawn up. In the second or third week of July they should be transplanted into the permanent bed, in rows 3 ft. apart, and 2 ft.

from plant to plant. As they progress in growth, they should receive 3 or 4 deep hoeings, and be slightly earthed up. The principal varieties are as follows: *Early Blood Red.* An early variety; will make fine winter cabbage if sown late in the open ground.— *Early Dwarf Flat Dutch.* An excellent second early sort which does particularly well in the Southern States. Head of medium size, solid, flat, grows low on the stump, and is of good flavor. — *Early Sugar Loaf.* A very compact growing variety, and the plants may be set as close as 16 in. apart each way; very early, but is more affected by the heat than most early varieties. — *Early Wakefield.* A great favorite with market gardeners for the New York market; the earliest, and sure to head; the seed is true and the best. — *Early Dwarf York.* A very valuable early variety. Heads small, heart-shaped, firm and tender; of very dwarf growth, and may be transplanted 15 or 18 in. apart. — *Early Large York.* Succeeds the Early York, and is equally desirable. It is of larger size, about 10 days later, more robust, and bears the heat better. — *Filderkraut.* A popular summer sort, a little larger than the Winnigstadt; largely used in the manufacture of "kraut." It is equally good for early or late use, and heads up hard with few side leaves. — *Green Globe Savoy.* Does not make a firm head, but the whole of it being very tender and pleasant flavored, is used for cooking; leaves wrinkled and dark green; is very hardy, and improved by frost. — *Henderson's Early Summer.* An old popular sort. It follows the Wakefield and resembles the Early Flat Dutch; should be sown in hot-bed in February or March; when sown in the fall are inclined to run to seed. — *Large French Ox-heart.* A fine, heart-shaped cabbage, coming in use after Early York and other earlier sorts; very tender and fine flavored, and heads freely. — *Marblehead Mammoth.* A very large winter cabbage; heads freely, and with good soil will grow to an enormous size. — *Netted Savoy.* The leaves of this are netted to an unusual degree, and it forms a solid, compact head; one of the finest flavored of all the cabbage tribe. — *Quintal Drumhead.* An exceedingly large variety, of French origin. Heads quite flat on the top, with few side leaves; solid, firm, hard, and of good flavor. — *Winnigstadt.* A fine tender variety, sugar-loaf in form; one of the best summer sorts; if sown late, good for fall or even winter.

Early Dwarf Flat Dutch.

Early York.



Netted Savoy Cabbage.

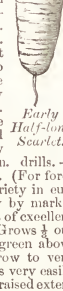
Winnigstadt.

CARDOON.—A species of artichoke. The stalks of the leaves being thick, fleshy, and crisp, are blanched, and used for salads, soups, and for stewing. Sow about the last of April, in deep, light, moderately rich soil, in trenches about 6 in. deep, 12 wide, and 4 ft. apart. Drop 3 or 4 seeds together, at intervals of 18 in., and when they come up, thin them out to single plants. Water frequently, and in a dry day, about the end of October, commence blanching by tying up the leaves with twisted hay-bands, after which earth may be heaped around them, in the manner of earthing celery.

CARROTS.—These prefer a light, loamy soil, that has been well manured for the previous crops and does not require fresh manure; if the soil is too rich or the manure too fresh, the plants have a tendency to run to leaf and not to form roots. The soil should be deeply spaded and well pulverized. Do not plow the ground until it has become thoroughly dry. Throw it up into slight ridges 3 ft. apart and leave until ready to sow the seeds. Rake off the ridges just previous to sowing the seeds, so as to have fresh, moist soil for them. For sowing, a calm day should be selected; the seeds should be separated by rubbing them between the hands, with the admixture of a little sand or dry coal-ashes. Sow thinly in drills 8 or 12 in. apart and the beds not more than 4 ft. wide. The larger weeds must be continually removed by hand, and when the plants are 7 or 8 weeks old, or when they have got 4 leaves 2 or 3 in. long, they should be thinned—those intended for drawing young to 4 or 5 in. apart, and those to attain their full growth to 10; at the same time the ground must be small-hoed. If the weather is cold and there is danger that the ground will freeze, this work may be done before the roots attain their full growth. The tops should be cut with a light, sharp hoe. If a little of the crown is removed, the roots keep just as well and are not so likely to sprout in the water. The best varieties of carrots are: *Danvers.* In form midway between the Long Orange and Early Horn class; color a rich shade of orange, growing very smooth and handsome; yields the greatest bulk,

with the smallest length of root, of any now grown. Under the best cultivation, it will yield from 25 to 30 tons per acre. — *Early Half Long Scarlet, Stump Rooted.* A popular early market variety, growing in favor. Of medium size; flesh bright scarlet, brittle and of fine flavor; will do well in shallow soil. — *Early Scarlet Horn.* The best early variety. It is shorter than most sorts; flesh deep orange color; fine grained and agreeably flavored; top small. It is best for table use, and will grow well on shallow soil. Sow 6 in. apart, in 14 in. drills. — *Earliest Short Horn.* (For forcing.) The earliest variety in cultivation; used mostly by market gardeners for forcing. Is small, but of excellent quality. — *Large White Belgian.* Grows ¾ out of the ground; root pure white, green above ground, with small top. It will grow to very large size on light, rich soil, and is very easily gathered. Flesh rather coarse; is raised extensively for stock. — *Long Orange.* A well known standard sort. Best for field culture, because of its excellent qualities for feeding purposes and its coloring effect upon the product of the dairy.

Long Orange.

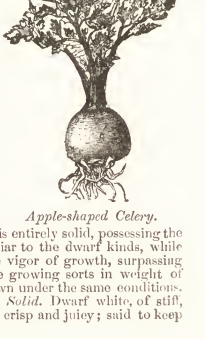


Early Half-long Scarlet.

CAULIFLOWER.—This requires a cool and moist climate, and a very rich soil, to succeed well. For spring eating sow about the middle of September. Prepare the ground by opening small trenches, and dig in some earth in good compost, to receive the plants. When of a proper size, the plants should be pricked out in a careful manner, and for them the warmest part of the garden should be selected. Being very tender they should always be put under glass in severe weather. They should not be covered until the weather is severe, and in the meanwhile the hoe should be frequently used between them, to keep the earth dry about their stems. From their beds they may be planted out in rows, like cabbages, at rather greater distances, and taking care to move a little earth with them about the middle of spring. When the flower heads show themselves, some of the leaves should be broken over them, in order to protect them from the rain and sun, and to keep the heads close and of a pure white color. They will be fit for use during the month of June or the beginning of July. Important varieties are: *Early Snowball.* Highly esteemed by market gardeners, for earliness and reliability as a sure header. — *Erfurt Earliest Dwarf.* Seed grown in Erfurt; the earliest variety in cultivation, very dwarf, with solid, pure white heads, and superior quality; one of the surest to head; seed very scarce. — *Extra Early Paris.* Heads large, white, compact and solid, of excellent flavor, tender and delicious; leaves large, stalk short. Being early, it is a favorite with market gardeners. — *Le Normand's Short Stem.* Considered by the French one of the very best sorts. The plant is hardy; semi dwarf, producing numerous leaves which protect the close, solid curd, keeping it well blanched. — *Veitch's Autumn Giant.* A distinct and valuable late variety. Heads very large, beautifully white, firm and compact, and being well protected by foliage remain a long time fit for use. The plants should be started and transplanted early in the season, to insure their full development.

Erfurt Earliest Dwarf.

CELERY.—This thrives best on a deep, mellow, sandy loam, rather moist in character. It will thrive, however, in drained clay land, if heavily manured. Dig a trench; place 1 ft. of rich soil in the bottom; set the plants in a row, about 5 in. apart; avoid breaking or drying off the roots, and when possible set out the plants in cloudy weather. Shelter from drying wind and hot sun when first transplanted and water often. In earthing up care should be exercised to close the stems well together with the hand, so that no mold can get between. Earthing up should be sufficiently frequent to keep the mold nearly level with the leaves of the outside stems. A good and simple method is to plant after early potatoes in the furrows, and have the blanching done in the storing pit in which they are kept for winter. The following are the principal varieties of celery: *Apple-shaped.* Very regular, almost spherical shape, with a fine neck and small leaves; may be planted very thickly, and will yield a heavy crop. — *Boston Market.* This forms a cluster of heads instead of a single large one, and is remarkably tender and crisp. The best variety for light soils. — *Crawford's Half Dwarf.* When blanched, this is of rather a yellowish white, and is entirely solid, possessing the nutty flavor peculiar to the dwarf kinds, while it has much more vigor of growth, surpassing most of the large growing sorts in weight of bunch, when grown under the same conditions. — *Dwarf White Solid.* Dwarf white, of stiff, close, habit, solid crisp and juicy; said to keep



Apple-shaped Celery.

in good order later in the season than any other variety. — *Golden Heart, or Golden Dwarf.* Resembles Crawford's Half Dwarf, but the heart is of a beautiful golden yellow. It is very solid, of excellent flavor, and one of the best for either home or market use. — *Incomparable Crimson.* A dwarf-growing, rich colored variety, very crisp eating, and of delicious flavor. — *Turnip-rooted.* The root is turnip shaped, tender, and narrow like, having a sweeter taste and stronger odor than other varieties. Used principally for seasoning meats and soups.

Incomparable Crimson.

CHERVIL.—An annual plant, and should be sown in March, April and May, in drills about ¼ in. deep, and 9 in. apart. Cover lightly and press firmly with the foot; rake evenly and give a gentle watering in dry weather. The leaves are fit for use when 2 to 4 in. high. Cut them off close; they will come up again, and may be gathered in succession throughout the season. One species is grown as parsley for garnishing, and is known as *Curled-leaved*; the other, known as the *Turnip-rooted*, is grown for its roots, which resemble an early horn carrot in size and shape, the flesh being white and mealy, with the flavor of a sweet potato.

CHICORY.—Chicory possesses aromatic oil, starch, sugar, nitrogenous substances, and salts; and though inferior, its action is in the same direction as coffee. When mixed with the last-named, it imparts both color and body, and is considered by most people to improve the beverage, so that it can scarcely be called an adulteration. The seeds should be sown in May, in drills ¾ in. deep and about 15 in. apart. The soil should be rich, mellow and well trenched 12 or more in. deep. When the young plants are 2 or 3 in. high, they should be thinned out to 8 in. apart. The soil should be kept frequently stirred and clear of weeds. Before being used as a salad the leaves should be blanched, which is done by inverting boxes or flower-pots over them about 12 in. deep, or by placing boards, nailed together at right angles over the rows. When wanted for winter use, the plants are to be taken up late in the fall and planted thickly in a box filled with sand or light earth, and then placed in a cool cellar, watering them after planting. When wanted for use, a box full of them should be placed in a dark room where the temperature will be from 50° to 60°; or they may be placed in the kitchen, and another box, such as a soap box, inverted over them. They will soon start into growth, and afford a supply of blanched leaves for salading purposes. Varieties: *Large Rooted, or Coffee.* Much used as a substitute for coffee, and large quantities of the prepared root are annually exported to this country for similar use. In the fall, the roots require to be taken up and cut into small pieces and put where they will dry, requiring the same treatment used in drying apples. When required for use, it should be roasted and ground like coffee.—*Paris.* This variety produces the *Barbe de Capucin*, a salad much used in France. Sown in June, the roots are transplanted in autumn into sand, in a cellar, and the shoots soon come up.

Chicory.

CHIVES.—These are small and not very important members of the onion tribe, quite hardy everywhere. The leaves are slender and appear very early in the spring, and may be shorn several times during the season. They are propagated by divisions of the root. The chives make the very best border for beds in the vegetable garden, and are not only ornamental, bearing pink flowers and masses of green leaves, but equal to the onion for flavoring soups and salads.

CRESS, or PEPPERGRASS.—This should be sown in a hot-bed or in a sheltered spot in the garden, quite thick, in shallow drills, and in a short time it will be fit for cutting. It gives a pungent relish to lettuce and other salad plants. A fresh lot should be sown every week, as it matures very rapidly and is useful only when young.

CRESS, Water.—Cultivated by sowing the seeds by running water, near springs which are not severely frozen in winter. Transplanting, however, is always surer than sowing. This may be done from March till August. The distance between the plants should be 10 or 15 in. Stirring the earth about the roots is useful; but having once taken root, no further care is necessary. There are three varieties of watercress: The *Green-leaved*, the easiest to cultivate; the *Small Brown-leaved*, the hardiest; and the *Large Brown-leaved*, the best for deep water.

CUCUMBER.—For open air raising, cucumbers should be planted in hills about 4 ft. apart, early in May; those intended for pickling may be planted till July 15th. Before planting, prepare the ground by mixing well rotted manure with the earth of each hill. 2 or 3 plants are enough to a hill. The seed should be sown about ½ in. deep; the plants must be kept free from weeds, and in very dry weather they should be watered. To have cucumbers earlier than by the ordinary way, make a hole under a warm fence, and put some hot dung in it. On this put 6 in. of fine, rich earth, and sow some seed in it. Cover at night with a carpet or other article. When the plants come up, and before they show the rough leaf, plant 2 in a pot; or let the seeds

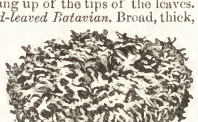
be originally planted in one, or in some large turnips, scooped out and filled with earth. The first pots may be put into a bed prepared for them, and covered as before, where they are to stand until cucumbers sown in the natural ground come up, when they may be turned out with the ball of earth and planted. When planted in turnips, put the whole into the ground. Varieties: *Bismarck.* Very constant in color and uniformly well formed and handsome. — *Early Cluster.* A popular early sort, very productive, producing its fruit in clusters; fruit about 5 in. long; skin prickly; flesh white, seedy, tender. — *Early Frame.* Plants vigorous, healthy and productive; fruit straight and well formed; flesh tender and somewhat seedy, although the young fruit makes excellent pickles. A good variety for forcing. — *Early Green Cluster.* Next in earliness to the Russian; small, prickly, in clusters, productive. — *Early Russian.* One of the earliest and hardiest varieties, and desirable for first planting. Fruit 3 to 4 in. long, and generally produced in pairs; flesh tender, crisp and well flavored. — *Early White Spine.* One of the best sorts for table use. Vines vigorous, fruiting early and abundantly; fruit uniformly straight and handsome, light green, with a few white prickles; flesh, tender and of excellent flavor. — *Gherkin.* Not a cucumber proper, but a little, rough, prickly fruit, that grows on a pretty vine, with leaves something like the watermelon. It is liked for pickling, and is known as the *West India Gherkin.* — *Improved Long Green.* Produced by selection from the London Long Green. Vines vigorous and productive, forming fruit fit for the table nearly as early as the shorter sorts; fruit about 12 in. long, firm and crisp, with very few seeds. The young fruit makes one of the best of pickles, and when ripe is the best of any for sweet pickles. — *Russian Netted.* Exceedingly prolific, and in hardiness surpasses all other varieties; of medium size, white flesh, skin covered with a pretty, white net-work, which imparts to the fruit a peculiar and handsome appearance.

Improved Long Green Cucumber.

DANDELION.—When cultivated in good rich garden soil it makes admirable spring greens, and when blanched, a salad resembling endive. The seed should be sown in May or June. Sow in drills ½ in. deep, and 12 or 15 in. apart, and in July thin out to 3 or 4 in. apart. The following spring they will be fit for use. For a salad, blanch the heads as with endive.

EGG PLANT. — Cultivation similar to musk melon. The soil cannot be made too rich. When about 1 ft. high, hill as with any other vegetables; Varieties: *Black Pekin.* Quite early and large. Very prolific and desirable for market gardeners. Fruit nearly round; skin smooth, black and glossy; flesh white, fine grained and delicate.—*Early Long Purple.* One of the earliest varieties; very hardy and productive; fruit long, and of superior quality; good for general culture.— *Improved New York Purple.* Very large and fine; the best.

ENDIVE.—Endive is one of the best salads for fall and winter use. Sow for an early spring about the middle of April. As it is used mostly in the fall months, the main sowings are made in June or July from which plantations are formed 1 ft. each way, in Aug. and Sept. It requires no special soil or manure, and after planting is kept clear of weeds until the plant has attained its full size, when the process of blanching begins. This is effected by gathering up the leaves and tying them by their tips in a conical form with bass matting. This excludes the light and air from the inner leaves, which in course of from 3 to 6 weeks, according to the temperature at the time, become blanched. Another and simpler method consists in covering up the plants as they grow, with slats or boards, which serve the same purpose by excluding the light, as the tying up of the tips of the leaves. Varieties: *Broad-leaved Batavian.* Broad, thick, plain or slightly wrinkled leaves. Principally used for cooking; preferred for stews and soups. If the outer leaves are gathered and tied on the top, the whole plant will blanch nicely, and make an excellent salad for the table.— *Green Curled.* The hardiest variety, with beautifully curled, dark green leaves, which blanch white and are very crisp and tender.— *White Curled.* Grown chiefly for summer and autumn.



Endive and Flower.

FETTICUS, or CORN SALAD.—Chiefly grown as a winter and early spring salad, but is sometimes used boiled, as greens. It requires a rich soil. The seed may be sown towards the end of August or the beginning of September, in drills 6 or 8 in. apart and ½ in. deep, rolling after sowing. When the plants are well up, thin out to 3 or 4 in. apart. Keep them well hoed and clear of weeds, and when severe weather sets in, give them a slight covering of straw or salt hay, as is done with spinach, removing it in March or April. It can also be sown early in the spring, and will be ready for use in 6 or 8 weeks.

Fetticus.

GARLIC.—This belongs to the onion family, and is the most pungent of all. The varieties

cultivated are the *Large* and the *Small*. It is grown by planting the bulb, root, or seed, in drills 2 in. deep, 6 in. apart, and 4 in. from plant to plant; plant early in the spring on light, rich ground; it should be well hoed. The bulbs attain their full size about the 1st of August, when the leaves wilt.

HORSE-RADISH.—Propagated from seed and sets, the latter obtained by cutting the main root and offsets into lengths of 2 in.; the tops or crowns of the roots form the best. Each set should have at least 2 eyes. The soil should be rich and mellow. The best time for planting is in October, for dry soils, and in February, for moist ones. The sets must be inserted in rows 18 in. apart each way. The ground should be trenched between 2 and 3 ft. deep, the cuttings being placed along the bottom of the trench, and the mold turned from the next one over them, or inserted to a similar depth. The shoots make their appearance in May or June. The only culture required is to hoe and rake the ground, and destroy the weeds. In taking up the roots, it should be done regularly, instead of a root here and there, as is often practised.

KALE, or BORECOLE.—Cultivation same as cabbage. Sow the seed in May; set out plants in July; they are better when touched slightly by the frost, and may be kept in the same manner as cabbages, during winter. The stocks, in spring, send out numerous tender shoots; and 1 oz. of seed will produce nearly 4,000 plants. The two best varieties for winter use are the *Dwarf Green Curled* and the *Purple-leaved*. The first seldom grows more than 18 in. high, and the plants may be set that distance apart. The last grows about 30 in. high, and should be planted 2 ft. apart on the rows. Other varieties: *Green Scotch, German Curled, Purple, Jerusalem*, and *Thousand-headed Cabbage*. The two last grow to 4 ft., and yield large numbers of sprouts.

Scotch Kale.

KOHL-RABI.—Belongs to the cabbage tribe, and the culture is the same, but the stem swells out, assuming a globular form resembling a turnip, this being the edible part. It is best sown thinly in drills, where it will remain. Varieties: *Green*. Large and excellent; raised both for table and cattle use.—*Purple*. Purple bulb, very tender, excellent for table.—*White Vienna*. Bulb light green, rapid in growth and symmetrical in form.

White Vienna.

LEEK.—Belongs to the onion tribe, but is more delicate. The culture is similar to that of the onion, but it requires more water. Put the rows 8 in. asunder, and thin the plants to 3 in. apart in the row. Hoe frequently between the plants until the middle of July, then take them up, and cut their roots off to 1 in. long. Make trenches for them like those of celery, only not more than ½ as deep, and ½ as wide apart. Manure the trenches with rotten dung, or other rich manure. Put in the plants as you do celery plants, and about 5 in. asunder. As they grow, earth them up by degrees. 3 leeks planted out for seed will ripen in August, and be enough for the next year. The chief varieties are: *London Flag*. This variety is more generally cultivated in this country than any other; it is hardy and of good quality.—*Musselburgh*. A remarkably large and showy variety.

Leek.

LETTUCE.—All sorts grow freely on any rich, mellow soil, where the subsoil is dry. Raise it on beds set apart for it, keeping the varieties separate; to multiply the supplies throughout the summer, portions may be sown, thinly intermixed with principal crops of leeks, onions, carrots and spinach, which will come off before the lettuces are fully grown. Sow from February to July, for the main summer or autumn crops. For an early crop, sow in the beginning of February, on a gentle hot-bed; care must be had to water them frequently with tepid water, so that they may be kept in a constantly growing state; and when the plants are 1 or 2 in. high, in March or April, prick a portion either into a warm border, or else let them be shielded with mats, during nights and bad weather, transplanting to a slender hot-bed, to bring them more forward. According to their progress in April or May, transplant them into the open garden, from 6 to 12 in. asunder to remain for heading. Varieties: *Brown Dutch*. An old sort, noted for its hardiness; leaves large, thick, green, tinged with brown. It forms a large, solid head with the inner leaves beautifully blanched, exceedingly sweet, tender and good flavored.—*Early Tennis Ball*. Very hardy and the best variety of head or cabbaging lettuce for growing under glass. Leaves dark green, thick, crisp and tender, forming under glass a compact head, but apt, unless planted very early, to be loose and open in the open air.—*Early White Head*. An excellent variety for hot-bed as well as open air culture; early and hardy. Heads small, white, crisp, very compact, and closely cabbaged.—*Green Fringed*. Exceedingly ornamental inside, the leaves are white, the edges a delicate green, and beautifully fringed and crimped; worthy of cultivation for table decoration though the quality is inferior.—*Hanson*. A very fine heading

Brown Dutch Lettuce.

variety of the largest size and standing the sun better than any other. The heads are very large, solid, sweet, tender and crisp throughout, and entirely free from any bitter taste. — *Large Drumhead.* Heads remarkably large, somewhat flattened, compact; pale green without, and white at the centre; crisp and tender; one of the finest summer varieties; seeds white. — *Simpson's Early Curled.* One of the best early sorts for market or family use; all the leaves tend to produce a large, loose head. Leaves beautifully crimped, dark green, very tender and crisp. — *White Paris Cos.* The heads are long, upright, with oblong leaves. It is very hardy, of large size, and long in running to seed; tender, brittle, and highly flavored.

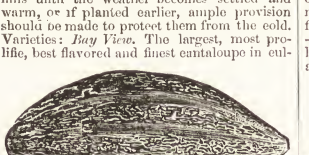
White Paris Cos.

MARTYNIA.—Seed-pods of this plant are used for pickling when in their young, green state, and by many persons are preferred to cucumbers. The seed should be sown in an open border in April or May, and in June should be transplanted into the permanent bed at a distance of 2 or 2½ ft. apart each way. In many soils it is apt to become a vile pest. Gather the pods before becoming woody.

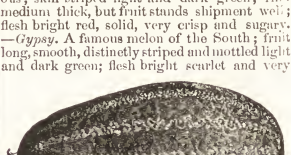
MELON, Musk.—A warm, moist, rich, loamy ground is most suitable for this crop. Hills should be prepared by digging out the soil from 1½ to 2 ft. deep and 2 or 3 ft. broad; add a very liberal quantity of the best decomposed stable manure, and mix well with the soil, filling up a little above the general level. By this mode, good melons may be raised on almost any soil. Plant in hills 6 ft. apart each way, 8 or 10 seeds in each, and thin out to 3 or 4 plants when well up. After cultivation, similar to that of the cucumber. Seeds should not be put into the hills until the weather becomes settled and warm, or if planted earlier, ample provision should be made to protect them from the cold. Varieties: *Bay View.* The largest, most prolific, best flavored and finest cantaloupe in cultivation; luscious, sweet, and very hardy; picked green, it will ripen up finely, and carry safely for a long distance. — *Casaba Citron.* Very showy cantaloupe, quality variable, in many instances, not surpassed by any known variety; flesh orange in color; sometimes produces fruit twice as large as an ordinary cantaloupe. —*Early Yellow Cantaloupe.* The earliest; of good size, nearly round, slightly ribbed. Flesh yellow, thick, but quite variable in quality. —*Green Citron.* Handsome fruit, roughly netted all over; flesh thick, green, melting and very sweet. —*Jenny Lind.* A very small, early variety, flattened at the poles; healthy, and of surpassing quality; recommended for family garden, but small for market. — *Montreal Green Nutmeg.* Nearly round, flattened at the ends; deep, regular ribs; skin densely netted; flesh thick and of a delicious flavor. —*New Surprise.* An excellent new variety; skin cream colored and thickly netted; flesh deep salmon color, of excellent flavor; very prolific. —*Nutmeg.* Of large size; flesh green, rich, sugary. — *Pine Apple.* Dark green; of medium size; rough netted; flesh thick, firm and sweet. — *Skillman's Fine Netted.* A small, very early, rough netted variety; flesh, green, thick, firm, sugary and of delicious flavor.

Green Citron Melon.

MELON, Water.—Requires a light, sandy soil, not over rich. Plant in hills, as directed for musk melons, giving more room, as the vines extend much farther. If wanted of large size, 3 or 4 melons to each plant will be sufficient, and when only one is allowed to grow from each plant, they will grow to 20 or 30 lbs. weight each. If they are planted near other varieties of vines, they will hybridize, and greatly injure the flavor. Varieties: *Black Spanish.* Vine small, so that they may be planted closer than most sorts. Fruit round, very dark green, with scarlet flesh and black seeds. It is not so large as some of the other sorts, but has a very thin rind and a rich, sugary flavor. — *Cuban Queen.* One of the largest melons known. Vine vigorous; skin striped light and dark green; rind medium thick, but fruit stands shipment well; flesh bright red, solid, very crisp and sugary. —*Gypsy.* A famous melon of the South; fruit long, smooth, distinctly striped and mottled light and dark green; flesh bright scarlet and very sweet. —*Ice Cream.* Medium size, nearly round; color pale green; white seed, thin rind, flesh solid, scarlet, crisp and of delicious flavor. —*Mountain Sweet.* One of the very best for general culture.



Casaba Citron Melon.



Gypsy Water Melon

Color dark green; rind thin; flesh scarlet, solid, very sweet and delicious.—*Orange.* Oval melon; skin green; flesh scarlet, of good quality, and may be easily separated from the rind. —*Peerless.* Rind thin, light green; flesh solid, bright in color, sugary.—*Phinney's Early.* Very early; medium and uniform size, and beautiful form; skin smooth, with uniform, narrow, white mottled and dark green stripes; flesh light red or pink, very sweet and delicious. For an early melon for family use it has few superiors, but does not bear carriage well, on account of its thin, brittle rind.

MOREL.—Chiefly used fresh or dried, to flavor sauces. Garden culture may be by collecting the spawn in June, and planting in dung-beds or ridges. It grows on wet banks, in the woods, and in moist pastures, and under old apple trees, and should be gathered when dry.

MUSHROOMS. — Grows spontaneously and very luxuriantly, and numbers several varieties, some of which are very poisonous. It needs great care to raise it artificially and to do so successfully requires a special training. It is raised in hot beds and otherwise. None but those familiar with the different species should collect the article at all, on account of the great resemblance between the good and the poisonous. The crown or hat is at first hemispherical, then convex, and at last flat, fleshy; about 2 to 5 in. broad; white, or very light brown, slightly scaly; the scales soft and fibrous; gills pink, changing to brownish black; the flesh when divided, changes generally to a reddish hue.

Mushroom.

MUSTARD.—Any free and open space in the garden will do for this plant. Sow from the beginning of November to March in a gentle hot-bed, or in the corner of a stove. From the close of February to the close of April it may be sown in the open ground, in a warm, sheltered border, and from thence to the middle of September in a shady one. Sow in flat bottomed drills, about ¾ in. deep, and 6 in. apart, very thickly. The earth should be very fine. Water in dry weather. Sow once or twice in a fortnight, according to the demand. The young plants, when about 3 in. high, are used as a salad, like cress, and the seeds are used in pickles. There are 2 species of this plant, the *Black* and the *White.*

NASTURTIUM. — The unripe succulent seed-pods are used for pickling, being an excellent substitute for capers. (For cultivation, see same in VARIETIES in FLORICULTURE.) The plants should have pea-brush set to them when they are about 6 in. high, on which they may climb. The pods should be gathered when of the size of a small pea; if left on too long, the seed within them becomes hardened and unfit for use. Sometimes the young shoots are used as a salad, or for mixing with lettuce. The *Dwarf* is the best variety for kitchen garden purposes. The *Tall Mixed* is useful and ornamental.

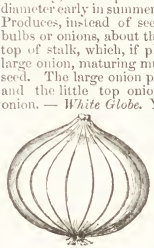
OKRA.—It may be sown, with certainty of success, at the time of planting Indian corn. Draw drills about 1 in. deep, and 4 ft. asunder, into which drop the seeds at the distance of 2 in. from one another, and cover them 1 in. deep. As they advance in growth, earth them up like peas. Varieties: *Dwarf.* Grows from 2 to 2½ ft. high and is best adapted for the garden. — *Long Green.* Long pale green, and ribbed. — *Tall or Giant.* This grows 5 or 6 ft. high, taking up too much room in the garden.

Okra.

ONIONS.—For a general crop, the ground should be well prepared by digging in some of the oldest and strongest manure that can be got. Plant in April or May, sowing the seed moderately thick, in drills 1 in. deep and 12 in. apart. The plants should be hoed 3 times during early growth. Beds to stand for ripening should be thinned out, while young, to 2 or 3 in. apart. When the greenness is gone out of the tops, it is time to take them up, for from this time the roots decay. After being pulled they should be dried, and removed to shelter. The small onions may be planted in the following spring. Even an onion which is partly rotten will produce good bulbs, if the seed stems be taken off as soon as they appear. Most varieties are propagated by seed. The potato onion, however, does not produce seeds, but increases by the root. One onion, slightly covered, will produce 6 or 7 in a clump, partly under ground. The bulbs are generally planted in the spring, 12 to 18 in. apart, though they are apt to yield better when planted in autumn, as they will survive the cold, if covered with dung or litter. Varieties: *Extra Early Red.* Ripens about 10 days earlier than the Large Wethersfield, and is rather smaller in size, but close grained and heavy. —*Giant White Italian Tripoli.* A large, beautiful, pure white, flat onion of mild and excellent flavor; to attain the full size, the small bulbs should be set out the next spring. — *Large Red Globe.* A handsome globular onion, of mild flavor and a good keeper. — *Large Red Wethersfield.* The standard variety, and the favorite onion in the East, where immense crops are grown for shipment. Large size; skin deep purplish red; form round, flat; flesh purplish white; stronger flavored than any of the other kinds. Very productive and the best keeper. — *Large Yellow,* or *Yellow Dutch.* One of the oldest sorts.

Extra Early Red.

and, as a market variety, probably better known than any other. Flesh white, fine grained, mild, and well flavored. — *Marzajola.* Probably the earliest variety grown in the warm climates; seed sown in autumn produces bulbs in spring. — *New Queen.* Silver skinned; of quick growth and remarkable keeping qualities. If sown in February, it will produce onions 1 to 2 in. in diameter early in summer. — *Top Set*, or *Button.* Produces, instead of seed, a number of small bulbs or onions, about the size of acorns, on the top of stalk, which, if planted, will produce a large onion, maturing much earlier than from seed. The large onion produces the top onion, and the little top onion produces the large onion. — *White Globe.* Yields abundantly, producing handsome and uniformly globe shaped bulbs. The flesh is firm, fine grained, and of a mild flavor. — *White Portugal.* A large flat onion; skin loose; of a mild flavor; fine for early winter use, and much esteemed for pickling; the best keeper of the white varieties.—*White Silverskin for Pickling.* This is of small size, silvery white, and, on account of its small size and handsome appearance, is preferred for pickling. — *Yellow Danvers.* Mild flavored, very productive, ripens early and a good keeper.



White Globe.

PARSNIP.—Sow the seed in drills, and leave in thinning, 8 in. apart in the rows; keep clean by frequent hoeings, and in the autumn they are fit for use; they improve in quality by being exposed to the frost, and will remain in the earth without injury; those intended for spring use may be left in their beds, and are usually found in a fine state in the spring months. The seed of this plant vegetates with some difficulty, and in a light, dry soil should have the earth pressed upon them with a roller immediately after sowing. The drills in which these are planted should be about 1 in. deep and 14 to 15 in. apart, sowing the seeds quite thickly. When grown as a field crop, the rows should be 20 in. apart, so that they can be readily worked with a cultivator or horse hoe. Varieties: *Early Round.* An early variety of small size. — *Guernsey.* A coarse growing variety; valuable for stock food, for which it is alone recommended. — *Hollow Crown.* Roots oblong, ending somewhat abruptly; with a small tap root; grows mostly below the surface; has a very smooth, clean skin, and is easily distinguished by the leaves arising from a cavity on the top or crown of the root. — *Long White Dutch*, or *Sugar.* Roots very long, white, smooth, tender, sugary, excellently flavored. Very hardy, and will keep through winter without protection.

PEAS.—For early peas, the soil should be light, warm and sheltered, but for general crop a moderately heavy soil is preferable. Sow as early as possible a few of the earliest varieties on warm quick soil prepared the fall before. The general crop can be delayed until later, but better success is obtained from sowing all the varieties comparatively early, depending for succession on selecting sorts that follow each other in ripening. The very earliest may be covered only 1 in. deep; the other sorts should be covered from 2 to 6 in. deep, the deep planting preventing mildew, and prolonging the season. Fresh manure or wet, mucky soil should be avoided, as they cause the vines to grow too rank and tall. Gather the crop as fast as it becomes fit for use. If even a few pods begin to ripen, young pods will not only cease to form, but those partly advanced will cease to enlarge. All wrinkled peas are superior to, and more delicate in flavor than those that present a full and perfect form. Varieties: *American Wonder.* A highly improved variety, whose stout, branching vines grow only about 9 in. high, and are covered with long, well filled pods. The peas are of the best quality. — *Blue Peter*, or *Blue Tom Thumb.* An early, dwarf, blue pea, of robust habit and strong growth. It grows about 9 in. high, and needs no sticks; it is a great producer, and perhaps, with the exception of the American Wonder, the most dwarf of any. — *Champion of England.* One of the richest and best flavored grown, and very productive; height 4 or 5 ft.; seed whitish-green and much shriveled. — *Dwarf White Marrowfat.* Similar in general character and appearance to the Large White Marrowfat, but of stiffer habit and dwarfer growth, being only 3 or 4 ft. high. — *Large White Marrowfat.* Cultivated more extensively for the summer crop than any others. 5 ft. high, of strong growth. Pods large, round, rough, light colored and well filled; seed large, round and yellow or white, according to the soil in which they are grown; excellent for summer use, but inferior to some of the newer sorts; the greatest bearer. — *McLean's Little Gem.* A very desirable early, dwarf, green, wrinkled variety, growing about 15 in. high. When in a green state, it is very large, sweet, and of delicious flavor.

PEPPER.—Sow early in a hot-bed, in the Northern and Middle States, or in the open ground, in a seed bed, about the middle of spring, in light warm soil. Transplant when 3 in. high, 1 ft. apart, in 18 in. drills, and earth up a little at 1 or 2 hoeings. Guano, hen dung, or any other bird manure applied upon the surface and hoed in when the plants are about 6 in. high will be found to increase the product. Varieties: *Chili.* Used in the manufacture of pepper sauce. Pods sharply conical, nearly 2 in. in length, and ½ in. in diameter; brilliant scarlet. Requires a long, warm season, and plants should be started quite early in hot-bed. — *Large Bell*, or *Bull Nose.* A very large sort, of square form, mild, thick and

Large Bell Pepper.

hard, suitable for filling with cabbage, and for mixed pickles; less pungent than other sorts, and one of the earliest varieties. —*Long Red Cayenne.* A long, slim pod, rather pointed, and when ripe, of a bright red color. Extremely strong and pungent.

Long Red Cayenne

PUMPKIN.—This is not so particular in regard to soil as melons or cucumbers, but in other respects is cultivated in a similar manner, though on a larger scale. It is generally raised on cultivated farms between hills of corn, and may be planted with success in fields by themselves. Varieties: *Cashaw.* A great favorite in the Southern States, but too tender for general cultivation in Northern climates. In form much resembling the Winter Crookneck Squash, though growing to a very large size, frequently weighing 70 lbs.; color, light cream, sometimes slightly striped with green; flesh salmon colored; very productive.—*Large Yellow.* Grows to a large size, and is adapted for cooking purposes and feeding stock. It is irregular in shape and size, some being depressed and flattened at the ends, others round or elongated; of deep rich yellow color; of fine grain and excellent flavor.

Cashaw Pumpkin.

RADISHES.—Sow for the earliest productions, during December, January and February, in a hot-bed; and in the open ground once a month during winter, and every fortnight during the other seasons of the year; In the open ground sow thinly in drills; bury ½ in. deep; drills for the Long-rooted, 3 in. asunder; for Turnip-rooted, 4 or 5; and for the Spanish, 6 or 8; when the seedlings are advanced to 6 or 6 leaves they are ready for thinning. In dry weather they ought to be watered regularly every night. The early and late crops that have to withstand the attacks of frost, should be kept constantly covered with dry straw to the depth of about 2 in., or with matting, supported by hooping, until the plants make their appearance, when the covering must be removed every mild day, but renewed towards evening, and kept on constantly during frosty or tempestuous weather. The bed should have a good watering the morning before that on which they are taken up, but none afterwards until subsequent to the drawing. The *soil*, a light loam, and moderately fertile, should be dug a full spade deep, and well pulverized. Manures should not be applied at the time of sowing. The situation should always be open, but for early and late crops warm and sheltered. Varieties: *California Mammoth White China Winter.* This was introduced into California by the Chinese; it grows to a large size; flesh, white, firm, and of good flavor. — *Early Long Scarlet, Short Top Improved.* This is unquestionably the best standard variety for private gardens or market use. It grows 6 or 7 in. long, ½ out of ground; is very brittle and crisp, and of quick growth; color bright scarlet; small top; tapers regularly to the root, and is uniformly straight and smooth. — *Early Scarlet Turnip-rooted.* Small top; quick growth; mild and crisp. — *French Breakfast.* A quick growing variety, and one of the best for early forcing. It is of oval form; color, scarlet, tipped with white. — *Olive-Shaped Scarlet.* An early and handsome variety, of a lively rose color and oblong shape. — *Scarlet China Winter.* Form rather conical and very smooth; of a lively rose color; flesh firm and pungent. — *Spanish Winter, Long Black.* Of very large size and firm texture. Store in sand in the cellar for winter use. — *White China Winter.* Except in color, this is similar to Scarlet China.

Long Scarlet Short Top.

French Breakfast.

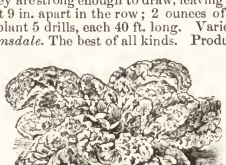
RHUBARB, or PIE PLANT.—Succeeds best in deep, somewhat retentive soil. The richer its condition, and the deeper it is stirred, the better. Sow in drills 1 in. deep. Thin out to 6 in. apart. In the full trench a piece of ground, and manure it well; then transplant the young plants into it, 3 ft. apart each way. Cover with leaves or litter the first winter, and give a dressing of coarse manure every fall. In the spring hoe the bed, and if to be blanched, dig a trench between the rows, and the earth from it place about 1 ft. thick over the stool. This covering must be removed when the cutting ceases in June, and the plants may then be allowed to grow at liberty. The more they are cut from the less productive they are the next year. As the earth in wet seasons is apt to induce decay, the covering may be advantageously formed of coal-ashes or drift sand. Chimney-pots and butter firkins make good coverings for blanching. The finest flavor is obtained by exposing the stalks to the light and air. Varieties: *Giant.* Very large and late green variety, with round stalks of great length and thickness. — *Linnæus.* The earliest variety, and very productive and high flavored. It produces little acidity and is very thin skinned. — *Victoria.* Very large leaf stalks, 2 or 3 in. in diameter at the broadest part, and often 2 or 3 ft. in length. They are stained with red at the base, and finely spotted to the nerves of the leaf.

SALSIFY, or OYSTER PLANT.—This plant, when properly cooked, has a flavor like that of oysters. Cultivation same as parsnips.

SEA-KALE.—The soil should be good, well manured, trenched, and pulverized. If intended to be raised from seed, lay the ground level in April after winter's trenching; draw drills 3 ft. apart, and finally thin the plants to 2 ft. apart in the rows. If the ground is to be planted with sea-kale to stand permanently, choose one-year old plants from a poor piece of ground; no matter how small they are, so long as they are clean from canker and from the distorted crooked swellings caused in them by wounds from the grub. Plant in rows 3 ft. apart, and the plants in the rows 2 ft. apart. Insert the plants singly. A cellar, or the bottom of a dark cupboard, or any dark corner, are excellent places for producing early shoots of it, if planted in sand, old tan, leaf, or other light vegetable soil, or even in common garden earth. The plants should be kept as much in darkness as possible if intended to be well blanched. Strong plants should be taken up, and no matter how thickly they are placed. Water them occasionally with tepid water, and 2 or 3 crops of excellent sea-kale may be obtained in succession before the plants are exhausted.

Sea-Kale.

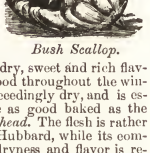
SPINACH.—This is best developed and most tender when grown in rich soil. It should be heavily manured and deeply trenched. Sow early in March for summer crop in drills, which method renders the cultivation and gathering of the produce more convenient. Encourage the growth with frequent hoeing, which draws the moisture to the roots. For a succession a few seeds of the summer varieties may be sown, at intervals of a fortnight, from April to August. Sow from the middle of August to the beginning of September, for the winter crop, in a light, sandy soil, on raised beds, which enables it better to stand the severe frost. Thin the plants as soon as they are strong enough to draw, leaving them about 9 in. apart in the row; 2 ounces of seed will plant 5 drills, each 40 ft. long. Varieties: *Bloomsdale.* The best of all kinds. Productive



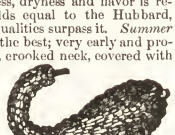
Round-leaved Savoy Spinach.

in leaf, thick foliage and corrugated like a Savoy cabbage.—*Prickly Winter.* The hardiest variety and will withstand the severest weather, with only a slight protection of leaves or straw. The seed is prickly; leaves triangular, oblong or arrow-shaped. It is employed for fall sowing, which is made about the 1st of September. —*Round-leaved Savoy.*—Produces large, thick, dark green leaves, somewhat crumpled, and possesses the valuable quality of standing a long time before running to seed.—*Round Summer.* This variety is generally preferred for early sowing; leaves large, thick and fleshy; not quite so hardy as the Prickly, but stands winter very well.

SQUASH.—This is cultivated the same as pumpkin. The principal varieties are as follows: *Boston Marrow.* A fall and winter variety. Oval form; skin thin; when ripe, bright orange; flesh rich salmon yellow, very dry, fine grained, and for sweetness and excellence, unsurpassed, but not as dry as the Hubbard.—*Early Bush Scallop.* An early, flat, scallop-shaped variety; color yellow or white; flesh pale yellow and well flavored; very productive; used when young and tender for boiling, and at maturity for pies.—*Hubbard.* This is a superior variety, and the best winter squash known; flesh bright orange yellow, fine grained, very dry, sweet and rich flavored; keeps perfectly good throughout the winter; boils or bakes exceedingly dry, and is esteemed by many to be as good baked as the sweet potato.—*Marblehead.* The flesh is rather lighter color than the Hubbard, while its combination of sweetness, dryness and flavor is remarkable. It yields equal to the Hubbard, while its keeping qualities surpass it. *Summer Crookneck.* One of the best; very early and productive. It is small, crooked neck, covered with warty excrescences, the more the better; color bright yellow; shell very hard when ripe.—*Turban.* An excellent variety for use in the autumn and early winter. Flesh orange yellow, thick, fine grained, sugary and well flavored. Generally a light yellow color, but occasionally greenish yellow, striped with white. In form resembling a turban or Turk's cap; not to be confounded with the French Turban, which is more showy but inferior.



Bush Scallop.

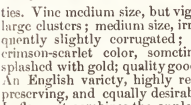


Summer Crookneck.

SWEET CORN.—Requires a rich soil; sow in hills about 3½ ft. apart, from the last of April to the 1st of July; manure each hill, and have only 2 or 3 stalks in each hill. Varieties: *Crosby's Extra Early.* A remarkably early, excellent variety; ears large and produced very low on the stalk; medium length; sweet, rich and delicate.—*Early Minnesota Sweet.* Excellent and very early; ears rather small, long and pointed. —*Early Red Narragansett.* The best red variety of sugar corn; early; kernels shrivelled, and

very sweet and tender. — *Early Sweet.* Ears good size, tender and sugary; plant productive, hardy and quite early. — *Excelsior.* Ears medium in size, but remarkably sweet, succulent and tender; plant small, but very productive. — *Mammoth Sweet.* This variety produces the largest ears of any sort, a single ear sometimes weighing 2 or 3 lbs. The quality is sweet, tender and delicious. — *Stowell's Evergreen.* Intermediate in its season, and if planted at the same time with earlier kinds, will keep the table supplied till October. It is hardy and productive, very tender and sugary, remaining a long time in a fresh condition, and suitable for boiling.

TOMATO.—Tomato is raised from seed, which should be sown in hot-bed in March, or in pots in a warm window. They should be started as early and forwarded as rapidly as possible, whether by hot-bed or open-air culture. When about 2 in. high they should be transplanted in single plants, to warm, light, rich soil. Water freely at the time of transplanting, and shelter from the sun a few days, or until well established. Train upon trellis work, or support by driving sticks in the ground and tying to them. Varieties: *Canada Victor.* Very early; vines large, spreading, productive; fruit of light scarlet color, round, smooth, of medium size, solid, and ripening up well. — *Early Conqueror.* One of the earliest and most productive varieties. Vine medium size, but vigorous. Fruit in large clusters; medium size, irregular, and frequently slightly corrugated; of a beautiful crimson-scarlet color, sometimes dotted and splashed with gold; quality good. — *Green Gage.* An English variety, highly recommended for preserving, and equally desirable for the table. In flavor it combines the apple and tomato; is piquant and highly agreeable; medium size, plum-shaped, and of a bright yellow color. — *Paragon.* Vine very large, vigorous and productive, and continuing so until killed by frost. Fruit large and round; of a very dark, rich crimson-scarlet color, with occasionally a purplish tinge. It ripens evenly, and the flesh is thick and fine flavored. — *Red Cherry.* A small, round, red tomato, of the shape and size of cherries; cultivated mostly for pickling; is very early. — *Trophy.* Well known as one of the best; vines of medium size, but producing compact clusters of fruit in immense quantities; fruit large, smooth, of bright red color; solid, and of good flavor.

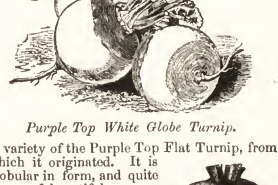


Canada Victor Tomato.

Paragon Tomato.

TURNIP.—Grows best in highly enriched, sandy, gravelly or light loamy soils. Commence sowing the earliest varieties in April, in drills from 12 to 15 in. apart, and thin out early to 6 or 8 in. in the rows. For a succession, sow at invals of a fortnight, until the last week in July, from which time to the end of August sowings may be made for the fall and main crops. Varieties: *Cow Horn* or *Long White.* This variety is carrot like in form, growing nearly half out of the ground, and slightly crooked. It is pure white except a little shade of green near the top. It is delicate and well flavored, of a very rapid growth, and has obtained favor as a market sort for fall and early winter use. — *Early Purple Top Strap-leaved.* Similar to the preceding, except in color, being purple, or dark red on the top. — *Early White Flat Dutch.* A medium size, white, flat turnip, of quick growth, juicy, and of excellent quality when young; sow in spring or fall. Designed for table use; is spongy and inferior when overgrown. — *Purple Top White Globe.*

Cow Horn.



Purple Top White Globe Turnip.

A variety of the Purple Top Flat Turnip, from which it originated. It is globular in form, and quite large; of beautiful appearance; of most excellent quality, and equally desirable for table or stock. It keeps well, and is a fine market sort. — *Ruta Baga, Swedish* or *Russian.* Extensively grown for a farm crop; the roots are close grained, very hard, and will endure a considerable degree of cold without injury. The roots are best preserved in a pit or cellar during the winter; excellent for table early in spring. Sow from the 20th of June to the middle of July, in drills 2 ft.

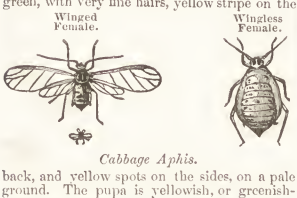
White Egg.

apart, and thin out to 8 in. — *White Egg.* A quick growing, egg-shaped, perfectly smooth, pure white variety, growing half out of the ground, with small top and rough leaves. Its smooth, white skin and quick growth make it particularly adapted for fall market purposes. The flesh is very sweet, firm and mild, never having the rank strong taste of some varieties.

VEGETABLE PESTS.

ASPARAGUS BEETLES.—These are troublesome pests found on asparagus. There are 2 kinds: one, blackish-green, the thorax red, with 2 black dots, yellow wing-cases, the suture and 3 spots united to it on both sides being black; the other, called *Twelve-spotted Leaf-beetle*, red, the wing-cases lighter, each having 6 black dots; the horns, eyes, breast, edge of the abdomen, tips of the thighs and palpi, black. The larva is spindle-shaped, flat beneath, arched, fleshy, wrinkled, covered with single hairs, bordered at the sides, of an olive-color; the head and legs black. The only remedy is to pick off and kill both beetles and larvæ.

BUTTERFLIES.—*Green-veined.* Attacks cabbage. Its wings are white, with the tips of the upper ones black. The male has 1 black spot, the female 2 or 3. The veins on the outer edge of the female's under wings are black. The under wings are yellow on the under side, with greenish-powdered veins. It flies about in April and July. The caterpillar is finely haired, of a faint or brownish green, lighter at the sides, with reddish-yellow spiracles, small white warts, and black punctures. The pupa is yellowish-green, with points on the head. To destroy them, pick off and kill the caterpillars, as well as the pupæ, excepting those which have a brown appearance, as these are full of the larvæ of ichneumons and other allied parasites. — *Large White.* White wings, upper wings with broad black tips, and the female has 2 black spots on the middle. The under side of the under wings is light yellow. Appears from May to October. The caterpillar is bluish-green, thinly-haired, sprinkled with black dots, having a yellow stripe on the back, and some on the sides; found on all sorts of cabbages. The pupæ are yellowish-green, with black dots, with a point on the head, and 5 on the back. Same cure as above. — *Small White.* This also attacks cabbage. It resembles the former insect, but is smaller, and the black tint at the points of the upper wings is fainter, and not visible on the outer edge. The caterpillar is of a dull green, with very fine hairs, yellow stripe on the



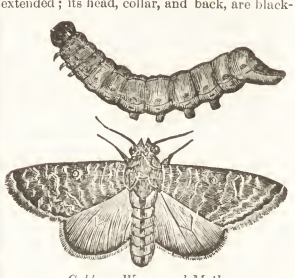
Cabbage Aphis.

back, and yellow spots on the sides, on a pale ground. The pupa is yellowish, or greenish-gray, with 3 yellow stripes. Cure same as that prescribed for the green-veined variety.

CABBAGE APHIS.—Early in June the cabbage aphis makes its appearance on young cabbage plants, and before long becomes very numerous. Tobacco smoke or infusion will destroy them.

CABBAGE FLY.—An ash-gray insect; the thorax has 3 indistinct black streaks on the back; the wings are clear, like glass; the abdomen is linear, with black stripes on the back of the male, or entirely ash-gray on the female; the length is 3 lines. The larva much resembles that of the onion fly, but is thicker. To diminish this, pull up sometimes and carry away the plants attacked by the larvæ, which may be known by their dull lead color, and the withering of their leaves in the sunshine.

CABBAGE MOTH and WORM.—The moth is of middling size, 1½ in. broad, when the wings are extended; its head, collar, and back, are black-



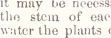
Cabbage Worm and Moth.

ish-gray, intermixed with whitish and yellowish hairs. The back has a thick double crest; the abdomen is dark ash-gray, the upper ½ beset with black tufts in the middle. The upper wings are gray, with a mixture of yellow and white; the under wings are light gray, with dark veins, and central spots, blackish towards the outer edge. The moth appears in May and June, sits in the day-time, and flies only at night. The caterpillar is green, more or less covered with gray or black; it has a dark stripe on the back, on which there is a pale, indistinct line. Above, it is sometimes furnished with dark or pale spots, placed lengthwise. At the sides is a dirty-yellow stripe, which becomes reddish above; close above this spot are 2 white spiracles, surrounded with black, each in a small black spot. Sprinkle over the parts where the worms usually operate, a pinch of cayenne pepper. Or, sprinkle air-slacked lime on the plant

in the morning, on the dew, till the plants are white with it.

CLUB-FOOT.—A disease common to cabbage grown in moist, mucky land. It is caused by a maggot or worm that infects the fine rootlets of the plant, and produces a thickening of the root. Salt, applied 2 or 3 times during the season, is recommended as a remedy. An application of lime to the soil will prove of benefit, or the use of sulphur is good. Another remedy is to boil leaves and twigs of the scarlet-berried alderberry to a strong decoction, and pour 1 gill, cold, on the centre of the plant; 1 application is generally sufficient. On heavy soil it may be necessary to loosen the earth about the stem of each plant. As a preventive, water the plants once or twice with the decoction after setting out.

FLAT-BACKED CENTIPEDE.—This attacks the roots of cabbage. Pieces of boards and chips scattered around the garden will gather a number under them, and they may be destroyed by cutting them to pieces. Or, place a hen with small chickens under a coop in the garden.



Flat-backed Centipede.

FLEA BEETLE.—This is a small black insect which destroys small plants. Soot, tobacco-water, solution of whale-oil soap, infusion of wormwood, Mayweed, pennyroyal, or slaked lime are all good remedies. Toads and snakes do more towards destroying these than all else combined.

LETTUCE FLY.—This insect is blackish brown; the under part and sides of the segments of the abdomen vary ang gray; length nearly ¼ in.; flies in July. The larva is small and smooth, and its color varies into yellow. It is almost impossible to get rid of these insects.

MELON PESTS.—1. To remove from the vines, dilute fresh cow manure until of a paste-like consistency and pour on the vines.—2. Plant a tomato vine in each hill.—3. Put ½ gal. of sharp sand immediately around them.

NEGRO FLY.—Slightly haired, shining black, rather of a metallic-green; head reddish yellow; legs light yellow; balancers white; wings clear, like glass; ¼ in. long. The larva is cylindrical, pointed anteriorly, like parchment, shining, smooth, bare, pale-yellow. Pull up the sickly infested carrots, known by their yellow outer leaves and early withering, and destroy the insects contained in them, before changing into pupæ.

ONION FLY.—The eggs of this fly are laid on the leaves, close to the earth, and the larvæ destroy the root, and cause the plant to turn yellow, wither and die. The larva state lasts about 2 weeks, the pupa is formed in the bulb itself, or in the earth near it, and the fly appears in 2 or 3 weeks afterward. Tar and water, wood ashes, lime, powdered charcoal, flour of sulphur, lime water, soot, petroleum, soapsuds, and pyroligneous acid, are all good remedies. As a preventive sow the seeds deeper than usual.

Onion Fly.

PARSNIP or PARSLEY WORM.—A large thick-bodied, apple-green worm, with black bands, which finally becomes a beautiful butterfly. It appears in July and August. To destroy pick off by the hand and kill.

Parsnip or Parsley Worm.

PICKLE WORM.—A pale green worm, which produces a peculiarly marked moth of yellowish brown color with an iris-purple reflection. It bores holes into cucumbers, squashes and melons in the garden, and after being gathered. The vines should be carefully watched and all infested fruits cut and destroyed immediately.

Pickle Worm.

Moth of Pickle Worm.

SKIP-JACK.—This insect attacks lettuce. It is a light yellow, 6 to 7 lines long, of the thickness of a pigeon's quill; its body is cylindrical, somewhat flatly compressed at the head, rather pointed behind, with strong, black, and shining jaws. The pupa or nymph is shorter than the larva, paler in color, and thicker. The beetle, which is developed from the pupa in 14 days, is from 4 to 5 lines long, 1½ lines broad, and has the usual form of spring beetles; it is slightly curved; head and thorax dark-brown; wing-cases yellowish, striped, with dots; the feelers are slender, notched, and yellowish-brown; the under side of the body also brownish. To get rid of this pest, pull up every plant that begins to wither, and kill the enemy within, or in the earth near the plant.

SQUASH BUG.—Very destructive to squashes and pumpkins. It is a little over ½ in. long, of a rusty-black color above and dirty yellow beneath. It gives off an odor like that of an over-ripe pear. They may be destroyed by pressing and cracking them between the thumb nails, or the clusters near the edge of the leaf may be torn off and trampled on, or destroyed by fire. The *Spotted Squash Bug* feeds upon the leaves of the squash, eating them in large circular holes. It is commonly called *Lady Bug.* The larvæ

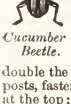
Squash Bug.

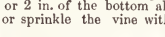
after attaining their growth, change to pupæ, enclosed in the dry and thorny skin of the larvæ. They remain in this state for a week, when the beetles crawl out. To destroy them, brush from the leaves into a pan of brine or boiling water. Encourage toads, lizards and snakes.


Spotted Squash Bug.


Larva Spotted Squash Bug.

STRIPED CUCUMBER BEETLE.—Feeds upon the leaves and tender shoots of the cucumber and melon. The larvæ work upon the stem generally below the ground. They are bright yellow with black stripes and black head. To destroy them, set 4 stakes 1 ft. high out of the hill; fold a stout newspaper


Cucumber Beetle.


Larva of Cucumber Beetle.

double the longest way and wind it around the posts, fastening tightly with pins; leave it open at the top; cover 1 or 2 in. of the bottom all around with dirt, or sprinkle the vine with Paris green.

STRIPED FLEA BEETLE. — Perforates small holes in the leaves of young cabbage. To destroy it, dust the plants with ashes, sulphur, lime, plaster, or snuff.


Striped Flea Beetle.

TOMATO PESTS.—To remove the pests from the tomato vine, take 1 bus. of newly slaked lime, and mix therewith ½ bus. wood ashes; mix and blend the whole intimately together, and sift the powder lightly along the top of the drills. Liberal sowing and rapid growth best insure the plant from injury; and to effect this, the seed should be plentifully sown in a rich soil, and, if possible, when the ground is moist. Before sowing, the seed should be steeped in some preparation, which experience has shown will the most quickly develop the germ. Hand-picking the worms is the easiest and surest mode of destroying them.

WEEVIL.—This deposits its eggs on the surface of the pods of beans and peas. It is about ¼ in. long and black in color. As soon as the eggs are hatched, the larvæ bore directly through the pod, 1 entering each pea or bean, and making a puncture smaller than a pin-hole. As the pea and pod enlarge, the puncture closes up, and the larva excavates a small cavity in one side of the pea, leaving its outer coating whole. In this cavity it assumes the pupa state, and comes out a perfect beetle the next year, usually about the time the young peas are in bloom. If the weevils are in the peas when sown, they remain in the ground till the proper time to come out and deposit their eggs. Inclose the peas, after they are perfectly dry, in a tight cask, and keep them over to the 2nd year before sowing, which will kill the weevils; put them into water just before sowing, when the sound ones will mostly sink, and those containing the weevil will rise to the surface. Also immerse them in hot water for 1 or 2 minutes, by which most all the weevils will be killed and the sprouting of the peas not injured. Beans and peas can be preserved by mixing with them, when being stored away, a few drops of crude carbolic acid.


Weevil.

LANDSCAPE GARDENING.

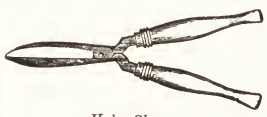
REMARKS.—In landscape gardening, aim to separate the accidental and extraneous in nature; preserve only the spirit or essence. This subtle essence lies in the expression more or less pervading every attractive portion of nature; and it is by eliciting, preserving or heightening this expression that landscape gardening has a higher charm than even the polish of art can bestow. The two principal things to be aimed at are the production of the beautiful and the picturesque. The beautiful is nature or art obeying the universal laws of perfect existence, freely, easily, harmoniously and without the display of power. The picturesque is nature or art obeying the same laws rudely, irregularly, and sometimes displaying power only. Unity, harmony and variety are the great principles in landscape gardening. Unity, or the production of a whole, is of the highest importance. The mind can only attend, with pleasure and satisfaction, to one object, or one composite sensation at a time. In the arrangement of a large extent of surface, where a great many objects are necessarily presented to the eye at once, the principle of unity will suggest that there should be some grand or leading features to which the others should be merely subordinate. Thus, in grouping trees, there should be some large and striking masses to which the others appear to belong, instead of scattered groups, all of the same size. Variety is a great source of beauty in landscape gardening. It should be considered as belonging to details, and not to the production of a whole. Introducing trees and shrubs, different species of vegetation, or kinds of walks, and ornamental objects, buildings and seats, have a pleasing effect. Harmony is the principle presiding over variety and preventing it from being discordant. If unity only were consulted, the ground might be planted with but one tree only, the effect of which would be sameness. Variety might be carried so far as to have each tree of a different kind, which would produce a confused effect. Harmony introduces contrast and variety, but keeps them subordinate to unity, and is the highest principle of the three.

ARRANGEMENT OF GROUNDS.

APPROACH.—Roads and walks are directly connected with operations on the surface of the ground and with the disposition of plantations. The approach is the most important of these routes. It is the route leading from the highway directly to the house itself. It should bear a proportionate breadth and size, and exhibit marks of good keeping, in accordance with the dignity of the house. The point where the approach is to start from should be chosen so as to afford a sufficient drive through the grounds, before arriving at the house, to give a stranger some idea of the extent of the whole property. The house should generally be approached so that the eye shall meet it first in an angular direction, displaying the beauty of the architectural facade and the end elevations, thus giving a complete idea of the size, character and elegance of the building; instead of leading in a direct line from the gate to the house, it should curve in easy lines through the park or lawn. In the approach, the curves should never be so great, or lead over surfaces so unequal, as to make it disagreeable to drive upon them, and the road should never curve without some reason, either real or apparent.

DRIVES.—These may be made an agreeable feature at a small expense. They should generally commence where the approach terminates; that is, near the house; and then proceed in the same easy manner through various parts of the grounds, farm or estate.

HEDGES.—Fences are unsightly and offensive objects. The close proximity of fences to the house gives the whole place a confined and mean character. Verdant or evergreen hedges are elegant substitutes for stone or wooden fences. To plant a hedge, if the sod is new, break it up in the fall, and in spring plow it, throwing the furrows outward, so as to leave a broad furrow in the middle, in the line of the intended hedge. If the ground is rough, it must be very thoroughly harrowed at planting time, and the earth, thrown into the centre by plowing from both sides, must be allowed to settle for a few days before planting the hedge, to prevent subsequent exposure of the roots. As it is requisite in order to have a handsome-looking hedge, to plant the sets in a straight line, the ground should be staked off at regular distances, and a cord run from one stake to another as a guide. When the plants are ready, they may be set in the ground with but little trouble by inserting a spade to the depth of 5 or 6 in., close to the line, pressing it outward, and dropping a plant into the hole thus made. The spade may then be withdrawn, and inserted a short distance behind its first position, by which the ground is pressed forward against the plant, thus fixing it firmly in position. A double row, with the plants alternating, is preferable to a single-row hedge. In no case should they be planted nearer than ten inches asunder in the rows, and the rows should be at least 8 in. apart. Many of the hedge-plants will require to be planted at even a greater distance from each other, or they will not thrive. The first year, keep the ground mellow, and clear of weeds. Throw a furrow against the plants on each side, and subsequently plow from them when weeds and grass spring up. Repeat this operation as often as any obnoxious vegetation makes its appearance, and late in the autumn, plow two heavy furrows against the hedge on each side. Trim frequently with shears during the summer, keeping the shoots down to within 3 or 4



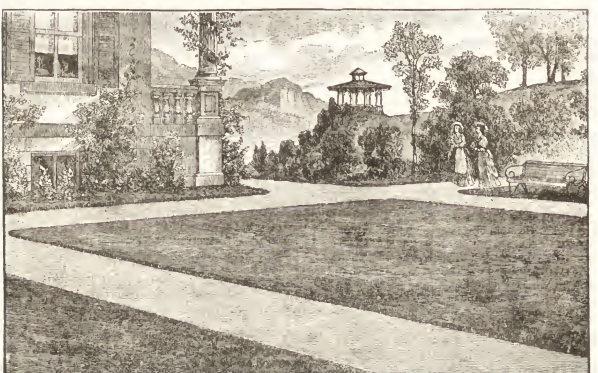
Hedge Shears.

in. of the ground. The second year replace all the plants which have died, setting them carefully, so as to insure their successful growth; cultivate as during the first year. Cut the plants down to the ground in the spring with a scythe, and in June trim all the vertical shoots down to 4 in., but allow the horizontal branches to extend as far as they will. Protect the plants from the frost by throwing a furrow against them, and leave them until the spring of the third year; then trim down the plants to within 5 in. of the last cut, and cultivate as before. The hedge now being very wide, but little vegetation will grow beneath it, consequently so much labor will not be required in clearing out weeds. Prune again in June within 5 in. of the spring cutting, and trim the hedge in a pyramidal, round, or square form. The principal varieties of hedge plants are, *Osage Orange, Honey Locust, Buffalo Berry, Buckthorn, Cockspur, Red Cedar* and *Flat Cedar.*

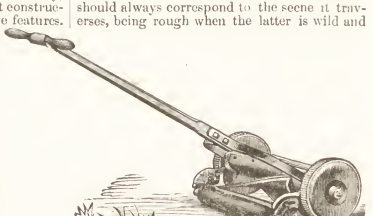
LAWNS.—Soft, velvety, elastic turf, smoothly shorn and of fine color, is always pleasing, but not always attained. The primary requisite is thorough preparation of the soil. A good foundation must be laid by draining and subsoiling, trenching, manuring, or otherwise loosening or enriching the soil. With limited lawns, spade-trenching will be at once thorough and permanent; but where a plow and other implements can be used, the work may be executed more economically, and, by using the subsoil plow in connection with the common surface turning, a depth of 18 in. will be reached. A lawn properly prepared should always receive a coating of gypsum, for this agent is the peculiar pabulum of the white clover plant, one of the richest, densest and most beautiful of our lawn grasses. There are two seasons for sowing—autumn and spring—either of them appropriate. A top-dressing of thinly sprinkled manure will protect the young plants during the winter, and a good thick-set lawn will be secured early in the following summer. After dry, hot weather, the grass-plots will, especially if newly laid, suffer for want of moisture; let plenty of water be poured upon the lawn freely, early in the evening, so that the roots will have time to absorb the water all night long. Should any cracks appear, fill them up with some finely

sifted soil. Roll previously to mowing. Mow early, if the scythe is used, before the dew evaporates, the grass being then more tender, and consequently more easy to mow; besides, the labor is not so much felt by the operator in the cool morning air. But, for lawns, the lawn mower is now well nigh indispensable to produce that even, velvety appearance ever to be desired. The well-known "Philadelphia," from the manufactory of Graham, Emlen & Passmore of that city, always gives satisfaction by its perfect construction and work and nicely adjustable features. Sweep the grass up, and convey it away, either to line a hot-bed or to decay amongst soil in the compost yard. Trim the edges of the walks and flower beds, and remove all the rubbish into the compost yard. Among the many grasses used on lawns, the *Little June* is superior to all others, especially for ornamentation of small areas, like door-yards, terraces, borders of flower beds, and fancy forms. It is one of the very earliest to start in the spring; has a vivid blue tint, a small leaf with capacity for close setting, making a velvet-like cushion, and is also of small and slow growth, thus requiring less clipping. — *Kentucky Blue* is also often used. It is reliable during drought, and winters well, but requires clipping every few days. The *Red Top* also forms a good sward where the soil is good, and the summers comparatively cool and moist; but during dry, warm weather it becomes hard and wiry. The timothy grass vegetates quickly, and greatly assists the growth of the others. The clover is also valuable in rapidly producing a thick, close sod, and getting ahead of the weeds.

WALKS.—These are laid out for similar purposes to drives, but are more frequent and may be introduced into very limited scenes. They should be dry and firm at all seasons. They may be open to the south, sheltered with evergreens, and made dry and hard for a winter promenade; or they may be formed of closely mown turf, shaded by a leafy canopy of verdure for a cool retreat in summer. The walk should always correspond to the scene it traverses, being rough when the latter is wild and picturesque, and more polished as the surrounding objects show evidences of culture or high keeping. Like the approach, it should take easy flowing curves, though it may often turn more abruptly at the interposition of an obstacle. When walks are out of order, with pickaxe and shovel loosen all the rubbish the walk may be made of. If the walk is not drained, or badly drained, have either some draining tiles or bricks with covers ready. Let all the old rubbish



The Lawn.



"*Philadelphia*" *Lawn Mower.*

be sifted, and the rough laid in a ridge at one side of the walk. The fine stuff that passes through the sieve will do well to mix with dung to manure the garden with, especially where the general soil of the garden is heavy, or of a clayey nature. Where there is plenty of room to lay the rough rubbish, the whole may be sifted at once; but where that is not the case, the work may be done in lengths of 10 or more yards at a time. After the rubble is removed, make and lay the drain, provided the walk is deep enough. To make a thoroughly good dry walk, there ought to be at least 9 in. deep of open rubble; the drain should be in the centre of the walk; $\frac{1}{2}$ of its depth ought to be below the bottom of the rubble. Lay short drains from the sides of the walk to the centre drain; upon them, close to the edging, lay 4 bricks to receive a grating, to take in the top water in heavy showers; where the walk is pretty level, these gratings need not be nearer to each other than from 10 to 15 yards; if the walk is steep, or of a moderate slope, the gratings ought to be much more numerous; in extreme cases, as near as 5 yards to each other. The clay, or earth, under the rubble, should be made smooth and sloping from each side, down to the drain. As soon as the drain is laid and the bottom made smooth, the rubble should be put in carefully, so as not to disturb the drain. This should be put in to within 2 in. of the level of the edging. If the edging be out of order, in this state of the walk it is a very good opportunity to renew it; but great care must be taken not to mix the earth with the rubble. When all this work is well done, and the rubble beaten down with a rammer, or well rolled with a garden roller, it is then ready for the gravel. Lay on a coating of rough gravel first, rounding it up in the centre, so that the top of the centre should be as high as the edging, and the sides $1\frac{1}{2}$ in. below it. This rough gravel would be better to lay as it is for a few days, or even weeks, so that it may settle, and become in a degree solid. Then lay on the last coat of moderately fine gravel, the pebbles amongst it not being larger than hazel nuts. This should be laid on pretty nearly level with the edging, and rounded up to the centre. This will, after it has been well rolled and has become solid, allow the water to run to the lowest part of the walk—the sides, and from thence into the drains. All the drains ought to have a gentle descent. If the walk is steep, it is best to lay the bottom of the drain with slate or flat tiles, to prevent the water working away the substratum, which will soon choke up the drain if this precaution is not adopted. In places where the walks are on a steep descent, it is a good plan to pick out of the gravel, or to procure them on purpose, as many pebbles about the size of hen's eggs as will pave each side of the walk 6 or 9 in. wide, laying them rather hollow, so as to form a conduit. This will prevent the gravel washing away.

EMBELLISHMENTS.

ARBORS.—Arbors may be either purely natural, partly natural and party artificial, or entirely the result of art. To the first class belong those trees which send down many branches, such as the weeping-ash, willow, etc. These trees, with their lithe and tenuous branches, waving with every breeze, are the most natural and perhaps the most delightful of arbors. To the second kind belong all those which are formed by the hand of man, such as an aged forest tree with climbing plants placed at its roots, so as to run through its branches and foliage, and descend gracefully from the extremities, until they nearly touch the ground. The construction of the third kind of arbor depends much on the situation; there are many designs for these. The various forms of the Turkish tent are very effective.

FLOWER-BEDS.—It is a mistake to lay out flower beds in exact geometrical forms, unless one has the means to adopt the geometric style of landscape gardening. This style has a bed in one part of the lawn, balanced by a similar bed in another corresponding part; has trees in straight and balanced rows, and walks with straight borders and acute, straight angles. It admits of few curves and no irregularities. It calls for an exactness of detail which is expensive and to most persons displeasing. This style of gardening is going out of date, to be superseded by the more free, graceful and informal natural style. It is better to scatter flower beds wherever a suitable place occurs for locating them. It is poor taste to plant directly in front of the house. A straight walk from the front gate directly to the front door, is not in good taste, and still less so if it is bordered with flowers or shrubs. Most individuals make the mistake of planting too many flower beds. The beauty of a clean lawn is enhanced by a few tasty beds, while it is spoiled by too many. Make the beds wide. If they are narrow, or have long, narrow points or appendages, the grass roots from each side will be sure to join feet under the bed and choke out the flowers. A sharp-cut sod is the neatest border for a flower bed. Stones, shells, bricks and beer bottles do not make tasty borders. It is a mistake to plant too many kinds of plants. A bed with nothing but phlox is far prettier than one with a dozen species of plants. The massing of colors is more effective than scattering them. In the front of most private houses there is usually a single round or square bed. One row or circle of blue, a second of yellow (as the calceolaria), a third of red dwarf geraniums, is a pretty arrangement, which may be varied by the use of dwarf variegated geraniums, etc., where the white leaf is an advantageous foil to the blue and red. In the centre there may be some thick, leafy evergreen.

FLOWER STANDS.—These are very effective when placed in the corners and angles of a garden; the most common form is the vase; but a rustic or any other is just as pretty, provided it is appropriate to its situation.

FOUNTAINS.—In a large garden these add much to the effect. In selecting them the surroundings must be considered, and the color or design should be such as to add to the brightness of the scene, if placed among shrubs and green foliage; if among flowers, bronze is very

effective; white marble is best where the background is green. In deciding where they should be placed, consider the general effect of the whole garden when done.

GARDEN SEATS. — These add much to the beauty and attractiveness of a flower garden, placed either in arbors or under an embowering shade, or in the open garden; they may be composed of hazel rods, or straight small branches of any other tough wood. On the lawn, rustic or wooden benches, painted green or red, add to the general comfortable look; iron ones are also pretty and much used.

HAMMOCKS are convenient during the warm months, and form comfortable beds or resting places during the afternoons. They may be hung between two trees, or on the porch. The disposition of hammocks to sag, can be obviated by placing sticks at each end with hooks along their length, which will catch in the meshes and spread them out flat. 1. Take 4 yds. of strong, unbleached muslin; make a wide hem at each end; slip ropes through, fasten to a tree, and by changing your position a trifle, you have an easy chair, a bed or cradle. — 2. Take a piece of manilla matting, from 2 to 3 yds. long and $1\frac{1}{2}$ yds. wide; bind or hem the ends firmly; fasten each end to a piece of timber; these pieces should be 5 ft. long, 2 in. thick, and should have holes bored about 3 in. apart the whole length; fasten by passing heavy twine from the matting to the hole, back and forth. For each end of the pieces of wood larger holes are bored, through which pass ropes to hang the hammock between two trees.

ROCK BEDS. — After deciding upon the position, excavate the beds, first ascertaining the nature of the soil; if wet, clayey, sandy, or otherwise improper, throwing it aside, to be utilized elsewhere. Let this excavation reach 16 in. below the level, according to the size of beds; throw in a few rough slabs of rock, placing them in various natural positions along the edge of the bed so that about $\frac{2}{3}$ of the stone is hidden when the chasm is filled in, and serving to raise the bed somewhat, here 1 ft., yonder 6 in., and occasionally jutting out to 18 in. Next arrange according to size of bed; if large, it may be built up to a height of 4 ft., or more; but if small it is best to make no attempt to form an imposing structure, rather depending upon tasteful planting, giving the appearance of a mere woodland break among the rocks. In a large bed, let the second layer of stones fall back so as to leave 1 ft. or more of soil exposed in one part, and 3 or more in another, thus forming a diversified and luxuriant vegetation between the rocks. As an approach to such a shady nook, place banks and braes, using care to mark out an irregular line in semicircles and ellipses, so as to give bold sweeps and connecting blocks, which may be made to jut out and divide one portion from another. Dig out a trench and fill in with clay or loam, the former answering especially well, inasmuch as any tree or shrub planted in the upper strata of rich loam will root firmly in it, and prosper continuously. Have banks in the rough, some high, some low, some straight, some crooked, with here an open space and there a deep bay. Face the banks with large blocks of sand and limestone, with huge burrs from a brick kiln or furnace, and when a straight line becomes necessary a rough wall of tree stems and roots will make ample amends. These must be laid horizontally and kept in place with stout uprights, driven down or planted in front, and carried about 2 ft. higher than the level of the bank of clay. On this a bed of fine loam, sand and old rotted manure, or, better still, of peat, will afford a bank on which to grow anything that will live outside a hothouse.

WATER. — When appropriately introduced, the effect of water in pleasure grounds is always pleasing; frequently it is strikingly beautiful. Of all the materials that enter into the composition of natural scenery, there are none that produce a greater amount of varied interest and beauty. It is desirable as an adjunct to the more artificial improvements of private residences, public institutions and city parks, where it can be secured. To form an artificial lake, the first requisite is an ample supply of water at all seasons. Water for ponds is sometimes procured from the discharges of underground drains; where the drained area is extensive enough to furnish all the water necessary, which can be ascertained by observations during summer, a pond may be excavated at the lowest point, allowing the surface of the water to be on a level with the discharge pipes of the drains. The excavated soil can be used in forming the banks of varied heights and configurations. The outline of the pond, like that of a belt of trees or shrubbery border skirting a lawn, should be varied and irregular, with bold points and deep indentations, and these should be a level lawn, surrounded by curved outlines of shrubbery, and that of a smooth sheet of water in a pond or small lake, with jutting banks and retiring bays, is very close, so far as relates to their artistic treatment in ornamental planting. The most natural position for water is in a hollow or low ground, occupied by a constantly running stream. It frequently occurs that small streams are so situated that by skilfully throwing a dam across the valley hollow through which the water runs, a large surface may be flooded and the water permanently retained. The water level on the surrounding ground will probably show a beautifully varied outline, which may be increased or rendered more definite by deepening bay-like recesses and adding to prominent or jutting points. This, together with the effects that may be produced by planting, will give a variety to otherwise monotonous outlines. In geometrically arranged flower gardens, simple basins of water may be introduced with good effect, either with fountains or without them. In these situations the marginal finish or connection between the grass and the water should be of an architectural description. Any attempt made toward a rugged, or what is usually termed a natural looking finish, will prove unsatisfactory. A fountain in the centre of a pond or lake, adds greatly to its beauty. A cascade is the most charming feature of natural brooks and rivulets. A small

cascade may be made by damming up a stream with a few large projecting stones, studiously avoiding any formal or artificial disposition of the stones or rocks employed.

Trees and Shrubbery.

CLASSIFICATION AS TO EXPRESSION. — Trees with relation to form may be divided into *Round-headed*, *Oblong*, *Spiry-topped*, and *Drooping*. *Round-headed*. This includes all trees which have an irregular surface in their boughs, more or less varied in outline, but exhibiting in the whole a top or head comparatively round, as the oak, walnut, etc. They are generally beautiful when young, from their smoothness and the elegance of form; but often grow picturesque when age produces its effects upon them. — *Spiry-topped*. Distinguished by straight leading stems and horizontal branches, which are comparatively small and taper gradually to a point. The foliage is usually evergreen. The evergreen trees comprising the spruce and fir families, most of the pines, the cedar, and among deciduous trees, the larch, belong to this class. These trees, when planted in large tracts or masses, give less pleasure than round-headed trees, yet their general expression when single or scattered is extremely spirited, wild and picturesque. — *Oblong-headed*. Heads of foliage more lengthened out, more formal and generally more tapering than round-headed ones. They have upright branches instead of horizontal ones. The Lombardy poplar is a representative of this class. Its great use is to relieve and break into groups large masses of wood. — *Drooping*. Though these are sometimes classed with oblong-headed trees, they differ from them so much that they deserve to be ranked under a separate head. To this class belong the weeping willow, drooping elm, etc. Their characteristics are gracefulness and elegance, and they are unfit to be employed to any extent in scenes where it is desirable to produce a picturesque character. They are in excellent keeping as single objects, or tastefully grouped in beautiful landscape.

PLANTING AND GROUPING.—It should be the aim in planting to produce not only natural beauty, but higher beauty of expression and individual forms than is found in nature. Create variety and intricacy by various modes of arrangement; introduce rare and foreign plants, and conceal all defects of surface, disagreeable views, unsightly buildings, or other offensive objects; but be careful not to hide the house from all points along the road, nor to place too many trees near it, as they produce dampness. Leave vistas through which to see the house. The group is the key-note of the modern style. A small place, having only a few trees, should have these connected in groups. Many a tame level with scarcely a glimpse of distance, may be rendered lovely by charming grouping of trees. Groups, to be natural, should be full of openings and hollows, of trees advancing before, or retiring behind each other; all productive of intricacy, of variety, deep shadows and brilliant lights. Care should be taken in the formation of groups not to place them in any regular or artificial manner, but they should be disposed so that the whole may express the variety, connection, and intricacy found in nature.

PLANTING FOR THE BEAUTIFUL.—Choose trees of graceful habit and flowing outlines, such as the elm and maple. In disposing them, they should be planted rather distant in groups, and often singly. Close groups may occasionally be formed, but in general the trees should be grouped at a distance from each other to allow a full development of the branches on every side. When a close group is planted the trees composing it should be of the same or a similar kind. Trees or groups where the beautiful is aimed at should be pruned with great care and only to remedy disease, or to correct a bad form. The fall and droop of the branches should never be warred against by trimming the lower branches. Clean, smooth stems, fresh and tender bark, and a soft rounded pyramidal or drooping head, are the characteristics of a beautiful tree.

PLANTING FOR THE PICTURESQUE.—All trees are allowable in a picturesque place, but those trees called picturesque trees, such as the larch, fir and some species of the oak, should be most employed. Everything depends upon intricacy and irregularity, and grouping should be done in the most irregular manner and with different species. There should be a wildness in the disposition of the trees; sometimes planting them closely, even 2 or 3 in a hole, at others more scattered. They should often be mixed with smaller undergrowth of a similar character. Bright vines should be allowed to clamber over trees occasionally in a negligent manner. There should be the same open glades in picturesque as in beautiful plantations; but in the former these openings should be bounded by thickets and groups of every form, and of different degrees of intricacy, while in the latter the eye will repose on softly rounded masses of foliage or single open groups of trees with finely balanced and graceful heads and branches. Pruning, where it is at all necessary, is directed towards increasing the naturally striking, and not to assisting the development of a form of unusual refinement and symmetry.

SHRUBBERY.—The manner in which shrubs are disposed depends in a great degree upon the size of the grounds, the use or enjoyment to be derived from them, and the prevailing character of the scenery. On account of the beauty and abundance of their flowers, shrubs are generally placed near the house. Where a place is limited in size, and the whole lawn and plantations partake of the pleasure-ground character shrubs of all descriptions may be grouped with good effect; the finer and rarer species being disposed about the dwelling, and the more hardy and common sorts along the walks, and in groups, in different situations near the eye. In planting shrubbery in beds or clumps, the taller-growing kinds should occupy the centre or background and those of dwarfer habits the front. With respect to soil, hardy shrubs may be conveniently considered as constituting two

great divisions; one requiring any common garden soil, and the other requiring a large portion of peat or leaf-mold. With regard to the first division, a rich, light, hazel loam is suitable to the greater number of the plants, though some will thrive in the poorest soils; but in this there is great diversity. After having taken out the original soil of the border, about 1½ or 2 ft. deep—though 3 ft. will do no harm—fill in the vacancy thus formed with peat or compost raised above the garden level, to allow for subsequent sinking. With respect to shrubs that shed their leaves on the approach of winter, they may be removed with safety as soon as the leaves have begun to fall in October. Shrubs which do not shed their leaves and are evergreen may, if carefully taken up, be planted at any season of the year, provided advantage is taken of dull or dripping weather. But, notwithstanding, there are particular seasons when they will thrive better and grow more freely than at others. If the situation be dry, and the soil light and sandy, evergreens, with the exception of hollies, should be planted as late in November as the season will permit. But in the case of a bad situation, with a soil retentive of moisture, May is the preferable season. When the plants are large or rather old, good balls should, if possible, be taken up with them, and all the fibres of the roots that can be got up without bruising or injury. Whatever may be the state of the weather, it is important to keep the roots as short time exposed to the air as possible. If only a few minutes, so much the better. In all seasons, situations, and soils, the plants should be well soaked with water as soon as the earth is put about the roots. As soon as a plant has been put into its place, the earth should be filled in and well firmed by pounding or tramping, leaving a sufficient hollow around the stem, and as far as the roots extend, to hold water, which should then be poured in, in sufficient quantity to soak the ground down to the lowest parts of the roots. If the season be very dry, it will be important to lay around the roots a quantity of moss, or cut grass. While the plants are small, care must be taken not to let them be stifled or choked with rank-growing weeds, nor by the increasing growth of contiguous shrubs, and to clear away all rubbish that might retard their shooting; also stir the surface of the ground frequently with a hoe, to prevent the surface becoming hard and caked in dry weather. The branches must be trimmed off as they grow too large or luxuriant, or overhang and smother each other. Among the numerous kinds of ornamental shrubs, the following are a select assortment: *Rose Acacia, Horse Chestnut, Strawberry Tree, Double-flowering Almond, Snowball, Japan Sophora, Spice-bush, Rose of Sharon, Lilac, Carolina Syringa, Spirea, Mountain Rose, Mountain Laurel, Azalea, Calycanthus, Honeysuckle, Hawthorn, Prim, Juniper, Storax, Halesia, Fringe Trees, Cyrilla, Suartia, Clethra, Weigelias, Golden Bell, Fire Bush, Magnolias, Hydrangeas,* and *Upright Honeysuckle.*

PESTS IN GENERAL.

REMARKS.—Insectivorous birds, lady bugs and toads are great devourers of insects, and should always be encouraged in a garden. The birds not only devour the living insects, but also devour the insect eggs, of which they are very fond. Lady bugs live upon the plant lice, and toads live upon small winged insects, of which they catch large numbers. In plant-houses, especially forcing-houses, where insects increase their numbers so rapidly at all seasons, the toad's services are especially valuable; and if a suitable ladder, made of a narrow board with bits of lath tacked on it 2 in. apart, be set in a corner, slanting from the floor to the stage, he will climb it, and thus be able to make himself still more useful. The swallow, swift and hawk are the guardians of the atmosphere. They check the increase of insects that otherwise would overload it. Woodpeckers, creepers and chickadees are the guardians of the trunks of trees. Warblers and flycatchers protect the foliage. Blackbirds, crows, thrushes and larks protect the surface of the soil. Snipe and woodcock protect the soil underneath. Lizards and black snakes are great insect consumers.

ANIMALS.

MICE.—The most satisfactory way of trapping the various species of mice that infest meadows, grain-fields and fruit orchards is, to sink several old barrels in the ground, about ⅔ their length, at different parts of field, and bore 3 or 4 1½ in. holes in the staves, say 6 or 8 in. from the top of the barrel, or at that point of the barrel which will come even with the surface of the ground. When the mice run along, they will be attracted by the barrel, enter the holes and jump into it. As they cannot climb up the inside of a barrel they can easily be disposed of. If a few inches in depth of water should collect in the barrel, field mice will plunge into it and be drowned—provided the surface is covered with dead grass and leaves. If the top of the barrel is left uncovered, and if there should be no water in the barrel, cats will soon learn to take every mouse from the trap. To keep mice from trees, a smooth compact mound of mellow earth, free from grass, made 1 ft. high, late in autumn, is best. A roll of sheet tin or sheet iron coated with gas tar, will be found convenient. Roofing tin, 14 by 20 in. will make to each sheet 4 protectors 7 in. high and 3 in. in diameter. They may be applied after some snow has fallen, with a little pressure and turning about. Tarred building paper is a cheap article, durable and easily applied.

MOLES.—1. To destroy moles, take castor beans, and where they have recently been passing along their underground passages, make a small hole in the passage with the finger or some other way, drop in a couple of beans and cover up the hole with dirt carefully, so as to disturb their track as little as possible. This course, persevered in for a few weeks, will exterminate them. The striped leaf variety that bears a speckled bean is best. — 2. Make a stiff dough of corn meal, mixing with it a small quantity of arsenic; make a hole with a finger in the runways, drop in a lump of dough about the size of a marble, and then cover over with a lump of earth to exclude the light. After the first rain, go over the field again and deposit in all freshly made roads. — 3. Sink a glass or stoneware jar into the ground under the mole-runs. The moles, while running along, fall into the jar, and the vertical, slippery sides of the jar prevent their getting out again.

POCKET GOPHER, or POUCHED RAT.—A prairie animal, confined to the Western States and Territories, and throws up a mound of earth on the prairie, in which it constructs a nest and rears its young. An effectual mode of getting rid of this animal is by trapping. Or, place a short barreled shot gun on a triangular frame, so that the muzzle points to the mound of the gopher; in the mound place a small cross piece, and attach it by a wire to the trigger, which is set at full cock. The motion of the animal discharges the gun. Poison has been successfully used, in the form of strychnine or arsenic, introduced into vegetables, and placed in their subterranean quarters.

PRAIRIE DOG.—To destroy them, mix corn meal with water to form a dough; add strychnine and bake it to form a cake; break the cake into small pieces, 1 of which is put into each prairie dog's hole, taking care to roll it well down and out of the way of domestic animals. Corn or wheat soaked to receive the poison may also be used.

RABBITS.—If bothered with rabbits lurking about and gnawing trees, a ferret will catch the last one. Find where a rabbit has taken to a hole in the ground, and place a sack over the hole; let in the ferret, and in a short time the rabbit will be in the sack.

RATS.—1. Where rats harbor numerously, take 4 joist posts about 4 ft. long and nail 12 to 13 ft. boards to them, about 2 in. apart from bottom to top. This pen should be set near where the rats are most abundant. In setting the pen put 4 in. square blocks under the posts, so that the rats can run under the lower board easily into it; now spread corn, oats or anything they are fond of over the ground inside the pen; then lay down 3 4-in. square joists equidistant, and floor these with boards; let the pen remain thus for a week or so, by which time the rats will have made it a great harbor for themselves; now take the blocks from under the posts and the lower boards of the pen will come so near to the ground that the rats cannot escape underneath it, and it being so high they cannot leap over; put in 1 or more terrier dogs, take out the floor boards and you will see rare sport. — 2. Put a shovelful of dry sand over each hole. The rats soon come up through this, but in doing so let half the sand into the burrow, which, unlike earth, they cannot either force or carry up again, and by repeating this at every fresh opened place their runs become filled up, and they make up your foundations again. All their burrows being at last filled with sand, they will be compelled to betake themselves elsewhere.

SLUGS AND SNAILS.—Great enemies to every kind of garden plant, whether flower or vegetable; they wander in the night to feed, and return at daylight to their haunts. Lay cabbage leaves about the ground, especially on the beds which they frequent. Every morning examine these leaves, and you will find a great many taking refuge beneath. Search for their retreat, which you can find by their slimy track, and hunt there for them. A pinch of salt will kill them, and they will not touch fresh lime; it is a common practice to sprinkle lime over young crops, and along the edges of beds, about rows of peas and beans, lettuce and other vegetables; but when it has been on the ground some days, or has been moistened by rain, it loses its strength.

INSECTS.

BASKET or DROP WORM. — They are ashy brown or black and white, and deposit their eggs in little cases, which may be seen hanging to trees in winter. The eggs hatch in May, and the worms begin their work. They feed alike on forest and fruit trees, and have been found attached to raspberry canes. The best way to destroy them is to pick off the cocoons in winter and burn them.

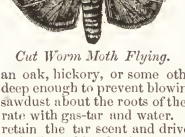
BLACK-VEINED WHITE BUTTERFLY.—A four winged insect. It is large, wholly white, excepting that the ribs or veins of the wings, and a short, oblique stripe from the 2d to the 3d vein of the upper wings, are black, which distinguishes it from the cabbage butterfly. At the beginning of June the butterfly appears and propagates its species. The best way of destroying these caterpillars on low fruit trees, is by seeking out the eggs or young caterpillars on the branches, and killing them. On high trees the mode of destruction must be delayed till the leaves have fallen off, when the nests of the caterpillars will become visible.

Black-Veined White Butterfly.

CANKER WORM.—When young they are of a blackish or dirty-brown color, with a yellow stripe on each side of the body. When full grown they are ash colored on the back and black on the sides. They are most abundant on apple, elm and oak trees; but cherry, plum

and lime trees, as well as some others, and many shrubs, suffer from them. They feed on the leaves about 1 month and then descend to the ground, burrowing into the earth 3 or 4 in., where they form small cells, in which they undergo their transformation and remain until the following season. To destroy them, dig around the trees and lay the earth smooth; then take air-slaked lime and strew 1 in. thick around the trees, to the extent of 2 to 3 ft. from the roots; then scrape or shave off the rough, shaggy bark round the body of the tree to the width of 2 or 3 in., and with a brush apply cheap printers' ink to the scraped part, forming a belt around the tree. This must be put on every 10 days during the fall and spring, and whenever a long thaw seems likely in the winter. The slightest contact with the ink is death to the insect.

CUT WORM. — Feeds on cabbage plants, corn, strawberries, peas, melons, cucumbers, tomatoes, in fact every green thing that is tender enough to suit their palate. 1. To destroy them, surround each plant with



Cut Worm Moth Flying. *Cut Worm Moth at Rest.*

an oak, hickory, or some other strong leaf, set deep enough to prevent blowing away. — 2. Put sawdust about the roots of the plants, and saturate with gas-tar and water. The sawdust will retain the tar scent and drive the pests away. — 3. Late fall plowing, followed by an early spring plowing, exposes the worms to the frost; 1 or 2 seasons of this treatment will kill them out effectually. — 4. The most deadly trap consists of a barrel in which is 1 ft. of water, covered with a film of kerosene oil. A large stone is placed in the barrel with the top level with the surface of the water; a lantern lighted is placed on the stone at night, and the light attracts the moths, which fall into the water and are killed.

EARWIG.—Varies in size according to its age and sex; when fully grown, it measures almost 1 in. The body is light brown, free from hair; it has very short wing-cases, under which the wings lie concealed, folded both longitudinally and transversely. It is usually under the bark of trees, in the hollow stems of trees, in rolled-up leaves and under stones. In orchards it injures fruit trees. In flower gardens it destroys carnations, pinks, and dahlias, in particular. The only certain method of destroying them is by catching them, which is best effected by hollow tubes, laid here and there, in orchards and flower gardens. The hollow stem of the sunflower is fit for this purpose, as the insects are eager in the pursuit of the remains of the sweet pith. They are also easily caught between the folds of paper, or in pieces of cloth and linen laid on the ground.

FALL WEB WORM.—Found in the fall on a great many kinds of trees, though on some more abundantly than others; but with the exception of the different grapevines, the evergreens, the sumachs and the ailantus, scarcely any tree or shrub seems to come amiss to its voracious appetite. The twig or branch containing their web should be cut off and burned.

Fall Web Worm.

GARDEN FLEA.—A very small leaping insect which gathers along the edges of a wound in a leaf made by other insects. To destroy them, dust the plants with lime ashes or soot.

LIME LOOPER, or MOTTLED UMBER MOTH. — Takes its name from the lime tree, on which it likes to feed, as also on fruit trees. This caterpillar, when full grown, is of a reddish color, and has a yellow stripe on each side. It goes into the earth in May or June, and is transformed into a brownish red pupa. The moth comes out of the earth in the beginning of November, and lays her eggs on a fruit tree. The male is as large again as that of the winter moth; its broad fore wings are of a reddish yellow, covered with blackish dots; the under wings are dirty white, dotted with brown, and in the middle of the wings is a black dot. The female has no wings, is much larger than that of the winter moth; the head and body are whitish, covered with black streaks and dots, and the feet annulated with yellow and black. To guard against its ravages, strike the branches of the tree with a long pole in May, to throw down the caterpillars.

Garden Flea.

MAY BEETLE, or WHITE GRUB.—Color chestnut brown, covered with minute punctures. Feeds on leaves, and flies with a humming noise, in May and June. The larvæ (white grubs with brown heads) feed on the roots of grass, and are found on fruit and forest trees, and sometimes do great injury to strawberry plants, Indian corn, wheat and potatoes. Great numbers of beetles can be destroyed by shaking them from the trees early in the morning. The grubs may be destroyed by turning hogs into the field. They take 3 years to undergo their transformation, hence their great danger.

PLANT LOUSE (Aphis), or GREEN FLY. — Sometimes becomes quite numerous upon the roots of the strawberry, when the soil is loose and open; it also attacks plants when grown under glass. A liberal application of dry ashes or refuse from a tobacco factory will destroy them; or fumigate with tobacco smoke.

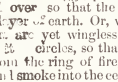
ROCKY MOUNTAIN LOCUST, or WESTERN GRASSHOPPER.—The female locust, in the autumn, deposits her eggs in small holes or cells made in the earth by means of her ovipositor.

Most of these eggs remain all winter uninjured by the frost, and hatch the following spring, earlier or later, according to the influences of climate. Cold rains in the spring, however, are said to destroy the young insects. The grass-

Rocky Mountain Locust.

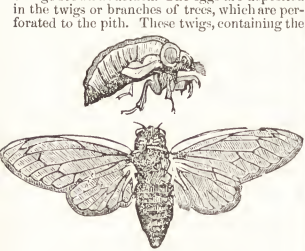
hoppers, when first hatched, exactly resemble the old insects in form, with the exception that they have no wings or wing-cases. When young they feed near the place where they were hatched, and upon whatever vegetation is growing in the vicinity. When fully grown, with perfect wings, they collect together, pair and emigrate in countless myriads to other places in search of food and proper places in which to deposit their eggs for the next year's crop, after which they soon die and disappear. This insect, from the egg to the perfect state, is injurious, devouring almost any vegetable substance. As soon as the grasshopper has laid its eggs, plow the fields and turn the soil over so that the eggs will be buried under 2 inches of earth. Or, when the young grasshoppers are yet wingless and the grass dry, set fire to 2 circles, so that the insects cannot escape from the ring of fire, but be driven by the heat and smoke into the centre, where they will eventually perish in the flames.

SADDLE BACK CATERPILLAR.—Bright green with an oval, reddish brown spot on the back. Is 1½ in. in length, and feeds on corn, rose bushes and fruit trees. Pick them off and destroy them.



Saddle Back Caterpillar.

SEVENTEEN-YEAR LOCUST.—Black, with transparent wings and orange brown abdomen. The eggs are deposited in the twigs or branches of trees, which are perforated to the pith. These twigs, containing the



Seventeen-year Locust.

eggs, drop off. The eggs hatch and the young insects enter into the ground to pass their 13 or 17 years, according to the brood. The larvæ feed on soil.

STALK BORER. — Leaden color, with light stripes. Bores into stalks of corn, wheat oats and tomato, and currant and peach twigs. Cut it from the stalks, and burn the stalks to prevent increase.

Stalk Borer.

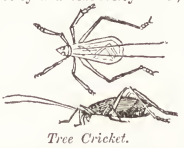
STRIPED TURNIP BEETLE.—Black, with a wavy yellowish stripe on each wing cover. It is less than 1-10 in. long, and feeds on mustard, turnip, and other plants. The larvæ feed on plant roots. 1. Sprinkle the young plants with lime, while covered with dew—2. Water them with strong soap suds.—3. Sprinkle the ground with lime or ashes as soon as the seed is sown.

Striped Turnip Beetle.

TENT CATERPILLAR.—White and yellowish on the back, with black and yellow stripes on the sides from ½ to 1 in. in length. It spins its web around leaves of fruit trees and some forest trees, and on most plants belonging to the rose family. 1. While the nests are small they are easily destroyed in the following manner: Procure a light pole, long enough to reach to the top of the trees (along rod of bamboo is the best), and tie to the end a small brush, or a wisp of broom corn; dip this into a mixture of kerosene oil and water, and twist it about the nest, gathering both the nest and worms at once into a mass; then clear the brush and crush every worm. Care should be taken to touch the fork of the branch all over with the oily water, which kills all it comes in contact with.—2. Cut off and burn the egg clusters during winter, and examine the trees carefully in the spring for the nests from such clusters as may have eluded the winter search.

Tent Caterpillar.

TREE CRICKET.—A green cricket that punctures grape, raspberry and blackberry canes, and the twigs of peach, white willow, and a variety of other trees. Sometimes bunches of grapes are entirely severed by them. Search thoroughly for them, and destroy by hand. In winter search for all punctured twigs and burn them; this will prevent their increase.



Tree Cricket.

TWIG BORER.—These insects measure from

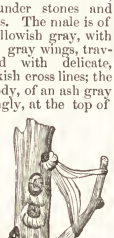
.25 to .35 of an in. in length. and are small, dark, chestnut colored beetles, of a cylindrical form, having the front part of thorax roughened with elevated points; the male having 2 little horns, and the tip of the wing covers above provided with 2 prickle-like points curving inward. Attacks apple, pear, hickory and cherry trees, and also grape vines, by boring into the twigs and young branches. When the insects attack twigs and branches, cut them off some distance below the place injured, and burn them immediately, with the beetles inside.

TWIG-GIRDLER.—Light brown. The eggs are deposited in the branches of trees, the female first gnawing a groove around the branch, above and below the eggs, so the larvæ may feed on the dead wood. It attacks hickory, elm, persimmon, peach, plum and pear trees. Kill by hand.

WINTER MOTH.—The green-looped caterpillar produced by this moth is injurious to fruit trees. It appears late in the autumn, and proceeds from a light-brown pupa, which lies from June to the end of October, either a few inches under the earth, or under stones and clods. The male is of a yellowish gray, with pale gray wings, traversed with delicate, darkish cross lines; the female has a much thicker body, of an ash gray color. The eggs are laid singly, at the top of the tree, and are small and greenish. The caterpillars are hatched in spring; are at first gray, and then light green; black head, without ventral feet. They devour the leaves, buds and fruit. To prevent their attacks, surround the base of the stem with a wooden frame, or box, and daub it on the outside with tar. Or, place a layer of bird-lime around the trunk of the tree.

Winter Moth.

VINE SCALE INSECT.—This insect forms a longish, marbled-brown scale. In old age the scale becomes blackish-brown, hemispherical and wrinkled. The eggs, which are laid under the body of the female, are covered with long white wool. They are found on vines, particularly in gardens. Their destruction is best effected by dry brushing in autumn or spring.



Vine Scale Insect.

WEEDS.

REMARKS.—Weeds are only "plants out of place," and many of the most common have elements of utility that are entirely overlooked. Their hardiness, great vitality, or structure and appendages, are matters of interest to the inquiring mind. But few fields are exempt from all kinds of weeds, and not only is the quantity of feed lessened, and greatly, but the quality is hurt. A great variety of weeds impart their taint to the milk; this is worse with hay than with pasture, as the objectionable flavor is disseminated through it when in bulk. Many of the seeds of weeds are sown with those of the crop, especially those that are nearly the size, color, etc., of the grains and grass seeds. Some weeds may be effectually exterminated by cutting off the stalks close to the ground with a scythe. The proper time to do this work is soon after they have attained their growth, but before the seeds have matured. The branches of some weeds are so close to the ground that they can only be severed from the roots by a hoe, which should be very sharp. The stalks of large weeds must be cut several inches below the surface of the ground or they will throw up suckers in the same manner as trees and bushes. A sharp spade or a spud is the best implement to use. After the stalk is cut and removed drop a handful of salt on the stump that may remain in the earth. A drop of sulphuric acid applied with the end of a stick is effectual in destroying the life of the roots of weeds. The fallow is the best means for successfully clearing the land, working the soil often enough to prevent any plants from seeing the light. Weeds on gravel-walks may be destroyed and prevented from growing again by a copious dressing of the cheapest salt. This is a better method than hand-pulling, which disturbs the gravel and renders constant raking and rolling necessary. One application early in the season, and others as may be needed, while the weeds are small, will keep the walks clean and bright. Or, carbolic acid, largely diluted with water, and applied with a brush or watering-pot, may be used.

BURDOCK.—A coarse, rank, bitter weed, with very large burrs. Cut the leaves off near the ground and pour a small quantity of coal oil into the crown of the plant. In some cases it will take years to completely exterminate it.

CANADA THISTLE.—This is the most troublesome of all the weeds. As soon as the pests appear in the spring, strike them off with a sharp hoe below the lower leaf, or even with the solid earth; repeat every time a sprout starts and they will be almost totally eradicated the first season. A few may appear the second year after this treatment; if so, repeat the cutting of the stalks, and if thoroughly done sure death is the result.

CHESS, CHEAT, or BROWN GRASS.—This is one of the most troublesome weeds which infest wheat fields. Sow nothing but perfectly clean seed and it will gradually disappear.

CHICKWEED.—An annual which is often very troublesome on damp soils. Underdraining and frequent cultivation will destroy it.

CLOT BURR, or COCKLE BURR.—An annual that is frequently quite troublesome, the burrs adhering to the fleece of sheep. It is easily exterminated by cultivation.

COUCH, or QUACK GRASS.—One of the most difficult pests to eradicate; ordinary cultivation,

that which answers for most weeds, only causes it to grow with unusual vigor. The leading methods of eradication are: 1. Use a flat-toothed cultivator, one that will shave the ground instead of running deep, and pass it 1 in. or so below the surface; this cuts off all shoots as they start up, but does not divide the horizontal running root-stocks. The plants die of exhaustion in endeavoring to throw up stems to bear leaves and seeds. — 2. Use a grubber, and tear the plants bodily from the soil, when they are gathered by the use of a long-toothed rake, and burned.

ELDER BUSH. — A troublesome bush. If it is cut early in summer, and the brush burned upon the stubs, and then all the sprouts pulled up the moment they appear, the roots perish.

HORSE NETTLE.—A very troublesome weed, and more so at the South than at the North. Thorough cultivation and pulling it by hand is the only way to destroy it.

OX EYE DAISY.—A perennial plant; yet if it is not allowed to ripen its seed, the vitality of the root is soon exhausted. Constant cutting and thorough cultivation will destroy it.

PLANTAIN may be destroyed by constant cutting, not allowing it to go to seed. The best way is to go over it with a long knife and cut it out, root and all.

PURSLANE.—A troublesome summer weed. It is easily killed when it first breaks ground, but once it gets rooted it will grow just about as well with its roots in the air as any other way, and will blossom and ripen seed after it has been hoed up and turned with roots upward. The only way to get rid of it, is to cart it off and bury it in a hole. Hogs and hens eat it greedily, but they do not destroy all the seeds.

RAG or BITTER WEED.—One of the most troublesome weeds. Clean culture and rotation of crops are the best means to destroy it.

RED ROOT, or WILD AMARANTH.—An annual, more difficult to exterminate than Canada Thistle. It is a great enemy to the wheat crop. A good plan for extirpating this weed is as follows: For the first wheat crop, plow the ground very deep, at least 8 in. This will throw the seed down beyond the reach of vegetating, and the wheat may be sown on the inverted surface and escape 1 year. In the fall plow as deep as for the wheat, which will throw the seed again to the surface. Harrow well and the seed will germinate. The next spring turn the weeds under with a gang plow, or cut them to pieces with a large steel-tooth cultivator, and sow oats, barley, spring wheat or peas; the latter is best. By way of rotation plow or harrow again in the fall, to start another crop of weeds, and plant corn, cultivating it thoroughly. The following spring plant clover or grass, and when wheat is again introduced in the rotation, the weeds that are discovered can be pulled by hand.

ST. JOHN'S WORT.—A very troublesome weed, and in neglected pastures often greatly diminishes or excludes the grass crop. Good cultivation and rotation is the best means to exterminate it.

SORREL.—This field pest may be eradicated by the judicious application of either lime or ashes. The souring principle of sorrel is oxalic acid; if this be removed from the soil, sorrel cannot grow.

TOAD FLAG, or WILD SNAP-DRAGON. — A very destructive weed, common in many places along the roadside, fences and in pastures. Cattle will not eat the grass that grows with it. Repeated plowing and harrowing will destroy it.

WILD CARROTS.—Kills out all grass, and the seeds are so light that they are wafted by the wind in every direction. After a heavy rain they may be pulled up by the roots, and as soon as any blossom, they should be pulled, as the seeds spread rapidly.

WILD RADISH.—An annual, propagated by seed. The plants should be pulled as soon as the flowers appear.

STORING AND CURING.

FIELD CROPS.

ENSILAGE.—The process of preserving grain and fodder green through winter, is very simple and easy. 1st. The preserving receptacles should be wholly air-tight, so that when sealed the air cannot come in contact with the food to be preserved. 2nd. The pits should be of such form and dimensions as will best facilitate the settling and compacting of the food into a solid mass, and when opened for feeding will expose as small a part to the atmosphere as practicable. 3d. The fodder must be cut green when in the best condition or in bloom, passed immediately through the cutting machine to reduce it to uniform short lengths of not more than 1 in., at once be deposited and trod firmly into the pit, and sufficient salt be used to render it palatable, but no more. As fermentation, which will commence at once, proceeds and the mass settles, the cutting and treading in of fresh fodder must be continued from day to day, after an interval of about 36 hours, until the pit is filled and settling has nearly ceased. 4th. The pit, as soon as completely filled and settling has ceased, must be securely sealed to exclude the air wholly and arrest fermentation, and must be kept sealed until opened for use. The pit may be made of hard brick, with 12 in. perpendicular walls. If the ground is sandy, the outside of the walls, next to the earth, is covered with a coat of cement. The bottom should be laid with brick. The deeper the pits the more they will contain in proportion to measurement, owing to the greater density of the contents from the weight of the mass above. In all cases where practicable, the pits should be made at least 20 ft. deep. The walls are made so smooth upon their inner

sides as to offer no obstacle to the settling or compacting of the food by friction of the sides. These pits are made open at the top and covered with a roof, or arched over under ground, with 2 necks to each coming up to within 1 ft. of the surface of the ground, through which they are filled and the necks then sealed with earth. The green fodder is drawn from the field as fast as cut, and may be cut in any weather except during rain. After running through the cutting machine it is deposited and trod into the pit firmly until it is full. The doorway at the end of the pit having already been closed, by placing boards across it upon the inside as the filling progressed, is now sealed tightly by placing other boards properly fastened across it upon the outside of the jambs and filling the space between the jambs with well compacted earth, so that no air can pass into the pit through this doorway; the outer covers are then placed temporarily upon the necks of this pit above. After the pit has been closed 36 hours, the necks must be uncovered and opened. The contents will be found very warm and thoroughly wilted, and upon being now trodden down will occupy less than $\frac{1}{2}$, and if clover not more than $\frac{1}{4}$ of the pit. The pit should then be filled again, trodden firmly and covered again temporarily as before. The pit should now be opened and refilled as before at intervals of from 24 to 30 hours, the contents at each time being trodden down as firmly and evenly as possible, and this should be continued until settling nearly or quite ceases and the pits are full. The pits being now full, and settling having nearly or quite ceased, must be immediately and thoroughly sealed over the whole top surface of the fodder by a well compacted layer of clear earth not less than 6 in. thick. If the pits are arched over, they should be filled fullest along the centre line of the arch, and must be sealed from the spring of the arch upon the curve, which will be caused by this fullness in the centre to prevent the earth from falling away or opening cracks in the sides in further settling. This covering of earth should be afterward examined at least twice at intervals of a week or 10 days, and any cracks that appear, be closed with fresh earth. In feeding, the fodder should be cut down and fed from one end of the pit in sections of convenient width, the earth being first removed from each section. If open pits are used, a layer of hay or straw may be put over the pit, when filled and sealed, to protect the contents from frost in winter, if necessary.

GRAIN. To Store.—In storing grain, a plentiful amount of air must be let in by some good system of ventilation, and great care taken to exclude rats and mice. Absolute freedom from moisture is necessary for the perfect preservation of wheat, and in storing it is about the only thing to be considered, save convenience. Every well regulated barn should have its granary, with accessible apartments for wheat, rye, oats, barley, buckwheat, etc. All grains, however well stored, should be occasionally examined to ascertain whether or not they are keeping well. (See *Granaries* in BUILDING.)

HOPS, To Dry.—(See *Hops* in SPECIAL CROPS).

TOBACCO, Curing of.—After the tobacco is cut, carry it to the scaffold or barn; hang 6 to 8 plants on a 4 ft. stick. If it is scaffolded, it is best to have the scaffold near the barn, so that it may be taken under shelter in case of rain. Tobacco should not remain longer than 5 or 6 days on the scaffold in good weather, and if there be rain or excessive heat, a much shorter time is required. Many of the best planters never scaffold, but carry the tobacco from the field and hang in the barn as they cut. Hang on the scaffold so that the plants touch, on sticks, say 6 or 8 in. apart; but if hung in the barn, plants must not touch; sticks must be 8 to 10 in. apart. But, as the tobacco cures, if room is needed, it can be stored closer; but never crowd too close. Never allow tobacco to lap tails and butts in the tier, nor hang close enough to exclude the air, as by either, the risk of dark cure and house-burn is incurred. No fire is admissible now in curing any sort of tobacco, except wrappers, and then only by flues. After this point is reached in the crop, good weather will almost surely give a good, bright, sweet cure. But if the weather is unfavorable, good judgment in the use of ventilators is all that can save a crop unhurt, as fire cannot be used under any circumstances, except for wrappers. When the plants are sufficiently dried, which may be judged of by the stems becoming hard, the leaves may be stripped from the stalks. A damp spell during the winter or spring is the best time for this operation, as the moisture in the air prevents the leaves from crumbling. They must then be sorted into 3 classes: 1st, comprising the best quality and color; 2d, that which is inferior; 3d, the ground leaves. The leaves may then be neatly tied up in bundles called "hands," each containing either 4 leaves of the 1st class, or 6 of the 2d and 3d classes. The "hands" must then be packed in large bulks, with the tails in the middle and the heads on the outside, and subjected to heavy pressure by weights. In this state it undergoes a sweat; but as soon as it commences to heat it must be taken out, and hung up to dry, and there left until a rain shall again bring it into case. It should then be put down in very large bulk; the number of courses being 6, 8, or any higher number, and the whole enclosed by soft straw, the walls of the house, and plank, so as to exclude the air entirely. In this condition it may be kept for any length of time, and will always be ready for hauling to market in the "hand" or "prizing." When the cover of the bulk is removed, with the view of taking out a part of the tobacco for prizing or sale, the entire top course or courses should be smoothly separated from the rest, and the cover carefully replaced. Prizing should be done in weather when the condition of the tobacco will not change. Each bundle should be straight, and closely packed in hogsheads in the usual way. When prizing in summer, some elder bushes may be spread over the bulk to keep the tobacco damp. Flue cured fillers command nearly or quite as much as sun cured, and the risk is much less. To cure fillers with flues, let the tobacco be placed in the barn as soon as cut, and raise the heat in the barn to 85° or 90° F.

Kindle fires in the flues every morning, raising the heat to 90°, and then leave as before, and continue to do this for 4 or 5 days, until the tobacco is thoroughly yellowed. If the tobacco has much sap, it may be necessary to continue the yellowing process from 5 to 7 days, to yellow properly. When the leaves have assumed a mottled, piebald appearance, run the heat to 100°, and let it remain at that point for 3 hours; then raise the heat 2½° an hour until 130° is reached. Keep the heat at this point until the leaf is cured, and then move up gradually to 170° or 180°, and thus cure stalk and stem. If cured properly there will be much of the leaf mahogany, while the remainder will run from a bright dapple to a cherry red. Dark heavy shipping may be cured with flues better than in any other way. Smoke from the open wood fire is objectionable, and with the flue you get the heat without the smoke, which is all that is wanted. There are 2 modes for curing yellow tobacco: one with charcoal and the other with flues. The first is gradually giving place to the latter, which is cheaper and more efficient. The chief agent in either mode is a dry, curing heat, to expel the sap from the leaves, stems and stalks of the plants, and catch the color, yellow, next to nature's color, green, and to fix it indelibly. By the process of nature, leaves drying descend in color from green, first to yellow, then orange, then red, and finally lose all color as they go to decay. A quick, dry heat, so regulated as to dry out the heat, and catch the yellow, and fix it, is the object in view. Charcoal produces an open, dry heat, well suited for the purpose; but its preparation is costly, its use tedious, dirty and laborious, and it deposits a black dust on the leaf that is objectionable. The flue process, if properly conducted, is free from smoke. The first step in curing is called the *steaming* or *yellowing* process. Medium tobacco will require from 24 to 30 hours steaming at about 90° to yellow sufficiently; but tobacco with more or less sap, larger or smaller, will require a longer or shorter time to yellow. Here the judgment of the curer must be his guide. The next step is called *fixing the color*. When the tobacco is sufficiently yellowed, the best leaves of a uniform yellow, and the greener ones of a light pea-green color, increase the heat to 100°; observing the leaves closely, to detect sweating, which will soon redden and spoil the color, unless driven off. To do this, open the door and let it stand open; and if after an hour the sweat has not disappeared, open a space between the logs on opposite sides of the barn to let in more air, and permit it to remain open until the tobacco has dried off all appearance of the sweat. Right at this point more curings are spoiled than at any other stage of the process. The thermometer will now indicate a fall of 5° to 10°; but a little cooling is necessary; then close up the opening and raise the heat to 100°. But a skillful curer detects the first indications of sweat, and prevents it by regulating the heat. Keep the heat at 100° for 4 hours, and then advance 2½° every 2 hours until 110° are reached. Here you have reached the most critical point in the difficult process of curing bright tobacco. The condition and appearance of the tobacco must now be the curer's guide. No one can successfully cure tobacco until he can distinguish the effects of too much or too little heat in the appearance of the leaf. Too little heat in fixing the color, operates to stain the face side of the leaf a dull brown color, and is called "sponging," and may be known to the novice by its appearance only on the face side of the leaf. Too much heat reddens the leaf, first around the edges and then in spots which are visible on both sides. To prevent sponging on the one hand and spotting on the other, is the aim of the experienced curer. No definite time can be laid down to run from 110° to 120°. Sometimes 4 hours will suffice, then again 8 hours is fast enough. While it is usual at this stage to advance about 5° every 2 hours for medium tobacco, the condition of the tobacco often indicates to the practiced eye the necessity for slower or faster movement. But it is safe not to advance above 110° until the tails begin to curl up at the ends. Arrived at 120°, this is the curing process. The heat should remain at or near these figures until the leaf is cured, which will require from 6 to 8 hours, according to the amount of sap in the leaf to be expelled. When the leaf appears to be cured, advance 5° every hour up to 170°, and remain until stalk and stem are thoroughly cured. To run above 180° is to endanger scorching the tobacco, and perhaps burning barn and tobacco. If, after the tobacco is cured, the weather remains dry and it fails to get soft readily, so that it can be moved, it may be brought in order in the following way: Place green bushes, with the leaves on, over the floor, and sprinkle water over them copiously; if the tobacco is very dry and the atmosphere contains but little moisture, and if the weather is cool, a little fire kindled in the flues will assist in making the tobacco soft. Straw, wet or made so, will answer the same purpose. If the weather is damp there will be no necessity to use either straw, brush or water. But when it is necessary to use any means to order tobacco, it is best to apply them in the afternoon, so that the tobacco may be removed next morning.

FRUITS.

REMARKS.—Fruit, which is to be kept beyond the natural period of ripening, must be gathered before fully ripe; all sudden changes in temperature and moisture are productive of decay, and should be avoided. A dry, cool place, where the temperature is even, is best calculated to retard decay and improve the keeping qualities. 1. The following preparation is unequalled for preserving apples, pears, lemons, etc.: Rosin, 2 lbs.; tallow, 2 oz.; beeswax, 2 oz.; melt slowly over the fire in an iron pot, but don't boil. Take the fruit separately, and rub it over with pulverized chalk or whiting, to prevent the coating adhering to the fruit; then dip it into the solution once, and hold it up a moment to set the coating; then pack away carefully in barrels, boxes, or on shelves, in a cool place.—2. Glycerine of purest quality has been recommended for the

preservation of fruits; previous to eating which, the glycerine should be removed, by immersing the fruit in water. — 3. Using wheat bran for packing tender specimens of fruit, to prevent bruising, has been long practiced, but an improvement has been made by which, in addition to this protection, the fruit is preserved from decay. The bran is slightly charred by a patented process. — 4. Dry sand is one of the best articles in which to pack fruit; packed in this way it will keep all the year round. The fruit must be sound when stored, and the sand must be quite dry. The chief advantages of packing in sand are the exclusion of air currents, the preservation from changes of temperature, and the absorption of moisture.

APPLES, To Dry.—1. Pare and cut the apples in slices; then spread them on cloths, tables or boards, and dry them out-doors. In clear, dry weather, this is the most expeditious way. It is a good plan to use frames. These combine the most advantages with the least inconvenience of any way, and can be used either in drying in the house or out in the sun. In pleasant weather the frames can be set out-doors against the side of the building, or any other support, and nights, or cloudy and stormy days, can be brought into the house and set against the side of the room near the stove or fireplace. Frames may be made in the following manner: 2 strips of board, 7 ft. long, 2 or 2½ in. wide; 2 strips, 3 ft. long, 1½ in. wide; the whole ¾ in. thick. Nail the short strips across the ends of the long ones, and it makes a frame 7x3 ft., which is a convenient size for all purposes. On one of the long strips nails are driven 3 in. apart, extending from the top to the bottom. After the apples are pared, quarter and core, and with a needle and twine, or stout thread, string them into lengths, long enough to reach twice across the frame; the ends of the twine are then tied together, and the strings hung on the nails across the frame. The apples will soon dry so that the strings can be doubled on the nails, and fresh ones put on, or the whole of them removed, and others put in their place. As fast as the apples become sufficiently dry they can be taken from the strings, and the same strings used to dry more on. Dried apples are bleached by exposure to the fumes of burning sulphur. This may be done by making a tight box with shelves to slide in or out at the front. The shelves should have wire gauze bottoms on which the dried fruit is to be placed. The box is set up on legs 1 ft. high. Under the box is a sheet iron close receptacle, from which a pipe passes into the bottom of the box. A quantity of ignited charcoal is put into the iron vessel and covered with sulphur, the fumes of which pass into the box and through the fruit, making them very white and clear. Any other convenient arrangement, which will answer the same purpose, may be adopted, but the fumes must be confined in a close receptacle, and the fruit should be arranged so that they pass through it.

APPLES, To Keep.—1. The fruit must be free from bruise and blemish, and should be spread out on shelves or packed in barrels, and kept in an atmosphere of 40° to 45°. Some cellars are just the thing, and preserve them beautifully; others are too moist. Where this is the case a few bushels of stone lime should be used. Sliding shelves, 6 in. apart, latticed bottom, with single layer of fruit, are extremely convenient, as they allow of constant examination without disturbing the fruit. — 2. Fall apples may be preserved in pits made as follows: Choose an elevated piece of ground in the orchard and scoop out a shallow basin, in which heap the apples in quantities of not more than 10 or 12 bus.; cover them with straw laid lengthwise from top to bottom of the heap; leave them thus for 2 or 3 days, during which they will heat and sweat; after they have dried, cover the straw with a light coating of earth, except in 3 or 4 small places at the bottom and at the top, where a large wisp of straw should be inserted and bent over to make a water shed. The apples will keep much longer in this way than in barrels, and winter apples may be kept until spring in fine order. If the apples are picked before they are quite ripe they will keep much longer.

APPLES, To Pack.—1. Assort them so as to run uniform in size and quality. Pack in new, sound barrels of the standard size, flat hoops preferred; only one variety in a barrel; turn the upper end of the barrel down; take out the lower head, and commence packing by placing a tier of apples snugly, with stem ends upon the head; then fill up the barrel without bruising the fruit; shake down gently, but thoroughly, and fill so full that the head must be pressed in with a level or barrel press, flattening the last tier of apples; then, fastening the head, turn the barrel over, and mark plainly with a stencil plate, or red chalk or ink, the variety contained. — 2. Wrap each one in manilla tissue paper; then pack as solidly as possible; putting a layer of soft chaff at the bottom of the barrel, and sifting more over every layer; when the barrel is full, place plenty of packing on top, and press the head firmly down. In this condition apples will travel months without injury.

CHERRIES, To Dry.—1. Stone, spread on a flat dish, and dry in the sun or a warm oven; pour whatever juice may run from them over them, a little at a time; stir them about that they may dry evenly. When perfectly dry, line boxes or jars with white paper and pack close in layers; strew a little brown sugar and fold the top of the paper over them, and keep in a dry, sweet place. — 2. Take large cherries, not too ripe; remove the pits; take equal weights of cherries and sugar; make a thick syrup of the sugar, put in the cherries and boil them a minute, and spread them on an earthen platter till the next day; strain the syrup; boil it down thick; put the cherries in, and boil 5 minutes; spread on a platter as before; repeat the boiling two more days; then drain; lay them on wire sieves, and dry in a nearly cold oven.

CRANBERRIES, To Keep. — Cranberries will keep all winter in a firkin of water in a cellar.

CURRANTS, To Dry.—Beat up the whites of eggs, or a little gum Arabic in water; and, after dipping in the bunches, and letting them get a little dry, roll them in finely-powdered

loaf sugar. Lay them on a sieve in a stove to dry, and keep turning them and adding sugar till they become perfectly dried. Not only red, white and black currants, but even grapes in bunches may be thus dried and preserved. They should be carefully kept dry, in boxes neatly lined with paper.

FIGS, To Dry.—When ripe, the figs are picked and spread out in the sun to dry; those of the better quality being much pulled and extended by hand during the process. Thus prepared, the fruit is packed closely in barrels, rush baskets, or wooden boxes.

GOOSEBERRIES, To Dry.—To 7 lbs. of red gooseberries, add 1½ lbs. of powdered sugar, which must be strewed over them in the preserving pan; let them remain at a good heat over a slow fire till they begin to break; then remove them. Repeat this process for 2 or 3 days; then take the gooseberries from the syrup, and spread them out on sieves near the fire to dry. This syrup may be used for other preserves. When the gooseberries are quite dry, store them in tin boxes or layers of paper,

GOOSEBERRIES, Red, To Keep.—Pick gooseberries when fully ripe, and for each quart take ¼ lb. of sugar and 1 gill of water; boil together until quite a syrup; then put in the fruit, and continue to boil gently for 15 minutes; then put them into small stone jars; when cold, cover them close; keep them for making tarts and pies.

GRAPES, To Dry.—1. The grapes are allowed to remain on the vine until of a golden color and translucent; they are then picked and put on wooden trays, 2 by 3 ft. in size, placed between the rows, sloping to the sun. When half dried they are turned by putting a tray on the top, and by inverting them both, are transferred to the new tray. When the grapes lose their ashy appearance, and after removing the green ones, the rest are put into large sweet boxes, placing sheets of paper between every 25 lbs. of raisins. They are left there for 2 weeks; when the stems are tough and the raisins soft. The packing follows, in which iron or steel packing frames are used, the raisins being assorted, weighed, inspected and made presentable.—2. The grapes are allowed to ripen and dry on the vine. After being plucked and cleaned, they are dipped for a few seconds into a boiling lye of wood ashes and quick lime at 12° or 15° Baume, to every 4 gals. of which a handful of culinary salt and 1 pt. of salad oil has been added; they are then exposed for 12 or 14 days in the sun to dry; lastly, they are carefully garbled, and packed for exportation. The sweet, fleshy kinds of grapes are those selected for the above treatment; and, in general, their stalks are cut about ½ through, or a ring of bark is removed, to hasten their maturation.—3. Place the grapes in boiling water for the purpose of scalding them. As soon as they boil the skins will burst, and the seeds rise to the top; they must then be skimmed off immediately, or they will sink again among the grapes. After skimming, remove from the fire, and stir in sufficient sugar made into a syrup to sweeten them, and then spread on dishes to dry.

GRAPES, To Keep.—Grapes, in bunches, are preserved by wrapping them in silver paper, and packing them in dry bran. Each bunch is suspended by the stem with the fingers of one hand, while the bran is poured round it with the other; the jar being occasionally gently shaken as the process of packing proceeds. Some paper is then laid over the top of the jar, the mouth or cover of which is, lastly, firmly tied over with bladder to exclude the air and moisture.—2. Grapes may be kept in shallow drawers, spread upon paper, and covered with the same material. Some varieties, in this way, can be kept in good condition until midwinter, and sometimes until toward spring.

LEMONS, To Keep.—1. Cover them with buttermilk or sour milk, changing it once a week. Even lemons that are quite dry will seem fresh if kept in this way.—2. Lemons can be kept sweet and fresh for months by putting them in a clean, tight cask or jar, and covering with cold water. The water must be changed as often as every other day, and the cask kept in a cool place.

LEMONS AND ORANGES, To Pack.—Examine each one carefully to see that it is perfect; then wrap in tissue paper, and pack closely in boxes.

PEACHES, To Dry.—Let the peaches get mellow enough to be in good eating condition; put them in boiling water for a moment or two, and the skins will come off like a charm; let them be in the water long enough, but no longer.

PEACHES, To Keep.—Peaches can be kept several weeks beyond the usual time, if carefully gathered when hard, and each peach at once wrapped in thin paper such as is used for keeping oranges, and then packing in stone jars; and storing in a cool, dry place, where the temperature does not rise above 60°.

PEARS, To Keep.—Summer pears, gathered a few days before fully ripe, and wrapped in thin paper, and kept in a cool place away from the changes of light and air, may be kept in good condition for several weeks.

PRUNES, To Dry.—These are mostly imported from France, where several sorts of prunes are raised especially for drying, among which are *German Prune, St. Catharine, Brignolles,* and others. The fruit is not gathered until the sun has dried off the dew; it is then picked by hand, and spread in shallow baskets, which are kept in a cool and dry place; when they have become soft, they are shut up close in spent ovens, and left for 24 hours; they are then taken out, and replaced after the ovens have been slightly reheated; on the next day they are taken out and turned by slightly shaking the sieves on which they have been laid; the ovens are heated again, and they are put in a third time; after remaining 24 hours they are taken out and left to get quite cold; after some manipulations, they are submitted to oven heat twice more, and then packed in boxes and jars for sale.

RASPBERRIES, To Dry.—Black raspberries and blackberries are dried whole, and care must be taken that they be unbroken; dried red raspberries never sell well.

VEGETABLES.

REMARKS.—To enjoy palatable and wholesome vegetables during the winter months, proper care and attention are essential in harvesting and storing. Most house cellars are too warm for the best preservation of vegetables, and it is therefore advisable to store only a limited quantity for immediate use in the house, while the main stock should be kept in a cool barn, cellar, or in an outdoor pit. Where a pit is not practicable and the entire crop has to be stored in a cellar, the roots intended for late keeping should be carefully selected. Only sound, solid roots will keep well. These should be laid loosely in thin layers, into bins or barrels, and each layer covered with sand, so that none of the roots are exposed to the light. The purer the air can be kept in the cellar, and the cooler without freezing, the better the vegetables will keep in it. A good way to keep vegetables, is to sink a barrel, box or cask, ⅔ its depth into the ground; heap the earth around the part projecting out of the ground, with a slope on all sides; place the vegetables in the barrel; cover the top with a watertight cover, and when winter sets in, throw an armful of straw on the barrel. If the bottom is out of the barrel, so much the better. Cabbage, celery, and other vegetables, will keep in this way as fresh as when taken from the ground. Celery should stand nearly perpendicular; the celery and earth alternating. Freedom from frost, ease of access, and especially freshness and freedom from rot are the advantages of this plan.

BEANS, Lima. To Dry.—Gather them while green and tender, and spread them in the sun to dry.

BEANS. String. To Dry.—Cut the beans up in the usual lengths; dry them; put them in a bag. In winter soak them and cook them in the usual way.

BEANS. To Keep.—Take a wide-mouthed stone jar, lay on the bottom of it some freshly-pulled snap beans, and over them put a layer of salt; fill the jar up in this manner with alternate layers of beans and salt. The beans need not all be put in at the same time, but they are better if the salt be put on while they are quite fresh. They will keep good all through the winter. When going to use them, steep for some hours in fresh cold water.

BEANS, To Pack.—The principal points to be looked after in packing beans are, the different kinds must not be mixed; they must be hand-picked, that is, looked over, and the dark-colored and imperfect beans, pebbles, etc., removed; they should be perfectly dry, otherwise they will become musty. Barrels should be used, and well filled.

CABBAGE, To Keep.—1. Gather them before the severe fall frosts. Let the coarse, outside leaves remain on them. Fix a strong string around the stalk, and suspend the cabbage from the timbers of the ceiling, heads downward. The cellar should be cool and dry. This will preserve them with certainty.—2. Pack in sawdust in the barn, and allow the whole to freeze, the sawdust being such a non-conductor of heat that once it becomes frozen through it will not thaw out again until well in April, and cabbage will come out almost as nice as when put in.—3. Cut the head from the stump; pack close in a cask, taking care to fill up all the vacancies with dry chaff or bran, and keep in a dry cellar.

CAULIFLOWER, To Keep.—1. They can be kept in a cellar, by covering the roots and stalks with earth, till February. Or they may be placed in a trench in the garden, roots down, and covered with earth, up close to the heads, and then cover with hay or straw, 4 or 5 in. thick, placing just enough soil on the straw to keep it in position.—2. Make a trench 12 in. deep; cover the stalk and part of the head with earth, and cover the whole with 4 or 5 in. of straw.

CELERY, To Keep.—To keep celery through the winter: About the last of October dig a trench 18 in. deep and 12 in. wide, in some dry place where drainage is perfect, so that no water can stand in it. Lift the celery with considerable soil about the roots; stand the branches upright, as they grew in the trench; pack them as close as possible; draw the earth close against them; then lay on them boards, and on the top of these coarse straw or leaves, or both.

CORN, To Dry.—Clean the silk carefully from the corn. Put it in a steamer, over a kettle of hot water. Steam 10 minutes; then draw a knife through each row of kernels, and scrape out the pulp, leaving the hulls on the cob. Spread on plates, and carefully dry without scorching.—2. Husk the corn and silk it; then shave it off with a sharp knife. To 6 qts. of the shaved corn add 1 teacup of sugar, and stir it up all together. Put it on a pie platter and plates, and set in the oven. Let it scald 10 minutes; then take it out and put it on a clean tablecloth, and spread in the sun and let it dry. When dry, put in a jar or box to keep.

ONIONS, To Keep.—Gather in the fall, and remove the tops; then spread upon a barn floor, or in any open shed, and allow them to remain there until thoroughly dry; put in barrels or small bins or boxes, and place in a cool place, and at the approach of cold weather cover with straw or chaff, if there is danger of very severe freezing. Onions are more frequently injured in winter by keeping them in too warm a place, than by frost. It is the alternate freezing and thawing that destroys them; and if placed in a position where they will remain frozen all winter, and then thawed out slowly in a dark place, no considerable injury would result from this treatment. Onions should always be stored in the coolest part of the cellar, or put in chaff and set in the barn or some outhouse.

PARSLEY, To Dry.—To have nice, bright, crisp parsley for winter use, spread thinly, as soon as gathered, on a piece of paper, and place in a cool oven, leaving the doors open; as soon as dry, powder it and put it into a bottle, corking to exclude the air. Dried in this way, it will retain its color and flavor.

PARSNIPS, To Keep.—The roots should be dug up late in the fall, leaving all the tops on, then carefully heeled in thickly together in rows, after which they should be covered with

a little coarse litter, and they can be reached whenever wanted during the winter.

PEAS, To Dry.—Look the peas over, and remove any that are bad; then place them in the sun until they are dried.

PEAS, Green, To Keep. — When full grown, pick and shell; lay them on dishes or tins in a cool oven, or before a bright fire; do not heap the peas on the dishes, but merely cover them; stir them frequently, and let them dry very gradually. When hard, let them cool, then pack in stone jars, cover close, and keep in a very dry place. When required for use, soak them for some hours in cold water, till they look plump before boiling; they are excellent for soup.

POTATOES, To Dry.—The potatoes are to be washed clean, placed in trays, and thrust into a steam box. At the end of 35 minutes they are removed and the skins stripped off by hand. Great care is necessary that the potatoes are not too much cooked, or they are worthless for drying. After peeling, they are placed in a press with a tight-fitting plunger and a perforated bottom and pressed through upon trays, which move on a tramway so as to secure an equal distribution. They are then ready for the dryer, and after being dried hard are placed in a grinder and coarsely pulverized. They can then be cooked in 15 minutes in a little boiling water.

POTATOES, To Keep.—1. A cave, dug in the side of a hill, or a pit in a sandbank, affords an excellent place for storing potatoes. If piled on top of the ground and covered with straw and earth, care should be taken not to leave them exposed to the light. A dark cellar is preferable to a light one for keeping potatoes.—2. To prevent potatoes from rot, dust over the floor of the bin with lime, and put in about 6 or 7 in. of potatoes; then dust with lime as before, then add more potatoes, using about 1 bus. of lime to 40 bus. of potatoes. The lime improves the flavor of the potatoes, and effectually kills the fungi, which causes the rot.

PUMPKINS, To Dry.—Take ripe pumpkins, pare, cut into small pieces, stew soft, mash and strain through a colander, as if for making pies; spread this pulp on plates, in layers about ½ in. thick; dry it in a stove oven, which should be kept at so low a temperature as not to scorch it; in about a day it will become dry and crisp. The sheets thus made can be stowed away in a dry place, and are always ready for use, either for pies or stewing. The quick drying after cooking, prevents the souring, which is almost always the case when the uncooked pieces are dried, while the flavor is much better preserved and the after cooking dispensed with. When ready to use, soak portions of the article in a little milk over night, when it will return to as delicious a pulp as if made of a pumpkin when fresh.

RHUBARB, To Dry.—The best method is to strip it of its epidermis. This is a long operation; but both time and expense are spared in the end by the promptness and regularity of the drying. Many cultivators of rhubarb on a large scale have repeated the experiment and have met with the most decisive results.

SALSIFY, To Keep.—Salsify is improved by being frozen.

SQUASHES. To Keep.—Squashes are injured by the lightest frosts, and should be kept in a warm, dry store-room, rather than in a cellar; if hung up by the stem in a cool place, they will keep for many months.

SWEET POTATOES. To Keep. — There is no better way than to pack them in dry sand, in boxes, and keep the temperature of the place where they are stored at from 45° to 60° Fahr. Where one has but a few, dig when thoroughly ripe; handle them as carefully as if they were eggs; dry them well, and then pack in ½ bbls. or small boxes, and place them in the kitchen near the stove, or some other warm place. The sand will absorb heat during the day and give it off slowly at night. In this way danger from freezing is obviated.

TOMATOES, To Dry.—To every gal. of peeled tomatoes put 1 teacupful of salt, and 1 tablespoonful of pounded black pepper. Boil all well until it becomes a marmalade. Then sift in 1 pt. of flour, and let it cook a few moments longer, in order that the mixture be thickened. Now take off the tomatoes, and spread them over dishes slightly greased. Dry them in the sun 3 or 4 days, then roll them into balls; sprinkle with flour, and expose to the sun a week or two longer. Put away in paper bags. One ball the size of a small apple is enough for a tureen of soup in winter.

TOMATOES, To Keep.—Pick the green tomatoes before the vines freeze; place in a cool, dry place, where air can be admitted and the frost can be kept out.

TURNIPS, To Keep.—Of all the roots turnips are the most affected by heat. They will sometimes grow in a cellar of not over 40° temperature. There is a natural heat about the roots, and when they are piled together, this accumulates and the roots sprout. A little frost does not hurt turnips. Place them in small lots in stalls where the frost can get at them, and cover with straw to prevent thawing.

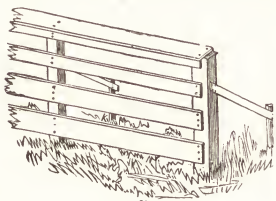
WORK ON THE FARM.

FENCES AND GATES.

BOARD FENCE.—This is an easily constructed and neat fence. In most cases it will prove to be the cheapest. To build 10 rods of fence, 4 boards high, requires 56 boards 12 ft. long and 6 in. wide.

BOARD-HOLDER.—The illustration shows a handy contrivance for the farm. The peg at the top is adjustable to any width of board or

any distance apart. It takes the place of one man in building board fences, and costs nothing.



Board Fence.

GATES.—To make a cheap farm gate: Take a round post and set it firmly in the ground; then make a gate with a scantling 3x3 at one end, and 2x2 at the other. For the top rail, make the heel piece of 3x4 scantling. Let the top rail of the gate run over the top of the post. Put a ¾ round iron pin through the top rail and into the centre of the post, thus forming the top hinge. For the bottom hinge, match upon the heel piece, about 6 in. from the bottom, a piece of 3 in. plank, 15 in. wide edgeways, hollowing it out so as to fit the round post. This gate will swing open both ways. Where there are obstructions to swinging-gates, a sliding gate is a good form. There are no hinges to this gate, or braces. It should be made of 6

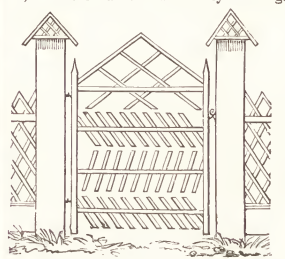
Board Holder.

A Cheap Farm Gate.

bars, mortised and pinned into the scantlings forming the end pieces. Set 2 posts in the ground, and connect them by 2 boards, on which the upper and next to the last rail of the gate is to rest. Place the posts at any easy distance apart for the gate to slide between easily, having the inner post 4 or 5 in. the rear of the other. At the other end of the gate place a post to which the gate is to be latched. This gate is easily opened by unlatching it, pushing it back on the supports at the other end, and swinging it to the right or left. A pretty front gate can be made of rustic branches or boards; these to be arranged in any design, according to the taste of the builder. The illustration is fanciful, cheap and serviceable. The design requires no explanation. There are various styles

Sliding Gate.

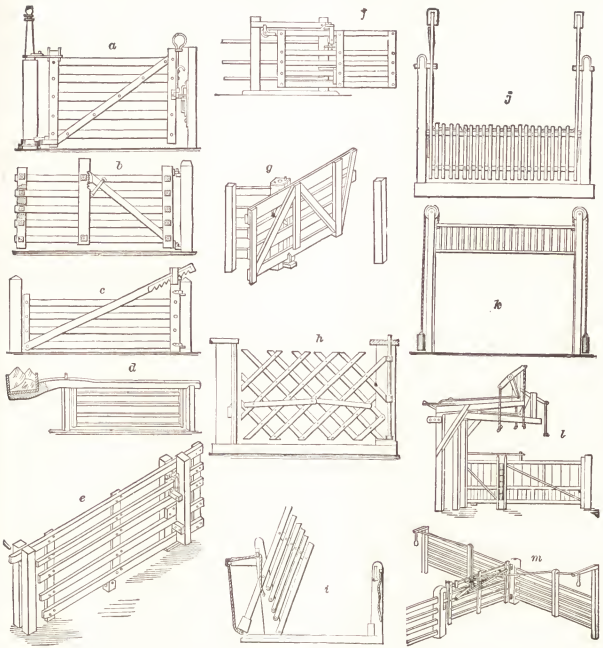
of making gates, not only in regard to appearance, but in the manner in which they are hung.



Fancy Gate.

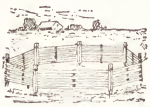
a, represents a gate which has adjustable hinges operating on rings on the post; the fastening consists of a movable latch and staple; *b*, represents a good method of hanging a gate when the loose end sags, by means of a diagonal strip; *c*, represents a method of preventing a gate from sagging, by a tie slat; *d*, represents a gate whose top bar is pivoted to the post, the whole gate being counterbalanced by a box filled with stone, placed on the extended bar; *e*, is a gate whose slats traverse on rollers, thus sliding longitudinally; *f*, is a sliding gate which has rollers to keep it level; *g*, slides half its length, and then rotates on a bar at its middle point; *h*, is a gate of pivoted bars; *i*, is a gate having a set of pivoted slats, which assume a vertical position when the top slat, being counterbalanced, is allowed to oscillate; *j*, is a suspended gate which swings upward in a vertical plane; *k*, is counterbalanced and suspended from pulleys; *l* and *m*, are complicated gates, so arranged as to be easily opened by pedestrians, equestrians, or persons in vehicles, by means of ropes.

HOOP-IRON FENCE.—Hoop iron makes as durable a fence as any kind of wire, and if tarred will last a lifetime; if painted white, it makes a beautiful light fence, besides a harmless one for any kind of stock. Old, sound rails would be good for supports or standards; 1½ in. hoop is the best size to use.



Forms of Gates.

MOVABLE FENCE.—Make lengths or frames of fence out of boards; at each end of each frame have the posts sharpened, in order that they may be driven into the ground. When all the frames are made and placed in position, fasten them together at the top by means of wire or rings of iron.



Movable Fence.

PICKET FENCE.—Useful to inclose the kitchen garden or hen-park. It takes from 900 to 950 pickets to make 10 rods. It also takes 28 posts, 6 ft. apart, and 14 pieces of scantling, 12 ft. long.

POSTS. To Set.—As posts, standing in the ground, decay a few inches below the surface, and in many cases become entirely rotten, it is best so to set them that these evils will be overcome. To preserve the posts, coat 6 or 8 in.

Picket Fence.

above and below the surface of the ground with crude petroleum, raw paint oil, or coal tar. Another method of preserving the posts, is by setting them above stone drains. For this purpose the stones may be laid in several ways. The bottom of the ditch may be covered with cobble-stones, capped with flat ones, upon which the post is set (*Fig. 2*), or the stones

may be laid as in *Fig. 1, 3* or *4*. *Fig. 1* is the best one shown, if properly laid on a hard subsoil.

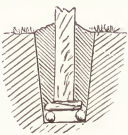


Fig. 1.

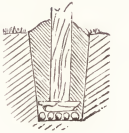


Fig. 2.

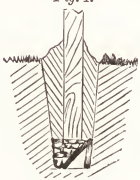


Fig. 3.

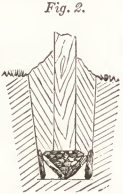
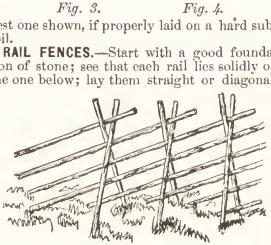


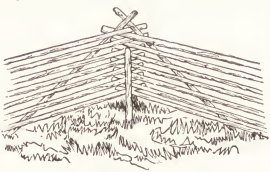
Fig. 4.

RAIL FENCES.—Start with a good foundation of stone; see that each rail lies solidly on the one below; lay them straight or diagonal,



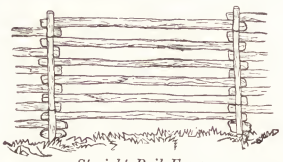
Diagonal Rail Fence.

in which case the end of each pole will be on the ground and more stakes will be needed; if



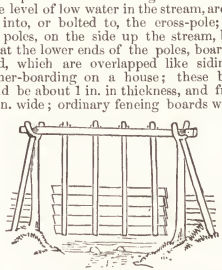
Zig-zag Rail Fence.

laid straight, the zigzag form is preferable; if the zigzag is not desired, drive the stakes in from 4 to 6 in. apart; place a stone 4 in. in height between them; upon this pile the rails; place a piece of annealed wire around both stakes; twist the ends well together; upon this place more rails; near the top use another piece of wire. Galvanized wire will not rust easily.



Straight Rail Fence.

WATER GATES.—Upright forks of heavy, durable timber, are placed on either side of the stream. These are set firmly in the ground, and securely braced. The gate swings, and is made as follows: A heavy pole rests upon the forks reaching across the stream; a small groove is made around the pole where it rests in the fork, which serves to keep it in place; 4 or more poles of sufficient length to reach down to the level of low water in the stream, are mortised into, or bolted to, the cross-pole; upon these poles, on the side up the stream, beginning at the lower ends of the poles, boards are nailed, which are overlapped like siding or weather-boarding on a house; these boards should be about 1 in. in thickness, and from 6 to 8 in. wide; ordinary fencing boards will answer; they should extend up the poles to the height of an ordinary fence above the bottom of the stream; when the water rises, this gate will swing upward, offering no obstruction to floating drift or ice, but effectually keeping animals from passing.



Water Gate.

WIRE FENCE.—1. A cheap, substantial, and sufficiently strong fence, can be made of No. 8 wire, 4 strands, with posts set 16 ft. apart. This requires 4 lbs. of wire to the rod. The wire is fixed to the end of the fence, where the post is strongly braced to the foot of the next one, set about 10 ft. from it, by means of a screw eye bolt, by which the wire may be loosened or tightened, as may be required by the contraction in winter or the expansion in summer. It is fixed to the posts by staples first loosely driven in, and is drawn tight by a winch and a binding cam attached to a rope, and then the staples are driven in firmly, so as to hold the post. The last post is braced as the first one, so that it will stand the strain firmly.—2. A good wire fence is formed by planting maple or cedar trees along the line, 30 to 40 ft. apart; then put up lines of barbed wire between them.

FUEL.

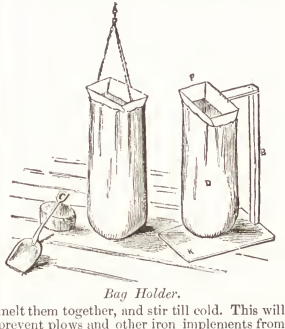
CHARCOAL.—This is made by the combustion of wood so confined that air is not admitted in sufficient quantities to make a blaze. The top soil is cleaned off, and the wood piled in pyramids, leaving small spaces between the different tiers, in which dry chips and brush are placed; the pile is then covered with earth, which is packed in closely, small openings being left immediately over the spaces in which the chips and brush are placed. The pile is then ignited below, the small holes acting as flues, creating a draft. The pile must be watched, to prevent blazing, and whenever a blaze is discovered, the hole from which it issues should be immediately closed with earth. When the white smoke which issues from the heap changes to thin blue, it is an indication that the charcoal is made, and all the openings should be closed; it should not be disturbed until thoroughly cooled, which will take a week or 10 days.

CORN.—Two bus. of corn will make a fire, which will keep a family warm all day; it makes a good and durable fire, and can be burnt in either hard or soft coal stoves, and is especially choice fuel for the cooking stove. Save the corn-cobs for kindlings. To prepare them, melt together 60 parts resin and 40 parts tar. Dip in the cobs, and dry on sheet-metal heated to about the temperature of boiling water.

FIREWOOD.—Among the first things to be considered during the winter, is to provide for a supply of fuel sufficient for the year's need. As soon as the fall work is over, it is a good time to commence in the woods the preparation for fuel. Cut down all trees come to maturity and those not growing any better from year to year; cut them into 8 ft. lengths; haul to the house; saw into stove lengths; split, pile in the wood house. Save all limbs of trees and scrubs. Oak, pine, hickory, dogwood, white ash, white hazel, red oak, hard maple, poplar, butternut and white birch, are all good as fuel.

IMPLEMENTS AND TOOLS.

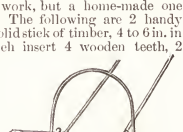
BAG HOLDER. — Useful in gathering potatoes and fruits. Take a 1 in. plank (K) for the bottom; bore a hole in the middle of one side; insert an upright stick (B) in this hole; to this fasten a short plank to which is attached 4 pieces of board, nailed together by their ends forming a square (P); on the outside place hooks or nails on which to hang the bag (D); the bag is hung, so that the square formed by the boards forms the opening. The opening can be made separately and attached by ropes or chains to the wall or ceiling.

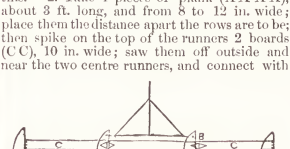


Bag Holder.

CARE OF IMPLEMENTS AND TOOLS.—When not in use, have them sheltered from the sun, wind, rain and snow. By this means, sleighs, wagons, carts, plows, threshing machines, harrows, and the like, would last twice as long as they would if left in the open air, swelling from moisture one week, and shrinking the next from the influence of the sun and wind. When put away for the season, paint the wood work well, and oil the iron to keep it bright. Take of rosin an amount equal to ½ an egg, and 1 lb. lard; melt them together, and stir till cold. This will prevent plows and other iron implements from rusting, when rubbed on. For general purposes on the farm, castor oil, with a little kerosene added, is a good lubricator and preserver.

CORN MARKERS.—There are several patent machines for this work, but a home-made one does just as well. The following are 2 handy ones: 1. Take a solid stick of timber, 4 to 6 in. in diameter, in which insert 4 wooden teeth, 2 ft. long; these should be round, strong and blunt. A pair of poles wedged into the sticks serve as thills. On the top of the pole, nail two hooks, firmly, to hitch to. Add a piece of sapling that, when bent, will come up about breast high. The operator guides the machine by this. — 2. Take 4 pieces of plank (A A A A), about 3 ft. long, and from 8 to 12 in. wide; place them the distance apart the rows are to be; then spike on the top of the runners 2 boards (C C), 10 in. wide; saw them off outside and near the two centre runners, and connect with 4 hinges (B B B B); put in a tongue, and it is ready for work on any kind of land; should a


Home-made Corn Marker.



Another Corn Marker.

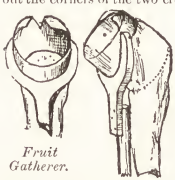
tree or stump be in the way, raise the right or left wing, as the case may be; if going through a narrow place, turn up both wings. To get the rows perfectly parallel, mark but three at a time, by allowing one runner to run in the last mark.

CORN HORSE. — Used to shock corn. The following is a good one. The cut shows the construction. The stock or rod in the centre is movable. It is placed in corn, with 3 rows upon each side, making 36 hills to a shock. The corn

Corn Horse.

is placed equally in the 4 corners formed by the cross-piece, and after tying the shock, this stock or rod is removed and the horse drawn out for the next shock.

FRUIT GATHERER.—Small fruits, or orchard fruits lying on the ground, can be gathered by a rake or by hand. But, for fruit on the tree, the following is a good invention: Take an old fruit can; place it on a bed of hot coals, and carefully melt off the top without loosening the side seam; cut the bottom ⅔ around and straight across, leaving on one side a crescent-shaped piece of tin, an in. or two wide at the widest part; through the middle of the crescent, extending down the side of the can, cut a V-shaped notch and bend out the corners of the two crescent pieces; next

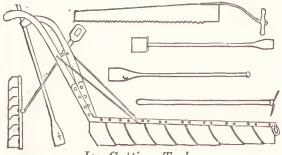


Fruit Gatherer.

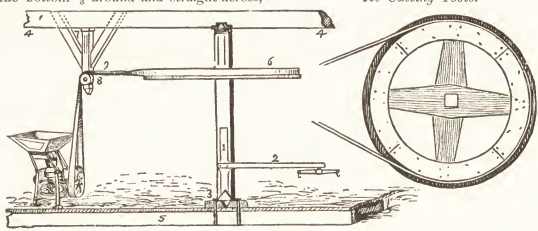
whittle or saw a fork out of a board and nail it to the pole, by means of nails or screws inserted from the inside; fasten the can in the fork; place the can over the fruit in such a manner as to bring the stem through the notch; draw down on the pole, and at the same time give the can a motion toward you; this will detach the fruit, which, falling into the can, will roll through the open end into a bottomless bag resting on the basket, fastened to the can by means of holes punched in the tin; hold the lower end of the bag up with the left hand until it gets heavy, then let the fruit pass carefully into the basket.

HORSE POWER.—The machine consists of an upright shaft, 6 by 6 in., 8 ft. high; bolt to this shaft a sweep to which the horse is to be attached; nail a pole also to the shaft to lead the horse; at the top and bottom of the shaft place iron journals; these, driven in firmly, turn with it and in the step below; erect in the barn; attach to the upright a pulley or wheel, 6 ft. above the floor; attach a strongly braced frame with 2 pulleys to the beam; over this pass a belt to the machine to be run.

ICE CUTTING TOOLS.—These are an ice-saw,



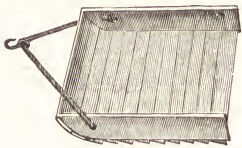
Ice Cutting Tools.



Horse Power.

an ice-hook or pole, and an axe. The ice-saw resembles somewhat the single or one-man cross-cut saw, for which the cross-cut saw may be substituted. The ice-pole or hook, is a long pole pointed with iron, and having a sharp iron hook near the point.

SHOVELS.—These are always in demand and



Surface Shovel.

3 or 4 are never out of place on a farm. A good

surface shovel is also needed. It consists of a wooden shovel, shod with iron. It may have a long handle or a cord and hook to which the horse is to be attached. It is needed in harrowing or in leveling a field or garden.

SLEDS.—These are convenient in hauling

Log Sled.

wood, etc. They can be easily constructed of boards or logs. Any form will do, but weight and size are great considerations. The less weight the better. The cut shows a good strong sled, made of logs. A horse may be fastened to the chain.

SOLDERING IMPLEMENTS.—A soldering iron, with the necessary accompaniments of resin, acid and solder, is another economical institution which dairymen, especially, find very convenient, for if every milk pan, can, pail, etc., had to be carried to the tinshop whenever a

Soldering Implements.

leak had to be stopped, a great deal of time, if not money, would be consumed by it. Then, every time a lead pipe can be mended by home talent, enough is saved, if far from a village, to nearly cover the cost of an iron. Implements like those shown in the illustration are convenient, and can be bought of agents.

ROADWAYS.

ROADS.—Very much of personal comfort and pleasure in rural residences depends upon good roads. A smooth, firm, dry road, is one of the greatest conveniences and enjoyments; while a rough, soft, or muddy road is one of the greatest drawbacks and annoyances of country life. Bad roads form the greatest obstacles to progress and permanent improvements. After locating the road and marking out its course, the sides should be brought to the proper grade and finished by a layer of sod as a guide to further operations. The road-bed is then formed by excavating and removing the soil to a depth of 6 in. at the sides, curving slightly higher in the centre, and made perfectly smooth by rolling, producing a uniform surface upon which the material of the road is to be placed. The best stone for road metal is tough granite. Hard, brittle stone is more readily reduced by pressure, but in a well-kept road this difference is not important. It is, however, all-important that the stones should be broken. The largest stones should be laid first. The road should be filled to a level with the sides. When it is necessary to branch a secondary road from the main line, it should leave the latter at as nearly a right angle as convenient, and at the same time be somewhat narrower, so that its appearance may convey the proper idea of its being subordinate, and so avoid confusion and mistake. A thin layer, not more than 1 in. in thickness, of fine clayey gravel, should then be evenly distributed over the stones, and the roller again applied until the surface becomes homogeneous, firm and close. Where stone cannot conveniently be obtained, the road-bed may be filled with refuse matters of many kinds, such as coal ashes, clinkers from furnaces, and shells. Oyster shells are plentiful in many places near the seaboard, and form an admirable road; but the permanency, as well as the efficiency of these materials in a road-bed, will depend altogether upon the care of surfacing with proper gravel. Where it is impracticable to procure, or deemed inexpedient to use, any of the foregoing materials, an earth road may be rendered very serviceable by proper attention to keeping it dry. In this case, instead of excavating a road-bed, slight excavations should be made at the sides and the material spread over the centre; and that surface water may pass to the sides more rapidly and thoroughly, a greater convexity may be given to the curve.

WALKS. Gravel. To Make.—Lay the bottom with lime rubbish, large flint-stones, or any other hard matter, for 8 or 10 in., to keep weeds from growing through, and over this lay the gravel 6 or 8 inches thick. This should be laid rounding up in the middle, by which means the larger stones will run off to the sides and may be raked away, for the gravel should never be screened before it is laid on. It is a common mistake to lay these walks too round, which not only makes them uneasy to walk upon, but takes off their apparent breadth; 1 in. in 5 ft. is a sufficient proportion for the rise in the middle; so that a walk 20 ft. wide should be 4 in. higher at the middle than at the edges, and so in proportion. As soon as the gravel is laid, it should be raked, and the large stones thrown back again; then the whole should be rolled both lengthwise and crosswise; and the person who draws the roller should wear shoes with flat heels, that he may make no holes. The walks should always be rolled 3 or 4 times after very hard showers, from which they will bind more firmly than otherwise they could ever be made to. (See also *Walks* in LANDSCAPE GARDENING.)

TABLES.

BINS AND PILES, Measurement of.—To ascertain the number of bushels in a bin of any dimensions, find the number of cubic ft. by multiplying the 3 dimensions of the bin in ft.; deduct 1-5, and the result will be the number of bushels. To find the cubic contents of a pile in the usual form of a cone, find the area of the base by the old arithmetical rule of multiplying the square of its diameter in ft. by .7854, and this product, multiplied by $\frac{1}{3}$ the height of the cone, will give the cubic ft.

TABLE EXHIBITING CAPACITIES OF GRAIN BINS, ETC., TEN FT. HIGH.

Width in Ft.	Bin 6 Ft. Long.	Bin 7 Ft. Long.	Bin 8 Ft. Long.	Bin 9 Ft. Long.	Bin 10 Ft. Long.	Bin 11 Ft. Long.	Bin 12 Ft. Long.	Bin 13 Ft. Long.	Bin 14 Ft. Long.	Bin 15 Ft. Long.	Bin 16 Ft. Long.	Bin 17 Ft. Long.	Bin 18 Ft. Long.	Bin 19 Ft. Long.	Bin 20 Ft. Long.
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
3	145	169	192	217	241	265	289	313	338	362	386	482	530		
4	193	225	257	289	321	354	386	418	450	482	514	643	708		
5	241	282	321	362	402	442	482	522	563	603	643	804	884		
6	290	338	386	434	482	530	579	627	675	723	771	964	1060		
7	338	394	450	506	563	619	675	731	788	844	900	1125	1238		
8	386	450	514	578	643	707	771	836	900	964	1029	1286	1414		
9	434	507	579	651	723	796	868	940	1013	1085	1157	1446	1592		
10	482	563	643	723	804	884	964	1045	1125	1205	1286	1607	1768		
11	531	619	707	796	884	972	1061	1149	1238	1326	1414	1768	1944		
12	579	675	771	868	964	1061	1157	1254	1350	1446	1543	1929	2122		

DRAINS REQUIRED FOR AN ACRE OF LAND.—The following table shows the number of tiles, of the different lengths made, which are required for 1 acre, and will be useful to those who may desire to purchase just enough for a particular piece of ground:

DISTANCE APART.				12 Inch Tiles.	13 Inch Tiles.	14 Inch Tiles.	15 Inch Tiles.
Drains	12 ft.	apart	require	3630	3351	3111	2934
"	15	"	"	2904	2681	2489	2323
"	18	"	"	2420	2234	2074	1936
"	21	"	"	2074	1914	1777	1659
"	24	"	"	1815	1065	1556	1452
"	27	"	"	1613	1480	1386	1291
"	30	"	"	1452	1340	1245	1162
"	33	"	"	1320	1218	1131	1056
"	36	"	"	1210	1117	1037	968

In reference to tile pipe drains, it must be remembered that the ditch may be much narrower than when stones are used, thus making a considerable saving in the expense of digging. The upper part of the earth is taken out with a common spade, and the lower part with one made quite narrow for the purpose, being only about 4 in. wide at the point.

ELEMENTARY SUBSTANCES IN A CROP OF ONE ACRE.—

DESIGNATION.	Bushels.	Pounds.	Husk of Woody Fibre.	Starch, Sugar and Gum.	Gluten, Albumen and Asselin.	Oil.	Saline Matter.
Wheat	25	1500	225	825	180	45	30
Barley	35	1800	270	1080	230	50	50
Oats	50	2100	420	1050	300	100	75
Peas	25	1600	130	800	380	34	48
Beans	25	1600	160	640	420	40	50
Indian Corn	30	1800	100	1200	220	130	30
Potatoes	12 tons	27000	1080	4800	540	45	240
Turnips	30 "	67000	1340	6000	1000	200	450
Wheat Straw	1½ "	3000	1500	900	40	80	150
Meadow Hay	1½ "	3400	1020	1360	240	120	220
Clover Hay	2 "	4500	1120	1800	420	200	400
Cabbages	20 "	45000	430	2300	1300	130	600

HAY, To Measure.—Weighing is the only accurate method of measuring hay. It is difficult to do this unless it is baled or made otherwise compact. On account of this difficulty it is sometimes weighed by the cubic contents, a mode which is only approximately correct. Equal bulks of different kinds of hay vary largely in weight. The following rules are useful for estimating the amount in meadows, mows or stacks. About 25 cu. yds. of average meadow hay in windrows make a ton; 15 or 18 cu. yds. make a ton, when well settled in mows or stacks; 20or 25 cu. yds., when it is loaded on wagons from mows or stacks; 25 cu. yds. of dry clover make a ton. 1. The number of tons of meadow hay, raked into windrows, may be found as follows: Multiply together the length, width and height of the windrow in yds., and divide by 25. — 2. To find the number of tons in a mow, multiply the length, height and width, in yds., together, and divide the product by 15. — 3. To find the number of tons of hay in old stacks, find the area in sq. yds. of the base, by the table of areas of circles in this volume; then multiply the area of the base by ½ the altitude of the stack in yds. and divide the product by 15. — 4. To find the number of tons in long, square stacks, multiply the length, width, and half the altitude in yds. together, and divide the product by 15. — 5. To find the number of tons of hay when taken out of the mows or old stacks, multiply together the length, width and height of the load in yds., and divide the product by 20. These estimates are for medium sized mows or stacks. — 6. To ascertain the value of a given number of lbs. of hay, at a given price per ton of 2,000 lbs., multiply the number of lbs. of hay, or any other article which is bought or sold by the ton, by ½ the price per ton, pointing off three figures from the right hand. The principle is the same as in interest: dividing the price by 2 gives the price of ½ ton, or 1,000 lbs.; and pointing off three figures to the right is dividing by 1,000. A truss of hay, new, is 60 lbs.; old, 56 lbs.; straw, 40 lbs.; a load of hay is 36 trusses; a bale of hay is 300 lbs.

LAND, To Measure.—Each section has four quarter sections, as here designated, each containing 160 acres. The township is 6 miles square, divided into 36 square miles or sections, numbered as in the following diagram, and each containing 640 acres.

A SECTION.

N.W.	N. E.
S.E.	S. E.

A TOWNSHIP.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Every farmer should have a light, stiff pole, just $16\frac{1}{2}$ ft. (1 rod long), with division marks on it of 1 yd. each, making it $5\frac{1}{2}$ yds.; then, by proceeding according to the rules below, the area in acres of each lot can be obtained. 1. Where the field is a square, a parallelogram, a rhombus, or a rhomboid, multiply the length in rods by the breadth in rods, and divide the product by 160, and the result will be the number of acres. —2. Where the field is triangular, multiply the base or longest side, in rods, by the perpendicular height (the greatest width), in rods, and divide $\frac{1}{2}$ the product by 160, and the result will be the number of acres. —3. Where the field is a trapezium or a trapezoid in shape, divide it diagonally by a line running from one extreme corner to the other, which will cut the field into two triangles; then proceed with each as in the preceding rule, and add the areas of the two triangles together; the result will be the number of acres in the field.—4. Where the field is an irregular polygon, draw diagonals to divide the field into triangles; find the area of each separately, and the sum of the whole will be the number of acres. There are very few lots which cannot be measured by cutting them into triangles; and proceeding by the above rule. In fact, all approximately straight-sided fields can be so measured, nearly enough for practical purposes.—5. Where the field is long, and the sides crooked and irregular, take the breadth in rods in a number of places, at equal distances apart; add them, and divide the sum by the number of breadths for the mean average or breadth; then multiply that by the length in rods and divide the product by 160, and the result will be the number of acres. —6. Where the field is long, and the sides and ends crooked and irregular, find the mean breadth in rods by the preceding rule, and proceed in the same way to find the mean length in rods; then multiply the mean length by the mean breadth, and divide the product by 160, and the result will be the number of acres.—7. Where the field is a circle, take the diameter in rods, and find the area of the circle in our table of the areas of circles in this volume, and divide by 160, and the result will be the number of acres. To lay off small portions of ground, we give the following table:

Parts of 1 Acre.	Square Feet.	Feet Square.	Parts of 1 Acre.	Square Feet.	Feet Square.
1-16	2722½	52½	½	21780	147½
⅛	5445	73⅝	1	43560	208⅛
¼	10890	104⅝	2	87120	295⅛
½	14520	120½			

The following table will assist in making an estimate of the amount of land in fields and lots:

*	10 rods by 16 rods	1	acre.
†	5 yds. by 968 yds	1	"
‡	220 ft. by 198 ft	1	"
	25 ft. by 125 ft	.0717	"
	4,356 sq. ft., .10 acre.	10,890 sq. ft., .25	"
	21,780 " .50 "	32,670 " .75	"

* Or any two numbers whose product is 160.
† Or any two numbers whose product is 4,840.
‡ Or any two numbers whose product is 43,560.

PLANTS OR TREES IN AN ACRE.—

Distance Apart.	No.	Distance Apart.	No.
3 in. by 3 in.	696,960	6 ft. by 6 ft.	1,210
4 " 4 "	392,040	6½ " 6½ "	1,031
6 " 6 "	174,240	7 " 7 "	881
9 " 9 "	77,440	8 " 8 "	680
1 ft. by 1 ft.	43,560	9 " 9 "	537
1½ " 1½ "	19,360	10 " 10 "	435
2 " 1 "	21,780	11 " 11 "	360
2 " 2 "	10,890	12 " 12 "	302
2½ " 2½ "	6,960	13 " 13 "	257
3 " 1 "	14,520	14 " 14 "	222
3 " 2 "	7,260	15 " 15 "	193
3 " 3 "	4,840	16 " 16 "	170
3½ " 3½ "	3,555	16½ " 16½ "	160
4 " 1 "	10,890	17 " 17 "	150
4 " 2 "	5,445	18 " 18 "	134
4 " 3 "	3,630	19 " 19 "	120
4 " 4 "	2,722	20 " 20 "	108
4½ " 4½ "	2,151	25 " 25 "	69
5 " 1 "	8,712	30 " 30 "	48
5 " 2 "	4,356	33 " 33 "	40
5 " 3 "	2,904	40 " 40 "	27
5 " 4 "	2,178	50 " 50 "	17
5 " 5 "	1,742	60 " 60 "	12
5½ " 5½ "	1,417	66 " 66 "	10

QUANTITY OF SEED IN A GIVEN SPACE.—

Asparagus	1 oz. produces 1,000 plants, and requires a bed 12 ft. square.
Asparagus Roots	1,000 plants for bed 4 ft. wide, 225 ft. long.
Eng. Dwarf Beans	1 qt. plants 100 to 150 ft. of row.
French "	1 " " 250 or 350 ft. of row.
Beans, pole, large	1 " " 100 hills.
" " small	1 " " 300 hills, or 250 ft. of row.
Beets	10 lbs. to 1 acre; 1 oz. plants 150 ft. of row.
Broccoli and Kale	1 oz. plants 2,500 plants, and requires 40 square ft. of ground.
Cabbage	Early sorts same as broccoli, and require 60 square ft. of ground.
Cauliflower	The same as cabbage.
Carrot	1 oz. to 150 of row.
Celery	1 " " gives 7,000 plants, and requires 8 square ft. of ground.
Cucumber	1 " " for 150 hills.
Cress	1 " " sows a bed 16 ft. square.
Egg Plant	1 " " gives 2,500 plants.
Endive	1 " " gives 3,000 plants, and requires 80 ft. of ground.
Leek	1 " " gives 2,000 plants, and requires 60 ft. of ground.
Lettuce	1 " " gives 7,000 plants, and requires seed bed of 120 ft.
Melon	1 " " for 120 hills.
Nasturtium	1 " " sows 25 ft. of row.
Onion	1 " " 200 " "
Okra	1 " " 200 " "
Parsley	1 " " 200 " "
Parsnip	1 " " 250 " "
Peppers	1 " " gives 2,500 plants.
Peas	1 qt. sows 120 ft. of row.
Pumpkin	1 oz. to 50 hills.
Radish	1 oz. to 100 ft.
Salsify	1 " " to 150 ft. of row.
Spinach	1 " " to 200 ft. of row.
Squash	1 " " to 75 hills.
Tomato	1 " " gives 2,500 plants, requiring seed bed of 80 ft.
Turnip	1 " " to 2,000 ft.
Watermelon	1 " " to 50 hills.

QUANTITY OF SEED TO THE ACRE.—

Wheat	1½ to 2	bus.	Potatoes 5 to 10 bus.
Barley	1½ to 2½	"	Timothy 12 to 24 qts.
Oats	2 to 4	"	Mustard 5 to 20 "
Rye	1 to 2	"	Herd's Grass 12 to 16 "
Buckwheat	½ to 1½	"	Flat Turnip 2 to 3 lbs.
Millet	1 to 1½	"	Red Clover 10 to 16 "
Corn	½ to 1	"	White Clover 3 to 4 "
Beans	1 to 2	"	Blue Grass 10 to 15 "
Peas	2½ to 3½	"	Orch'd Grass 20 to 30 "
Hemp	1 to 1½	"	Carrots 4 to 5 "
Flax	½ to 2	"	Parsnips 6 to 8 "
Rice	2 to 2½	"	Onions 4 to 5 "
Broom Corn	1 to 1⅛	"	Beets 4 to 6 "

POUNDS PER BUSHEL OF VARIOUS PRODUCE BY THE LAWS OF THE SEVERAL STATES.

	PRODUCE.																												SEEDS.												
STATES.	Apples, dried.	Apples, green.	Barley.	Beans, castor.	Beans, white.	Bran.	Buckwheat.	Carrots.	Coal.	Corn, ear.	Corn, shelled.	Corn, meal.	Cranberries.	Hair.	Lime, unslaked.	Malt, barley.	Mangel Wurzel.	Onions.	Oats.	Peaches, dried.	Pears.	Peas.	Plums.	Potatoes, Irish.	Potatoes, sweet.	Rye.	Salt.	Sugar Beets.	Turnips.	Wheat.	Blue Grass.	Broom Corn.	Clover.	Cotton.	Flax.	Hemp.	Hungarian.	Millet.	Orchard grass	Osage orange.	Sorghum.	Timothy.
Maine			48		64		48	50			56	50		11			60	52	30		60	60		60					50	60												
N. Hampshire					60						56	50							30			60		60		56				60												
Vermont			48		64		48												32			60		60		56	70			60			60									42
Massachusetts			48				48				56	50					50	52	32					60		56				60												
Rhode Island								50																				50														
Connecticut							45	55			56								28		60			60		56		60		56												
New York			48		62		48				58								32			60		60		56				60			60		55							44
New Jersey			48				50				56								30					60		56				60			64		55							
Pennsylvania			47				48				56								30					56		56	85			60			62									
Delaware											56																			60												
Maryland	28		48		62		48			70	56			7		34		57	32			60		60		56	56			60	14		64		56	44	48	50		37	37	45
Dis. Columbia	24		47	46	62	20	48			70	56	48		7		38		57	32	38		60		56	56	56	50		55	60	12		60		56	44						45
Virginia			48		60		48			70	56	50							32			60		60	56	56			56	60			64		56	44						45
W. Virginia	25		48		60		52		80		56	48							32	33				60		56			60	60			60		56							45
N. Carolina			48				50				54	46							30			50				56				60			64		55							
S. Carolina	26		48	46	60	20	56		80	70	56	50			80	38		57	33	33		60		60		56	50			60	14		60		56	44	60	50				
Georgia	25		40	46					80		56	48						75	35					56	60		56			60			60		56							45
Alabama																																										
Florida																																										
Texas																																										
Louisiana			32								56								32							32		60		60												
Mississippi																																										
Arkansas	24		48	46	60		52		80	70	56	50		8		34		57	32	33		46		60	50	56	50			60	14		60		56	44	48	50		36	42	45
Tennessee	26		48		60	20	50			70	56	50						56	32			60		60	50	56				60	14				56		48	50		33	42	45
Kentucky			48		60	20	52				56	50						57	33¼					56		56	50			60	14		60		56	44						45
Ohio	25		48		60		50			70	56				70				32	33		60		60	50	56				60			60		56	44	50	50				45
Michigan	22		48	46	60		48		80	70	56		40		70			54	32	28	60	60	28	60	56	56	56		58	60	14		60		56	44	50	50	14	33		45
Indiana	25		48	46	60		50		70	68	56	50						48	32	33				60		56	50			60	14		60		56	44						
Illinois	24		48	46	60	20	52			70	56	48		8	80	38		57	32	33				60	55	56	50			60	14		60		56	44						
Wisconsin	28		48				50				56								32	28				60		56				60			60		56							
Minnesota	28		48				42				56								32	28				60		56				60			60									
Iowa	24		48	46	60	20	52				56				80			57	32	33				60	46	56	50			60	14	30	60		56	44	45	45		32	30	45
Missouri	24		48	46	60	20	52				56							57	32	33				60		56	50			60	14		60	33	56	44						45
Kansas	24		50	46	60	20	50			70	56	50		8	80	32		57	32					60	55	56	50		55	60	14				56	44	55	55				45
Nebraska	24		48	46	60	20	52			70	56	50		8	80	30		57	34	33	60	60		60	50	56	50		55	60	14		60		56	44	60	85		82	30	45
California			50				40				52								32							54				60												
Oregon	28	45	46				42				56								36	28				60		56				60			60									

WAGON BEDS, Capacity of. — 1. If the opposite sides are parallel, multiply the length inside in in. by the breadth inside in in., and that again by the depth inside in in., and divide the product by 2,150.42, (the number of cu. in. in a bus.), and the quotient will be the capacity in bus. — 2. Should the head and tail boards, or either of them, be set in beveling, add the top and bottom lengths together and divide by 2 for the mean length, and proceed by the foregoing rule; should the sides be sloping, add the top and bottom widths, and divide by 2 for the mean width, and proceed by the foregoing rule. — 3. Should the contents be required in cu. ft., divide the product by 1,728 (the number of cu. in. in a cu. ft.), instead of 2,150.42, and the quotient will be the contents in cu. ft.

WHEAT, Depth of Sowing. — The depth of sowing wheat must vary with the soil. A thinner covering is required in a heavy than in a light soil. Experiments give the following results:

	Appeared above ground in	No. of days.	No. of plants
Seeds sown to the depth of	½ in.,	11 days.	¾
" " "	1 "	12 "	all.
" " "	2 "	18 "	¼
" " "	3 "	20 "	⅛
" " "	4 "	21 "	⅛
" " "	5 "	22 "	⅛
" " "	6 "	23 "	⅛

VEHICLES.

EVERY farm needs a buggy, a spring wagon, a hand-cart, and a heavy farm wagon of some kind. A carriage is also a great addition to the comfort of the household. These all need a certain amount of care and should not be neglected, but kept in perfect order.

AXLE GREASE.—1 lb. tallow; ¼ lb. castor oil; ¼ lb. black lead; melt the tallow, and rub the whole together until cold and well mixed. —2. Water, 2 gals.; soda 1 lb.; palm oil, 20 lbs.; mix well by heat, and stir till nearly cold. Just enough grease should be applied to the spindle of a wagon to give it a light coating.—3. Tallow, 8 lbs.; palm oil, 10 lbs.; plumbago, 1 lb.

CARRIAGE AND BUGGY, Care of.—Never under any circumstances put them away dirty. In washing, keep out of the sun, and have the lever end of the "setts" covered with leather. Use plenty of water, which apply with a hose or syringe, taking care that the water is not driven into the body to the injury of the lining. When forced water is not attainable, use for the body a large soft sponge. This, when saturated, squeeze over the panels, and by the flowing down of the water, the dirt will soften and harmlessly run off; then finish with a soft, wet chamois leather and an oiled silk handkerchief. The same remarks apply to the underworks and wheels, except that, when the mud is well soaked, a soft mop, free from any hard substance in the head, may be used. Never use a "spoke brush," which, in conjunction with the grit from the road, acts like sand-paper on the varnish, scratching it, and of course effectually removing all gloss. Never allow water to dry itself on the carriage, as it invariably leaves stains. Aprons of all kinds should be frequently unfolded. Enamel leather tops should be first washed with Castile soap and warm water, then oiled with neat's-foot oil; or if sweet oil and a coat of enamel varnish are put on, the leather will look like new. Dashers may be cleaned in the same manner, but varnish color is not very beneficial to patent leather; however, when old and cracked, it may be colored to improve the appearance. Be careful to grease the bearings of the fore-carriage so as to allow it to turn freely. Examine a carriage occasionally, and whenever a bolt or slip appears to be getting loose, tighten it up with a wrench, and always have little repairs done at once. Never draw out or back a carriage into a coach-house with the horses attached, as more accidents occur from this than from any other cause.

TIRES, To Tighten.—Procure a number of small pieces of leather, from 1½ to 2 in. in diameter; with a sharp knife and a compass, or a cutting punch, make round holes in the centre of these pieces, and make a straight cut from the hook to the outer edges of the pieces, so as to form open rings; the holes must be made of a size that will nicely fit the tenons on the out ends of the spokes. Place a fulcrum on the top of the hub, on which place your lever, with the short end under the felloe, near a spoke; have an assistant bear down on the other end sufficiently to raise the felloe, and expose the shoulder and tenon of the spoke; open your leather and fit it nicely around the tenon, holding it to its place while your assistant relaxes the lever and settles the felloe firmly upon the spoke by a blow or two upon the tire. Having repeated the process with a sufficient number of spokes to make the tire all right, trim off the projecting leather even with the surface of the spokes, and your task is done. If the pieces of leather should be spongy, hammer them down before using.

WHEELS, To Prevent Shrinking. — Apply a mixture of petroleum and linseed oil to the felloes with a brush, several times over, where they are dry.

WEATHER INDICATORS.

ANIMAL CREATION. — Rain is sure to come when the cattle snuff the air and gather together in a corner of the field with their heads to leeward, or take shelter in the sheds; when sheep leave their pastures with reluctance; when the goats go to sheltered spots; when asses bray frequently and shake their ears; when dogs lie much about the fireside and appear drowsy; when cats turn their backs to the fire and wash their faces; when pigs cover themselves more than usual in litter; when cocks crow at unusual hours and flap their wings much; when hens chant; when ducks and geese are unusually clamorous; when pigeons wash themselves; when peacocks squall loudly from trees; when the guinea-fowl makes an incessant grating clamor; when sparrows chirp loudly, and clamorously congregate on the ground or in the hedge; when swallows fly low and skim their wings, on account of flies upon which they feed having descended toward the

ground; when the carrion crow croaks solitarily; when wild waterfowl dip and wash unusually; when moles throw up hills more industriously than usual; when toads creep out in numbers; when frogs croak; when bats squeak and enter houses; when singing birds take shelter; when the robin approaches nearest the dwelling of man; when tame swans fly against the wind; when bees leave their hives with caution, and fly short distances; when ants carry their eggs busily; when flies bite severely, and become troublesome in numbers; when earth-worms appear on the surface.

CHEMICAL BAROMETER.—Put a small quantity of finely pulverized alum in a long ½ oz. vial, and fill it with spirits of wine. When the atmosphere is dry and clear, the spirits will be clear as crystal; but on the approach of rain or bad weather, the alum will rise in the centre in the form of a spiral cloud, which is an infallible indication of rain or bad weather.

CLOUDS.—1. The cirrus consists of fibres or curling streaks, which diverge in all directions. It occupies the highest region, and is frequently the first cloud which is seen after a continuance of clear weather. While the cirrus remains nebular in structure and indistinctly defined against the sky, no rain need be expected. Under the low barometer, however, it develops by accretion, becomes smooth and compact in structure and much enlarged in volume. It now sinks lower and becomes more sharply defined against the blue sky. Rain may now be expected, especially if it unite with the cumulus, which is a convex aggregate of watery particles, increasing upwards from a horizontal base, and assuming more or less of a conical figure. If the cirrus, instead of forming the nimbus or rain-cloud, reascends, it dissipates, and no rain may be expected until it lowers again, which generally is in 24 hours.—2. If the clouds are soft, undefined, and feathery, the weather will be fine; if the edges are hard, sharp and definite, it will be foul. Generally speaking, any deep, unusual hues betoken wind and rain, while the more quiet and delicate tints bespeak fair weather.

LUNATIONS OF THE MOON.—The following table and remarks, originally made by Herschel, the astronomer, and approved with some alterations by Dr. Adam Clarke, are the result of many years' close observation, the whole being a due consideration of the attraction of the sun and moon, in their several positions, respecting the earth, and will, by inspection, show the observer what kind of weather will most probably follow the entrance of the moon into any of its quarters. It has seldom been found to fail. 1. The nearer the time of the moon's changes, first quarter, full, or last quarter are to *midnight*, the fairer will the weather be during the seven days following.—2. The space for this calculation occupies from 10 at night till 2 the next morning.—3. The nearer to *mid-day* or *noon* the phases of the moon happen, the more foul or wet weather may be expected during the next 7 days.—4. The space of this calculation occupies from 10 A. M. to 2 P. M. These observations refer principally to the summer, though they affect spring and autumn nearly in the same ratio.

If the new moon, the first quarter, full moon, or last quarter happens

Moon.	Time of Change.	In Summer.	In Winter.
	Between midnight, and 2 in the morning.	Fair.	Hard frost, unless the wind be S. or W.
	Between 2 and 4 morning.	Cold, with frequent showers.	Snow, and stormy.
	Between 4 and 6 morning.	Rain.	Rain.
	Between 6 and 8 morning.	Wind and Rain.	Stormy.
	Between 8 and 10 morning.	Changeable.	Cold rain, if less the wind W.; snow, if E.
	12 morning. At 12 o'clock at noon and at 2 P. M.,	Frequent showers	Cold and high wind.
	Between 2 and 4 P. M.,	Very rainy.	Snow or rain.
	Between 4 and 6 P. M.,	Changeable.	Fair and mild.
	Between 6 and 8 P. M.,	Fair.	Fair.
		Fair if wind N. W.; rainy, if S. or S. W.	Fair and frosty, if wind N. or N. E.; rain or snow, if S. or S. W.
	Between 8 and 10 P. M.,	Rainy, if wind S. or S. W.	Rain or snow, if S. or S. W.
	Between 10 and midnight,	Fair.	Fair and frosty.

PLANTS.—Trees and their branches fall just before a severe storm; the common English bindweed and the English pimpernel, spread their leaves at the end of wet weather, while the different species of clover contract them; the chickweed, at 9 o'clock in the morning, if the weather is clear, straightens its flowers, spreads its leaves, and keeps awake until noon; if, however, there is a prospect of rain, the plant droops and its flowers do not open; if they open a little, the coming rain will be of short duration; the same with *Pimpinella saxafraga*; the marigold opens between 6 and 7 in the morning, and generally keeps awake until 4 in the afternoon; in such cases the weather will be steady; if, on the other hand, it has not opened by 7 o'clock in the morning, you may look that day for rain; the hog thistles indicate fine weather for tomorrow if the head of the blossom closes for the night; rain, if it remains open; again, rain is certain if the *Bladder ketmi* does not open its blossoms; if the stemless thistle closes; if clover and most allied kinds droop their leaves; also, if the nipple-wort does not close its blossoms for the night; if the whitlow grass lets its leaves hang drooping; if *Gallium vernum* swells and exhales strongly; also, if birches scent the air; the crowfoot anemone tells the coming rain by closing its blossoms; while *Anemone mentalsa* carries its flowers erect when the weather is fine, and droop when overcast.

SKY, Color of.—An intensely blue and serene sky indiactes heavy rains and severe storms in from 12 to 48 hours. A gray, hazy sky, indicates continuous dry and generally hot weather. A bright sunset presages fair weather. A bright yellow, in the evening, indicates wind; a pale yellow, wet; a natural gray color constitutes a favorable sign in the evening; an unfavorable one in the morning.

SMOKE.—Dense smoke and haze in the early

morning portend falling weather. If the smoke arises, the weather will be clear; if it falls, the weather will be rainy.

STRAW AND CATGUT.—A simple hygrometer can be made by a piece of catgut and a straw. The catgut, twisted, is put through a hole in a dial, in which a straw is also placed. In dry weather the catgut curls up; in damp, it relaxes, and so the straw is turned either to the one side or the other.

WIND.—Wind veering from N. or W. to S. and S. E., precedes falling weather; if the wind is in S. W. and rain sets in, the rain is of short duration and light yield; as a rule, if the wind touches N. E. or E. for 2 or 3 days, it is a sure indication of rain; an immediate cessation of rain occurs as soon as a N. W. wind sets in; the W. wind brings 3 or 4 clear days.

STOLEN SWEETS ARE SWEETEST.

BEES AND SILKWORMS.

BEE-KEEPING.

ANATOMY AND RACES.

REMARKS ON RACES.—The bee is a resident of any climate of the globe. It will prosper in hollow trees in Canada, where mercury will freeze in the open air, as well as at the equator. The following are the principal varieties or races of bees: *Albinos.* These are a pure, highly bred and distinct race of bees, and surpass all others for gathering honey; as for beauty, they can't be excelled in the world, and they are among the most gentle bees known to mankind. About the eyes they approach nearer a purplo than the Italian. Beginning at the waist, they first have 3 distinct yellow bands, then 3 distinct white bands—the white is pure, the wings are fino and of a bright silvery color. Their shoulders and the under part of the abdomen are very thickly coated with white hair. The queens are large and beautiful. They are a bright reddish yellow and generally havo the white hair as described of the workers. They are very prolific. — *Black* or *Common.* These bees are not really black, but a grayish black. South they are so very light in color as to be taken for a distinct race. — *Cyprian.* Yellow and undoubtedly a variety of the Italian. The Cyprian queen is lively, and of a very light yellow color under its body. This often approaches a straw color. She is ferocious when attacked, and resists vehemently. Her workers are much more hardy than either the Italian or black bee. It is said that in Cyprus she will live for 6 yrs.—*Egyptian.* Broadly banded with yellow, and smaller, more slender and yellow than the Italian. They are supposed to be the ones mentioned in the Scriptures. — *Italian.* These bees have 3 bright rings at the base of the abdomen. They are the best natured of any race of bees. The best color for Italian worker bees is a golden hue. They are superior to the common or black bees, in the prolificness of their queens. Italian hives will be strong in spring and throw off swarms from 1 to 2 weeks before the common bee. The great preventive of the ravages of the moth is to keep the hives strong, and this very prolificness of the Italian queen answers this purpose.

ABDOMEN.—The abdomen of the bee contains the honey-bag, the stomach, the wax-bag, the venom-bag and the sting. The honey-bag is not used for the purposes of digestion; it is a small bag, about the size of a pea, with 2 pouches behind, and is properly only an enlargement of the gullet. This receptacle receives the honey from the probocis; a small passage leads from it to the stomach, which receives and digests the food of the bee. Wax is derived from the saccharine matter consumed by the bee. It is secreted from vessels on the surface of their pouches. After the wax has remained there for a time, it appears externally in scales, 8 in number, below the medial rings of the abdomen, and is removed by the bee itself, or one of its fellows.

EYES.—In front of the head are 2 eyes, which are protected by hairs from any substances that might otherwise injure them, and on the top of the head are three smaller eyes. This visual apparatus renders the bee's power of sight a very extended one. Simple as the tiny instrument seems, it is composed of about 3,500 perfect hexagonal lenses, fitting closely together and disposed in regular rows.

FEELERS.—Two feelers spring from between the front eyes, and curve outwards on each side; these are endowed with a very acute sense of touch, and perform many of the offices of eyes, in the dark recesses of the hive. It is by the assistance of these delicate and highly sensitive organs that these insects form their combs, fill their cells, and feed the young.

LEGS.—The bee has 3 pairs of legs, of which the posterior are the longest, and the anterior the shortest. These are formed and articulated much like the same limbs in man, and are attached to the thorax; at their extremities we find 2 lit-

tle hooks, which appear like sickles or reaping hooks, and have their points opposed to each other. By means of these the insect suspends itself to the top of the hive, or in any other position it may desire.

MOUTH.—The bee's mandibles or jaws, when separated, resemble a pair of toothed pincers; they are composed of the same horny substance as constitutes the rings of the body, and are extremely powerful. Besides these there are a second pair of jaws composed of 2 long-pointed blades, whose thin edges work together after the manner of a pair of scissors. It is with these latter instruments that the bee cuts and molds its wax in its work of cell making. The mouth of the bee is further provided with a tongue of a curious sort. It is capable of protrusion considerably beyond the jaws, and covered along its whole length with regular and symmetrical circlets of fine hairs. From root to tip it is traversed by a tube, through which, in all probability, the nectar is conveyed to the mouth. When the insect is in a state of repose, the whole of this complicated apparatus folds under the head.

STING.—Seen through a microscope of low power, the sting presents the appearance of a tiny thorn, slightly curved and tapering to inscrutable fineness. This, however, is not the actual sting, but the mere scabbard which contains a distinct pair of darts. Seen under a very powerful microscope, the 2 darts are found to bear 8 notches or barbs, which prevent them from being released too quickly from the part attacked. But the puncture made by this complicated set of instruments, is the simplest part of the affair. Situated at the root of the sting there is a little bag filled with an acrid fluid, generally supposed to be formic acid. At the moment when the double dart enters the wound made by the sheath, there is expressed from the poison bag a drop of the fluid which is conducted in a groove to the end of the sheath, and from thence into the wound. When human beings are stung, they can instantaneously obtain relief by pressing upon the point stung with the tube of a key; this will extract the sting, and relieve the pain, and spirits of hartshorn will completely remove it.

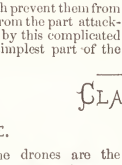
THORAX.—Interiorly the thorax contains the gullet, which traverses its extent on its way into the abomen, where it dilates into, first, the honey-bag, which is furnished with 2 pouches posteriorly, and a muscular apparatus, by which it is enabled to give forth its saccharine contents; and, secondly, into the true stomach, in which digestion goes on, for the nourishment of the insect and the secretion of wax.

WINGS.—Four wings are attached to the superior portion of the thorax, which consist of 2 pairs of unequal size. These wings are hooked together in order that they may act simultaneously, and not only serve to convey the insect from place to place, through the air, but by the humming, buzzing noise their motion produces, to give notice of their departure from, and return to, the hive, as well as possibly to animate their fellows in their mutual labors, and by their fanning motion at the entrance, cool and ventilate the hive.

CLASSES.

DRONE.

CHARACTERISTICS.—The drones are the males, and larger in body than either the queen or the working-bees. Their head is rounder, proboscis shorter, eyes fuller, and they have no sting; they also make more noise in flying, and do no work.



Drone.

COMB.—Drone comb cells are larger than those of the worker. Four inches of drone comb is enough for any hive of bees. By removing it the raising of drones may be prevented to a certain degree, but the bees will always find some little corner in which to raise a few drones. A hive with a young queen builds worker comb almost entirely.

HATCHING.—The drone passes 3 days in the egg, and about 6 in the worm, and changes into a perfect insect on the 24th day after the egg is laid. Much depends upon the strength and heat of the colony, which should be about 70° Fahrenheit for their speedy development. They lie in rather a dilatory state for several days, after they hatch, before taking wing.

LONGEVITY.—The age of the drone depends on the condition of the colony and the supply of honey, but it is something less than the age of the worker. If kept constantly in a queenless hive, they might live for 3 or 4 months. At the end of summer they are expelled from the hive.

QUEEN.

CHARACTERISTICS.—The queen-bee may be recognized by her greater length of body, which is of a blackish color above, and of a yellowish tint beneath. She is sometimes of a larger size than either of the other classes; her abdomen contains 2 ovaries, or receptacles, for eggs, and her sting is of a curved form. She receives the greatest attention and respect from the other bees; none of them appear to be willing to turn their backs upon her, but all are watchful to offer her food and anticipate every want.

Queen.

CHOICE.—Preference should always be given to the dark or orange colored, rather than the bright yellow.

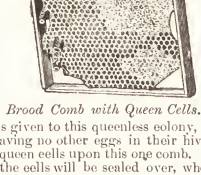
CLIPPING THE WINGS.—The wings of all queens, as soon as they are fertile, may be clipped; but it is an erroneous idea to suppose that clipping the wing of the queen will keep the

bees from swarming. They are just as likely to swarm, but the queen being unable to accompany them, will prevent their leaving for parts unknown. It is only necessary to clip the tip of one front wing; this will prevent her flying, and does not disfigure her. The queen should be handled as little as possible. Take her by the thorax, between the left forefinger and the thumb; raise the point of the wing with the scissors and clip, being careful not to catch her foot, as she is liable to throw her leg up around the wing while held. Never take her by the abdomen, as a slight squeeze is likely to injure her.

FERTILIZATION.—A fertile queen is one that has paired with the drone and is capable of laying eggs that will produce workers, drones, or queens. A queen's fertility lasts from 3 to 5 yrs. In the spring and summer young queens leave the hive to meet the drones for impregnation, usually on the 5th day; in the fall months they very seldom leave until 7 or 8 days old.

FERTILIZATION. Artificial.—A wire cloth dish cover, 10 in. in diameter, is just the thing for a fertilizer. It can be easily fixed by fitting a piece of thin board in the bottom, in which a door, large enough to put in one's hand should be made. Fasten on the inside of the fertilizer a piece of empty drone comb, 3 or 4 in. square; when required for use, fill with honey and water, taking pains not to drop any honey in the fertilizer, or the queen and the drones will become daubed up so as to prevent them from flying. On the morning of the day that a queen is to leave the hive, put her with 4 or 5 drones into the fertilizer. In selecting the drones to be put with young queens, great care should be taken to choose only those that are strong, vigorous, and well marked, and they should be caught as they are about to leave the hive. Having got the queen and the drones in the fertilizer, and everything fixed, lay it over the frames of the hive to which the queen belongs, so that the heat from the hive can get into it. Leave her there 36 or 48 hours. When a dead drone is found, examine it, and if the generative organ is gone, the queen can be released, when she will go down into the hive and begin to lay in a few days, or she can be introduced into a nuclei hive, which can be done in a minute by giving the bees in the nuclei a dose of smoke, where she can be kept until wanted.

HATCHING.—Queen bees and the ordinary worker bees are produced from the same kind of eggs. The difference is, that the workers are reared in small cells and fed sparingly while in the larval state of their growth, which leaves them undeveloped females. The queen is reared in a large cell, produced by uniting several ordinary cells into one, and fed very plentifully with a rich food, called "royal jelly," and the result is a perfectly developed female, capable of laying eggs and becoming the mother of a colony. When a colony is deprived of its queen, the bees proceed at once to repair their loss, by constructing from 3 to 15 or 20 of these queen cells. The first queen that hatches bites into the sides of the remaining cells—the bees often joining with her—and destroys her imprisoned sisters. Knowing these facts, the breeder of queens, when he wishes to rear some, removes both the queen and all the royal brood from some strong colony. Then a comb of eggs from some choice



Brood Comb with Queen Cells.

queen is given to this queenless colony, and the bees, having no other eggs in their hive, build all the queen cells upon this one comb. In 5 or 6 days the cells will be sealed over, when they will, in shape, resemble peanuts projecting from the side of the comb. In about 10 days more, or 16 days from the time the eggs were laid, the queen will hatch; but after the cells are sealed over, all that is required is heat; therefore the apiarist removes the comb upon which are the cells, and brushes off the bees, and hangs it in a lamp nursery. He then gives the colony another comb of eggs, and the bees proceed to build another batch of queen cells.

INTRODUCING.—Queens cannot be introduced to colonies that have been queenless a few hours without caging several days, and sometimes a week may elapse before they can be released with safety. When a colony is deprived of its queen, the bees realize their loss, and at once prepare to repair it. To introduce an Italian queen to a colony of common bees, inclose her in a wire cloth cage and insert the cage in the centre of a comb where the bees will cluster upon it. In 36 hours release the queen, smear her with honey, and allow her to crawl down among the bees.

LAYING.—As soon as the cells are in readiness, intimation of the fact is conveyed to the queen bee, who at once proceeds to lay her eggs. She has 3 sorts of eggs to deposit—worker, drone, and princess eggs, and the cells prepared for the reception of each differ in shape from the other. The worker cells are smaller and neater than the drone cells, and those intended for the reception of royal eggs are more commodious still. She deposits an egg in every cell, and should she, by accident, leave 2 in a cell, the extra one is quickly destroyed by her attendants. The eggs are long, slightly curved, and of a bluish color; when laid, they are covered with a gelatinous matter, which instantly dries, attaching them to the bottom of the cell. The queen bee commences depositing her eggs when 5 days old; during the heat of the season she lays from 150 to 200 eggs per day, and lays with little or no intermission from early spring to the middle of autumn.

LONGEVITY.—Queens are the only bees that live more than one season, and they sometimes live 3 years, and they have been known to exist for 5 years. If a queen survives her second year, it is best to remove her to give place to a younger and more vigorous one.

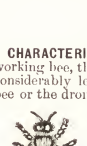
RACES, Changing.—The queen deposits all

the eggs, and it follows that all the bees will be like her. If the queen be taken from a colony of common black bees and an Italian queen placed there in her stead, it follows that all the eggs thereafter laid will produce Italian bees.

REARING QUEENS. — Provide some small boxes on the plan of a simple movable frame hive, with a loose top and rabbeting for the frame; and just sufficient size to accommodate from 3 to 5 of them. When eggs have been deposited in the combs, set up one of the small boxes with them as a miniature hive, and inclose therein from 1 pt. to 1 qt. of bees. They will immediately commence work, and construct queen cells, and the hive may then be opened. In this manner a large number of queens may be had.

WORKER.

CHARACTERISTICS. — The third class is the working bee, the most interesting of all. It is considerably less in size than either the queen bee or the drone; is about ⅓ in. in length; of a blackish-brown color, and covered with closely-set hairs over all the body, which aid in carrying the farina which it gathers from the flowers. The workers are imperfect females. Every worker egg, or grub, not more than a few days old, is capable, by appropriate treatment, of becoming developed into a perfect female, or mother bee.



Worker.

FERTILE WORKERS. — The workers are undeveloped females, but sometimes they may be sufficiently developed to lay eggs. Some account for this by the possibility that the larva may have been adjacent to the queen cell and received some of the pabulum, given so plentifully to the queen. When this occurs it is a great annoyance. Any bee-keeper is liable to be bothered with fertile workers once in a while. As soon as discovered, if in the brood-rearing season, make a small division of a stock that is in good condition, set it close beside the infested colony, with entrances in the same direction. As soon as the division has a fertile queen (one may be introduced at the time of making it) well established and laying, move it to the farthest side of the brood chamber of its hive, at the same time reducing its number of combs to 3 or 4; then proceed gradually to break up the infested colony by going to them at sundown and spraying both stocks liberally with diluted honey or thin sugar syrup, and placing a few of the outside combs with adhering bees of the fertile worker stocks in the side of the hive containing the queen; remove every other evening until all are united; remove the empty hive, and the work is done.

HATCHING. — The bee's egg is a small, colorless speck, and is deposited at the very bottom of its cell. The worker and drone cells are used not only for brood rearing, but also for storing honey and pollen, or bee bread. At the end of 4 days, there emerges from the egg a little dingy-white worm, possessing, as far as the naked eye can observe, no sign of external members; and by this time, the bees, whose duty it is to nurse the little strangers, have poured into each cell a drop of diluted honey, and in this the little maggot lies curled up. When the nurses know that the worm is approaching bee-hood, they plaster over the mouth of its cell and leave it to itself. It then sets about spinning for itself a silken cocoon (the worker in not less than 36 hours), and in this it lies enveloped till the metamorphosis is complete, and becoming a perfect bee, it comes forth from its cell. Its first journey is to the lighting board in front of the hive, that the sun may dry its damp body; while an old bee busies itself to straighten and smooth the hairs that cover its limbs. The time occupied from the deposition of the egg to the final appearance of the worker bee is about 20 days. (See *Hatching* in QUEEN.)

HABITS OF YOUNG WORKERS. — After filling itself with honey, to supply the demands of hunger, the bee goes to work at partially digesting food and feeding the larvæ, not leaving the hive till 6 days old, at which time, if the weather is propitious, the first flight is taken, which happens about 2 o'clock in the afternoon. In taking leave of the hive for the first time, the bee, as it rises on the wing, turns its head toward the hive and commences to describe small circles in the air, each circle increasing in diameter until it is lost from sight. This they do to mark their location, so as to be enabled to return to the exact spot they started from, and so accurately do they do this, that they will return within a few inches of the exact place from which they started, ever after, unless by swarming or long confinement they are compelled to mark their location anew. After the first flight the bee still remains in the hive the most of the time, till it is 16 days old, building the comb (if any is to be built), feeding the young bees, taking the honey from the field bees as they come in with their loads, evaporating the honey and storing it in the cells, and, in short, doing all the duties of the hive. At 16 days old the bee goes into the field to gather honey and pollen, and thereafter rarely ever performs any of the labors belonging to the inside of the hive.

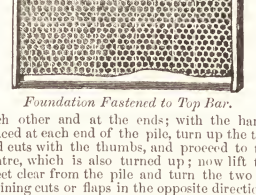
LONGEVITY. — It is difficult to decide how long a worker bee would live, if kept from wearing itself out by the active labors of the field; 6 months, and perhaps 1 year; but the average life during the summer time is not over 3 months, and during the height of the clover bloom, not over 6 or 8 weeks. The matter is easily determined by introducing an Italian queen to a hive of black bees at different periods of the year. If done in May or June, the hive will be composed entirely of Italians in the fall. If the Italian queen is introduced in September, you will find black bees in the hive until the month of May. It is also pretty well established that black bees will live longer than Italians; probably because the latter are more inclined to push out into the fields when the weather is too cool for them to do so with safety; they seldom do this, however, unless a large amount of brood is on hand, and they are suffering for pollen, or unless they are in need of water.

COMB FOUNDATION.

ADVANTAGES.—In olden times the bees were allowed to make the honey and all the comb; but it has been found that the workers consume about 20 lbs. of honey to construct 1 lb. of comb, and that by supplying the bees with an artificial comb foundation, much labor is saved, and a great deal more honey stored. A perfect comb foundation is a sheet of pure wax, put in in such shape as will enable the bees to utilize the greatest amount of wax in the construction of their cells in the least time, of sufficient strength when used in brood frames to retain a perfect shaped cell, and be handled safely in extracting or moving. With broad sheets of foundation, every bee has an opportunity either to draw out the foundation or to bring honey, and the result is surprising. Comb foundation has another and far greater merit than that of saving labor to the bee; it secures a perfectly even, straight comb for each frame. Or, into the large frame there may be set 8 little 1 lb. frames, each with its foundation "starter," and if these are placed in a second hive set on the top of the first, the bees will very rarely rear brood in them, but fill them with clear honey.

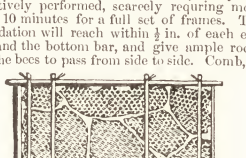
DESCRIPTION.—Comb foundations consist of sheets of beeswax, formed by dipping wooden plates into melted wax; the sheets, thus molded, being removed and rolled through a machine, have inuendations made on both sides that form the foundation of cells. There are many styles and many machines for their manufacture. There are foundations with triangular-shaped cells, with flat-bottomed cells, with high side walls, and with no walls at all; with linen, cotton, wood, paper, tin-foil and woven wire for a base. There are also foundations with fine wires imbedded therein, and frames of foundation with wires pressed therein. A medium heavy sheet, say 4½ or 5 sq. ft. per lb., with a thin base or septum, and heavy, prominent side walls, is most desirable for economy in the use of wax, and rapidity in comb building by the bees.

FASTENING IN.—Use the Langstroth frames, with a V-shaped top bar; the foundation is just as wide as the inside of the frame from the bottom bar to the lower point of the top bar, and is 1 in. shorter than the frame from end to end. When ready to use a set of frames, the foundation is placed on clean paper, evenly piled, with the straightest edge next to the operator; now, with a sharp knife, make 4 incisions or cuts, ½ in. long, down through the foundation to the paper, and at equal distances from



Foundation Fastened to Top Bar.

each other and at the ends; with the hands placed at each end of the pile, turn up the two end cuts with the thumbs, and proceed to the centre, which is also turned up; now lift the sheet clear from the pile and turn the two remaining cuts or flaps in the opposite direction; lay the sheet down with the top edge nearest to you; place the frame with the lower or sharp edge fitting closely to the joints, formed by alternately bending up and down the flaps, and press the foundation to the top bar with the thumbs, drawing to you. When warm, and the wax quite pliable, the work is very easily and effectively performed, scarcely requiring more than 10 minutes for a full set of frames. The foundation will reach within ½ in. of each end bar and the bottom bar, and give ample room for the bees to pass from side to side. Comb, in



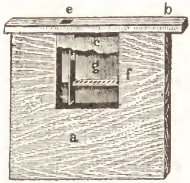
Utilizing Pieces of Comb.

pieces, may be used by a little cutting and fitting, and temporarily fastened with wire, tied top and bottom, until the bees secure it, which they will do in a day or two.

FOOD.

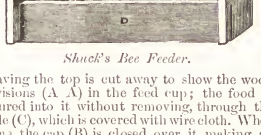
ARTIFICIAL.—The best kind of food that can be given to bees is honey liquefied with a small portion of warm water; but where honey is scarce and dear, an excellent substitute will be found in lump sugar; 3 lbs. of sugar to 1 pt. of water, boiled for 2 or 3 minutes, and then mixed with 1 lb. of honey, will make 5 lbs. of excellent food, which the bees appear to like quite as well as honey alone. Barley sugar is excellent food when honey in the comb cannot be had. A good mode of feeding is to put the honey or syrup into a shallow box; lay on the top of the sweet liquid a thin board with ⅜ in. holes in it, through which the bees can suck the syrup without falling into the mass or becoming clogged by it; place the box in the top of the hive; the bees will soon make it out, and remove the stores to their cells. For feeding inside the hive, the division board feeder may be used to advantage. The top bar of this is 2 in. wide; from the upper central portion, beneath the top bar, a rectangular piece, the size of an oyster can, is

replaced with an oyster can (*g*), after the top of the latter has been removed. A vertical piece of wood (*d*), is fitted into the can, so as to separate a space 1 in. square on one side from the balance of the chamber. This piece reaches within $\frac{1}{8}$ in. of the bottom of the can. In the top bar there is an opening (*e*), just above the smaller space below. In the larger space is a wooden float (*f*), full of holes. On one side, opposite the larger chamber of the can, $\frac{1}{2}$ in. piece of the top (*c*) is cut off, so that the bees



Division Board Bee Feeder.

can pass between the can and top bar on to the float, where they can sip the feed. The feed is turned into the hole in the top bar (*e*), and, without touching a bee, passes down under the vertical strip (*d*), and raises the float (*f*). The can may be tacked to the board at the ends near the top; 2 or 3 tacks through the can into the vertical piece (*d*), will hold the latter firmly in place; or the top bar may press on the vertical piece so that it cannot move. The feeder is placed at the end of the brood chamber. When about to feed, with a teapot pour the feed into the hole in the top bar. Shuck's bee feeder feeds at the entrance any time in the day, without danger from robbers, as the food can be reached only from the inside of the hive; it is placed on the alighting board, with the side (D) nearly covering the entrance. In the en-



Shuck's Bee Feeder.

graving the top is cut away to show the wood divisions (A A) in the feed cup; the food is poured into it without removing, through the hole (C), which is covered with wire cloth. When done, the cap (B) is closed over it, making all tight.

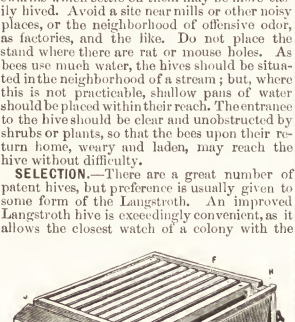
PLANTING FOR FOOD.—As fast as the apiary is increased, plant or scatter self-propagating seed, which will provide good honey-secreting bloom. The following are some of the best plants for bee pasture: *Alsike Clover* is a good honey plant. The bees have no trouble in finding the honey, as the blossoms are short and the head no larger than white clover. It ripens in the latitude of Chicago, in the latter part of July.—*Basswood.* The bees are fond of this, and it produces most excellent honey.—*Box Elder.* A great favorite with bees, and yields a superior honey; it blooms between the basswood and tulip.—*Buckwheat.* The honey from this, though dark and strong, is highly prized for manufacturing and other purposes. It furnishes an excellent winter food for bees, and when well ripened will allow the producer to avail himself of all the white grades of honey stored earlier in the season.—*Catnip.* Can be planted any time and anywhere. Bees work on it early and late, and the honey is excellent.—*Eucalyptus.* A superior and beautiful honey producer.—*Figwort.* Furnishes honey plentifully, but is of slow growth.—*Honey Locust.* The most certain of honey producers. Although the duration of bloom is but limited, it yields a bountiful supply of rich honey, and bees will gather thickly around the highly perfumed blossoms. The time of the year in which it blooms, nearly filling the interval between the late fruit bloom and the white clover, makes it very valuable. It is a most profuse honey bearer, and the honey is of a superior quality. When in the liquid state its color is of a rich pale red; but, in the shape of comb honey, its appearance is little inferior to clover honey. It becomes exceedingly thick if left with the bees till the cells are thoroughly sealed, and its keeping qualities are most excellent.—*Mammoth Mignonette.* Grows and blooms, and yields a rich return of beautiful honey under the most adverse circumstances.—*Motherwort.* An excellent honey plant. Its blossoms make their appearance early in July, and it remains constantly in bloom till frost. It is not a favorite with grazing animals, and may be planted on the roadsides, where stock are allowed to run at large.—*Mustard.* There are several varieties of mustard which furnish honey. The length of season for bloom is quite extended, and where a dearth of honey pasturage prevails, bees will work on them vigorously. They bloom during July and August.—*Sweet Clover* or *Melilot.* One of the hardiest plants and the best honey producer.—*Tulip Tree.* As a producer, it ranks only second to the basswood.—*White Clover.* Honey almost equal to the sweet clover.—*Willows.* There are 2 or 3 varieties of willows, all of which are good honey producers.

WATER.—Bees use a large amount of water in preparing food for their young, and when they themselves are secreting wax. If no water is near the apiary, shallow troughs, with floats in them, should be kept constantly filled with water for their use, and in this way much time and labor may be saved them.

HIVES.

LOCATION.—The east is the most favorable aspect for boxes and hives; this, however, may be modified or varied according to the season. The arrangement of the hives should be in line, or singly, under trees. Never set a hive upon benches close together, as the bees are continually quarreling and interfering with one another. Set the hives within 4 to 6 in. of the ground and have the alighting board to reach down to the ground, so that if a bee happens to fall on the ground, he can run right into the hive. The place for fixing the stand should be on dry soil, and a sandy one is best. It should slope towards the front in order to carry off the surface water produced by occasional rains, and should not, on any account, be exposed to the droppings from the eaves of houses, or even hedges. Shelter is essential, especially behind and on the east of the hives; a house or high wall is the best; it is also recommended that the stand be placed in a sort of small, open shed, well painted on the outside, to protect it from the weather; a few shrubs about the stand are also good as additional shelter. Whatever trees are planted in the immediate vicinity of the hive, should be of low size, with bushy heads, in order that the swarms which settle on them may be more easily hived. Avoid a site near mills or other noisy places, or the neighborhood of offensive odor, as factories, and the like. Do not place the stand where there are rat or mouse holes. As bees use much water, the hives should be situated in the neighborhood of a stream; but, where this is not practicable, shallow pans of water should be placed within their reach. The entrance to the hive should be clear and unobstructed by shrubs or plants, so that the bees upon their return home, weary and laden, may reach the hive without difficulty.

SELECTION.—There are a great number of patent hives, but preference is usually given to some form of the Langstroth. An improved Langstroth hive is exceedingly convenient, as it allows the closest watch of a colony with the



Improved Langstroth Hive.

greatest ease. By turning the thumb screw (L) and opening the movable side (which takes but an instant), the frame can be examined; and by removing the loose side board (M) the bottom board may be cleansed; giving all the advantages of a loose bottom board, without its disadvantages. The new Langstroth hive is peculiarly adapted for the production of comb honey; its honey rack is the best in use, and perfectly adapted to the use of prize boxes. It holds 18 prize boxes, with separators between them. A wedge holds all with a vise-like grip. The outer boxes are glassed as they stand on the hive. By removing the wedge, any box may be instantly removed, examined, returned or replaced by an empty one, the space between the rows readily admitting the fingers for that purpose. The Langstroth hives are made of different sizes to suit those who use them. The standard size is 14x18⅝ in. inside and 10 in. deep with 4 in. portico. The second story is the same as the first, but only 6 in. deep. The frames are 9½x17⅜ in. outside. *Home-made Hive.* The shape of the box should be long from front to rear, 15 in. deep, 12 wide, and 12 high. Inch boards unplaned are the best, and the boards should be well seasoned and carefully put together. The hive should be set in a groove in the bottom board and not be fastened to it. Place 2 or 3 ⅜ in. sticks, crossing each way, in the middle of the hive to support the combs; ¼ in. from the top of the hive fasten slats 4 to 6 in. in width of ⅜ in. stuff, leaving cracks from ¼ to ⅜ in. in width between them. Over the top of the hive place a cover projecting on every side, and fasten the same to the hive by small hooks, which not only gives you a movable top and bottom board, but also a honey board. This will answer for a movable hive.

WINTERING. — For wintering on summer stands, all preparations should be made early enough in the fall to admit of ample feeding in case of a scarcity of stores, as they can not often be fed afterward without great disturbance. Put the hive into a box some 6 in. larger than it; provide a winter passage out from the entrance, and fill with sawdust, forest leaves or chaff; leave the cover off the hive; fill in on top, and then cover the box. In all cases of packing on summer stands, a passage-way should be made through each comb, a little above and back of the centre, or ⅜ in. square sticks laid over the tops of the frames, to afford the bees a passage from comb to comb, to reach their stores without going to the extreme ends of the frames to pass around. In wintering bees in the cellar the first thing to be assured is, that it is sufficiently warm to prevent the freezing of potatoes, etc., and that it is sufficiently ventilated to allow of the escape from it of noxious gases and heat generated by the bees. The bee apartment should be separate, and not so situated as to be subject to constant invasion by individuals or vermin. The covers should be removed from the hives, 1 or 2 thicknesses of woolen or cotton cloth spread over the frames, 2 or 3 in. square sticks laid crosswise of the hive, and the next one set on top and treated the same way, proceeding thus till all are neatly and

carefully piled up. This work should not be done till the fall is so far advanced that the bees will be quite chilled, and exhibit but little activity when slightly disturbed. The work should be done gently, so that the bees will not know they are being moved. When all are piled away, darken every nook and crack, so that should the bees venture to the entrances of the hives, they will think it is night. Every fortnight enter the bee apartment with a dark lantern, and see that all progresses favorably. If the thermometer indicates above 45°, admit cold air at night; if below 40°, partly close the ventilators.

HONEY HARVEST.

TAKING THE PRODUCT.

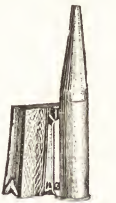
DEFENSE. — The best protector is a veil, made of net or tarlatan, with one side sewed up, and an elastic in the end to be placed over the hat; the veil must be long enough to allow the vest or coat to be put over it. Rubber gloves should be used on the hands.

Bee Veil.

HANDLING.—Nothing is either more offensive or more irritating to bees than the human breath; therefore breathing upon them must at all times be most carefully avoided. Avoid, also, all sudden jars, quick, active motions, and never fight them. It is a part of the nature of bees to gorge themselves with honey when alarmed, and, when in this condition, they rarely if ever sting unless pinched. Use the smoker judiciously, and avoid being stung. Never allow a hive to become infuriated and then left alone; for if a hive gets the better of you once, it is likely to show its temper through the whole season. If a colony proves unmanageable, get up a big smoke, and give them as much as is needed; strike on the side of the hive; it will scare them, but will tame them. In mid-summer, from early morning till 10 A.M., is the best time to handle bees, when many of them are out. They should never be disturbed at night or when the air is damp and chilly, or when it is windy.

REMOVING GLASSES.—At noon, upon a clear fine day, pass either a very thin knife or fine wire between the hive and the glass intended to be taken. If this precaution be neglected, a piece of comb is frequently left projecting from the top of the one left, or the bottom of that taken, which will cause much trouble to the operator. The glass must be lifted very gently, kept in the same position, and placed upon 3 inverted flower pots, or something of the kind, in a shaded place, about 30 or 40 yds. from the hive, and the bees will make their escape in about 10 or 15 minutes. The glass being thus placed, a loud humming noise is first heard, and the bees are then seen to leave it, and in 5 or 6 minutes all, except a few stragglers, that may be brushed out with a feather, will have left it; but should the queen be in the glass, which very rarely happens, quite a different appearance presents itself, no noise will be heard, nor a bee scarcely seen to leave it; but the hive from which it has been taken will in a very short time appear in great confusion. Whenever this occurs, the glass must be returned immediately, and taken off again the next day.

REMOVING HONEY FROM HIVES.—The best time is the month of July. When a part of the honey only is to be taken, the full hive should be inverted, and an empty one placed over it, and the two fastened together by a large sheet or table cloth. The hives being thus arranged, beat the sides gently with a stick, being particular not to strike those parts where the combs are attached. After a few minutes the bees will have ascended into the new hive, and it may then be placed on the pedestal formerly occupied by the old hive. Having extracted the requisite quantity of comb, the hive may be returned to its former position, reversing the hive which contains the bees; and placing the deprived hive over it, they may be left in that position for hours, by which time the bees will be once more in possession of their old habitation. Smoke is often used in removing honey from the hive. With a good smoker, blow some smoke in at the entrance of the hive; after a while open it and take out the frames of honey to be extracted; shake the bees from each frame by one or two sudden jars, brushing the remaining ones off, right over the frames into the hive, or down in front of the entrance, with a large feather or small turkey wing; place empty combs, or a frame furnished with comb foundation, in place of what is taken from the hive. Always cut the comb with a knife ground to a "wire edge"; never hone off the wire edge.



Bee Smoker.

Extracting Knife.

TREATMENT OF THE PRODUCT.

CANDIED HONEY.—Much of the honey received, is candied or granulated and turned to sugar. This may be from adulteration, but

the principal cause is taking the honey from the comb before it is ripe. The bee, having filled the cell with honey, does not directly close it up, but for a time leaves a slight aperture for the action of the air upon the honey, after which the cell is sealed up by the insect. If this interval has been allowed to elapse and the bee has closed the cell, the honey extracted will keep for almost any length of time without crystallization; but if the honey is extracted before the period is complete, solidification is almost certain. Granulated honey can be made liquid by immersing the can in boiling water, but the process has the effect of darkening the honey, and granulation again speedily ensues. A small quantity of cream of tartar, added to the honey, on being put in jars, will prevent granulation.

CLARIFYING HONEY.—1. The honey is mixed with an equal weight of water, and allowed to boil up 5 or 6 times without skimming; it is then removed from the fire, and after being cooled, brought on several strong linen strainers, stretched horizontally and covered with a layer of clean and well-washed sand, 1 in. in depth; the sand is rinsed with a little cold water, and the mixed liquor is finally evaporated to the thickness of syrup. —2. Dissolve the honey in water, as last; clarify with white of an egg, and evaporate to a proper consistence. —3. Dissolve in water; add 1½ lbs. of animal charcoal to every ¼ cwt. of honey; gently simmer for 15 minutes; add a little chalk to saturate the excess of acid, if required; strain or clarify, and evaporate. —4. Honey, 1 cwt.; water, 9 gals.; fresh burnt animal charcoal, 7 lbs.; simmer for 15 minutes; add a little chalk to saturate free acid; strain or clarify, and evaporate as before.

DRAINING HONEY FROM THE COMB.—Place a sieve, either of hair or canvas, over an earthen jar; cut the combs containing the honey into small pieces, and put them into a sieve; let them be cut in a horizontal direction. It is better to slice them at the top and bottom, than in the middle. Crushing, or pressing, should be avoided; for as a portion of brood and bee-bread generally remains in the comb, pressure would force it through the sieve, and the honey would thereby be much injured, both in color as well as flavor. It is very desirable to have 2 sieves, for in every hive there will be 2 kinds of honey—the one, almost colorless and fine flavored, found at the sides of the hive; the other, dark and not so good, stored in the centre. These should always be kept separate. The draining process may occupy, perhaps, 2 days; but the largest quantity, as well as the best quality, will be drained off in 3 or 4 hours. The honey should be put into jars immediately and the jars filled and tied down with bladder; for exposure to the air, even for a few hours, very much deteriorates its flavor.

EXTRACTING HONEY.—Extracted honey is obtained by the use of the extractor, a modern invention which has cheapened honey by saving much of the labor of the bees. The extractor is a contrivance by which a knife is made to shave off a very thin slice from each side of the comb, opening each cell, from which the honey drains out. By this means the comb is available for second use by the bees; all they have to do being slightly to repair it, when it is ready to be again filled with honey.

IMITATION HONEY.—1. 10 lbs. of good brown sugar; 4 lbs. of water; gradually bring it to a boil, skimming it well; when it has become cool, add 2 lbs. of bees' honey, and 8 drops of peppermint. A better article can be made with white sugar instead of common, with 1 lb. less of water and 1 lb. more of honey. —2. To 20 lbs. of coffee sugar, add 6 lbs. of water, 4 oz. cream of tartar, 4 tablespoonfuls of vinegar, the whites of 2 eggs well beaten, 1 lb. of bees' honey, and 20 drops of Lubin's extract of honeysuckle. Place the water and sugar in a kettle, and put it over a fire; when lukewarm, add the cream of tartar, stirring it at the time; then add the egg; when the sugar is melted, put in the honey, and stir well until it comes to a boil; then take it off; let it stand 5 minutes; then strain, adding the extract last; let it stand over night, and it is ready for use. —3. Take 10 lbs. of Havana sugar, 4 lbs. of water; 40 grs. of cream of tartar, 10 drops essence of peppermint, and 3 lbs. of honey. First, dissolve the sugar in the water over a slow fire, and take off the scum arising therefrom; then dissolve the cream of tartar in a little warm water, and add, with some stirring; then add the honey, heated to a boiling point; then add the essence of peppermint; stir for a few moments, and let it stand until cold, when it will be ready for use.

Honey Extractor.

WAX. To Bleach.—Melt yellow wax in a kettle, and then dip out into a long tin vessel that will hold 2 or 3 gals., and which has a row of small holes about the diameter of a knitting-needle, in the bottom. This vessel is fixed over a cylinder of wood, 2 ft. in length and 15 in. in diameter, which is made to revolve like a grindstone, in one end of a trough of water, 2½ ft. in width, 10 to 15 ft. in length, and 1 ft. in depth. As the melted wax falls in small streams on this wet revolving cylinder, it flattens out into a thin ribbon, and floats off toward the other end of the trough of water. It is then dipped out with a skimmer (that may be made of osier twigs), spread on a table with a top made of small willow rods, covered with a clean white cloth, and then exposed in this way to the sun until bleached.

WAX, To Color.—¼ lb. best roll annatto to 1 cwt. wax, depending on the paleness of the latter, is put into a clean boiler with about 1 gal. of water, and boiled till it is perfectly dissolved, when a few ladlefuls of the melted wax are added, and the boiling continued until the wax has taken up all the color, or till the water has mostly evaporated. The portion of wax thus

treated has now a deep orange color, and is added in quantity as required to the remainder of the melted wax in the larger boiler, till the proper shade of color is produced; when cold, observing to mix well the whole, and to cool a little now and then to ascertain when enough has been added. The copper must then be brought to a boil, and treated with vitriol, etc., as before.

WAX, To Refine.—The usual method of refining crude beeswax, is to melt it after adding about 5 per cent. of water to the quantity of wax. When the mixture becomes perfectly liquid, and has boiled for some minutes, oil of vitriol in the proportion of 5 or 6 oz. to every 100 lbs. of wax, is sprinkled over the whole surface of the wax. Great care must be observed during this operation, as the wax froths up, and will run over the sides of the vessel, if not carefully attended to. The wax is then covered over and left to settle until cool enough to mold, when it is gently skimmed off with a hot ladle, care being taken not to disturb the sediment. When no more can be drawn off, the impurities are scraped off from the under sides of the cakes, which are then to be remelted and strained through canvas.

SWARMING.

REMARKS.—A colony of bees that have been well wintered, with a vigorous laying queen, is induced to enlarge the brood, and the workers are enabled to scatter through the hive, which they could not do in cold, unfavorable weather. The hive is soon filled with brood and honey, and young bees begin to hatch. Being provident of the future, the bees construct queen cells. The queen, seeing the sealed queen cells, becomes restless, and on the first beautiful day this restlessness of the queen causes a commotion in the whole colony; the workers, in contemplation of an early removal, fill themselves with honey before making their exit in search of a new home. The queen always goes out with a swarm, and if by accident she becomes lost the bees immediately return to the hive which they had left. The oldest of the bees in the hive are the ones to swarm, because the very young bees are not ready to leave yet. The natural swarming instinct is so strong, that great care and many precautions must be taken to prevent over-swarming. The swarm is led off by the old queen, and her place supplied with a young queen. An old queen will seldom go out with a swarm except about the middle of a fair day. While swarming is by no means to be forced, yet if symptoms of a swarm present themselves early, say in April or May, it may be permitted to take place, provided the parent stock be still sufficiently strong in numbers; otherwise it is highly disadvantageous to the well-being of the hive, as well as to emigrants. The indications preceding a first swarm are the rapid increase in numbers clustering or hanging out, and drones becoming numerous and unusually active. Those of an after-swarm are much more certain, for 9 or 10 days after the departure of the first swarm, a singular noise, called "piping," may be heard in the stock.

ARTIFICIAL.—Artificial swarming may be easily effected by the use of the movable comb hive. As soon as signs of swarming are detected in a hive, a portion of the comb sheets, with queen cells in them, may be removed to a new hive. In the hive where the old queen remains, the queen cells should be destroyed. Let the old hive then be removed a little to one side of its former position, and the new hive placed a little to the other side. When the bees return, not finding the hive in its place, they will divide about equally between the old and new hives. The new hive is called a nucleus colony. After a swarm has been once divided in this way, it can be prevented from swarming again by destroying the queen cells, whenever any indication to swarm is detected.

CATCHING.—A swarm of bees will always settle, if let alone, and then send out scouts. If they are hived before the scouts return, all is right; if not, the spies will lead the swarm off to a new location. When hiving bees, go among them clean and calm; not dirty, and in a state of perspiration, nor flurried and afraid; work coolly, calmly, and slowly; avoid, as much as possible, the killing of any of the bees; it makes the others cross and more apt to sting. Never set a hive over a cluster of bees without stirring them up;

Swarming.

they will cling to whatever they pitch on, even if there be a dozen hives over them, and are just

as likely to fly away as though there was no hive within a mile of them.—1. When the swarm settles, the bees collect themselves in a heap around the queen, hanging to each other by means of their feet. When thus suspended from a tree, hold an empty hive under them, and tap the branch. See that all the bees enter the hive. Every bee may be in except one, and if that one be the queen, you have lost your time and swarm. They should then be confined for about 12 hours. When a swarm divides and settles separately, it is probable there are two queens. One of them must be secured. If a second swarm comes off, as soon as it is hived, secure the queen, and return the swarm to the hive; deprived of its queen, it will usually immediately return of its own accord.—2. When the bees swarm out, place an old hat on a brown stick, and hold in the midst of them, and in a few minutes they will be clustered upon it.—3. A swarm catcher, like the one in the illustration,

Swarm Catcher.

is useful in swarming time; it consists of a bag made of factory, having a handle of cloth on the inside as well as the out—making it reversible. With a long wooden pole it will reach any swarm, and when the bees are emptied in front of the hive, the handle on the outside gives the apiarist control of it, and when turned inside out, a handle is still on the outside, as it has two.

DIVIDING.—It sometimes happens that a swarm divides itself into different clusters, this is a certain sign that there are several queens, each cluster having one. These clusters should not be molested, but quietly watched until they incorporate, which they will presently do. It is a disadvantage to have swarms from different hives unite; but, in case they do, the swarm being collected into one hive, a sheet must be spread on the ground, the hive held over it, and giving it a smart knock the bees will all fall upon it; no fear need be entertained of their flying away, and the queen should be immediately sought. Having detected a queen in the midst of a group, cover it with a small bell glass, and then proceed to divide the bees as nearly as possible into two equal portions. For this purpose two hives must be in readiness, and having allotted a proper number to the queen, who is at large, the hive should be placed in a remote part of the garden, and as far as possible from the parent hive. The imprisoned queen is then set at liberty and conducted to her hive with that proportion of bees which has been assigned to her. The whole being placed in the hive, it is placed, as far as limits will permit, in a contrary direction to the former hive. No further fear need be entertained of their quietly though busily adapting themselves to their homes.

DRONES.—When a stock has too little honey to afford to rear drones until the flowers yield it, they will occasionally swarm before drones appear. The appearance of drones is not a certain indication of swarming. When honey is scarce, the workers take the drones out of the hive and sting them to death; no swarms need be expected at such a time. If it occurs late in the season, they may not swarm, though they may rear drones. A hive that has not reared any drones until the flowers yield honey, is much more likely to swarm than one that has destroyed them once. The queen does not lay drone eggs exclusively at any time, but a number of both drone and worker eggs daily for months in some seasons. Drones do not appear to control the swarming.

HIVING.—Whatever system be adopted, let everything be in readiness for the reception of swarms; watch the swarm in silence, and after it has once collected, lose no time in housing it in a new, clean, and dry hive; and let it be placed where it is to remain, within 10 or 15 minutes after the time of its being hived; it will not be necessary even to wait till the bees, clustered in front or on the sides of the hive, are reunited to their companions inside, as they are never long in being so.

PREVENTING.—Immediately after the issue of the first swarm, open the hives; destroy every royal cell but one. If at the end of 5 days this has not hatched, look over the combs again, and destroy every royal cell that may now appear, excepting the one saved at first. The best way is to make the first swarm an artificial one, before or soon after queen cells are started; then, at the end of 9 days, destroy all cells but one, as above. To prevent first swarms, clip the wing of the queen, and put in front of the hive a shallow box, some 2 ft. square, with edges of tin projecting inward, so that no bee can get out and away from the hive without flying. This will, of course, prevent the escape of the queen, and swarms will return.

PUTTING ON GLASSES.—The best time for putting the bell glass, or small hive, or box, upon a swarm, will be from the 18th to the 21st day after their being hived; and should it be quickly filled, and more room required (which may be known by the crowded state of the bees inside the glass, and by their being seen to cluster at the mouth of the hive at 9 or 10 in the morning), let no time be lost in lifting up the glass, and placing between it and the stock hive a small hive or box with a hole in the top. It is necessary to use this precaution at all times, but more especially in a rainy season, as a greater disposition amongst the bees to swarm then prevails.

UNITING.—When two 2d swarms, or a 2d and 3d, come off on the same day, hive them separately, and leave them till before sunset; then spread a cloth upon the ground, upon which, by a smart and sudden movement, shake all the bees out of one of the hives, and immediately take the other and place it gently over the bees that are heaped together upon the cloth, wedging up one side about ½ in., that the bees outside

may pass under, and they will instantly ascend into it and join those which, not having been disturbed, are quiet in their new abode. Next morning, before sunrise, remove this newly united hive to the place in which it is to remain. Two 2d swarms, or a 2d and 3d, may be joined in the same manner, although one of them may have swarmed some days or even weeks later than the other; taking care, however, not to make the 1st one enter the 2d, but the 2d the 1st. A 3d and a 4th swarm of bees may be joined to them at different times in the same way, till the stock becomes strong.

WORKING CALENDAR.

JANUARY.—Look well to the ventilation of the boxes. Mice are very apt to take up their winter abode inside the hives; hence the necessity of a frequent examination. Combs will grow moldy where a hive has no upward ventilation, but more especially if the swarm is small. It is a cold atmosphere that kills bees and molds comb. The vapor exhaled from the bees settles on the outside of the combs, and after a time finds its way into the cells and lodges in small drops against the septum of the cells, and creates a fungus in a very short time. See that the entrances of the hives are narrowed and that during the time snow remains upon the ground they are wholly closed, so that not a single bee can escape; for the sun shining upon the snow will bring the bees out of their hives, and, settling upon the snow, they are chilled and die; but upon the disappearance of the snow, no time must be lost in unstopping the entrances, and giving the bees full liberty. See that the entrances are clear, and not filled up with dead bees, which, after a long confinement, sometimes happens. Should a very warm spell of weather occur at any time in the winter, the mercury rising to 60°, ventilate the hives thoroughly.

FEBRUARY.—Look to the covers and see that they be all sound, and that no moisture comes upon the tops of the hives. Towards the end of the month, particular attention must be given to keeping the interior of the hives free from damp, which a frequent changing of the floor boards will tend very much to effect. About the 15th clean the hive, and if any of the stock have exhausted their stores, they should be replenished. Let the food be given, if possible, at the top of the hive; if at the bottom, not till after sunset, carefully stopping up the entrance of the hive, and removing the vessel in which the food was given before sunrise the next morning. The chief enemies to guard against at this time are mice and birds; cold, if the floor boards and hives are dry, affects them but little.

MARCH. — Should the hives be found to be at all damp or moldy, take the precaution of raising them a little for a few hours on a dry day. Remove all incumbrances from the mouth of the hive, and make every part thoroughly clean. Supply the bees with fresh water. Make an addition to such hives as are strong and heavy, and remove such combs as are old and discolored. The effects of long confinement and poor food are the causes of dysentery. If bees partake of sour pollen, even in the smallest quantity, they will be affected by it to a greater or lesser extent. The time has now arrived for all careful apiarians to possess themselves of as many hives, glasses, boxes, bee-dresses, etc., as they are likely to require during the coming season; and those who prefer the use of straw hives should never put a swarm into an old hive. Where the population is low, and little or no food in store, the bees are very likely, upon a fine and mild day towards the end of the month, to forsake their hives entirely, and to join themselves to more populous and better stored communities. As a rule, bees should be kept in until they can gather some pollen from the soft maple and willows. Give the bees plenty of water. Look out this month and next for queen wasps, and destroy every one. March and April are the best two months for purchasing stocks, and May for swarms. It is better to obtain them from such a distance only as they can be conveyed by hand.

APRIL.—This is the best time to remove a leaf or two of comb from old hives; select those of very dark color and thickened cells. It is probable that at the end of the month some of the most populous hives may require glasses, but it is best not to add them till the bees have shown evident signs of want of room, for it is desirable that the stock should ascend into the glass immediately. Guide combs being fixed in glasses of every kind that are to be placed either on hives or boxes, the bees are induced thereby to commence working in them sooner than they otherwise would do; and it must always be remembered that simply putting on a glass, a box, or a small hive, will not prevent swarming except the bees commence working in it, which a small piece of comb fixed at the top induces them to do more readily. A very large quantity of food is consumed by the young bees while in the larvæ or maggot state, which draws very heavily on the store of food in the hive. It is therefore necessary to look attentively to all weak stocks, and more especially to swarms of the last year, and let them have a regular supply of food. Moths now begin to make their appearance, and they are, by far, the most dangerous enemies the bees have to contend with. It is the caterpillars of these moths which gnaw and destroy the combs; and they would soon be ruined by these insects, if the bees did not offer the greatest opposition to their ravages. The female moth is distinguished from the male by her bill-like head. She deposits her eggs in and around the warm portions of the hive, which soon hatch worms. The worms feed upon the wax, and work in the centre of the combs edgewise, enveloped in a kind of tubular covering of web, so that it is difficult for the bees to remove them. Strong stocks will generally protect themselves. The best way to keep rid of them, is to attend often to the bees and destroy all the millers and

worms found about the hive or apiary. Place blocks or sticks under the hive, with little troughs cut in them, and turned down upon the bottom board, with frequent openings for the worms to crawl under; these form good hiding-places; remove these every day or two; mash all the worms, and replace the blocks for more.

Bee Moth.

MAY.—Inspect the hives and clean away everything offensive. Weak stocks must still continue to be fed. When the bees are beginning to work in a glass, a cold night generally obliges them to forsake their newly-made combs, and to discontinue their labors, which are seldom resumed till the middle of the next day. To prevent this delay, the space between the glass and the covers should be filled with fine tow or wool, the temperature of the glass being thereby kept up, and the bees enabled to carry on their labors without interruption. Putrid foul-brood is a disease which attacks the young brood of the hive about this time, showing itself fully after the larvæ have been sealed up. It may be known by the viscous, gelatinous and yeast-like appearance of the decomposing brood, the unpleasant odor arising from the hive, and by the sunken covers of the cells. There is no cure for this disease when it has once obtained headway. Destruction of the bees and honey, and thorough purification of the hive, is the only remedy to prevent the spread of the disease. As a means of preventing the disease, feed no fermenting honey; feed no meal, especially when the hive is threatened with disease; destroy carefully every particle of dead and moldering matter; and avoid weakening colonies during the brooding seasons, so that they will not be able properly to maintain the heat necessary for the development of the brood. Premature swarming generally happens early in May. The best plan that can be adopted in these cases is to unite the bees to another stock, if they should not join one of themselves; for, if put into a hive, they generally leave it or die. The cause usually arises from poverty, or the old age of the queen. Should there be a dry May, swarms may be expected at the end of the month, therefore it will be a good policy to have every arrangement for their reception made in good time. Give plenty of ventilation this month. Queen wasps and moths should be killed, and the swallows watched.

JUNE.—The system of management for the present month must be determined by the intentions of the bee-keeper. If box honey is desired, the boxes should now be properly arranged upon the hives. If the extractor is to be used, extra combs should be supplied for this purpose. If increase of swarms is the object, rather than surplus honey, preparations for additional swarms should be made. It will now be time to place glasses or small hives upon such stocks as are not intended to swarm, and it will be well not to do it until the bees show evident signs of want of room. A glass should never be put on without having a piece or two of guide-comb placed at the top, which may easily be effected by first warming the glass, and then attaching the comb to it while in that state. It is not at all unusual at this season to see the bees of some hives, although possessing a good store of honey, quite inactive, carrying in no pollen, and basking in the sun at the edge of the hive, but still giving smart resistance to a robber if he venture to make an entry. This arises from the old age or death of the queen; and if the bees are numerous, will go on in the same manner nearly through the summer. But if the numbers be few, robbers will attack them and little or no resistance will be offered; but frequently the bees themselves will assist in carrying off the store to the pirate's home, where the queenless bees will meet with a ready welcome. The best method to adopt in such a case is to introduce a piece of comb from a strong hive which contains both brood and eggs and queen or queen cell, and they will ultimately do very well. The time for swarms is now near; but in weak stocks it is not very desirable. However, if they come, the best must be made of them. By all means let the new swarm be placed where it is to remain as soon as it is settled in its new hive, which rarely exceeds 10 minutes. This will save the bees much loss of time, as well as numbers of them their lives. Honey stored in June and July is thicker and contains less acid than that stored later in the season, and for this reason is a better winter food than fall honey; hence during these months, full frames of honey should be removed from the hives and put away in a dark, dry and airy room for winter purposes, and their places in the hives be filled with frames full of comb foundation set in the centre of the hive. Now begin to look out for the woodpecker and sparrow, as they are enemies to the bees; the woodpecker draws the honey out of the hive with his long round tongue. Bees are sometimes now troubled with lice. They are small parasitical insects, of a red color, which adhere to the body of the bee, and derive their nourishment from her juices. They are about the size of a grain of mustard-seed, or rather smaller; Morocco tobacco will kill the lice without injuring the bees. Millipedes, or woodlice, sometimes now make their appearance; they are often produced by the stand being made of decayed wood, or the hive being placed too near an old hedge. Let the stand be of new wood, and strew soot on the ground under and about the hive. This will also serve in part as a protection against the attacks of ants. All ants' nests that are found in the neighborhood of a hive should be destroyed.

JULY.—The hives should always be shaded from the hot sun, in such weather as that of the middle of July, and more especially so for swarms of the year. The necessity for returning swarms in some seasons, will be apparent to every one at all acquainted with bee management. The manner of performing the operation will be as follows: As soon as the swarm has left the parent hive, proceed immediately to open the hive and take out the bars, one by one, and cut from each comb every queen cell that is seen upon it, and replace the comb again in the

hive. This operation of removing the royal cells will take about 5 minutes; when done, return the swarm immediately to the hive. The old queen, which led it off, finding, by this process, that there is no royal brood left in the hive to succeed her, will not again attempt to leave it. Persons who have never practiced this method will be surprised to find how easily it is accomplished. In some cases the help of a puff or two of tobacco smoke may be useful, should the few bees left be angry, or the operator feel at all timid. The readiest way of returning the swarm will be to lay a board upon the floor-board of the hive, and parallel with it, upon which, by a smart and sudden movement, shake the swarm, and as nigh to the entrance of the parent hive as can be done conveniently, and with the finger, or piece of wood, guide a few bees to the entrance, and the remainder will follow immediately. Swarming is frequently much later than usual, if May be wet and cold, and the stocks be very weak. It is very probable that 2d and 3d swarms will be coming in July, and should it prove so, we would recommend their being united to late swarms, or 3 or 4 of them being put together.

AUGUST.—It will be quite useless to give additional room to any colony of bees, be they ever so prosperous, after the month of July is ended; for the honey season is fast drawing to a close, and the population of the hives very much upon the decrease, not only from the killing of the drones, but by the death of numbers of the workers. Where 2d and 3d swarms have been hived by themselves, they will generally be found too poor to live through the winter, even with feeding. Late swarms and stocks that are weak, must be closely watched, and if the least appearance of robbing is discovered, the entrance of the hive must be closed, so as to admit but one bee at a time. Weeds or small brush set up before the entrances to hives, will prove considerable of a barrier against robber bees, as they dislike very much to approach the entrance by winding passages. For very bad cases of robbing, a wet cloth hung over the entrance and kept dripping, is generally very effective. Too much heat is always injurious to bees, and they should not be exposed to the sun in sultry weather; it renders them irritable, and exposes the comb to the danger of being melted. Those persons who have been so fortunate as to get their glasses filled with honey, will now be preparing to take them off. Do this with great caution. Weigh the hives, and if it can be satisfactorily proved that they will contain 20 lbs. of honey each when the glasses are removed, all well; but, if not, let the glass or box remain upon the stock hive until the bees have emptied it of its honey; as soon as this is ascertained, let it be removed.

SEPTEMBER.—About the middle of September examine the hives; at all events, do not, whatever may be the aspect of the season, neglect this necessary operation until October. It is now quite time to remove glasses from hives intended for stocks, and to see that each one contains at least 20 lbs. of honey; if not, they had better at once be made up to that weight by feeding. The end of the month will be a good time to examine the pedestals upon which the stocks are placed; for it is not unusual to hear of a stock being destroyed by the pedestal decaying just below the surface of the earth, so that by a strong wind, or anything accidentally going against it, it is broken, and the combs by the fall so misplaced as to render the stock of little or no value.

OCTOBER.—In most northern sections, bees that are to be kept indoors should be placed in winter quarters this month. Those to be wintered out of doors, should be properly packed and protected. A system of wintering, by which one shall have nothing but good strong stocks in the spring, will go further in insuring a profitable season than anything else connected with bee-keeping. Defending them effectually from wet, is of first importance. Narrowing the entrances, to prevent the ingress of mice, is also necessary, as well as their destruction in the neighborhood of the apiary. Having done this, and taken effectual means for keeping the hive free from damp, very little fear need be entertained of their being safely carried through the winter without any further attention beyond that of occasionally cleaning the floor-boards and shutting up the hive while snow lies upon the ground.

NOVEMBER.—Remove the top story of the hive; take off all surplus honey boxes; place the lids on the brood chambers, and they are read to wheel into winter quarters as soon as the proper time comes, which varies with latitude, but in Central Illinois is, as a rule, about the middle of November. Select a nice cool day or evening, about the middle of November, soon after the bees have had a good purifying flight. Close up the entrances of the hives, and place as many as is desired into the repository, and stack the hives one upon another as high as you can lift them, always being very careful as you stack them up to raise each lid 1 in. above the hive all around, by slipping under the lid a suitable number of $\frac{1}{4}$ in. pieces prepared for the purpose. Avoid placing the hives against the walls of the building, as this might produce a concussion among the bees from an outside jar of the building. Look into the hives as they begin to stay indoors. If there is not enough honey to carry the colony through the winter, give it a frame of honey from another hive, or, in case all are found to be short, feed a little syrup every warm day. In hives of wood, it is necessary, during the winter months, to withdraw one of the slides at the top of the hive, and place over the opening a feeder or small glass for the purpose of carrying off the condensed vapor, which would otherwise run down the sides of the hive, and cause dampness and moldiness to the combs, and sometimes the entire destruction of the stock.

DECEMBER.—The population of the hives will now be found to be very much reduced; but alarm for their safety on that account need not be entertained. Stocks will require but little attention during this month beyond cleaning the floor-boards, and seeing that there is neither damp nor mold in the hives; and if the

floor-boards are observed to be quite dry, it will be a pretty sure indication that all is right within. During this month bees should not be interrupted, unless there come a warm day. All hives should have the brood chambers contracted to just what combs the bees can cover, and a good quilt or piece of carpet placed just above the combs with some absorbing material on it. Have the hive covers well secured, so that the wind may not blow them off, and place a few boards over the hives, to keep off the snow and rain. The west and north winds should not strike the hives.

SILK CULTURE.

BREEDS.

REMARKS. — Domestication has produced numerous varieties of the silkworm, every different climate into which it has been carried having produced some changes in the quality of the silk, or the shape or color of the cocoons, or altered the habits of the worm. The wild silkworm is much more prolific than the domesticated. The latter has almost lost its generative power, reproducing only once a year. The wild species is therefore of much greater value than the domesticated, for breeding purposes.

ATTACUS ATLAS.—The larva, when hatched, is black, with long, white soft spines. In the subsequent stages the larva appears almost entirely white; this is due to a white powder, which covers not only the tubercles, but the greater part of the body. In the 2d and 3d stages, the color seems orange on the parts of the body from which no farina is secreted.

ATTACUS AUROTA. — Found in Brazil and equatorial America. Various names are given to different races of *Aurota*, as if they were distinct species. *Attacus speculifer*, found in Brazil, is so much like the true type *Aurota*, that it seems but a variety, if it be even a variety. The male moth of the *Aurota* is blotched all over with reddish brown; the female is pale green. In French Guiana they have 6 generations every year.

ATTACUS CYNTHIA. — The larva of *Attacus cynthia* (ailantus silkworm) is covered, but not so thickly, with a white farina, in its last stages. On removing the powder, the skin of the larvæ is green. There are 6 rows of spines on the larva, the 2 rows on the top of the back being the longest; the 2 lateral rows are very small and almost filiform. The farina on the 4 top spines is so thick that they look as if covered with hoar frost. In the 5th stage the larva seems of a yellowish green, the tips of the spines blue; the anal segment is blue, with small black spots, and has on each side an orange red ring.

ATTACUS PERNYI.—This most valuable oak silkworm, now thoroughly acclimatized in Spain, where it is double-brooded, has been reared in the United States. Worms, which had left oak trees, the foliage of which had become dry and tough in consequence of the heat, have been found feeding on hawthorn bushes growing close to the oak trees. Other *Pernyi* larvæ were found on apple trees in a garden, where they reached an enormous size.

BOMBYX CYNTHIA.—A new variety of the silkworm introduced into Europe from the East Indies and naturalized in Malta. They will thrive upon the leaves of the castor oil plant, lettuce, wild endive, weeping willow, etc. It reproduces itself several times in the course of a year. The cocoon, not being entirely closed, the chrysalis may emerge from its cell without injuring the value of the cocoon. The aperture is covered in a very novel manner. On the side from which the moth issues, the cocoon is terminated in the form of a cone, formed by the convergence of a crown of stiff, continuous threads, running in such a manner as to prolong that part of the cocoon, and render the entrance impassable from the outside, while it is easily traversed by the imprisoned grub, which, as it is transformed, pushes its way out, by stretching the elastic sides of this cone. The stiff threads constituting the cone-shaped appendages of the cocoon, are glued, doubled, and folded on each other in such a manner as to retain their primitive integrity after the hatching of the moth.

GATURNIA CLEANOTHA. — This variety was recently discovered in California. It is of the same species as the Chinese silkworm, but superior. Silk of excellent quality has been produced from it.

PROMETHEA.—This worm is very closely allied to the *Cynthia*, and is spared by the sparrows.

SAMIA CLEANOTHI.—A native of California. The ground color of the wings is of a uniform reddish brown; the bands and markings are pure white. The cocoon has the open end very pointed and pear-shaped; its color is iron-gray. The inside cocoon is brown and small compared to the outside envelop. The moths emerge from the 3d of April to the 18th of July.

SAMIA GLOVERI.—This fine species has only been found in Utah and Arizona. The cocoons were collected in plantations of a species of willow with small, narrow leaves. The cocoon is of a silvery gray outside; the rough envelop adheres to the cocoon inside, which is of a very dark brown. The *Gloveri* moths emerge from the middle of April to the middle of July.

TELEA POLYPHEMUS.—This silkworm produces a closed cocoon, a little smaller than that of *Pernyi*, and is the best of the silk producers of the United States. The silk is white, very fine, and of a superior quality. It is double-brooded in Alabama and in the Southern States; in the Northern States it is single-brooded.

CARE AND MANAGEMENT.

THE silkworm exists in 4 stages: Egg; larva or caterpillar; chrysalis; and adult, imago or moth.

EGG STAGE.

CHARACTERISTICS. — The eggs are laid by the moth, and are numerous, about the size of a pin's head, and are not attached together. The color, when first deposited, is yellow, and this color they retain if unimpregnated. If impregnated, they soon acquire a gray, slate, lilac, violet, or even dark green hue, according to variety or breed. They also become indented. When diseased, they assume a still darker and dull tint. With some varieties they are fastened to the substance upon which they are deposited by a gummy secretion of the moth produced in the act of ovipositing. As the hatching point approaches, the egg becomes lighter in color, which is due to the fact that the fluid contents become concentrated into the centre, forming the worm, leaving an intervening space between it and the shell, which is semi-transparent.

HATCHING.—The eggs are laid at the end of summer, and hatched at the beginning of the next summer. When the buds of the mulberry begin to burst, remove the eggs from the ice, and put in a cool place for 2 or 3 days, so that they may be brought gradually to the temperature of the air. As soon as the mulberry leaves have begun to open, spread the eggs on clean white paper; 1 oz. will require 1 sq. ft. of surface. The temperature should be about 70°, and may gradually increase about 1° or 2° a day to 75° or 80°. They will hatch usually in 5 days, but the higher the temperature the sooner the hatching. The worms hatch out in the morning for 3 or 4 successive days. Those who wish to rear worms in June, can rub the new eggs with a whisk broom for about 10 minutes, or until a shiny appearance has been produced; then, if the weather is warm, they will hatch themselves; otherwise, they require artificial heat: 1 oz. of the eggs will produce about 40,000 worms.

PRESERVATION.—The eggs are best preserved on the cloth where originally deposited, as they are protected by a natural coating of varnish, and, being fastened, the worms, when hatching, eat their way out better. For commercial purposes, they are usually detached during the winter by immersing the cloth containing them in cool soft water for a few moments; the moisture is drained off by means of blotting paper, and the eggs gently removed with a paper knife; they are then washed in soft water, thoroughly dried, and put away for safe keeping. The eggs are usually kept at the temperature of ice until hatching time. The Japanese producers sell their eggs on cards or cartoons made of coarse silk. The cards are placed in wooden frames, the rims of which are varnished, so that the moths, disliking the varnish, are made to confine their eggs upon the cards, which are consequently covered in a very regular and uniform manner, as is desirable.

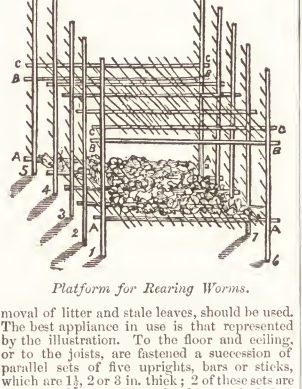
WINTERING.—There is little danger of premature hatching until December, but from that time on the eggs should be kept in a cool, dry room, in tin boxes, to prevent the ravages of rats and mice. They are most safely stored in a dry cellar, where the temperature rarely sinks below the freezing point, and they should be occasionally looked at to make sure that they are not affected by mold. If at any time mold be perceived upon them, it should be at once rubbed or brushed off and the atmosphere made drier. If the tin boxes be perforated on two sides, and the perforations covered with fine wire gauze, the chances of injury will be lessened. The eggs may also be tied up in small bags and hung to the ceiling of the cold room. The string of the bag should be passed through a bottle neck, or a piece of tin, to prevent injury from rats and mice. The temperature should never be allowed to rise above 40° F., but may be allowed to sink below freezing point without injury. Indeed, eggs sent from one country to another, are usually packed in ice. They should be kept at a low temperature until the mulberry leaves are well started in the spring, and great care must be taken as the weather grows warmer to prevent hatching before their food is ready for them, since both the mulberry and osage orange are rather late in leafing out.

CATERPILLAR STAGE.

COLOR. — The color of the newly-hatched worm is black or dark gray, covered with long, stiff hairs, which spring from pale colored tubercles. Different shades of dark gray will, however, be found among worms hatching from the same batch of eggs. The hairs and tubercles are not noticeable after the first molt, and the worm gradually gets lighter, until, in the last stage, it is of a cream white color. It never becomes entirely smooth, as there are short hairs along the sides, and very minute ones, not noticeable with the unaided eye, all over the body. While feeding, the worm is of a light green color, and soft as velvet to the touch.

COCOONERY.—Any sort of a house or room may be used for hatching and raising silkworms provided it is well lighted, well aired, and can be kept tolerably uniform in temperature: fire will be needed on cool nights and rainy days. Direct sunshine should be excluded, which may be done by window blinds on the sunny sides of the room. For a small crop, a room on the north side of the house is best. Ventilation should be secured from the upper part of the room, to avoid direct draughts upon the worms. A close, hot air is injurious, and any sudden or great change of temperature. Cleanliness is very important. Rats and ants must be excluded, as they are very fond of the larvæ. The odors of smoke and tobacco are fatal. Both the room and the apparatus should be arranged to secure as nearly as possible the same condition which the worm finds on the tree. A frame or plat-

form which will allow the free circulation of air from below and on all sides, and the ready re-



Platform for Rearing Worms.

moval of litter and stale leaves, should be used. The best appliance in use is that represented by the illustration. To the floor and ceiling, or to the joists, are fastened a succession of parallel sets of five uprights, bars or sticks, which are 1½, 2 or 3 in. thick; 2 of these sets are represented as touching the floor at 1, 2, 3, 4, 5, and 6, 7, etc. The uprights are about 1 ft. apart in the sets, and the sets running the length of the room, about 5 ft. apart, and the whole should be not less than 2 ft. from the wall. The uprights have sloping pins or nails driven into them 4½ or 5 in. apart. On these, as at A, A, A, A, and C, C, C, C, are laid a series of 5 bars or sticks, and across these little rods or straight twigs; the first of these platforms may be 5 or 6 in. from the floor, and the next (C, C, C, C,) say 2 or 3 ft. above that, and so on, as high as one chooses to go; but 2 are as many as can be easily managed without steps. On these platforms are placed the papers or frames containing the young worms, up to the 3d or 4th age, and after that the twigs or small branches of mulberry leaves with the worms. All the timber of both room and apparatus must be seasoned. The papers containing the young worms may be laid on these platforms directly, but it is perhaps better to use frames like that represented in the illustration. The bars (A, A, and B, B,) are ¾ in. thick; the cross slats, or laths (*a*, *b*,) are ½ in thick, 1 in. or less wide, and 1 in. apart. It is better to make these frames 2½ ft. by 5, so that 2 of them will occupy, crosswise, 1 platform. The only additional apparatus

Frame.

needed is perforated paper and netting (mosquito or other) about the size of the frames, for the younger stages of the worms. The paper should have sufficient strength and stiffness, so that it can be lifted with the worms on it without huddling them. A good quality of merchants' wrapping paper will do.

FEEDING.—The worms should be fed as soon as hatched and removed, by sprinkling young and tender leaves over the tray. Repeat the feeding every 2 hours during the first age, and afterwards every 3 or 4 hours. Give the first feed at 5 o'clock in the morning, and the last at 10 or 11 at night. Before each feeding, spread a net or paper over the worm and place the leaves on it. About every 2 days lift the net with the worms to a new frame and remove the litter. The space must be increased as the worms grow, so as to avoid crowding. They will need double space the second day. To accomplish this in feeding, when about ⅓ the worms have come through the net or paper, remove and place a second paper with leaves for the remainder; in the same way the space may be trebled by removing ⅓ at a time. The leaves should be spread evenly so that the worms may get the same amount of food and keep together in their growth, as it is important to have them molt together. The leaves must be fed fresh and dry, never wet or wilted. Gather the leaves in the evening for the next morning's meal, and, when rain threatens, gather a day ahead, and keep in an airy, cool place, stirring occasionally to prevent heating and fermentation, which will ruin them. When food is scarce, lower the temperature of the room and the worms will eat less. For young worms, gather only the small leaves. After the second age, small twigs or branches may be cut with the leaves. Cut up the mulberry leaves on a chopping-board; they can not be chopped too fine, because the more the leaf is chopped, the more fresh-cut edges there are to which the young insects fasten themselves. In this manner, a few oz. of leaves will present so many edges and sides that 100,000 insects may feed in a very small space. In this state they bite the leaf quickly, and it is consumed before it becomes withered. It is better to keep the silkworm a day without food than to give it wet. If gathered wet, the leaves should be spread on the floor, and afterwards dried, by a few lbs. being shaken at a time in a sheet, which speedily absorbs all moisture. If the weather is very warm, feed lighter and oftener. If the worms do not eat all their feed, give them less at a time.

FOOD.—The *Chincapin oak*, growing in the California mountains, will feed the wild Chinese silkworm; some of the other kinds of oak, that grow upon the coast, can be utilized for food.—*Lettuce.* The silkworm will eat lettuce leaves, if given before it has tasted those of the mulberry.—*Mulberry.* There are 11 varieties of the *Morus alba*, or white mulberry. Among them are the *Morus multicaulus*, *Morus tartarica*, *Morus maretta*, *Morus japonica*, English white, and others. The *Morus tartarica*, from Russia, where it has long been grown and used for silk, is one of the favorites. It produces a red-

dish-white fruit of inferior quality, and is easily propagated. It flourishes best in light sandy or gravelly soils. One full grown tree will yield from 200 to 300 lbs. of leaves; 200 trees may be planted on 1 acre of land. In 3 years they will yield, under fair conditions of soil and cultivation, 10 to 12 lbs. of leaves each, or more than 2,000 lbs. per acre; 1,800 lbs. suffice for 1 oz. of eggs, and will produce 100 to 120 lbs. of cocoons. At 7 or 8 years the yield will be 10 fold.— *Osage Orange.* This affords a good substitute for the mulberry, and will make excellent cocoons. Those who use this plant as silkworm food, must bear in mind that the shoots from a hedgerow become very vigorous and succulent by the time the worms are in the last age. These more milky and succulent terminal leaves should be thrown aside and not used, as they are apt to induce flaccidity and disease. In avoiding these more tender leaves, and using only the older and firmer ones, especially when the worms are large, consists the whole secret of the successful rearing of silkworms on this plant; and if care be had in this respect there will be no appreciable difference in the silk crop from osage orange as compared with that from mulberry.

LONGEVITY. — The time of the silkworm's life in the caterpillar stage is generally from 6 to 8 weeks; about 5 days are occupied in the spinning of the cocoon; about 2 or 3 weeks elapse before the perfect insect or moth comes forth. The life of the caterpillar is commonly divided into 5 "ages," these ages being defined by the same number of "molts."

MOLTING.—The 1st age of the caterpillar extends from the 1st to the 6th day, or to the end of the 1st molt. The 2d age extends from the 6th to the 10th day, or to the end of the 2d molt. The 3d age extends from the 10th to the 16th day, or to the end of the 3d molt. The 4th age extends from the 16th day to the 23d, or to the end of the 4th molt. The 5th age extends from the 22d to the 28d day, or to the end of the 5th molt. When the time for their sleep approaches, the worms lose appetite and raise their heads with a waving motion. When any of the worms are seen in this state, give a light fresh feed to hurry up the tardy ones. During their torper they eat nothing. As soon as their skin is shed their activity and appetite return. This process is usually over in about 30 hours. No food should be given until about all of the batch are through the molt and ready to make an even start; or if the last are much delayed, give a light feed to the first, and feed the last more copiously, and keep them warmer for a day or so, that they may overtake the first. This rule need not be observed after the 4th molt. After molting, the space will generally need to be doubled. The worms usually pass through the 1st molt without difficulty. The 2d and 3d casting of the skin takes place with but little more difficulty than the 1st; but the 4th is more laborious, and the worms not only take more time in undergoing it, but often perish in the act. At this molt it is perhaps better to give the more forward individuals a light feed as soon as they have completed the change, inasmuch as it is the last molt and but little is to be gained by the retardation, and it is important to feed them all that they will eat, since much of the nutriment given during the last age goes for the elaboration of the silk. At each successive molt the color of the worm has been gradually whitening, until it is now of a decided cream color. Some breeds, however, remain dark, and occasionally there is an individual with zebra-like markings. During the last few days the worms require the greatest care and attention. All excrement and litter must be often removed, and the sickly and diseased ones watched for and removed from the rest. The quantity of leaves which they devour in this 5th age is something enormous, and the feeding will keep the attendant busily employed. Summed up, the requisites to successful silkworm raising are: 1st. Uniformity of age in the individuals of the same tray, so as to insure their molting simultaneously; 2d. No intermission in the supply of fresh food, except during the molting periods; 3d. Plenty of room, so that the worms may not too closely crowd each other; 4th. Fresh air and as uniform temperature as possible; 5th. Cleanliness; the last 3 are particularly necessary during the 4th and 5th ages.

MUSCARDINE.—A worm about to die of this disease becomes languid, and the pulsations of the dorsal vessel, or heart, become insensible. It suddenly dies, and in a few hours becomes stiff, rigid and discolored; and, finally, in about a day, a white powder or efflorescence manifests itself, and soon entirely covers the body, developing most rapidly in a warm, humid atmosphere. No outward sign indicates the first stage of the disease, and though it attacks worms of all ages, it is by far the most fatal in the 5th or last age, just before the transformation.

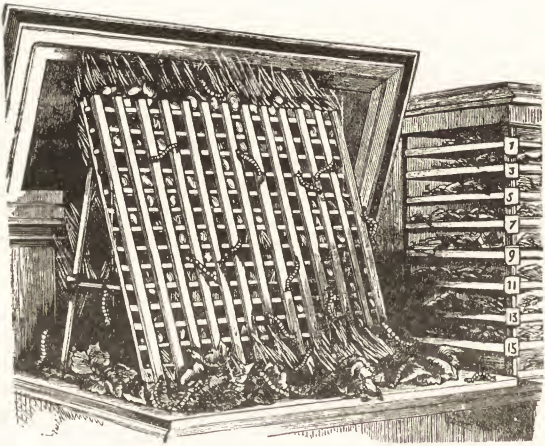
PESTS.—Silkworms are subject to many casualties, besides suffering severely from want of cleanliness, cold apartments, moisture and tempests. Large numbers are every year killed by the operation of some or all of these causes; but more disastrous than any other is the effect of thunder. The most beautiful worms which have passed safely through all their molting seasons, are frequently killed by the operation of electricity. Red ants are great enemies of the silkworm, as also spiders, mice and rats.

SPINNING.—With 8 or 10 days of busy feeding, after the last molt, the worms will begin to lose appetite, shrink in size, become restless, and throw out silk, and the arches for the spinning of the cocoons must now be prepared. These can be made of twigs of different trees, 2 or 3 ft. long, set up upon the shelves over the worms, and made to interlock in the form of an arch above them. Interlace these twigs with broom corn, hemlock, or other well-dried brush. The feet of each arch should be only about 1 ft. apart. The temperature of the room should now be kept above 80°, as the silk does not flow so freely in a cool atmosphere. The worms will immediately mount into the branches and commence to spin their cocoons. They will not all mount at the same time, and those which are more tardy should be fed often, but in small

quantities at a time, in order to economize the leaves, as almost every moment some will quit and mount. There will always be a few which altogether fail to mount, and prefer to spin in their trays. It is best, therefore, after the bulk have mounted, to remove the trays and lay brush carefully over them. The fact that the worms already mounted, make a final discharge of soft and semi-fluid excrement before beginning to spin, makes this separation necessary; as otherwise the cocoons of the lower ones would be badly soiled. As the worms begin to spin, they should be carefully watched to guard against 2 or 3 of them making what is called a double or triple cocoon, which would be unfit for reeling purposes. Whenever one worm is about to spin up too near another, it should be carefully removed to another part of the arch. In 2 or 3 days the spinning will have been completed. The cocoon, when finished, is much shorter than the body, which, being bent, is completely inclosed in it. The cocoon is about the size of a pigeon's egg, 1 to 1½ in. long, and of a bright yellow color.

neither heat nor cold hurts them, but want of air will smother them at once.

Spinning a Cocoon.



A Cocoonry.

VENTILATION.— The worm needs pure air, and must have an abundance of it; therefore, if the weather is at from 75° to 80°, keep the windows and doors wide open, avoiding strong draughts, as they will give the worms cold, and surely kill them. During the month of May

Chrysalis Stage.

CHRYSALIS.—The chrysalis is a brown, oval body, which is inclosed in a bright yellow cocoon; it is considerably less in size than the full-

Chrysalis.

grown worm. In the external integument may be traced folds corresponding with the abdominal rings, the wings folded over the breast, the antennæ, and the eyes of the inclosed insect—the future moth. At the posterior end of the chrysalis, pushed closely up the wall of the cocoon, is the last larval skin, compressed into a dry wad of wrinkled integument.

COCOON.—The cocoon consists of an outer covering of loose silk, known as floss, which is used for carding, and is spun by the worm in first getting its bearings. The amount of this loose silk varies in different breeds. The inner cocoon is tough, strong and compact, composed of a firm, continuous thread, which is, however, not wound in concentric circles, as might be supposed, but irregularly, in short figure of 8 loops, first in one place and then in another, so that in reeling, several yards of silk may be taken off without the cocoon turning round. In form the cocoon is usually oval, and in color yellowish, but in both these features it varies

Cocoons.

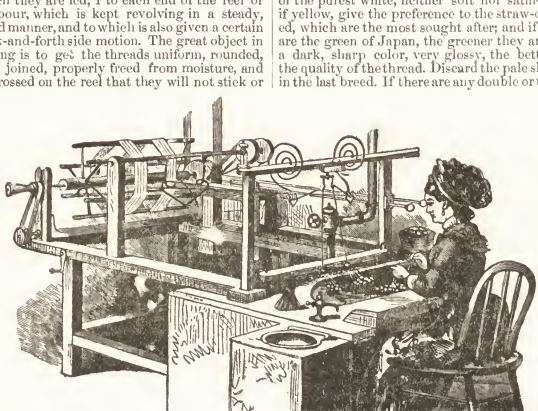
greatly, being either pure silvery white, cream or carneous, green, and even roseate, and very often constricted in the middle. It has always been considered possible to distinguish the sex of the contained insect from the general shape of the cocoon, those containing males being slender, depressed in the middle, and pointed at both ends, while the female cocoons are of a larger size and rounded form, and resemble in shape a hen's egg, with equal ends. Eight days from the time the spinning commenced, it will be time to gather the cocoons. The arches should be carefully taken apart, and the spotted or stained cocoons first removed and laid aside. Care should be taken not to stain the clean ones with the black fluids of such worms as may have died and become putrid, for there are always a few of these in every cocoonry. The hardest, brightest and most substantial cocoons are saved for seed, strung on threads by means of a long needle, so passed through them as not to injure the occupant, and hung up in a moderately warm position. Both male and female cocoons are kept.

CHOKING THE CHRYSALIS. — When the cocoons are intended for reeling purposes, the chrysalis should be killed before it is time for it to burst the shell and come forth as a moth; for by so doing the thread is cut and the silk injured for the reel. There are several methods of killing or choking the chrysalis, which are as follows: *Dry Heat Method.* The cocoons are placed in shallow baskets, and slipped on iron drawers into an oven, which is kept heated to a temperature of about 200° F. This should not be increased for fear of burning the silk. This operation lasts from 2 to 24 hours. A certain humming noise continues so long as there is any life, and its cessation is is an indication that the chrysalides are all dead. Where the choking is well done, there is little loss, only about 1 per cent. of the cocoons bursting at the ends. After choking in this manner, the cocoons should be strewn upon long wooden shelves in the shade, with plenty of air, and, for the first few days, frequently stirred. After remaining on these shelves for about 2 months, with occasional stirrings, the chrysalides become quite dry, and the cocoons will preserve indefinitely. Choking may also usually be effected by exposing the cocoons to the hot sunshine, from 9 o'clock till 4, for 2 or 3 days. A longer time is needed if there is much air stirring, or the sunshine is not strong. And the process is surer if conducted in a shallow box under glass, with a crevice for the escape of moisture. In either case guard against ants. The stifling should be attended to as soon as the cocoons are gathered, lest cloudy weather intervene. In this case the result may be reached by packing the cocoons in a barrel, carefully lined with paper, so as to be nearly air-tight, with alternate sprinklings of camphor, roughly granulated with the hand, beginning with camphor on the bottom, then 3 or 4 in. of cocoons; again camphor, and so on, finally closing the barrel for 2 or 3 days; using about 1 lb. of camphor to the barrel. After 3 or 4 days, spread the cocoons on boards or shelves to dry, in an airy room or attic, stirring frequently the first 2 or 3 days, and afterwards occasionally for about 2 months, when they will be thoroughly dry, and may be packed for market. Guard must be kept against rats and mice, ants and smaller insects, which will penetrate the chrysalides and injure the silk. The latter may be expelled by a sprinkling of camphor or other insectifuge drugs, or by the bark of sassafras root, or chips of red cedar, tobacco stems, etc.—*Steam Method.* This is a much quicker process than the dry heat method. The cocoons should be put into a bag of coarse flannel, or a basket, and steamed for $\frac{1}{2}$ hour over boiling water, exactly in the same manner as potatoes are steamed. When sufficiently steamed, they should be spread on a cloth on the same frames upon which the worms have been fed; these being net-work, the air passes through and dries the cocoons; they should be turned and moved occasionally to prevent fermentation, and should not be heaped upon one another above 2 in. deep. — *Vacuum Box Method.* In the colder climates it has been suggested that the chrysalides could be well choked, with no injury to the cocoons, by placing them in a vacuum box and exhausting the air. Chloroform has also been used to a certain extent.

LONGEVITY.—The chrysalis state continues from 2 to 3 weeks, when the skin bursts and the moth emerges.

REELING.—The cocoons are plunged into water, when it is near the boiling point, and

moved about so that the gum which fastens the threads becomes uniformly and thoroughly softened. They are then beaten with a small birch-en broom, having the tips split, so that the loose threads readily fasten to them. After beating a short time, the operator gets all the cocoons fastened, and, taking the bundle of threads, shakes the cocoons till each hangs but by a single one. She now takes up 5 or more threads, according to the quality of silk wanted, unites them, and introduces the combined staple or strand into a little glass eye on one side of the basin. She then forms a 2d similar strand, and introduces it into a 2d eye on the other side. The strands are then brought together, twisted several times, separated above the twist, and introduced into 2 other glass eyes or ringlets through which they are led, 1 to each end of the reel or tambour, which is kept revolving in a steady, rapid manner, and to which is also given a certain back-and-forth side motion. The great object in reeling is to get the threads uniform, rounded, well joined, properly freed from moisture, and so crossed on the reel that they will not stick or



Reeling the Silk.

glaze, as it is termed. These objects are attained by the twisting and the to-and-fro lateral movement of the reel, as also by properly regulating the distance between reel and basin. The uniformity of the thread depends on the skill of the operator, who must supply a new thread as soon as one begins to give out. This is called nourishing the silk, and is done by dexterously casting with the thumb the new thread upon the combined strand, to which it immediately adheres. In this she must use much judgment, for the silk of a cocoon gradually gets lighter and finer as it approaches the end, and the uniformity of strand does not entirely depend on the uniformity in number of the individual threads forming it. Whenever the silk rises in locks, the temperature of the water is known to be too hot, and when it unwinds with difficulty, the temperature is, on the contrary, too low. The operator is supplied with a skimmer with which to remove all chrysalides and refuse silk; also with a basin of cold water in which to cool her fingers, which are being constantly dipped in the hot basin. This constitutes the whole operation of unwinding.

SEED.—The very best of the firm cocoons should be chosen as seed for the next year, unless the raiser prefers buying his eggs to the trouble of caring for the moths and keeping the eggs through the winter. Eggs bought from large establishments are apt to be untrustworthy, and it is well for all silk raisers to provide their own seed. These cocoons should be chosen for their firmness, and the fineness and color of the silk, rather than for their size. If white, take them of the purest white, neither soft nor satin-like; if yellow, give the preference to the straw-colored, which are the most sought after; and if they are the green of Japan, the greener they are, of a dark, sharp color, very glossy, the better is the quality of the thread. Discard the pale shades in the last breed. If there are any double or triple cocoons in the batch, of the right color, quality and consistency, they should be used before the others, as they are just as good for breeding purposes, though unfit for reeling.

IMAGO STAGE.

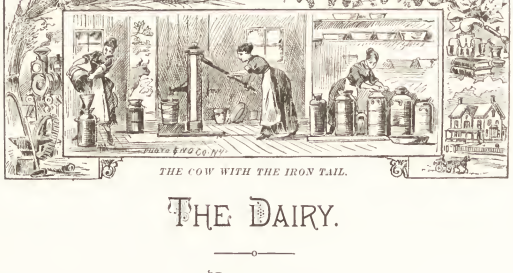
BURSTING THE COCOON.—In from 12 to 20 days from the time when the worm commenced to spin, the moths begin to issue from the cocoons laid aside for breeding purposes. They issue most abundantly during the early morning hours, from 4 to 8 o'clock, and, as they appear, they should be taken by the wings, and the sexes kept apart for a short time. The males may be readily distinguished from the females by their broader antennæ and smaller bodies,

as also by the incessant fluttering of their wings. The females remain comparatively quiet, their abdomens being heavy and distended with eggs.

REPRODUCTION.—A few hours after issuing, the sexes, in equal numbers, may be placed together, great care having been taken to destroy any that are at all deformed, in order to keep the breed as fine as possible. They should be placed upon paper or card-board, and the room should be kept as dark as possible, in order that the males shall not uncouple themselves. For the complete impregnation of the eggs, the sexes should be kept together for 6 hours, neither more nor less, and occasionally visited in order to replace those males which may have become separated. Should however, they may be thrown away. These last, as soon as separated, should be placed for a few minutes upon sheets of blotting paper, where they will free themselves of a quantity of greenish-yellow fluid. From the blotting paper they should be transferred to trays lined with cloth, upon which the eggs are to be laid. This cloth should be of the smoothest sort of woolen stuff rather than of linen or paper, if it is desired to remove the eggs at a future time, as they will stick so fast to the latter that it will be difficult to remove them without bruising. Upon these trays they may be placed in rows, and will immediately commence depositing. It is advisable to tip up the trays at one end, so that they incline a little, as the moths are then more apt to

Moth Laying Eggs.

there, on this day, more males than females issue, the superfluous males may be put in a closed box and kept till the next day, when this state of things may be reversed. Should there, on the other hand, be a superfluity of females, a sufficient number of the strongest and most vigorous males should be uncoupled at 4 hours and placed with the unpaired females for 6 hours more. As the pairs are uncoupled at the end of 6 hours, care should be taken not to injure either sex. The female should be held by the wings with one hand and the abdomen of the male gently pressed with the other. The males may then be laid aside in a box, as there may be use for them before all the moths have appeared. After all the females are impregnated, lay their eggs uniformly. They should also be kept in the dark, in accordance with the nocturnal habit of the moth. The temperature of the room should be kept at about 75°, and plenty of air given during oviposition. All of the thoroughly impregnated eggs will be laid in about 24 hours, and the moth should be removed after that length of time. She may continue depositing a short time longer, but the eggs should be kept by themselves and not mixed with the others. It will be well, also, if the best and purest breed be desired, to keep the eggs of those moths which were coupled with males that had been used before, separated from the eggs laid by those which where coupled with virgin males.



THE COW WITH THE IRON TAIL.

THE DAIRY.

BUTTER.

REMARKS.—To make good butter, requires good cows; those not necessarily giving a large flow of milk, but a regular flow of rich milk, which will make butter of a waxy texture; and, to please the eye, of a deep yellow color. While improved systems of setting, and improved churns, workers, and salt, may save much time, labor and anxiety, and secure more uniformity, good butter can be made without the improved machinery; but good butter cannot be made without good cows. The only difference between creamery and dairy butter is, that creamery butter is made in large quantities, and according to uniform and scientific rules, while dairy butter is made by different farmers in their dairies, from varying material, and no scientific system followed.

BUTTER, To Make.—Set the milk according to the directions for *Setting* in MILK; then skim (see *Skimming*, in MILK). Stir the cream every day; and the day before churning, put the pot near the stove, to allow the cream to warm and get sour. To sour the cream, take the milk after it has stood 9 or 10 hours, and place it over a clear, slow fire, but do not boil it. The earthen pan, having its bottom much smaller than its top, when the milk is sufficiently heated, throws up the form of its bottom on the surface of the cream; it is therefore preferable to the tin pan, which, if almost as big at the bottom as at the top, gives no criterion to judge by, except the wrinkles on the cream become smaller, and the texture somewhat leathery. In summer, the process of scalding ought to be quicker than in winter, as in very hot weather, if the milk should be kept over too slow a fire, it would be apt to run or curdle. Now turn all the cream into the churn. The coloring (if any is to be used) may be added now, or worked into the butter after churning; but, by adding the color in the churn, it is easier and more evenly mixed with the butter. In churning, care should be taken that the agitation is not too rapid, or so violent as to injure the grain of the butter. In filling the churn, leave out whatever milk may be found at the bottom of the cream crock, as its sour taste will be sure to promote acidity in the butter, and give it a cheesy flavor. Churning should occupy from $\frac{1}{2}$ to $\frac{3}{4}$ of an hour; if the butter should be hard and granular, refusing to come together well, throw in a little warm water, churning all the while, and the butter will be gathered and ready to take up. When the butter is well churned, rinse it with cold water until the water runs off clear; then churn it together again and press the water out; instead of washing it, the buttermilk may be worked out. When it is taken out of the churn, work with the hand, which presses out most of the milk. Press a cloth repeatedly down upon it, to absorb all the remaining milk; the less it is beaten or worked, however, the better. Care must be observed not to work enough to destroy the grain, or the butter will become sticky and adhere to the knives. 1 oz. of fine, purified dairy salt should be used for each lb. of butter. Salt is added by being sprinkled over the butter after it has been spread out in layers; a few turns should be given to the mass with the butter worker. The quality of the salt should be strong marine, free from the brine of mineral salt; the quantity may be that of about 10 oz. to 14 lbs. of butter; rather more or less, according to the length of time which the butter is intended to be preserved; but it is generally thought that the butter made during the summer months is the most suitable for salting, and that the sort which is made in the latter part of the season, not taking it so well, requires rather more. Some farmers use saltpetre, in the proportion of $\frac{1}{2}$ oz. of salt to $\frac{1}{2}$ of saltpetre to the lb. of 16 oz.; and although this forms a valuable pickle, if the salt be really good, yet it would unquestionably be much improved if 4 oz. of raw sugar were added to each lb. weight of salt. A compound of 1 part of sugar, 1 part of nitre, and 2 parts of the best Spanish salt, beat together into a fine powder, and mixed thoroughly with the butter, in the proportion of 1 oz. to the lb., has been

found to keep the butter in every respect sweet and sound during 2 years that it was in the cask; it is also said to impart a rich, marrowy flavor that no other butter ever acquires, and tastes but very little of the salt.

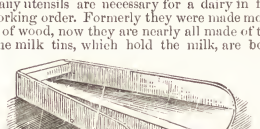
BUTTER, To Make Come.—To 20 lbs. of butter, add 1 teaspoonful of carbonate of soda, and 1 teaspoonful of powdered aluminate of sodium; put into the cream at the time of churning. It is claimed that this powder makes the butter come firm and solid, and gives it a clean, sweet flavor, and that the yield of butter will be increased and the process of churning shortened; but this method is not advisable, as it adds to the butter a part of the curd that belongs properly to cheese-making only.

BUTTER, To Color.—1. Annatto, 4 oz.; curcuma, 1 oz.; sweet, nice lard, 4 lb.; put 1 lb. of the lard in an iron kettle on the stove, with the annatto; stir all the time to prevent burning; put the curcuma and 1 lb. of lard in another iron kettle; stir constantly to prevent burning; when the lard, which settles on top, looks of a bright clear amber color, turn off the clear lard from both kettles into a jar, leaving the sediment at the bottom in the kettle; put the rest of the lard on this and heat and stir again until it is all dissolved; strain it all together through toweling.—2. Annatto, 5 oz.; pulverized turmeric, 6 oz.; saffron, 1 oz.; lard oil, 1 pt.; butter, 5 lbs.; the butter is first melted in a pan over the water-bath, and strained through a fine linen cloth; the saffron is made in ½ pt. tincture, and together with the turmeric and annatto, is gradually stirred into the hot butter and oil, and boiled and stirred for about 15 minutes; it is then strained through a cloth as before, and stirred until cool.—3. Annatto, 10 parts; caustic potassa, 1½ parts; borax, 1 part; water, 100 parts; tincture of turmeric, 20 parts; mix and filter.—4. Take 2 large-sized carrots; clean them thoroughly, and then with a knife scrape off the yellow exterior, leaving the white pith; soak the yellow part in boiling milk for 10 or 15 minutes; strain boiling hot into the cream; this gives the cream the desired temperature, colors it nicely, and adds to the sweetness of the butter.

DAIRY AND CREAMERY, Construction of.—The only respect in which a creamery is different from a dairy, is that it does the work of several dairies, and greatly reduces the cost of making the butter. If the first requisite of good butter is the cow, the second is the dairy-room; for it is useless to produce good milk if it is spoiled in the keeping. The best situation for a dairy is on the north side of the dwelling-house; one that is partly underground and has an apartment over it for churning, and washing pans, etc., is preferable, as it will need no artificial heating by a stove. One with brick walls, whitewashed with lime, plastered overhead, and with a cement or flag-stone floor, is best; have the windows above ground, and facing the south and west; cover the windows with fine wire gauze outside, and hinge them at the top, so that they may be opened by raising and hooking up the sash. The windows being close up to the ceiling ventilates the room completely. Small dairies have only 1 or 2 rooms; but large dairies, where both butter and cheese are made, have 3 or 4 rooms: the milk-room, the churning-room, the cheese-room, containing the cheese press, and the drying-room, where the cheeses are placed to harden; to these may be added a scullery, furnished with boiler, water, etc., for scalding and washing the dairy utensils, when it is not desirable to perform these operations in the churning or cheese rooms. If room and means will not allow of a dairy, a substitute may be found, for keeping the milk fresh 48 hours, in the following: A box or covered trough, 2 ft. deep, 18 in. wide, and long enough to hold 4 cans of milk, should be placed under some shade trees in the back yard, a few yds. from the house well. Wooden pump tubing should lead from the pump into this trough; the milk cans, each holding one milking, are stored in the trough, which should be kept filled with water to within a few inches of the top, where the overflow passes through an orifice into open troughs, and hence to a large trough in the stock-yard. Thus, in watering the stock, the water in the milk trough is changed several times a day.

DAIRY AND CREAMERY, Management of.—It is very necessary that every article should be kept perfectly clean. All utensils that have held milk or butter, should be scalded, scrubbed, and rinsed with cold water, before being used a second time. Ample means should be provided to insure thorough ventilation, by means of suitable windows; but flies and other insects must be excluded. The temperature must be preserved as much as possible in an equable state, ranging from 45° to 55° F. In the summer, the heat may be lessened by sprinkling water upon the floor, which will produce a considerable degree of cold by its evaporation. Should the temperature rise too high, it may be reduced by suspending a piece of ice at a considerable distance from the floor, or by hanging up a wet sheet where the air will strike upon it. If in winter the cold should become too great, and the room is not provided with a stove, a barrel of hot water, closely covered, or a few hot bricks placed upon the floor, will prevent all mischief. A charcoal stove should never be used. Abundance of pure water is essential. Dampness does no harm if the dairy is kept fresh and clean.

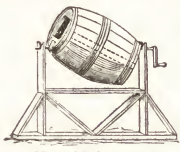
IMPLEMENTS AND UTENSILS.—A great many utensils are necessary for a dairy in full working order. Formerly they were made mostly of wood, now they are nearly all made of tin. The milk tins, which hold the milk, are both



Butter Worker.

large and small, as larger ones are generally required in summer than in winter. A good-sized tin is 6 ft. long by 3 broad, and 5 in. deep. The

curd-breaker, used to grind the curd, is an instrument about 1 ft. square, being a frame-work of tin cutters with 1 in. mesh, the handle 4 ft. long. Then there are vats of all sizes, which are usually made of elm, the cheese-press, the milk-warmer, bowls, strainers, coolers, girth butter-boards, markers, cloths, brushes and various other pots and pans. The butter-worker is also an important article in the dairy. It can be made entirely of wood, and is light to handle and move about. There are innumerable patent churns in the market, the preference being much a matter of choice. A good home-made churn, like the



Home-Made Churn.

one in the illustration, may be made of any water-tight cask or barrel. The cover is held in place by a bar screwed loosely at one end to the head of the churn, and the other end falls into a hook, after the cover is adjusted. The second illustration also represents a churn, moved by dog-power. A cream still is an important addi-

Dog Power Churn.

tion to a dairy. It is simply a kind of refrigerator to maintain a temperature of about 60°. The ice-chambers are above the pans, and the pans rest on slats, except the lower tier. It will prove serviceable to those who keep a small number of cows, and who have no proper appliances for setting milk, but who can have ice at their command during summer.

PACKING, STORING AND MARKETING.—The best package for keeping butter through the summer is a white oak pail, varnished on the outside, and made with a tight-fitting cover; or, for larger quantities, a white oak firkin should be used. The pails should be thoroughly scalded, next soaked in clean brine before being used, and then dusted with dry salt on the wet sides before the butter is put in. The butter should be packed solid, without any air spaces, and if the tub is not filled at once the butter

Cream Still.

should be covered with a little clear brine until the next packing is put in. When the tub is filled to within ½ in. of the top, a piece of clean muslin, dipped in brine, should be placed over it and pressed down; dry salt is then laid on a level with the edge of the pail, and the cover is pressed down and fastened. The package is then kept in a cool, sweet cellar. Stone crocks, which hold 10 or 12 lbs. each, are also excellent vessels in which to pack butter. Fill them to within ½ in. of the top. A good plan is to make a long box; put 1 in. of salt in the bottom; put in the filled crocks; place 1 in. of salt all around the packages, and on top of the butter pour 1 pt. or more of clear brine as strong as can be made from the best dairy salt; over this place a common plate, projecting over the edge of the crock; over the plate place 1 in. or more of salt; put all in a cool, clean cellar, and cover with paper and a board. Some butter goes into market in the form of rolls; some pine-apple, and other fancy forms for the table. Every person should be guided by circumstances in his choice of styles for putting up butter, always being careful to give it a neat and attractive appearance.

RANCID BUTTER, To Purify.—1. Melt in twice its weight of boiling water and shake well; pour the melted butter into ice water to regain its consistence. — 2. Wash in good, new milk, in which the butyric acid, which causes the rancidity, is freely soluble. Wash afterward in cold spring water. — 3. First agitate the butter with hot water. On standing it soon separates from the water, when it is again agitated for some time with an equal volume of fresh hot water, and a few oz. to the lb. of fresh animal charcoal, in coarse powder and free from dust. It is freed from charcoal by straining through a cloth while hot, and from the water by the difference in specific gravity. The butter, when cold, is well washed with fresh milk to which a little sulphite of lime has been added; then re-

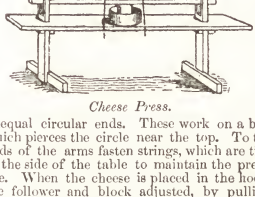
worked, salted, and colored with a small quantity of annatto. An objection to this receipt is that so much working tends to destroy the grain and make the butter oily.

CHEESE.

REMARKS.—Cheese is composed of the curd, or congulated milk, and may be obtained from the caseous part alone, after the milk has been skimmed. If thus deprived of the cream, this "skim milk" cheese is, however, of a poor quality; and if intended to be good, the whole milk should be used, without any loss of cream. Cheese differs vastly in quality and flavor, according to the method employed in its manufacture and the richness of the milk of which it is made. *Limburger* cheese is not considered ready for consumption until it is partly putrefied. Much depends upon the quantity of cream milk contains; consequently, when a superior quality of cheese is wanted, cream is frequently added to the curd. The addition of a pound or two of butter to the curd for a middling size cheese also vastly improves the quality of the product.

CHEESE. To Make.—In making cheese, put the greater portion of the milk into a large tub, to which add the remainder, sufficiently heated to raise the temperature to that of new milk; whisk together, then add the rennet or rennet liquor, and cover the tub. It is allowed to stand until completely turned, when the curd is gently struck down several times with the skimming dish; after this it is allowed to subside. The cheese hoop, covered with cheese cloth, is next placed on a horse or ladder over the tub, and filled with curd by means of the skimmer; care being taken to allow as little as possible of the oily particles or butter to run back with the whey. The curd is pressed down with the hands and more added as it sinks. This process is repeated until the curd rises to about 2 in. above the edge. The newly-formed cheese, thus partially separated from the whey, is now placed in a clean hoop, and a quantity of salt, to taste, added, as well as of annatto, when that coloring is used, after which a board is placed over and under it, and pressure applied for about 2 or 3 hours. The cheese is next turned out and surrounded by a fresh cheese-cloth, and then again replaced in the hoop, and submitted to pressure in the cheese-press for 8 or 10 hours, after which it is commonly removed from the press, salted all over and again pressed for 15 to 20 hours. The quality of the cheese depends on this part of the process, for, if any of the whey is left in the cheese, it rapidly becomes bad-flavored. Before placing it in the press the last time, pare the edges smooth; then wash the outside of the cheese in warm whey or water; wipe it dry, and cover the outside of it with annatto or reddle.

CHEESE PRESS.—A good cheese press may be made at a trifling cost. The uprights are 2 by 4 in. scantling, 4 or 5 ft. long, with pieces of the same fastened to the bottom as braces; 30 in. from the floor stout cleats are nailed firmly to the uprights, upon which rests a 2 in. plank, which serves as a table. Upon this plank is a cheese hoop, with a cheese inside to be pressed. Above this is a stout strip of 2 by 2 stuff, with ends resting in mortises cut in the uprights. This strip should be 5 or 6 ft. in length. Under it, in the centre, is a block which rests upon a round follower the exact size of the cheese to be pressed. The power is furnished by the eccentrics, or arms, which are merely levers with



Cheese Press.

unequal circular ends. These work on a bolt which pierces the circle near the top. To the ends of the arms fasten strings, which are tied to the side of the table to maintain the pressure. When the cheese is placed in the hoop, the follower and block adjusted, by pulling down upon the eccentrics a pressure of any required degree is applied upon the cheese; both the board and strip being elastic, the pressure is maintained as long as applied.

CHEESE, To Store.—Store in a cool cellar, neither damp nor dry, and one which is uninfluenced by changes of weather. The temperature should not be permitted to exceed 50° or 52° Fahr.; an average of about 45° is preferable.

ANTI-ACID.—Draw the whey off while it is still sweet, and place the curd so that it shall not in the least soak whey, but be cleared from it as fast as it exudes, because of the action of the rennet. Depend on the rennet to perform the work of cheesing, with the aid of the oxygen in the atmosphere, to which the curd should be thoroughly exposed; pay no attention to the degrees of acidity, but be guided, in the dipping of the curd, by the stage to which the action of the rennet has developed it.

ARTIFICIAL.—Oleomargarine is used to adulterate and cheapen cheese. In manufacturing cheese, the oil is mixed with skim-milk; it can be handled then as if all milk, and the product can scarcely be detected from ordinary cheese.

BELLUNESE.—Made by heating the milk, pouring in rennet, letting it congulate, breaking it into medium-sized pieces, re-heating it in wooden tubs, salting, and placing it on stands for daily turning and re-salting.

BRICKBAT.—Made of new milk and cream. This name is given to it from its being made into forms resembling brickbats.

BUTTERMILK.—Buttermilk, after being boiled and allowed to stand until cool, is placed in a cheese form or heavy linen bag until the whey

is drained off, when it is salted, spiced according to taste, and thoroughly mixed; a spoonful of wine or cognac is then added for each lb., and the mass is thoroughly kneaded and formed into cheeses of any desired size or form, which are dried in the air, and then wrapped in clean linen cloths that have previously been moistened with hot whey, and packed in a well-covered cask and stored in a warm place; 4 days suffice to render it fit for use, but it improves by age. The small hand cheeses, which especially become dry in winter, may be rendered palatable by simply wrapping them, when dry, in horseradish leaves, and packing them very closely in a cask.

CACCIO CAVALLO. — The cows are milked once daily; their milk, when poured into large vats, is divided, and ½ heated to a point which will make it and the unheated, mixed, when tested by hand, 100° Fahr. Whey of goat's milk is shaken in it, and while curdling it is covered with a cloth to keep up the temperature. When curdled, it is broken, stirred till in filbert-sized pieces, placed with whey in a vat, re-beaten, wet, and covered with warm whey to grow. When, by heating on hot coals, ductility is obtained, the curd is called "grown." It is next cut, the pieces thrown into a pail, where they are wet with hot water, re-united, manipulated, pulled into thread, and made into as many balls as there is cheese to make up. These thread balls are immersed in the water which served to make them manipulated, until homogeneous and compact, formed by hand into proper shapes, and salted daily for 2 or 3 days.

CHEDDAR.—A fine kind of cheese, with a spongy appearance, the eyes or vesicles of which contain a rich oil. It is made up into thick, round cheeses of considerable size. Its manufacture is based on the method of drawing the whey from the curd while it is yet sweet, and of setting the curd at a low temperature. The milk is heated to only 78° or 80°, when the rennet is added, and no further heat applied until the curd is set and broken up. The curd is then heated to 100°, and the whey is drawn off before any acidity becomes apparent without the closest test by an experienced dairyman. The curd is then aired in the vat; this is, in fact, a process of oxidation, by which a certain degree of acid is produced. When this point is reached, the curd is gathered up and pressed for a few minutes, to get rid of the whey; then ground, salted, and put to press.

CHESHIRE.—The best is made from new unskimmed milk. Mix with the morning milk that of the preceding evening, previously warmed, so that the whole may be brought to the heat of new milk. To this add a little less rennet than is used for other cheese. A small piece of dried rennet put into 1 pt. of water over night, and allowed to stand until the next morning, is sufficient for 18 or 20 gals. of milk. The curd is now broken down and separated from the whey, after which it is put into a cheese vat and pressed very dry, then broken in small pieces, and mixed with a proper quantity of salt, and about ½ its weight of curd from the day before, kept for the purpose; now press the mixed curds, with the hands, into a cheese vat, previously lined with cheese cloth; press 4 or 5 hours, then take out, turn, and again put into the press, and leave for the night. Take out the next day; salt well, and leave until the salt is quite melted; then wipe dry and place in a dry, cool situation; turn every day, until it becomes fit for the market.

COLORING.—Spanish annatto, 3½ dr., is sufficient for a cheese of 50 lbs. weight. If a considerable part of the cream of the night's milk be taken for butter, more coloring will be requisite; the leaner the cheese is, the more coloring it requires; tie up in a linen rag the quantity deemed sufficient, and put it into ½ pt. of warm water over night; this infusion put into the tub of milk in the morning with the rennet infusion; dip the rag into the milk, and rub it against the palm of the hand as long as any color runs out.

COTTAGE.—Also called *Schmeer Kase* and *Clabber* cheese. Skim the sour milk on the stove in a milk pan, and let it gradually warm till it is lukewarm all through; stir it occasionally to prevent its hardening at the bottom; when it is a little warmer than new milk and the whey begins to show clear around the curd, pour it all into a coarse, thin bag; tie it close, and hang it up to drain; let it hang up 2 or 3 hours in a cool, shady place; then take from the bag the contents and put in a covered dish.

CREAM. — Procure some molds made of blocks of maple or beech, 6 in. long, 3 in. wide, and 3 in. deep, inside measurement. Mats of common green rushes are sewed together to fit into the mold; sweet cream, as thick as can be procured, is the material of which the cheese is made; the mold is laid upon a dish; a rush mat is placed at the bottom of the mold; this is covered with a piece of fine muslin, rinsed in brine; the cream is put into the mold, and a piece of muslin dipped in brine laid upon it; then a rush mat is laid upon the cloth, and a small block is laid upon the mat; this pressure is enough. The dish and all are set away in a cool place for 2 or 3 days, when it will have become compact, slightly acid and of a cheesy flavor.

DUNLOP.—When a number of cows are kept, so that a cheese of any tolerable size may be made every time they are milked, the milk is passed, immediately as it comes from them, through a sieve into a vat, and, when the whole is collected, it is formed into a curd by the mixture of the rennet. Where, however, the cows are not so numerous as to yield milk sufficient to form a cheese at each meal, the milk of another meal is stored about 6 or 8 in. deep in coolers, and placed in the milk-house. The cream is then skimmed from the milk in the coolers, and, without being heated, is put into the curd vat, along with the milk just drawn from the cows, and the cold milk, from which the cream has been taken, is heated so as to raise the temperature to about blood heat. If coagulated much warmer, the curd becomes too adhesive, much of the butyraceous matter is lost in the whey, and the cheese will be found dry, tough and

tasteless; but if too cold, the curd, which is then soft, does not part readily with the serum, and the cheese is so wanting in firmness that it is difficult to be kept together. When the utmost pains are taken to extract the whey, and give solidity to the cheese, eyes frequently break out, rendering them rancid or insipid. About 1 tablespoonful of the liquid rennet is generally thought sufficient for 25 gals. of milk, and the curd is usually formed by it within 12 or 15 minutes. The curd is then broken with the skimming dish, or with the hand, and the whey ought to be taken off as speedily as possible, though without pressing. When quite freed from the whey, and the curd has acquired a little consistence, it is then cut with the cheese knife, gently at first, and more minutely as it hardens, after which it is put into the drainer.

DUTCH. — Allow the milk to thicken, then heat gently over a fire in a large kettle, till the curd separates from the whey; then dip out into a colander, so that the whey can be pressed out of the curds as dry as possible; after the curds are pressed out, crumble up with the hands as fine as can be done; press them down in an earthen vessel; let it stand a few days till it becomes thoroughly heated; stir it throughout daily, afterwards pressing it down, so that every portion of it may become heated alike; now take it out, and salt to suit the taste; a small quantity of butter makes it richer, but it is not positively necessary, as it is very good without it. Take a deep basin, or basins; grease them well; press them even full of cheese, and set them in a stove or oven, and bake till they are slightly brown on the top.

FROMAGGIO DE GRANA.—Milk is poured into caldrons and placed on the fire. If mature, it is warmed to 88° Fahr.; if retaining the whiteness and sweet taste of freshly milked, it is heated to 90°. At this temperature, as tested by the hand, it is removed from the fire and mixed with rennet; ½ oz. of rennet is used for 720 qts. of milk. The rennet is dissolved with a pestle in wooden cups, and filtered through horsehair sieves, the oozing going into the caldron of milk. To prevent hardness, the curd formed is broken and turned with the cream turner; this is continued for ¾ of an hour, while concretions appearing on the surface are removed by hand. Turning is stopped for 2 or 3 minute intervals to consolidate, but not harden, the now softened or dissolved curd. The whey is removed, and ½ oz. of saffron for 110 qts. of milk, thrown into the caldron; the curd is replaced, and left for 1 hour on the fire heated to 122° Fahr., but not higher, and continually stirred. A cup is filled with the curd for examination as to the minuteness of its particles; if small enough, the caldron is removed, and the curd sinks and forms on its bottom. To hasten this, the cooled whey, before drained off to enable the adding of the saffron, is poured into the caldron, the bottom of which is pressed with the rotella, to unite and incorporate the curd. The curd is loosed with a stick from the sides of the caldron, lifted, drawn on the surface, collected in a cloth, placed and left for 1 hour in a vat, then wet with whey, and pressed for drainage, by hand, in a box of narrow beech boards, bound with hoops and packthread and covered with linen, a wooden disc and a heavy stone. When dried, these coverings are removed, and it is re-wet with whey, and then covered with buckram, which, under the pressure of the disc and stone, makes reticulated imprints on its circular surface; after some hours the buckram is cut, and the clippings removed to permit the whey to dry in; it is covered and rubbed on an oak bench with salt; dipped in salt water, and repressed between the beech-boards. It is re-salted every other day for 2 weeks.

FRIULANI. — Friulani cheese is made with milk tepified in heaters, and thence poured into wooden vats for coagulation. The curd formed, is wet, broken into large lumps, re-wet with hot whey or water, gathered, and pressed in wooden hoops.

GLOUCESTER.—The double Gloucester are made entirely from new, unskimmed milk; the single Gloucester, from ½ new and ½ skimmed. A smaller proportion than usual of rennet is used in turning the milk for these cheeses, and it is this that renders them so delicate and mild in flavor. They are often made up into large, round cheeses, from 100 to 200 lbs. in weight.

GORGONZOLA.—The milk, while warm from the cow, is well curdled with rennet. The quality of the cheese depends much on that of the rennet, and experience guides as to the quantity required. In 15 or 20 minutes, when the milk is coagulated, and the whey separated, the curd is hung in hemp cloth bags to drain. The morning-drained curd, inclosed in light, flexible wooden bands, covered on their inside surface with hemp cloth, is placed on an inclined board, strewn with rye chaff. Being of 2 milkings, the curd is partly warm, partly cold, and, though mixed, care is taken to form the upper and lower strata of the warm, because it is cementitious. As hot and cold curd never perfectly unite, minute interstices remain in the cheese, and, while maturing, green mold, known as parsley, forms and gives the stracchino the delicious taste for which it is famous. The curd is further drained during the first day of the process, by 2 or 3 turnings. On the following morning, when of some consistency, the cloth being removed, its value is determined by weighing. After 3 or 4 days, fermentation begins, and the wooden bands are removed; it is then, once daily, for 8 or 10 days, alternately salted on its upper and lower sides, 4 oz. of pulverized salt being, on an average, used per form of 33 lbs. The color changes in a month to pinkish-white, if good; to black, if bad; when black, the crust is soft and the cheese perishable in summer; if the crust is sufficiently hard, the shade is improved by 1 or 2 dippings in salt water. The time of maturity depends upon the temperature (which is best from 10° to 15° Centigrade), manner of making, and the quality of the milk.

GREEN or SAGE. — Steep over night in a proper quantity of milk, 2 parts of sage, 1 part of marigold leaves, and a little parsley, after they have been bruised; on the following morning the greened milk is strained off, and mixed with about ½ of the whole quantity intended to

be run or coagulated; the green and white milks are run separately, the 2 curds being kept apart until ready for vatting; these may be mixed, either evenly and intimately, or irregularly and fancifully. The management is the same as for common cheese.

NEUFCHATEL. — A variety of Swiss cheese. The rennet is added to the milk in pots, holding about 3 gals., at its natural temperature as it comes from the cow; various devices are resorted to for preserving this temperature in winter without warming the milk. The rennet being added to the milk, it is left for many hours for the curd to be fully deposited; the curd is afterward placed in a linen cloth, which is suspended from the 4 corners of a skeleton box, and it is then left several hours to enable the whey to drain off; it is then transferred to a clean cloth, in which it is carefully folded up, and is submitted to pressure for about 12 hours, or at least until the whey ceases to run out; but the pressure is neither very great nor very even; the curd is next passed through cylindrical molds, and the small cylindrical cheeses thus formed are at once salted on the outside; the cheeses being then made, are put into a cellar on boards, each one being quite separate from its neighbors; in a few days, more or less, according to the temperature, the first mold, thick and white, makes its appearance, and soon afterwards, especially in summer, the cheeses are sold fresh.

PARMESAN.—The cheese is made of the evening milk, after having been skimmed in the morning, and at noon, mixed with the morning milk, which is also skimmed at noon; both kinds of milk are poured together into a large copper caldron, of the shape of an inverted bell, which is suspended on the arm of a lever, so as to be moved on and off the fire at pleasure; in this vessel the milk is gradually heated to the temperature of about 120°, after which it is removed from the fire and kept quiet for a few minutes, until all internal motion has ceased; the rennet is then added; within about 1 hour the coagulation is complete, and then the milk is again put over the fire and raised to a temperature of 145°; during all the time it is heating the mass is briskly stirred, till the curd separates in small lumps, when a part of the whey is taken out, and a few pinches of saffron are added to the remainder, in order to color it; when the curd is sufficiently broken, nearly the whole of the whey is taken out, and 2 pailfuls of cold water are poured in; the temperature is thus lowered, so as to enable the operator to collect the curd by passing a cloth beneath it and gathering it up at the corners. It is now pressed into a frame of wood, placed on a solid platform, and covered by a round piece of wood fitting into the mold, with a heavy weight at the top. In the course of the night it cools, parts with the whey, and assumes a firm consistence. The next day, one side is rubbed with salt, and the succeeding day the cheese is turned, and the other side rubbed in like manner; this alternate salting being continued for about 40 days; after this period, the outer crust of the cheese is pared off, the fresh surface is varnished with linseed oil, the convex side is colored red, and the cheese is fit for market.

POTATO.—Potatoes of good quality are boiled in a caldron, and, after becoming cool, they are reduced to a pulp, by means of a grater or mortar. To 5 lbs. of this pulp, add 1 lb. of sour milk and the necessary quantity of salt; the whole is kneaded together and the mixture covered up, and allowed to remain 3 or 4 days, according to the season; at the end of this time it is kneaded anew, and the cheeses are placed in little baskets, when the superfluous moisture escapes; they are then allowed to dry in the shade, and placed in layers in large vessels, where they must remain for 15 days.

RASCO.—Cow's milk, when coagulated and lightly broken, produces a semi-solid excretion or discharge, which forms the essential substance of *Rasco* cheese. This is placed in hoops, slightly shaken, and dipped quickly 3 or 4 times in hot whey; removed, and replaced when sufficiently solid, upper side down, in these hoops, and there kept for 24 hours; slightly salted, and taken to cool, dry rooms for keeping. It is soft, white, and soluble at a low degree of heat.

RENNET, To Prepare for Cheese. — Rennet is employed to curdle milk, and is the fourth, or true digesting, stomach of the calf. A piece of the requisite size is cut off and soaked for some hours in whey or water, after which the whole is added to the milk for curdling. A large quantity should be made at a time, as it should never be used until it has stood at least 2 months. It is prepared for use as follows: 1. Take the maw of a newly-killed calf, and clean it of its contents; salt the bag, and put it into an earthen jar for 3 or 4 days, till it forms a pickle; take it from the jar, and hang it up to dry, after which it is to be replaced in the jar, the covering of which should be pierced with a few small holes to admit air, and let remain there for about 12 months; when wanted for use, a handful, each, of the leaves of sweet briar, dog-rose and bramble, with 3 or 4 handfuls of salt, are to be boiled together in 1 gal. of water for ½ hour, when the liquid is to be strained off and allowed to cool; the maw is then to be put into the liquid, together with a lemon stuck around with cloves; the longer it remains in it, the stronger and better will be the rennet; ½ pt., or less, of the liquor is sufficient to turn 50 gals. of milk.— 2. Fresh rennet, 12 oz.; salt, 2 oz.; proof spirit, 2 oz.; white wine, 1 qt.; digest for 24 hours, and strain; 1 qt. of milk requires 2 or 3 teaspoonfuls. The membrane of the stomach is to be cut with scissors and kneaded with the salt, and with the rennet found in the interior of that organ; the whole left in a cool place in an earthen pot, till the cheesy odor is replaced by the proper odor of rennet, which will be in 1 or 2 months; then add 16 parts of water and 1 of spirit; filter, and color with burnt sugar.

ROCHEFORT. — This is made of ewe's milk. The evening's milk is heated almost to boiling, and set aside; in the morning it is skimmed, heated to 98°, and mixed with the morning's milk for coagulation. After the curd has been divided, by stirring with a paddle, and the whey

drawn off, it is kneaded with the hands and pressed in layers into molds with perforated bottoms, and usually a thin layer of moldy bread, made of summer and winter barley, sour dough and vinegar, is put between the layers of curd to hasten the ripening of the cheese, by supplying the germs of the green mold peculiar to cheese. The curd remains under pressure for 3 or 4 days, after which the cheeses are wrapped in linen and put to dry.

SKIM MILK.—This article, made of milk from which the entire portion of the cream has been taken, is more or less palatable in proportion to the time during which the milk is allowed to stand. The milk should, if possible, not be allowed to become sour, and the moment it has been skimmed, it should be heated to no more than animal heat, or about 90°; for, if put together too hot, its toughness will be increased, and as the curd coagulates more readily than that of full milk cheese, the same degree of heat is not necessary. This is the chief perceptible difference in management, except that the curd is more difficult to be broken, and that the cheese needs less of the press; but in all other respects the mode of making is the same.

STILTON.—Put the night's cream, without any portion of the skimmed milk, to the milk of the following morning; those who wish to make it very fine add a still greater quantity of cream, and of course the richness of the cheese depends upon the amount which is used. Butter is also sometimes added. The rennet is then added without any coloring. When the curd has come, it is taken out without being broken, and put whole into sieve or drainer, where it is pressed with weights until entirely cleared of whey; when dry, it is put, with a clean cloth, into a cheese hoop, and placed under the press, the outer coat being first salted. When sufficiently firm to be removed from this mold, the cheese is placed upon a dry board and tightly bound in a cloth, which is changed daily in order to avoid all danger of cracks in the skin, until this is found to be tolerably well coated, after which it is no longer used, and the cheese requires no further care than being frequently turned upside down and occasionally brushed.

SWISS.—The milk, partly skimmed, or not, according to the quality of the cheese desired to be made, is put into a kettle over a gentle fire, where it is allowed to attain a temperature of 77° Fahr., when rennet is added to the milk. When coagulation has advanced far enough, the curd is cut into as fine pieces as practicable with a large wooden knife; the kettle is then swung over the fire again, and the curd is taken up in small quantities and poured back through the fingers, where it is still more finely divided. Great importance is attached to this division of the curd, in order that each particle may be fully exposed to the action of the heat in the "cooking" process, which ensues up to a point when the temperature of 90° has been attained; the kettle is then immediately swung off the fire, and the waste of curd and whey stirred for some 15 minutes longer; and if the cooking has been properly performed, the particles of curd have the appearance of bursted grains of rice swimming in the whey; the curd is then collected in a cloth, and great care is taken to expel all whey. The salting of the cheese is also considered a delicate and important process; the salt is rubbed from time to time on the outside of the cheese, care being taken to discern when enough shall have been absorbed.

MILK.

REMARKS.—Unless cows are fed with good, sweet, nutritious food, it will be folly to suppose that their milk will be good; and the best cows, well fed, will still furnish milk of an undesirable quality, unless great care is taken to keep them perfectly clean, and also particular attention paid to the keeping of the barn clean and free from bad odors, and all the vessels sweet and clean; for there are but few, if any, liquids that will absorb bad odors more readily than milk. Buttermilk is the liquid that is left after the butter or fatty matter has been separated from the cream. It contains the sugar, caseine, and salt of milk, and when it is procured from sweet cream, is both delicious and nourishing, besides being easy of digestion.

COW, To Milk.—Cow milking machines have been invented, but have not succeeded in displacing the hand as the best method. The udder should be washed before milking. The milker should work his hands rapidly, keeping up a constant flow till the udder is clean, when, except in severely cold weather, the milk will be crested with a fleecy foam. Cleanliness is one great point to be had always in view. The best time to milk is either before or after feeding; never while the cow is eating. Drawing the milk with a strong, downward pull—in fact with a jerk—should never be allowed; it irritates the cow, and often injures the bag. Fill the teat, and with a firm pressure of the last 3 fingers empty it, drawing slightly on the teat and udder at the same time; so proceed alternately with each hand until the milk supply is exhausted. The cow should be milked regularly and stripped quite clean. The milk will be thin in quality when near calving, and it is not customary to use the milk for some days after calving, as it is considered fit only for the calf.

SETTING.—Strain the milk into the cans and set them into cold water as fast as the cows are milked. The cans can be placed in a cream still, or in a trough, as described under *Dairy and Creamery, Construction of.* Never mix the night's milk with the morning's. If the cream is wanted for immediate use, enough will rise in 2 or 3 hours; for butter, let it set at least 24 hours; 36 is the time in which all the cream will rise.

SKIMMING.—The cream should be taken off

either early in the morning or in the evening after sunset. Take it off carefully and neatly with a skimmer; deposit it in clean stone crocks or tin pail, if for butter, or in the cream jug, if for immediate use. If the cream is for supper, skim that from the morning's; if for breakfast, skim the evening's milk.

SOURING, To Prevent.—To prevent the milk souring by thunder storms, start a fire in the dairy; this should be done even in the hottest weather. Another good remedy, which answers at all times, is to add to each qt. 15 gr. of bicarbonate of soda. A thin iron chain, passed through the milk pans, and the ends of the chain kept in cold water, will prevent souring.

"ON THE CONTRARY, I FEEL QUITE LIGHT."

HEAVY LIVE STOCK.

REMARKS.—The laws which govern the raising and management of the brute creation for the service of man need to be well understood by the farmer, breeder and user of all descriptions of live stock. The demand for improved breeds is constantly growing, and no department of farm work is more profitable. It is the effort in the following pages to give comprehensive and practical, though condensed directions in all important particulars. In the descriptions given of the different breeds of all the animals, will be found sufficient to guide in selection for specific purposes. It should be here remarked that the greater humanity (or analogy of treatment between what is accorded to domestic animals and what would naturally be given to a human being) that is exercised in the health or diseases of all, the greater the success in stock raising. It is apt to be forgotten that there is a close analogy between the physical structure and requirements of both man and beast; that whatever psychological differences may exist, both possess bones, sinews, muscles, senses, organs of nutrition, absorption, circulation and respiration; and last, though not least, brain and nerves susceptible to fright, exquisite pain, and intelligent teaching. It therefore follows, that success with the animal creation depends largely on common sense and the observance of the golden rule, which is the attribute of all true humanity.

GESTATION OF ANIMALS.—

KIND OF ANIMAL.	Proper Age for Reproduction.	Period of the Power of Reproduction.	No. of Females for 1 Male.	Period of Gestation and Incubation.		
				Shortest Period.	Mean Period.	Longest Period.
		Years.		Days	Days	Days
Mare	4 yrs.	10 to 12		322	347	419
Stallion	5 "	12 " 15	20 to 30			
Cow	3 "	10		240	283	321
Bull	3 "	5	30 to 40			
Ewe	2 "	6		146	154	161
Buck Sheep	2 "	7	40 to 50			
Sow	1 yr.	6		109	115	143
Boar	1 "	6	6 to 10			
She Goat	2 "	6		150	156	163
He Goat	2 yrs.	5	20 to 40			
She Ass	4 "	10 to 12		365	380	391
He Ass	5 "	12 " 15				
She Buffalo				281	308	335
Bitch	2 "	8 " 9		55	60	63
Dog	2 "	8 " 9				
She Cat	1 yr.	5 " 6		48	50	56
He Cat	1 "	9 " 10	5 to 6			
Doe Rabbit	6 mos.	5 " 6		20	28	35
Buck Rabbit	6 "	5 " 6	30			
Cock	6 "	5 " 6	12 to 15			
Turkey				24	26	30
Hen		3 " 5		19	21	24
Duck				28	30	32
Goose				27	30	39
Pigeon				16	18	20

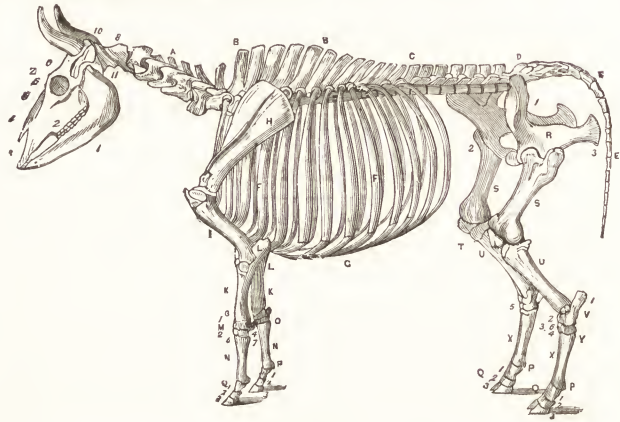
CATTLE.

A YOUNG castrated male bullock, after the 1st year, is called a stot, stirk, or steer; at 5 years old, an ox. A female, after the 1st year, is called an heifer, or quey; at 5 years old, a cow; and afterwards a castrated female is called a spayed heifer or cow. Bullock is the general term for any full-grown cattle, male or female, fat or lean.

ANATOMY.

BONY STRUCTURE. — The skeleton is the foundation of the animal, upon which is built and attached the muscles and other soft parts. These are then all covered by the skin. The only weapons of offense and defense used by a bullock are the horns, which are very firmly attached to the frontal bone. The whole skeleton of the animal is admirably adapted to its purposes—to

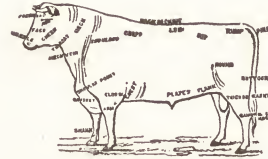
its usually peaceful and sluggish habit. A good form of bullock is solidly rectangular, from whatever point it is viewed. Massiveness and strength of foundation and superstructure, are the prevailing characteristics. The following illustration shows the location and scientific names of the principal bones of cattle.



Skeleton of the Cow.

A, cervical vertebræ; B, B, dorsal vertebræ; C, lumbar vertebræ; D, sacrum; E, E, coccygeal bones; F, F, ribs; G, costal cartilages; H, scapula, 1, humerus, K, K, radius; L, ulna; M, carpus, or knee; 1, scaphoid; 2, semilunar; 3, cuneiform; 4, trapezium; 5, trapezoid; 6, os magnum; 7, uneiform; 8, pisiform; N, N, large metacarpal, or cannon; O, small metacarpal; P, P, sesamoid bones; Q, Q, phalanges; 1, os suffraginis, or pastern bone; 2, os coronæ; 3, os pedis; R, pelvis; 1, ilium; 2, pubis; 3, ischium; S, femur; T, patella; U, tibia; V, fibula; W, hocks; 1, os calcis; 2, os tragalus; 3, cuneiform magnum; 4, cuneiform medium; 5, cuneiform parvum; 6, cuboid; X, large metatarsal; 1, 2, 3, phalanges; Y, small metatarsal; Z, head; 1, inferior maxilla; 2, superior maxilla; 3, anterior maxilla; 4, nasal bone; 5, molar; 6, frontal; 7, parietal; 8, occipital; 9, lachrymal; 10, squamous; 11, petrous.

POINTS. — The accompanying illustration shows the points of cattle. In judging of, or selecting an animal, the following will be found useful: The animal's flesh should be elastic to the touch, having the power to replace the parts when pressed. The skin should be thick, soft, and elastic, thus allowing room for the animal



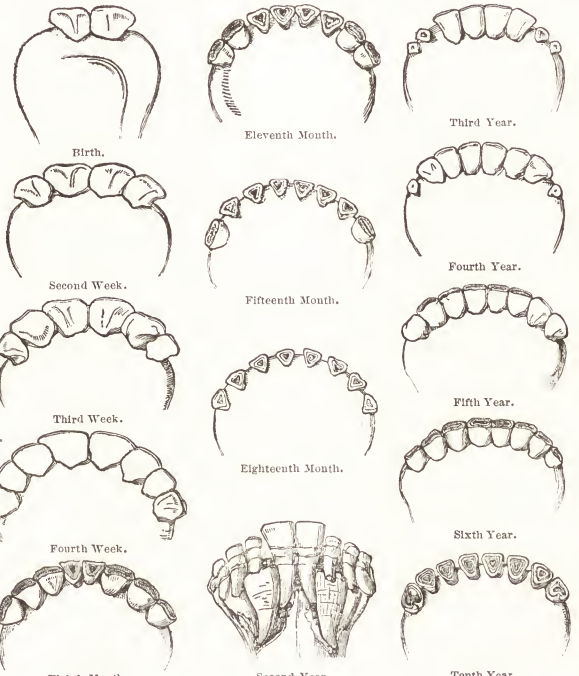
Points of Cattle.

to fatten. The general form of the body should be square; the back straight, and the belly nearly so; the flanks low; ribs, barrel-shaped; the rump, long and wide, and the loins wide; the thigh, long and wide, and the back wide; legs, short and small, standing well under the animal, and the hocks directly in line with the body; tail, light; hair, fine, color unimportant; the head should be small and wide above the eyes; small, dark, eyes, surrounded by a circle, with large face above, show a vicious and bad-tempered animal; a bright, yellow circle around the eyes is a good indication; the eyes should be quiet, yet bright; the lips thin and the nostrils elastic; ears, medium size; neck, strong and muscular upon its sides, covering the points of the shoulder well at the base; it should be long enough to allow the taking of food easily. If the animal is broad in the crops, it shows a good back, and also a good rib beneath the shoulder-blade, thus giving width to the chest and greater play to the lungs.

RINGS ON HORNS, To Determine Age by. — The ages of horned cattle may generally be known by the rings on the horns till their 10th year; but after that time they give no indication of age further than that the animal has passed its 10th year. The 1st ring appears on the

horn after the animal is 2 yrs. old. During the 3d year the ring gradually increases, and at 3 years of age it is completely formed. The 2d ring appears during the 4th year, and at the end of the 5th year it is complete. After that period an additional ring is formed each year.

TEETH, To Determine Age by.—The calf is generally born with 2 fore or cutting teeth; 2 central incisors has begun to wear, the osseous portion of the tooth appearing where the enamel is abraded; this increases, and in the course of 2 months, the next teeth will begin to show signs of wearing, and in about 3 months the next in succession; till, in the course of 4 months, or a little more, the whole set show the effects of use, but the 4 central teeth by far the most decided-



Age of Cattle Shown by the Teeth.

at the close of the 2d week, a tooth on each side of this central pair cuts the gum, making the number 4; at the end of the 3d week the number will be increased to 6; at the termination of the 4th week the full number of the deciduous, or milk incisors, will be complete. At this time the upper line of the sharp edges of the

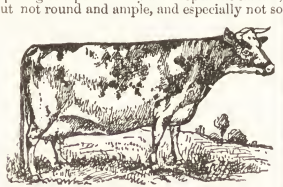
ly. At this time, independently of their wearing down by attrition, the 2 central teeth begin to diminish in size; at first this is not very perceptible, but, in the course of a few months, the change will be very palpable. This diminution is the result of a process of absorption, which goes on with increased rapidity as the

new teeth, in their nutrient cells beneath, become more and more developed; the worn surface of the teeth in question assumes a triangular form, with an oblique inclination inwards, the osseous portion appearing as a distinct central mark. At the age of about 8 months the diminution and wearing down of the 2 central incisors is very decided; and before the close of the 12th month, the next incisor on each side will show the same appearance, and the 4, instead of being close together, will be separated from each other, especially at their base; at the close of 15 months the number of teeth thus diminished by absorption, worn by use, and separated from each other, will extend to 6; and at the close of 18 months the whole 8 will appear as little worn rudiments. During these changes the ox experiences increasing difficulty in cropping herbage, and from this cause, and the action connected with the formative process of the permanent teeth, the animal is subject to many disorders and is liable to become out of condition, especially where the herbage is not abundant and succulent. Still these rudiments of teeth remain for some months, their decrease continuing, first more especially in the 2 central teeth; till at the commencement of the 2d year the 2 central permanent teeth shoot up and push out the mere relics of their predecessors. Towards the close of the 2d year the next incisor on each side takes the place of its temporary predecessor; at the close of the 3d, the next in rotation succeed. The corn, or milk teeth, give place at the close of the 4th or beginning of the 5th year, to their successors; the last teeth obtained are smaller than the rest, and can scarcely be said to be fully grown until a few months have elapsed. The whole set is complete, but while the outer teeth have been growing, the 2 central permanent teeth first, and then the next, have been wearing, and show the marks of attrition, which, at the age of 6 yrs. will have extended to the whole set. The teeth become flattened at the top with a dark, central mark, bounded by a line of bone, and this by the layer of enamel. As yet the 4 middle teeth are the largest; but, again, by slow degrees, a change takes place, and the process of absorption and wearing down goes on. First the 2 central teeth show this, then the next on each side, till at the age of 10 the 4 middle teeth are smaller than the outermost 2 on each side, which, nevertheless, are greatly worn. The animal has then turned the grand climacteric, and the teeth continue more and more to show the ravages of age. At 16 the ox is old, but there are many instances in which the cow will give milk to the age of 18 or 20.

BREEDS.

ALDERNEY.—This breed is almost identical with the *Jersey*, which see.

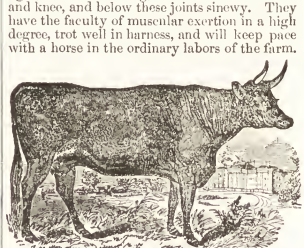
AYRSHIRE.—This breed has been much improved. It is short in the leg, the neck a little thicker at the shoulder, but finely shaped towards the head; the horns are small, but clear and smooth, pointing forwards and turning upwards, tapering to a point. They are deep in the carcass, but not round and ample, and especially not so



Ayrshire Cow.

in the loins and haunches. The Ayrshire cow is a valuable dairy cow, the quantity of milk yielded by her being very great, considering her size; 5 gals. daily for 2 or 3 months after calving, may be considered as not more than an average; 3 gals. daily will be given for the next 3 months, and 1½ gals. during the succeeding 4 months; 3½ gals. of this milk will yield about 1 lb. of butter.

DEVON.—Well recommended for workers and for beef, but not for milk. Their shoulders have that obliquity which enables them to lift freely their fore extremities; and their quarters behind are relatively long. Their bodies are light, their limbs long, muscular to the hock and knee, and below these joints sinewy. They have the faculty of muscular exertion in a high degree, trot well in harness, and will keep pace with a horse in the ordinary labors of the farm.



Devon Cow.

The horn of the Devon bull ought to be neither too low nor too high, tapering at the points, not too thick at the roots, and of a yellow or waxy color. The eye should be clear, bright and prominent, showing much of the white, and it ought to have around it, a circle of a variable color, but usually a dark orange. The forehead should be flat, indented and small, the purity of the breed being very much determined by the latter characteristic. The cheek should be small, the muzzle fine, the nose clear yellow, the nostril high and open, the hair curled about the head, and

the neck quite thick. Excepting in the head and neck, the form of the bull does not materially differ from that of the ox, but he is considerably smaller. There are few things more remarkable about the Devon cattle than the comparative smallness of the cow. The bull is a great deal less than the ox, and the cow almost as much smaller than the bull. But though small, the Devon cow possesses that roundness and pro-

Devon Bull.

jection of the last 2 or 3 ribs, which renders it more roomy than a careless examination would lead one to suppose. She is particularly distinguished for her full, round, clear eye, the gold-colored circle around the eye, and the same color prevailing on the inside skin of the ear; countenance cheerful, muzzle orange or yellow, but the rest of the face having nothing of black, or even white, about it; jaws free from thickness, and the throat free from dewlap. The points of the back and the hind quarters differ from those of other breeds, having more roundness and beauty, and being free from most of those angles by which good milkers are sometimes distinguished.

FRIESIAN.—These are a Dutch breed, and at home are valued both for beef and milk; but, in this country, milk is the object. As bred here, the best are black and white, very large, well-

Friesian Cow.

formed, broad and deep, wedge-shaped, with enormous udders, which are very well quartered and placed; fine bones, with long heads, broad muzzles, thin withers and thighs, and of enormous digestive capacity.

GALLOWAY.—The Galloway cattle are a hornless breed, native to Scotland. They are a medium-sized, compactly built, beef cattle, mature early, and have good flesh; in color mostly black, occasionally red and red brindled. They have not been esteemed specially as dairy cattle.

GUERNSEY.—Similar to the *Jersey*, which see; has richer milk and more highly colored butter; it is also larger, making a very fair animal for the butcher, when well fatted.

HEREFORD.—The countenance cheerful, pleasant, open; the forehead broad; eye full and lively; horns bright, tapering and spreading; head small; chap lean; neck long and tapering; chest deep and full; bosom broad and projecting forward; shoulder-bone thin, flat, full and mellow in flesh; loin broad; hips standing wide and level with the chine; quarters long and wide at the neck; rump even with the level of the back, and not drooping, nor stand-

Hereford Cow.

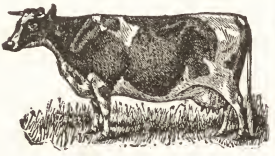
ing high and sharp above the quarters; tail slender and neatly haired; barrel round and roomy; the carcass throughout deep and well spread; ribs broad, standing flat and close on the outer surface, forming a smooth, even barrel, the hindmost large and full of length; round bone small, snug and not prominent; thigh clean and regularly tapering; legs upright and short below the knee; hock small; feet of middle size; flank large; flesh everywhere mellow, soft, and yielding pleasantly to the touch, especially on the chine, the shoulder and the ribs; hide mellow, supple, of a middle thickness, and loose on the neck and huckle; coat neatly haired, bright and silky; color a middle red, with a bald face, characteristic of the true breed. They fatten to a much greater weight than the Devons, and at an early age. They are far worse milkers, but will thrive and grow fat where a Devon would scarcely live. A cross of the Devon and Hereford will

Hereford Bull.

often improve each other, the former acquiring bulk and hardihood, and the latter a finer form and activity. The Hereford cow is apparently a very inferior animal. Not only is she a poor milker, but her form is defective, small, delicate

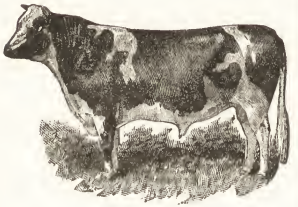
and ill-made. She is very light-fleshed when in common condition, and beyond that, while she is breeding, she is not suffered to proceed; but when she is actually put up for fattening, she spreads out and accumulates fat at a most extraordinary rate. The Hereford ox fattens speedily at a very early age, and it is therefore generally more advantageous that he should go to market at 3 yrs. old than to be kept longer to be employed as a beast of draught.

HOLSTEIN.—This breed has been introduced into this country from Holland, where they have been bred for centuries for dairy purposes.



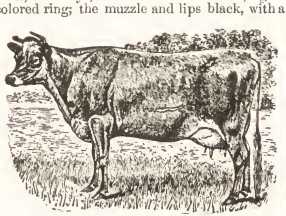
Holstein Cow.

They are large, resembling the shorthorn somewhat in shape and size; black and white in color, and great milkers in quantity and quality.



Holstein Bull.

JERSEY.—The Jersey is well fitted to thrive in all climates, and upon all kinds of food. She is singularly docile, with the graceful head of a fawn, a soft eye, surrounded with a clear, light-colored ring; the muzzle and lips black, with a



Jersey Cow.

light band above, and crumpled horns; the skin is very thin, of an orange color; the ears small and thin, and lined with a deep orange tinge. The limbs of the Jersey cow are very slender and fine; her hips broad and well developed; her neck graceful and rather long; body rotunded with sufficient angularity to insure milking qualities; the veins full and prominent; the udder broad, running well forward and well up behind; teat squarely placed and of a fine yellow tint. For butter making, the Jersey is now the most popular breed among those who take an interest in improved stock. The cows

Jersey Bull.

of this breed are remarkable for their gentleness, their graceful form, and especially for the richness of their milk. They do not give so large a quantity of milk as other improved breeds, but much more than the best common cows; 4 gals. is not considered an extra yield for a Jersey, and this will make 2 lbs of butter.

NEW LEICESTER.—The fore end long, but light to a degree of elegance; chap clean; the head fine but long and tapering; eye large, bright and prominent; the horns of the bulls comparatively short, of the oxen extremely long, as are also those of the cow, and most of them hang downward by the side of the cheeks; shoulders fine and thin as to bone, but thick as to flesh, without any protuberance of bone; girth small compared with the short-horns and middle-horns; chine quite full when fat; loin broad; hip quite wide and protuberant; quarters long and level, the nache of a middle width, and the tail set on variously; round bones small, but thighs fleshy, tapering; legs small, clean, somewhat long; feet neat, middling size; the carcass as nearly a cylinder as the natural form of the animal will allow; ribs standing out full from the spine; belly small; hide middling thick; the color quite varied. The fattening quality, when the breed is in a state of maturity, is indisputably good. As beef stock, they rank high. The principle of the utility of form has been strictly attended to. As dairy stock, their merit is less evident. As beasts of draught, many of them are sufficiently powerful, and are more active than some other breeds used for the plow or on the roads; but their horns form an objection to such use of them.

POLLED ANGUS. — The Angus cattle are black, but at times the evidence of other colors in ancestral breeding will show itself. Their size does not equal the shorthorns, but their

flesh is perhaps unequalled wherever known. They are rivals of the Durham in hardiness, and thus peculiarly fit for exposure on the range. On account of having no horns they are of great merit in shipping; a car will hold 2 more steers, if they are hornless.

RED POLLED NORFOLK.—These are an English breed. They are excellent as dairy cows, and resemble the Devons in their deep red color, and in the fact that they are remarkably good beef cattle also, on an average surpassing that breed as milkers, and not quite equalling

Red Polled Norfolk Cow.

them as economic beef producers. The thoroughbred bull calves sell quickly at high prices for use on the plains. The grade calves are usually hornless, and much more tractable, less dangerous, and less liable to hurt one another when shipped on railway cars.

SHORTHORN, or DURHAM.—This is an English breed, and is one of the most popular imported into this country. In color they are red, red

Shorthorn or Durham Cow.

Shorthorn or Durham Bull.

with white spots, roan, or pure white. They attain a greater size than any other breed, mature early, and make most excellent beef. They are also good milkers, but are bred almost exclusively for their beef.

SUSSEX. — The points wherein the Sussex cattle seem to excel other breeds, consist in their size, deep flesh, thick (though supple) skin, hard hair, and activity; but they carry an excess of horns, and are unamiable animals.

SWISS.—These are hardy milk givers, bearing all the vicissitudes of weather, and yielding rich and abundant milk. Among these breeds is one of a silver-gray color, like one of the most fashionable colors of Jerseys, and in fact resembling

Swiss Cow.

them in other points also—the mealy muzzle, the richness of the milk, etc. The cows are stronger boned and carry more flesh than the Jerseys, and will sometimes approach the average short-horn in weight; 20 quart cows are common, and those giving 28 to 30 qts. are not very rare.

BREEDING AND REARING.

REMARKS.—In breeding, always have a definite aim in view. Indiscriminate breeding always leads to poor results. When a line is established suitable for the purposes in view, continue in that line and work each change of the sire, producing a grade higher in the same line than before. In this way the good qualities of a breed may be perpetuated, and desirable characteristics cannot be maintained without. The breeder of cattle should know that blindness is an hereditary disease, and that the progeny of a bull that has any defect of sight is very apt to become blind.

BULL.

AGE, Procreating. — The age at which bulls should be employed, and the number of seasons they should be allowed to serve, are points regarding which practice is by no means uniform. Sometimes the bulls are pretty commonly allowed to leap while yearlings, and if good stock getters, are kept on as long as they can serve, perhaps till they are 10 or 12 years old; in some places they are employed only 3 seasons, for the first time at 2 yrs. old.

BREEDING-IN.—If milk be the object, select

a yearling bull from a good stock of milkers; if beef be the object, select one with barrel-shaped ribs, well sprung out and ribbed close to the hips, and with large loins, rump and thighs. (See *Choosing the Bull.*) For this bull select from the best cows on the farm, 10 2-year old heifers. The result of this intercourse will be 10 calves; castrate the bulls when about 3 or 4 weeks old. When the heifers are 2 yrs. old, they should be bred to their sire, and the offspring of this union again bred to the same animal, and this continued through 4 generations, if the bull still remains vigorous. The 4th generation will inherit 15-16 of the blood of the sire. Select from these the strongest and most vigorous, and follow this down through the intermediate grades, but keep the families distinct. Great care should be exercised in breeding closely, and whenever the feeding qualities or constitutional vigor seem to be impaired, breeding-in should be discontinued. If the progeny does not improve in the essential qualities, take what is called a "line cross," by choosing another sire with the same qualities as the old sire; this is called "breeding-in." Breed this bull again with select heifers for 2 generations; then take another line cross similarly as before.

CHOOSING THE BULL.—In the bull, the head should be well set upon a broad, deep, muscular neck; having the horns short and not too bright; the ears long, and situated near the head; the inside skin have an orange tint; the forehead should be broad at this point, with a somewhat concave appearance between the eyes; the eyes themselves large, mild, lustrous and prominent; fine flesh-colored muzzle, with nostrils well dilated; the shoulder blades well set toward the rib behind, and yet stretching out finely toward the "crop," leaving no deep hollow between it and the ribs; chest deep; ribs well rounded, and stretching backward to the hip bone, so as to leave no very wide space there; the breadth between the hip bones proportionate to the length from them to the point of the fleshy rump, and tail set on within this outline; the thighs should be well developed and touching each other inwardly to near the hock; the skin covered with thick, soft, somewhat curly hair, and should be to the touch, when the animal is in store condition, soft, elastic, mellow and pleasant; but when the animal is fully fat, the skin itself should be very firm, resisting and resilient to the pressure, like the feel of a well distended hair cushion.

CROSS BULL, Treatment of.—Never pat a cross bull about the head. A firm command, promptly enforced, is the only treatment he should receive; over kindness makes a bully of him.

STABLING.—Keep bulls constantly well fed and in proper inclosures. If designed for breeders, they should be kept as much as possible in an open lot, and not in the stable or box-stall, and should be kept in only in very bad weather, and then only during the prevalence of a storm. Exercise in the open air is conducive to strength, while lying on the ground has a tendency to keep the system cool, which is necessary when an animal is living on stimulating food. Attention must be paid to the feet of bulls kept up, as the hoofs are apt to grow too much, and inconvenience them in walking.

Cows.

AGE FOR BREEDING.—It is best to bring heifers into breeding condition as soon as possible after they are a year old. The first calf should come at 2 yrs., or soon after. To effect this the calf should be well fed after weaning, have good pasture in the summer, with a mouthful or two of bran daily, to push them forward. Unless the calf has been pushed in this way, it will be slow in breeding until it is 2 yrs. old. After the birth of the first calf, the heifer should be coupled with the male again in from 60 to 90 days, and not sooner, so that she may produce the second calf just a year after the first, and so on through her entire breeding period. The great majority of cows cease to breed at the 12th yr., but some have been known to breed when they were 15, 16, 17, or 20 yrs. old.

CALVING, Season for.—The most desirable season for putting cows to the bull is midsummer, in order that the calves may be dropped in the spring, and have the whole of the grass season before them, thus becoming sufficiently strong for enduring the change to a dry food the ensuing winter. Where no regular system is followed, and the cows are sent to the bull merely because they are in heat, calves will be dropped at all seasons. A calf, newly weaned, seldom thrives well during the cold period, unless it is pampered with better food than usually falls to the share of young animals. By midsummer the cows are readier to take the bull than at any other season, and will bring calves in proper time. If a cow goes till after May before she calves, the calf will be too weak the winter following, and the dam will not be so ready to take the bull again, but will often grow barren.

CALVING, Treatment before.—Prevent all excitement to the system. Keep the cows in fine condition during the period of non-lactation; feed very sparingly just before coming on, giving only cooling food; the food richest in muscle-forming elements, and poorest in heat and fat-forming elements, is called cooling food. Nice clover hay, malt sprouts, a little bran, etc., may be given, but no food very rich in oil or starch. But if a pt. of oil meal has been given through the winter, no harm will come of continuing this small quantity, for this is cooling food and slightly loosening, but must be given very cautiously near calving. A roomy stall or loose box should be provided, in which the cow may remain at night without being tied. Milch cows should be milked up to within 4 weeks of calving. Be particular not to allow coming-in cows out among young cattle and oxen, where they may be injured; and do not drive them over ice or allow them to drink a great amount of water.

CALVING, Treatment during.—The average duration of pregnancy is 280 days; but various causes may prolong or shorten this period by a a week or two. When, from the enlargement

of the udder and vulva, and the spreading of the hips, her time is evidently near, the cow should be secluded in some sheltered yard, or in a box stall in the barn, where she may be quiet, and as free as possible from noise and other disturbing influences. If not delivered within an hour after labor pains are fairly established, her case should be examined, and, if necessary, assisted. And, in order to render intelligent aid, the first requisite is to understand the natural and proper presentation; then, in what respect there may occur deviations and how these deviations can be remedied: 1. The natural presentation is that of the 2 fore feet, and the nose following along between them. All the malpresentations, where help is needed, are those in which 1 or both feet, or the head, fail to come forward, and are turned back or on one side—except 2 or 3 breech presentations, which will require separate notice. In order to assist the delivery, or even to examine thoroughly what the presentation is, the hand and arm must be introduced; and, in order to do this, the cow must be supported in a standing posture, and with the hind feet preferably a little higher than the fore feet; because it is almost impossible to introduce the arm when the cow is lying down. Before introducing the hand and arm, the presenting part, whatever it is, should be noosed with a strong cord or small rope, in order that it may not be lost while the fœtus is being pushed back during the operation; for, during the introduction of the arm of the operator, either for examination or for operation, the fœtus must be pushed back. — 2. If, therefore, on examination, one foot does not come forward, or the foot and the head are both turned back or to one side, first move the presenting foot, then push back the fœtus, introduce the hand and arm, noose the other foot and also the head, by putting the cord in the calf's mouth or around his jaw, and pull gently and steadily, till these parts are brought as nearly as possible into the position of a natural presentation; taking special care in all cases to interpose the hand between the hoof of the fœtus and the cow's womb, as you draw the hoof forward, so as to avoid laceration of the womb by the sharp point of the hoof. — 3. As to breech presentations, the one least dangerous is where both the hind feet present. In this case, the chief danger is to the life of the calf; for, unless the labor is hastened as much as possible by a judicious pulling of the presenting limbs, and a lifting of the buttocks of the calf over the rim of the cow's pelvis by the hand of the operator, there is great danger that the calf will suffocate in consequence of the long pressure on its navel-string before its head can be delivered so as to enable it to breathe. The calf lives, either by the pulsations of its navel-cord or by breathing; if, therefore, these pulsations are stopped by pressure, the calf must breathe within about 4 minutes, or suffocate. The other 2 presentations of the breech, where the hind feet of the fœtus are either turned backwards and up against the loins of the cow, or downwards towards her belly, are remedied by introducing the hand and arm, noosing the hind feet, and drawing them as nearly as possible into the breach position, first mentioned, and then delivering as speedily as possible. There is one more presentation, and it is the worst possible—that of the neck or shoulder of the calf, while its feet are turned towards the cow's abdomen. This is usually owing to hydrocephalus and ascites, or head dropsy, and abdominal dropsy of the fœtus; and delivery can only be accomplished after letting out the water, first, by a short trocar plunged into the calf's head, and then by a long one to reach its abdomen. A dead fœtus is, of course, the result.

CALVING. Treatment after.—The calf should not be taken away immediately, and the mother should be allowed to cleanse its offspring in its own way. After calving, the food should be light and cooling. The oil meal may be increased to 1 qt., as it is desired to keep the bowels open. Feed 1 pt. of oil meal through the winter. Simple hay and a thin bran slop is sufficient for 6 or 8 days after calving, as it is necessary to ward off all danger of milk-fever in fleshy cows. After the system has recovered from parturition, then the food should be gradually increased up to a full ration. It is usual to take away 1 qt. of the first milk, called the "beastings," before the calf is allowed to suck. After this the young animal may be allowed access to the cow, but regulated by the plan of suckling, or bringing up, on which the raiser may determine. The calf should remain with the mother during a few days at least, or until the milk is proper for the purposes of the dairy; 9 months in 12 is as long as any cow should give milk. In case the animal becomes too fat, exercise, and not starvation, should be used to reduce her.

CHOOSING FOR BREEDING.—Extra milkers should be kept to breed from, their milking qualities alone entitling them to this preference. More attention should be paid to what the cow has done and can do, than to the fact that its parents through a long line may have their names in the herd-book.

SEX AT WILL.—The practicability of this is maintained by Fiquet. The following are experiments which led to his conclusions: Choosing 8 cows, he fixed upon 1 from which he desired a bull calf, the other 7 were to produce heifers. Having carefully noted the dates of the periods of the 8 cows he allowed them to pass 1 œstrum, and thus was able to anticipate the return of the period in each. The cow destined to produce a bull calf came in first. Mr Fiquet began to feed her most bountifully upon grain, corn, oats, meal and rich hay. A few days before the reappearance of her period, she was withdrawn from the herd and well stabled. As anticipated, her passion came strongly. The bull, meanwhile, had been fed upon green and cooling food, which moderated his usual passion, and the difference between the animals was plainly discernible. His theory was, that the cow being far more desirous for the bull than was the latter for the cow, nature was thus calling more loudly through the female than through the male for the natural gratification of her desires; that the services of a male were more necessary than that of a female. This he supposed to be the desired

disturbance of a uniformity in nature, and consequently, that in her very economy nature required the production of a bull calf. The cow was served by the bull twice, and the result was the desired bull calf. The remaining 7 cows were submitted to a castrated bull, who, though impotent, served as a never failing detective of the periods of the cows. Previous to his introduction to each of the cows, the other bull was generously fed on various rich grains and clover hay. On the other hand the several cows were kept cool by light food—grazing, green fodder, and bran. When their periods arrived, the animals were allowed to run temporarily with the castrated bull, and their frenzy was thus partially allayed. Being finally coupled with the service bull, the conditions in each case were a rampant bull and a moderately excited cow—the reverse of the conditions in the first experiment. The bull, being more anxious for the cow than the cow for the bull, the result was the birth of 7 heifer calves.

SUCKING BY CALF, Injury from.—Allowing a calf to suck long after birth is a great injury to a cow. The udder of a young cow, thus treated in the full flush of her yield, loses capacity to hold a large quantity of milk, if it ever had it, and older cows, becoming accustomed to the steady half-hourly draughts of the calf, fall off in their yield rapidly after the calf is sent to the market. Calves, it is true, usually fatten better on the cow than as fed in general practice in this country, but the practice is wrong. Take the calf away when 4 weeks old; it can be fattened after that even on skim milk, if properly cared for.

TWINS.—Cows seldom bring more than one calf at a time. When they produce twins, one of them a male and the other a female, the latter, which is called a "free martin," is commonly considered incapable of procreation, though there are a few instances to the contrary.

CALVES.

CARE IN GENERAL.—The calf should be allowed to suck for a day or two to get enough of the mother's milk to physic it. Then shut it up in the apartment assigned. Fasten up, at a proper height, a V trough large enough to hold 2 gals. It is no use to offer a calf milk until it has fasted 24 hours. When the calf gets hungry it will generally be little trouble to teach it to drink. For a week or 10 days give the calf new milk; then substitute warm skim milk, with a little flaxseed tea or oil meal added. When the calf is about 4 weeks old, put a little shelled corn in its trough, and it will soon learn to eat it. It is essential in feeding to change the food as much as possible and to have it of a nourishing quality. A good substitute for milk is bean soup, made thin enough to drink, to which has been added cornmeal and a small portion of salt. If it is possible to add milk to the bean soup, it will be much better for the calf. For older calves the following mixture is good: 100 lbs. wheat middlings; 50 lbs., each, of corn, oats and linseed cake meal, ground together. Give 1 qt. a day of this in a dry state to a calf on pasture after it is weaned from milk. Salt should be given sparingly to young animals; but plenty of water must be supplied. After grain has been cut, calves may be turned into fields that have been seeded to clover and true grasses, to excellent advantage. At first they should be allowed the range of a field of young clover a few hours at a time, and should be supplied with some dry food to prevent bloat or hoven.

CASTRATION.—If bull calves are to be raised for beef or draught, the best time to castrate is when they are about 4 weeks old. Tie the calf's head close to a post or fence; or the animal may be thrown on its left side for the operation. Grasp the scrotum in the hand, between the testicles and the belly, and make an incision on one side of it, near the bottom, of sufficient depth to penetrate through the inner covering of the testicle, and long enough to admit of its escape. The testicle immediately bursts from its bag, and is seen hanging by its cord; compress the blood-vessels with ligatures, and prevent after hemorrhage, and thereby save a great deal of unnecessary torture by including them alone in the ligature, and afterwards dividing the rest of the cord. The other testicle is proceeded with in the same way, and the operation is complete. The length of the cord should be so contrived that it shall immediately retract into the scrotum, but not higher, while the ends of the string hang out through the wounds. In the course of about a week the strings will usually drop off, and the wounds will speedily heal. It will be rare that any application to the scrotum will be necessary, except fomentation of it, if much swelling should ensue. Another mode is as follows: The spermatic artery is exposed, and seized with the forceps, which are then closed by a very simple mechanical contrivance; the vessel is drawn a little out from its surrounding tissues, the forceps are turned round 7 or 8 times, and the vessel liberated. It will be found perfectly closed; a small knot will have formed on its extremity; it will retract into the surrounding substance, and not a drop more blood will flow from it; the cord may then be divided, and the bleeding from any little vessel arrested in the same way.

SPAYING.—If the heifers are to be raised for beef, it is best to spay them; i. e., to remove the ovaries, when 1 yr. old. Get 3 ropes, 16 ft. long, and $\frac{3}{4}$ in. thick; tie a 2 in. iron ring in the end of 1 rope; take $\frac{1}{2}$ in. rope, 30 in. long; put a 2 in. ring on it and tie the ends together, making a loop 12 in. long; tie the animal to a tree or post, by putting a rope on its head, also by a rope on the left hind leg, below the hock, to another post; put the long rope through the ring around the right fore ankle; put the short rope around the right hind leg, with the ring through the loop for a pulley; now pass the end of the rope on the fore leg through the ring on the hind leg, and then under the belly to the left, where it is pulled hard, while a man on the right pulls the tail to the right. Now grasp the flank, and push it downward. Cut a gash through the hide into the red flesh; make the gash about 4 in. long; draw the skin and mem-

brane back 2 in. toward the hip; stick a knife through the flesh at this point into the abdominal cavity; with the right thumb and left forefinger tear an incision to admit the hand to feel for the ovaries; remove them with curved, pointed scissors; then sew up the cuts by the skin only, and smear the wound with pine tar.

STABLING.— When they are suckled, if the stable be roomy enough, stalls are erected for them against the wall behind the cows, in which they are usually tied up; or they are put into large loose boxes at the ends of the stable, and unfastened at stated times to be suckled. When brought up by hand, they are put into a separate apartment from that of the mother, and each confined in a crib, where the milk is given to them. The crib for each calf should be 4 ft. square and 4 ft. in height. Abundance of light should be admitted, either by windows in the walls or skylights in the roof; thorough ventilation and a regular supply of fresh air should also be attended to. The crib should be fitted up with a manger to contain eut turnips or carrots, and a high rack for hay, the top of which should be as much elevated above the litter as to preclude the possibility of the calf getting its feet over it.

General Management.

BREACHY CATTLE, Treatment of.—When cattle jump out of inclosures, take an old headstall with a browband, throat-latch, and noseband, going all around the nosc; get an old boot-leg, (or any piece of leather that is wide enough to extend beyond the eyes), split it open, and with copper rivets fasten this to the browband and the noseband. The animal can see in front of him by bending to the right or left, but he will never jump with his neck bent, or when he can not see his way clear.

BREAKING OXEN TO THE YOKE.—It is best to begin with them as calves, and let the boys play with them, and drive them, tied or yoked together, taking care they are not abused. When a pair of old steers are to be put together and broken to the yoke, or a pair of bulls, it is best to yoke them and tie their tails together, in an extempore stall, in a well-fenced yard, and then turn them loose in the yard, which should not be large enough for them to run in and get under much headway. If the tails are not tied together, they will frequently turn the yoke, which is a very bad habit. The daily lesson should be given after they have stood yoked a while. They should not be taken from the yard until they have become used to the yoke, and are no longer wild and scary. All treatment should be firm but mild, and no superfluous words should be employed.

COOKING FOOD.—Connected with the cattle sheds and feeding yards, there may be an apartment for boiling or steaming food, in which a steaming apparatus is placed. For this purpose our illustration shows a good form. The boiler is so constructed as to generate steam in a few minutes. The water barrel or tank is connected with the boiler by 2 pipes; the upper one conveys the steam into the barrel, thus forcing the water through the lower pipe into the boiler. The lower one is provided with a cock, by which the flow of water is stopped at pleasure. The pipe on the other side of the boiler connects with the cooking apparatus, conveying the steam to the food to be cooked. To cook corn for cattle, soak as many barrels, ½ full, as are desired, from 15 to 24 hours; turn these at the end of this time into the cooking apparatus; turn on the steam, and cook until done. To make mush, fill the barrel ½ full of water, and bring it to a boil; then stir in from 1½ to 1¾ bus. meal, until well mixed; then cook till done. To cook vegetables in general, fill the barrel full, chop the top fine with a shovel and cover with meal; then

Apparatus for Steaming Food.

cook till done. To cook hay, put a false bottom in the barrel; press down the cover tightly, after the hay has been cut, wet and put in. Pass the steam under the false bottom. Warm water may constantly be had from the boiler, and the superfluous steam may be usefully applied for heating, and other purposes of domestic economy.

FASTENING CATTLE IN THE STABLE.—When a farmer is about to build a barn or stable for his cattle, the question always arises which method of fastening is best, for there are various devices in use and each one has its advocates. The old fashioned stanchion seems to be the most popular; but better than any other mode of fastening are proper stalls. Cows, as well as man, must be allowed a change of position to be comfortable and continue healthy. These requisites can not be had, if the cattle are fastened. If stalls are not used, a humane way to fasten the cattle is as follows: Use small posts, 4 by 6 in., set up where the stanchion would be, 3 ft. 2 in. from centre to centre. On the inside of these posts, 14 in. above the floor, drive a ⅝ staple, 12 in. long, into each post. A ¼ inch cable chain, stretching from staple to staple with a ring on each end, slides up and down on the staples, and has a ring in the middle to which the cow is to be fastened; a leather strap, 1½ in. wide, with a strong breast

strap slipped on, is placed around the cow's neck and riveted on with 3 small copper rivets. The cow is brought between the 2 posts, and the snap fastened to the ring in the middle of the chain, which holds the cow in the centre between the 2 posts, but the slack of the chain, and the chain slipping back and forth upon the neck, enables the cow to move forward and backward, to turn her head, and she may lick or scratch herself from shoulder to rump; when she lays down, it may be in the natural position with her head upon her shoulder. The cow carries the strap upon her neck, and it is not as much work to fasten her as with a rope.

FATTENING.—The age at which cattle are fatted depends on whether they are being employed in breeding, in labor, for the dairy, or solely for the butcher. In the latter case the most improved breeds are fit for market when about 3 yrs. old, and very few of any large breed are kept more than a year longer. As to cows and working oxen, in most instances the latter are put up to feed after working 3 yrs., or in the 7th or 8th year of their age. When fattening an animal for beef, let the process be as quick as possible. Any stint in feeding will make the meat tough and dry. Fattening stock will thrive most when fed only such a quantity as will be eaten readily with good appetite. A variety is desirable. One feed daily should be some esculent, as potatoes, turnips, or beets. Feed and water should be given at regular times, by one feeder, who will soon learn what each animal requires, and salt must be placed where they can take it at will. An ox may be fatted on hay and potatoes, boiled, and given half warm with cornmeal. Give 1 bus. of potatoes and 8 qts. of meal daily, and all the hay that will be eaten clean. Feed 4 times a day and give water only moderately. Another good fattening ration is made as follows: 8 bus. of corn, soaked in 10 pails of water 2 days; then simmered for 1 hour or so; afterwards mixed with 14 lbs. of coarse, cheap sugar or glucose, and mixed with cut straw, hay or other fodder. It is often necessary to dry up the milk when cows are wanted speedily to fatten, and this is sometimes found difficult with large animals. The best time is very early in the spring, when they are eating dry food. A good dose of physic, followed by mild, astringent drinks, will usually dry her, especially if she is moderately bled before the physic is given. The cow may be milked clean when the astringent is given, and then turned on some dry, upland pasture; 2 days afterwards she should be examined, and if the udder is not overloaded, hard or hot, the milking may be discontinued; but, if the udder is hard and full, and especially if it is hot, she should be milked clean, and another astringent drink given. The common method of fattening calves is to allow them to suck. The period necessary varies from 5 to 9 weeks, the time being much shorter where milk is very valuable. Another method is, to give them the milk to drink, morning and evening, warm from the cow; the quantity increased according to their age and strength. They should be kept in pens in a close house, well littered, kept clean, and enjoy a due quantity of fresh air. Meal, linseed boiled into a jelly, and such like articles, are also given to calves while fattening.

FEEDING MILCH COWS.—Grass is the best milk-making food. In summer give the cows plenty of good, rich pasture, free from weeds, and plenty of water. The transition from summer to winter food should be gradual; as the grass becomes shorter, give hay in increasing quantities. For milch cows, barley meal is probably better than any other, when fed alone. Equal quantities of corn, oats and barley, mixed and ground together with the same weight of wheat bran added that there is of each kind of grain, makes the best kind of feed. The meal for cows in cold weather, should be scalded, using enough water for the purpose to make it like thick porridge, and fed to them while it is warm. Bran or ground feed is best fed to cows upon moistened hay; it being mixed with the hay, all will be eaten together, and mixed and masticated. But, if it is not fed with cut hay, it should be fed dry and in a small quantity each time. The drumhead cabbage and cotton-seed meal are the richest vegetable substances that can be given to a milch cow. The disagreeable flavor liable to be imparted to the milk by the cabbage, may be removed by dissolving 1 oz. of saltpetre in 1 qt. of spring water, and mixing ¼ pt. of it with 10 or 12 gals. of milk, as it comes from the cow. Cotton-seed, 1 qt., combined with bran and cornmeal, of each 3 qts., then mixed with hay and thoroughly saturated, makes a splendid feed, given twice a day. If the cow shows a desire to chew old bones, give her phosphate manures. If 30 lbs. of pumpkins are fed to a cow each day, the yield will be increased; but more should not be given.

HEIFER, To Break.—If in winter, it is best to milk in the stable, make as little fuss and as few alarming motions as possible; handle her very gently. Be careful not to pinch the teats. A cow naturally wishes to be rid of her milk. She stands quietly until some careless milker has given a squeeze that hurts, when she kick and runs. The best way to manage, if you have no stable, is to have a well-fenced yard, and teach the heifers to stand for milking in that; or, next best, to tie them, using them very quietly. As a rule, by letting the calf suck 2 or 3 days and milking at the same time, with patience and gentleness, heifers will become docile to the milker, and stand even quietly untied in the open yard to be milked. Occasionally comes the exception. In that case, loop a rope around the near hind leg above the ankle, and draw it back till it becomes impossible to bring it near the pail or to disquiet the milker, milking with both hands. At first the animal kicks ferociously, but daily it grows less, till all becomes quiet, when it will do to make a trial of the heifer without the rope. The heifers should be daily handled and petted, and made so familiar with the persons who have them in charge as not only to show no fear, but exhibit a fondness for persons and a desire to be caressed.

HOOKING FENCES, To Prevent.—Take ½ in. annealed wire 10 in. long, make a ring in one end 1½ in.; grind the other end sharp, and punch through the gristle into the nose. The animal's head has to be fastened securely in the stanch-

fons in order to bore the holes through the horns, which should be done with a $\frac{3}{8}$ bit; then punch

To Prevent Cows from Hooking Fences.

the wire through and make the same sized ring in the sharp end. Now take a cord that will run easily through the holes in the horns; tie one end to the ring on one side and pass the cord through the holes in the horns to the other ring. The wire should be bent above the nostrils to prevent the breath from the nostrils rotting the cord. The cord should not be very tight when put on, as it will shrink a little.

JUMPING FENCES. To Prevent.—Nail a horse-shoe on one forward foot. This prevents the hoof from spreading, and renders the animal unable to spring. Make it a rule, whenever cattle are made to pass a fence, whether through bars or slipgap, to leave 1 rail for them to pass under. This gives them a downward tendency, and lessens their inclination to jump or look upward, as they are sure to do when a lazy attendant throws down part of the rails, and makes them vault the rest.

MILCH COWS, Selection of.—A good native cow should yield an average of 7 qts. of milk per day for 10 months, that is, equal to about 2,000 qts. in the year; of this, if she is a good cow, and well fed, 160 or 170 lbs. of butter should be made, or about 5 lbs. a week. A good Jersey cow should give about the same amount of milk, but twice as much butter. A cow is in her prime at from 4 to 6 yrs., and the best paying time to buy is just after the birth of her second or third calf. A good milch cow should have a thin, hollow neck, light fore quarters, with little dewlap; a well-rounded chest; broad loins and hips, and not show indications of putting on fat. The udder should be full and round, yet thin to the touch, and of equal size and substance throughout. If it shows more behind than before, it is deemed a sign of the milk falling off soon after calving, and if it feels coarse and lumpy, the bag will be found not to contain a large quantity. The teats should stand square, at equal distance, and should neither be very large nor thick towards the udder, but nearly equal, yet tapering. Draw milk from each teat to see that it is in good working order. When the large vein running forward from the udder on the belly just under the skin, called the milk vein, is very large, crooked, and enters the abdomen through a hole that will allow the entrance of a man's finger; it is a sign that the cow will yield a large quantity of milk. The famous Guenon system of judging of the value of cows for milk by the "escutcheon" or "milk mirror," is an external mark on cows, whereby their good qualities or defects may be known. Great diversities exist among cows in respect to the shape of the bearded ears, or quirls, which produce the dandruff found in spots on her hind parts, where the hair grows upward. Escutcheons are different in size, shape and quality of the skin and of the hair growing on them. These differences indicate the different milking qualities of the cows, including quantity and quality of milk, and the length of time they will give milk after being with calf. On the edges of the escutcheon, where the upward and downward growths of hair meet, a feather is formed, and this is most conspicuous on the back part of the thighs, where escutcheons extend that wide. The hair on the escutcheon is shorter and softer than elsewhere, and sometimes nearly resembles fur. There is one general shape to which they

A Good Mirror.

The Best Mirror.

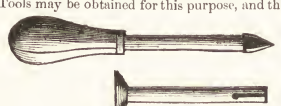
conform, they are wider below than above, and at or near the top of the udder they narrow in abruptly; some continue up as far as the vulva, and even above it, and others but a little distance above the udder. The larger the escutcheon, the better. All great milkers have very large escutcheons. In large ones the upturned growth often begins on the belly, in front of the udder, extends along between the teats and up the back part of the udder, over the whole width. A good escutcheon is symmetrical. The feathers on the two thighs are at equal distance from the middle line of the body and extend up to equal heights on the back part of the thighs. A broad and high escutcheon indicates a superior milker. There is nearly always another sign accompanying such an escutcheon, and that is one or two ovals just above the hind teats, on which a fine coat of hair grows downward. These may be large or small, may be one or two, and may be alike in size, or unlike, but they are always good signs. Two are better than one, and the larger and more uniform they are, the

better. **The quality of hair and skin of the escutcheon** indicates the quality of the milk. There are 10 classes and 6 orders to each class of escutcheons. To each class one more is added called the "bastard." The first 4 orders of each class and the marks of the bastard are all that require notice. The classes are as follows: 1st class, or Flanders; 2d class, or left Flanders; 3d class, or Selvage; 4th class, or Curveline; 5th class, or Bicorn; 6th class, or Double Selvage; 7th class, or Demijohn; 8th class, or Square Escutcheon; 9th class, or Limousine; 10th class, or Horizontal. The orders in each of these classes are designated by their appropriate numerals. Each class is better than the succeeding one, and each order better than the following one of the same class, but may be better than the preceding order of the next class.

MILK, Holding Back, To Prevent.—Place a weight on the back of the cow while milking her, or lay a wet rag on her back.

PASTURING.—The best grass for pastures is orchard grass. This stands the drought beyond all the good grasses, and is never seriously hurt. Besides, it is an early grass, and will maintain itself in a late growing season, on good soil, pushing forward very rapidly, making 1 in. a day. It is also highly nutritious and relished by stock. Pastures that have been fed a few seasons will generally produce more milk or make more fat than those which have been newly seeded down. Mow orchard grass 3 times in a season, and in October an aftermath will be had, which furnishes good pasture. The meadow pasture can be kept in good condition by this method, if it is occasionally re-seeded, harrowed, and other varieties mixed in. Do not cut too low, and add a light top-dressing of some fertilizer after cutting. The following is a good plan to follow in pasturing, in case of a scarcity of land: Plant a strip 14 rods long and 4 rods wide, with timothy and clover, which cut twice, and sometimes thrice a season. As soon as it will do to cut, feed it regularly to the cows twice a day, and it will last till the corn is ready to use. Plant a strip 14 rods long and 10 rods wide with sweet corn for fodder; make the stalks about 2 in. apart in the row; plant at 3 different times, so as to have it early and late. About the 1st of July commence to thin it out, leaving about 1 stalk per ft. Soon after, commence cutting it up clean. When ½ cut up, plow the ground and sow winter rye; sow the balance as soon as the corn is on. This makes good pasture late in the fall and early in the spring. The average amount required in this case is 2½ acres to one cow.

RINGING. — Bulls should have a good ring placed in their nose before they are 1 year old. Tools may be obtained for this purpose, and the



Tools for Ringing Bulls.

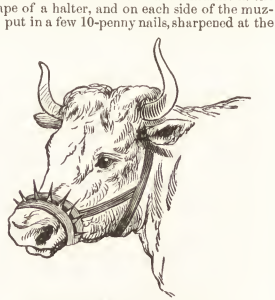
ring is easily inserted. Whittle a piece of wood that it may be placed in the nostril to meet the blow to be given to the punch; let an assistant hold the wood in place; tie the bull securely; then place the punch in the opposite nostril; give it a smart blow, and then put the ring in the hole thus formed.

RUBBING POSTS.—There should be posts set up in the pasture for cattle to rub themselves, and they will use them and thus save the fences and gate-posts.

SELF-SUCKING COW, To Cure. — 1. Take a halter, with a nose-piece just tight enough to allow the cow to eat well; fasten on each side, with wire, sticks made of good hickory, 2 ft. 3

Device to Prevent Self-sucking.

in. long; make a girth of No. 9 wire, with eyes bent a little above the middle of the sides, to which fasten one end of short wires, 10 in. long; fasten the other ends to the sticks; place a leather pad under the wire on the back. —2. A good device is as follows: Make a muzzle in the shape of a halter, and on each side of the muzzle put in a few 10-penny nails, sharpened at the



Device to Prevent Self-sucking.

points. —3. A good method is to take a stick about the size of a large pitchfork handle and about 3 ft. long; insert in or near each end, stap-

les, such as are used on light neck-yokes for 2-horse buggies; put a strap, long enough to reach around the cow's neck, through 1 staple, and one long enough to pass around the cow's body, just back of the fore legs, through the other staple; buckle the shorter strap around the neck; pass the other end of the stick between the cow's fore legs and buckle the surcingle around the girth, both rather loosely.—4. If their teats are rubbed frequently with strong, rancid cheese, it will prove an effectual remedy.

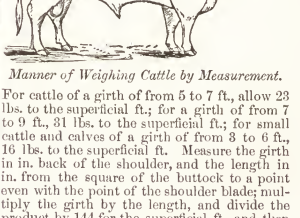
SHADE AND SHELTER.—To cattle in summer time left to roam about sunburnt pastures, a few shade trees are a luxury. There are generally odd corners where trees may be left to advantage, especially a wet place, perhaps near a spring, where a willow would grow. A shed, open to the north side, will furnish a great protection to the cows that are kept in the pasture through the day, and provide safe shelter from sudden showers.

STABLING.—Cleanliness should be the rule, instead of the exception, in the case of the stable, and the animal should be kept clean by the use of a card and brush. The bedding should be frequently renewed; the fodder in the bin kept fresh, and not allowed to become moldy and emit foul odors. The floors should be kept swept, and occasionally be allowed the privilege of the hose; but the stable must be kept dry. Cows need plenty of air and a warm temperature. If they have not a warm shelter, they consume an unusual amount of food to keep warm. A temperature of 45° should be maintained. Very good ventilation can be secured through the windows or small doors, placed at intervals in the walls in front of the cows. These small doors can be swung up so as to let in more or less fresh air, as the wind and weather may demand. The air should always come in near the cows' heads, where they can breathe it, and the outward ventilation should be in the rear, through tunnels running up in the walls; or, if the cattle stand in 2 rows, running up from the alley-way between them. Care should be taken that there be no perceptible draught on the cows. For keeping cow stables clean and sweet, fine, dry earth is superior to any other bedding. It absorbs all smell, and saves the loss from evaporation of the liquid manure. Dry sand is another good bedding; it is easily procured, and acts as an absorbent. Sawdust, however, is considered the best; it makes a more comfortable bed, completely absorbs the urine, and the cow is kept clean with less labor than when anything else is used. All animals, to be kept in good health, must have exercise and sunlight. The light of all stables should come from behind, never from the front.

SOILING.—The meaning of the word "soiling," as understood among cattle feeders, is the practice of confining animals to the stake or small lots, and feeding them on green clover, corn, grass, etc., cut as needed, and not allowing stock to graze on the ground where the food grows. By this system, land may be utilized which would be kept barren by the cattle being constantly pastured on it. The crop can be much more easily manured to better advantage, and a careful rotation of crops is kept up; also, a more uniform system is provided as regards quantity.

TETHERING.—This mode of pasturing saves the fence and grass. A tether chain, 20 ft. long, with a leather headstall, by which the chain is fastened to the cow, and an iron peg to drive into the ground, are all that are required. The cows should all be pegged in a line; then they will eat in a circle. Move them forward a few feet at a time, so as to give only a narrow strip of grass at the end of their chain. They thus stand principally on the ground eaten over. When the cows have eaten across the field, bring them back, and repeat the process. If a pole is used in place of a chain or rope, as far as the animal's body extends, and a piece of rope to admit of the animal holding its head up, is attached to one end, and the desired length of chain to the other, there is no danger of injury by tangling.

WEIGHING CATTLE BY MEASUREMENT.—To obtain the girth, pass a cord around just behind the shoulder blade, under the fore leg; to find the length, measure along the back from the foremost corner of the shoulder blade, in a straight line to the hindermost part of the rump.



Manner of Weighing Cattle by Measurement.

For cattle of a girth of from 5 to 7 ft., allow 23 lbs. to the superficial ft.; for a girth of from 7 to 9 ft., 31 lbs. to the superficial ft.; for small cattle and calves of a girth of from 3 to 6 ft., 16 lbs. to the superficial ft. Measure the girth in in. back of the shoulder, and the length in in. from the square of the buttock to a point even with the point of the shoulder blade; multiply the girth by the length, and divide the product by 144 for the superficial ft., and then multiply the superficial ft. by the number of lbs. allowed for cattle of various girths, and the product will be number of lbs. of beef in the four quarters of the animal.

TREATMENT OF DISEASE.

REMARKS.—When cattle stretch themselves on rising from the ground, and when they chew the cud, they are well and hearty. When their coats stare, and their eyes are dull, if the nose is dry and scurfy, and especially if their hide sticks close and hard to the ribs, pass the hand

with something of pressure along the back; if they shrink down from the touch, they are ill; have either caught cold, or have internal disorder coming on, which, taken in time, may be checked by warm nursing and a dose of salts, well seasoned with some cordial mixture, or with ginger. As soon as an animal is discovered to be unwell, let it be placed in a house by itself; this is necessary, both for the welfare of the sick animal and for the safety of others. The house that the animal is placed in, ought to be warm, well lighted and ventilated, and kept scrupulously clean. In acute diseases, no food ought to be given until improvement has taken place, and then only in a sparing manner; the articles of diet most suitable are, bran, oats, hay, carrots, turnips, and green food, either grass or clover; the bran may be given either dry or wetted, whichever way the animal prefers; oats may be given mixed with the bran, either raw and crushed, or whole and boiled; it is necessary to keep the animal without food or water ½ hour before and after administering medicine. In acute diseases, it is necessary to repeat the dose every 5, 10, 15, or 20 minutes; in less acute diseases, every 2, 4, 6 or 8 hours; in chronic diseases, once in 24 hours is sufficient. Physical symptoms and diseases of the brute creation should be treated generally on the same principles as those in man. There is no more mystery about the ailments of one animal than another. With the exception, perhaps, of cattle, the quantities of doses should be proportioned to those given to man, as weight to weight, somewhat reduced for safety. Cattle have 4 stomachs, and need to be treated with medicine in larger quantities, and always in fluid form, so that it may pass from one stomach to another without injury and in the shortest possible time. Similar rules of proportion should also be followed in the administration of doses to early ages of animals, to those given in *Administration of Doses* in MEDICINE.

ABORTION.—The premonitory signs are an irritable, excited state of the animal, staggering when walking, a discharge from the vagina, looseness and fullness of the external organs of generation, and occasionally sudden enlargement of the udder. Abortion may be caused by fright, injury, improper food or water, a diseased male, and commerce with him after conception. *Treatment*: These symptoms may continue for several days, and if noticed before straining or other signs of calving have appeared, the animal should be placed in a comfortable loose box, away from the herd, kept as quiet as possible, moderately supplied with soft, laxative food, and, if the bowels be costive, with 1 or 2 lbs. of molasses daily. Powerful purgatives are too irritant, and must be avoided; 2 oz. of laudanum, with the same quantity of sweet spirits of nitre, should be given twice a day, until all danger is over.

ALBUMINURIA.—This corresponds to Bright's disease in the human system, and is caused by impoverished blood in consequence of low diet. There is generally constipation, straddling gait, stiffness, and the urine is thick and dark. *Treatment*: If the bladder is full, evacuate it. Regulate the bowels and kidneys by giving 1 dr. of blue mass at night, and the following the next morning: Epsom salts, ½ lb.; sulphur, 4 to 6 oz.; ginger, ½ oz.; gentian, ½ oz.; warm water, q. s.; and with injections, when necessary. Make also a complete change of diet. If it still continues, give 1 dr. of muriated tincture of iron (tincture of chloride of iron) in ½ pt. of water, 3 times a day.

ANEMIA.—This is a weak condition of cows, and is sometimes called poverty of blood. The symptoms are whiteness and clearness of the lining membranes of the nose, mouth and eyes. When this condition occurs as an effect of some disease, the animal will become hectic, and die in a month or so from the first attack. *Treatment*: Give the following powders, night and morning, in cut feed: 3 dr. powdered gentian root; 3 dr. powdered ginger root; mix, and make into 1 dose. If these powders improve the animal in a week, give 2 dr. sulphate of iron in addition. The iron may dry up the milk considerably.

ANGLE BERRIES.—Little warty tumors, growing on various parts of the skin, which sometimes become very sore. *Treatment*: 1. Tie a piece of waxed silk firmly around the base of each, and tighten it every day; the tumor will drop off, and rarely grow again; there will be no bleeding, and the neighboring parts will not be inoculated. — 2. If attended to before they have reached any considerable size, they will gradually disappear when they are daily touched with nitrate of silver, either in substance or in the form of a strong solution; strong nitric acid will answer the same purpose.

APOPLEXY.—In this disease the animal drops suddenly, and is incurable.

BLACK-LEG.—The symptoms are: Extension of the neck, red eyes, hot breath, dry muzzle, quick pulse, heaving, moaning, loss of appetite, and lameness. *Treatment*: Give a strong purgative dose, composed of 1½ lbs. Epsom salts, 1 pt. linseed oil, and 3 pts. water. A seton, occasional doses of physic, and frequent careful examinations by the owner, are better than all else to prevent this disease. The following drench has been recommended: 1. Sweet spirits of nitre, ½ fl. oz.; powdered cascarilla, 2 oz.; solution of acetate of ammonia, 4 fl. oz.; yeast, 8 fl. oz.; given every 3 or 4 hours. — 2. Laudanum and sweet spirits of nitre, of each, ½ fl. oz.; solution of chloride of lime, ¼ fl. oz.; prepared chalk, 1 oz.; warm gruel, 1 pt.

BLADDER, Inflammation of.—In cows that are near parturition, a discharge of urine is not infrequent, which arises from irritation of the bladder, caused by the pressure of the fœtus, or from sympathy with the uterus, now much excited, and not from actual inflammation. When the cow has calved, this will gradually cease. *Treatment*: If it continues, give a dose of salts, followed by 1 or 2 of the following powders: Antimonial powder, 1 sc.; camphor, ½ dr.; nitre, 1 oz.; mix; and give twice a day in gruel.

BLADDER, Prolapsus of the.—Among cows, during and after difficult calving, there will be sometimes observed a white, shining, watery bag protruding between the lips of the vulva;

this is the bladder; it is twisted at its neck, and cannot be emptied. *Treatment*: Carefully examine the distended bag, its shape and size. Having determined that it is the bladder, carefully cleanse it, if dirty, and pass the hand, previously oiled, along its surface, ascertaining which way the turn or twist is made; then take the bladder by the other hand, and reverse the turn or twist, and carefully push it back into its place. Should it again protrude, plug up the vulva, for 1 or 2 hours, with a roll of soft cotton cloth. If this is not sufficient, with a small packing or darning-needle, pass a suture of stout saddler's silk, or other strong material, through each side of the vulva, and allow it to remain for a few days.

BLAIN.—The animal appears dull and languid, the eyes red and inflamed, with tears trickling from them. A swelling begins about the eyes, and occasionally appears on other parts of the body; there are generally blisters under the tongue or at the back part of the mouth; the pulse is quicker than natural; there is more or less heaving of the flanks; and the bowels are sometimes constipated; there is often a copious flow of saliva from the mouth, mixed often with a purulent, bloody, stinking discharge; the animal becomes extremely weak and reduced, and is in danger of being suffocated by the rapid enlargement of the tongue. *Treatment*: Cut deeply from end to end, the bladders that are found along the side of and under the tongue; they will appear to be filled with a glutinous matter; although there may not be much bleeding from them at first, considerable bloody fluid will gradually ooze out, the swelling of the mouth and head will subside, and the animal will be very much relieved. If much fever has accompanied the enlargement of the tongue, give a physic drink. Wash the mouth with a solution of chloride of lime in water, in the proportions of 1 dr. of the chloride to 1 pt. of water, while the mouth is very offensive; and with equal parts of tincture of myrrh and water afterward, to promote the healing of the ulcer. Thin gruel should always be placed within reach of the animal, and plenty of thick gruel administered with a horn.

BLOODY MILK.—Results from violent jerking of the udder, racing about, a blow, cold in the organ, or other similar accidents. Some heavy milkers are subject to it occasionally. *Treatment*: 1. Freely bathe the udder and flank with cold water until soreness departs, and milk regularly and gently. — 2. Give 8 oz. of salts, or 4 dr. of saltpetre, or both together.

BONE DISEASE.—*Treatment*: 2 oz. bone meal in 1 pt. bran, 3 times a week, during early summer and fall feeding, accompanied by plenty of salt, will cure this disease.

BOWELS, Inflammation of.—Sometimes called *Enteritis* and *Fardle-bound*. The animal is continually lying down and getting up again immediately, and, when up, strikes at its belly with the hind feet; the bowels are obstinately constipated; the dung, if any is voided, is in small quantities, hard, covered with mucus, and sometimes streaked with blood; the urine is generally voided with difficulty; the pulse is quicker than natural, and there is much heaving at the flanks. It is distinguished from colic by the great degree of fever that attends it, the muzzle being dry and the mouth hot. The animal becomes speedily weak, falls or throws itself down suddenly, and when it rises, does it with difficulty, and staggers as it walks. The lowness and weakness appear more speedily and decidedly than in almost any other disease. *Treatment*: For the pain and inflammation, give doses of calomel and opium, 2 or 3 times daily—calomel ½ dr.; opium 5 gr. Give for a purge: Epsom salts, 1 lb.; hot water, 1 qt.; dissolve, and add linseed oil, 1 pt.; to be repeated in 6 hours, till the bowels are well relieved, with injections of warm gruel. In very severe cases, bleeding will sometimes aid the operation of the medicine.

BRAIN, Inflammation of.—This is due to overfeeding in long, wet grass or clover, and distension of the stomach. *Treatment*: Give 1 lb. of Epsom salts and 1 lb. of table salt, dissolved in 4 qts. cold water, and sweetened with molasses. Apply ice to the forehead, warm water bandages to the legs, and tightly clothe the body.

BRONCHITIS.—This is inflammation of the windpipe and its branches. In no case of pure bronchitis is the breathing painful, but short and quick, the thoracic as well as the abdominal muscles being brought into full play; this distinguishes it from the breathing characteristic of pleurisy, in which the ribs are more or less fixed and the respiration abdominal. In ordinary cases of bronchitis, the animal is dull, listless, sometimes semi-comatose; hangs its head; is generally thirsty; ropy saliva fills the mouth, which is hot and moist; the visible mucous membranes are affected, and present a varying degree of lividity, due to non-oxidation of the blood; the animal stands in a corner, or moves listlessly about. If in a box, and the door be open, it stands with its head to the open air, from which it evidently obtains relief; the bowels are generally somewhat constipated, the feces covered with mucus; the urine is high colored and scanty. *Treatment*: Give tincture of aconite, 3 times a day, 25 drops to a dose, when there is fever. Give once or twice daily, ½ oz. of commercial sulphuric acid, mixed in ½ bucket of cold water. Apply warm poultices of slippery elm, on the surface of which is sprinkled powdered lobelia, to the throat; and give internally as an expectorant, tablespoonful doses of tincture of lobelia 2 or 3 times a day, as long as the cough is tight.

CATARRH.—*Treatment*: In slight cases, house and give a dose of Epsom salts. In malignant cases give a mixture of Epsom salts, 12 oz.; ginger, 1 oz.; gentian, 1 oz.; syrup, 4 oz; and water, q.s. Then administer the following: Whisky, 2 oz.; iodide potash, 2 dr.; gruel, 1 pt.; powdered cinchona, 1 oz.; give as 1 dose. Foment the head with hot water and rub in the following: Oil of turpentine, 1 oz.; linseed oil, 1 oz.; liquor ammonia, 1 oz.; mix.

CHOKING.—In choking, the accumulation of gas (chiefly sulphurreted hydrogen) is the cause of the animal's death. *Treatment*: This gas can be decomposed by forcing a strong solution of salt and water down the animal's throat; or force the beast to jump over the bars

of a gate or fence; when she touches the ground on the opposite side, the obstruction will be ejected. Another way, is to use 4 or 5 ft. of $\frac{3}{4}$ in. rubber hose, and push the obstruction down. If the obstruction is low down, and this operation be attempted, 1 pt. of olive or linseed oil should be first turned down the throat, which will lubricate the parts and greatly assist the operation. The power applied must be steady, but not violent, for if the gullet is torn, the rupture is generally of serious consequence. Or a hollow tube may be used, and after the obstruction has passed into the stomach, the tube should remain for some time to permit the escape of the gas. A dose of chloride of lime or ammonia may be given, and the animal kept on fluid diet for several days afterwards, to prevent a recurrence of the choking.

Malignant Catarrh.

CLUE-BOUND. — An affection of the third stomach of cattle, induced by their unduly partaking of coarse, indigestible food. The symptoms vary greatly in intensity, and are often some days before they definitely manifest themselves. The animal ceases to ruminate, refuses food, and, if a cow, the secretion of milk is stopped. Then, after a day or two, fever (indicated by heat and dryness in the nose and mouth) comes on, with somewhat quickened circulation and breathing, the breathing by the second or third day being accompanied by a grunt at the beginning and end of respiration, which is very noticeable when an attempt is made to move the animal. *Treatment:* $\frac{3}{4}$ lb., each, of Epsom and common salt, 20 croton beans, and 1 dr. of calomel, will suffice for a full-grown, middle-sized ox or cow, and must be administered in 3 or 4 bottles of water or very thin gruel. In this disease there is little fear of giving too much medicine.

COLIC.—The animal is evidently in pain, and appears very restless; it occasionally turns its head, with an anxious gaze, to the left side, which seems to be distended more than the right; there is an occasional discharge of gas from the mouth and anus. *Treatment:* Powdered aniseed and powdered cinnamon, of each, $\frac{1}{2}$ teaspoonful; mix, and give in 1 qt. of spearmint tea. Repeat if necessary. If the animal suffers much pain, apply fomentations to the belly, and give the following injection: Powdered ginger, $\frac{1}{2}$ oz.; common salt, 1 tablespoon; hot water, 1 gallon.

COSTIVENESS.—*Treatment:* For simple costiveness, the best remedy is the milk that comes from the cow for the first 4 days after calving; but in confirmed cases, doses of warm water, containing 2 or 3 oz. of Epsom salts, should be frequently administered.

COW-POX.—This is identical with small-pox in the human subject. It shows itself by a slight fever for 2 or 3 days, then breaks out in pimples on the teats, udder, flanks, and around the vulva, nose, mouth and eyes. These are first red, then they enlarge and become yellow. *Treatment:* Foment the udder, and apply poultices of spent hops; give laxative and saline medicines, and draw off the milk.

CUD, Loss of.—A species of indigestion, and may be brought on by the animal's eating greedily of some food to which it has not been accustomed. *Treatment:* 1. Give the animal 1 pt. raw linseed oil.—2. Golden seal, powdered, 1 oz.; caraway, powdered, 2 oz.; cream of tartar, $\frac{1}{2}$ oz.; mix; divide into 6 powders and give 1 every 4 hours, in a sufficient quantity of chamomile tea; also, give as a drink Epsom salts, $\frac{1}{2}$ lb.; powdered gentian, $\frac{1}{2}$ oz.; powdered caraway seeds, 1 oz.; powdered ginger, 2 dr.; mix, and give in warm gruel.

DIARRHEA.—If this becomes chronic, it is hard to cure. *Treatment:* 1. If milk, thickened with fine flour and boiled for some time, fine and free from lumps, like starch paste, be added to the daily ration, in the proportion of 1-5 to $\frac{1}{2}$, according to the severity of the attack, and fed by pouring it from a bottle down the calf's throat (if he will not drink it), a cure will be promptly effected in most cases. — 2. Prepared chalk, powdered, Winter's bark, and laudanum, of each, 1 oz.; water, 1 pt.; give 2 or 3 tablespoonfuls, according to the age and condition of the animal, 2 or 3 times a day.

DROPSY. — The first symptoms are short breath, followed by stretching on the ground. If it is abdominal dropsy, the swelling will show about the abdomen; if general dropsy, it will appear over the whole body and legs. The swelling will feel doughy to the touch. *Treatment:* In order to carry off the water, and reduce the swelling, use occasionally and alternately one of the two following hydragogue cathartics: 1. Calomel, powdered jalap, powdered squill, of each 1 dr.; podophyllin, 15 gr.; $\frac{1}{2}$ oz. powdered nitre, and 2 dr. powdered ginger; mix, and make a powder, to be administered mixed with meal.—2. $\frac{1}{2}$ lb. of Epsom salts; 4 oz. of cream tartar; 1 oz. of nitre, and 2 dr. of ginger, to be given in warm gruel. Make a free use of vegetables, potatoes, carrots, parsnips, etc., in the diet.

DROPSY OF THE CHEST, or HYDROTHORAX. —This is the result of neglected or badly managed cases of pleurisy, the chest filling with water from the excessive effusion. *Treatment:* See that the bowels are kept free, and then apply blisters to the sides, and give the following: 2 dr. gum camphor; 1 oz. spirits nitre; dissolve the camphor in the nitre, and add 4 dr. saltpetre and 1 pt. of water or gruel. Give as 1 dose, and repeat every 4 or 6 hours. Administer stimulants freely, and tap the chest early, repeating it if necessary.

DYSENTERY.—This is one of the most dangerous diseases cattle are subject to. It is often mistaken for diarrhea, but can be easily distinguished by closely observing the following symptoms: The efforts to expel the dung are frequent and accompanied by evident pain; the animal is restless, frequently lying down and rising again. If the loins are pressed with the hand, the animal will shrink. The discharge will be thin, and have an offensive smell. *Treatment*: 1. ½ lb. Epsom salts; 2 to 4 oz. sulphur; ½ oz. nitre; 2 dr. ginger; 1 oz. spirit of nitrous ether; dissolve in warm water or gruel, and repeat once a day for several days. Give frequent injections of starch gruel, each containing 1 oz. opium. — 2. 1 lb. mutton suet; 2 qts. new milk; ½ dr. powdered opium; 1 dr. ginger; melt the suet in the milk by boiling; when dissolved, add the remaining ingredients. Feed lightly and nurse carefully.

DYSPEPSIA.—The symptoms are changeable appetite, staring coat, belching from the stomach, emission of gas from the rectum; the manure is small in quantity, dry and glazed; the skin and hair are dry and coarse, and there is rapid loss of flesh. *Treatment*: Give a dose of bran twice a week, and daily a bitter tonic, in which rhubarb and gentian, or Peruvian bark, are prominent ingredients; and also 1 tablespoonful of bicarbonate of soda. The skin should be kept clean, and rubbed and curried a good deal.

ECZEMA.—A skin disease. The skin becomes hardened, dry and sore, and cracks into fissures. The discharge continues, and becomes greasy and offensive. *Treatment*: Cleanse the bowels with 1 dr. of calomel and 1 oz. of rhubarb, mixed. Apply hot linseed meal poultices till all inflammation and soreness are gone; then embrocate freely with the following: 1 dr. pure carbolic acid, in from 6 to 12 oz. of water. When all soreness has gone, apply the following: 4 oz. lard; 1 oz. alum; and 1 dr. carbolic acid; mix.

ERYSIPELAS.—*Treatment.* The bowels must be kept gently open, by small doses of medicine, and laxative glysters. If there be any fevcrish symptoms, saline diuretics should be administered; and as a lowering treatment is objectionable, tonics and stimulants should be had recourse to at an early stage of the disease. The affected parts should be kept constantly moist with a lotion composed of rum, or alcohol diluted to about the strength of rum. Nutritious food, fresh air and general comfort must not be neglected. Cold applications are hurtful.

EYELIDS, Torn.—*Treatment*: Bring the edges neatly together; sew with fine silk, and dress 2 or 3 times a day with the following: 1 dr. white vitriol; 1 pt. water; mix, and use the lotion.

FITS, or EPILEPSY.—*Treatment*: Animals subject to fits, should not be driven, excited, or agitated. Give ¼ oz. doses of bromide of potash daily.

FLOODING.—A discharge of blood from the uterus of the cow after calving. *Treatment.* 1. Apply very cold water to the loins. If it continues, raise the cow's hind parts; give 2 dr. tincture of opium every hour; keep the patient quiet; take her calf. — 2. Injections of alum water—1 oz. of alum to 1 qt. of water—will be useful in this disease.

FOOT-ROT. — This disease makes its appearance sometimes between the claws of the foot, often in the heel, and, extending up the leg, causes extreme lameness, loss of flesh and loss of milk. *Treatment*: Give 1 lb. of salts, and, when that has operated, give 1 oz. of hyposulphite of soda daily; wash the sore spots with water and soap, and dress them with an ointment as follows: Melt 4 oz. of lard and spermaceti together; add 1 oz. of acetate of copper (verdigris); and stir thoroughly; and, while still fluid, add 1 oz. of turpentine, and stir until cold. Keep for use.

GLANDS, Inflammation of.—Inflammation of either of the glands may be known by the heat, tenderness, enlargement, and difficulty of swallowing. *Treatment*: In the inflammatory stage, teas of marshmallows or slippery elm, and poultices of the same, are the best means yet known to reduce it; they relax constricted or obstructed organs, and by being directly applied to the parts affected, the more speedily and effectually is the object accomplished; 2 or 3 applications of some relaxing poultice will be all that is needed, after which apply 1 gill olive oil or goose grease; 1 oz. spirits of camphor; 1 oz. oil of cedar; ½ gill vinegar; mix, and rub around the throat as occasion may require. Or, the parts may be well rubbed with coal oil or petroleum. Give tonics, as iodide of potassium, gentian, etc., and pay particular attention to the bowels.

GLOSSITIS (Inflammation of the Tongue.)—*Treatment*: Examine the mouth carefully, and remove offending matter. If the tongue hangs pendulous, foment it with hot water. Apply the following lotion 4 or 5 times a day; honey, 2 oz.; borax, ½ oz.; water, 1 pt.; mix.

GRAVEL.—*Treatment*: Wash out the bladder with tepid water. Inject into the bladder a weak solution of hydrochloric acid. Then, twice a day, give internally the following: 2 dr. gentian; 1 dr. tartrate of iron; 1 dr. ginger; mix, and give in 1 pt. gruel.

HOOSE. — A cough caused by a species of worms, the eggs of which are swallowed in grazing. *Treatment*: Give linseed or cotton cake, with the most nutritious diet. Let the animal breathe the fumes of turpentine burned on pine shavings.

HORN, Ail in.—This disorder usually attacks cattle in the spring, after a severe winter; likewise, those that are in poor flesh, or those that have been overworked and exposed to severe storms, or reduced by other diseases, are predisposed to take it. Symptoms, eyes dull, discharging yellow matter, dizziness, loss of appetite, shaking of the head, bloody urine, coldness of the horns, stupidity, and great debility. *Treatment*: Give nourishing and relaxing food, as cotton-seed, or flax-seed meal.

HORN, Broken.—*Treatment*: If the shell is broken, leaving the inner core bare, wrap it in an oiled cloth, or even in a bandage wetted with water, to protect the horn from the air. A new horny covering will grow over the core, and although it will never again be wholly repaired, yet the horn will become hard and solid again.

HOVEN, or BLOATING.—This often follows the feeding of a large quantity of green fodder. When partly wilted and with very succulent forage, as alfalfa, clover, or green corn fodder, the danger is increased, as partial fermentation has already begun and is greatly quickened by the warmth and solid packing in the stomach. *Treatment*: 1. If the cow is able to stand alone for 10 minutes, tie her by the head, so as to hold her head up; then press down on the sides just forward of the hip bone on both sides; gently at first, but continuing the pressure harder and harder. In a few moments you will hear the cow commencing to belch up gas, the escape of which will relieve her.—2. Give 1 lb. of Epsom salts, with 4 oz. of cream of tartar, repeating the dose till a movement of the bowels is obtained.—3. Once a week give a dose of calomel and jalap, 1 dr. each.

HYDROPHOBIA.—*Treatment*: There is no cure; the best thing is to destroy the animal as soon as the disease is sufficiently plain. Care should be taken that the saliva of the rabid ox is not received on a wound or abraded part, for it has produced the disease in other animals. Any wound on which it has fallen should immediately have lunar caustic applied to it. When a mad dog has been known to bite an ox or a cow, there is a possibility of their escape, for the hide is thick, and the hair is thick too, and the skin may not be penetrated, or the tooth may have been cleaned in passing through the hair. They should be most carefully examined, and especially about the part on which they were seized by the dog, and if the minutest scratch can be found the hair must be cut off round it, and lunar caustic applied.

JAUNDICE.—This affects cattle, giving rise to a tawny hue of the skin and membranes, yellow eyes, skin and urine. *Treatment*: If there be fever, give Epsom salts, 1 lb.; powdered ginger, 4 dr.; warm water, 3 pts. After the bowels are well opened, give every day, for a purge, madder, 1 oz.; flour of sulphur, 2 oz.; powdered caraway seeds, 1 oz.; Epsom salts, 2 to 4 oz.; warm water, 3 pts.

KIDNEYS, Inflammation of.—The symptoms are a constant desire to void the urine, which is thick and dark; great pain, as shown by the expression of the countenance, and by frequent wistful looks at the loins, straddling gait, and arching of the back; the appetite is poor and fever high. *Treatment*: Apply hot water to the loins, and give large quantities of linseed tea or slippery elm water to drink, with warm water injections. Give the following as 1 dose: 20 drops tincture aconite root; 3 oz. Mindererus' spirit; 1 pt. linseed tea; mix. Keep the animal quiet, and feed on sloppy food.

LIMBS, Broken.—*Treatment*: By means of plaster of Paris (not land plaster), and some bagging strips, the limb may be set and supported until the bone unites again. Wind the strips about the broken limb; plaster over with calcined plaster, mixed to a thin paste; wind another over that, and apply more plaster, the leg being fastened to splints of wood until the plaster sets. The animal will limp around for a few days on three legs, but will recover.

LIVER. Inflammation of.—The symptoms are, fever; reclining on the right side; fullness on that side of the belly; urine yellow or brown, and sometimes bloody. *Treatment*: If there is much fever, give calomel, 1 dr.; powdered opium, 10 gr.; powdered ginger, 2 dr.; rub together, and give in 1 qt. gruel, and repeat it twice a day; give, in 6 hours after first dose, a purge of Epsom salts, 8 oz.; water, 1 qt.; dissolve, and add linseed oil, 1 pt.; repeat till the bowels are open. If purging takes place from the first, give the calomel, opium and ginger, and give the drench as in diarrhea, at the same time blistering the right side; if great weakness ensue, give for a tonic powdered gentian, ½ oz.; powdered caraway seeds, 1 oz.; powdered aniseed, 1 oz.; Epsom salts, 4 oz.; mix, and give in 1 pt. warm brandy.

LOCKJAW.—The symptoms are, a stiffness of gait in the animal; he will walk unusually wide behind; there will be difficulty of turning; permanent cocking of the tail, except when that is interrupted, or accompanied by a singular tremulous motion of it. The animal can scarcely, and, after a while, not at all, bend his neck to graze, but he will stand with his head protruding and his ears stiffened and unnaturally fixed in a somewhat backward direction; rumination gradually ceases, or is performed slowly and painfully; the jaws become firmly closed, and neck perfectly stiff; the eyes are strangely fixed, and with some degree of squinting, and the expression of the countenance is peculiarly anxious; the breathing is considerably affected, and there is much labor of the flanks. *Treatment*: Give for a drink, Epsom salts, 1½ lbs.; flour of sulphur, ½ lb.; warm water, 2 qts.; mix, and repeat in ½ lb. doses every 6 hours, assisted by injections every 4 hours, composed of Epsom salts, ½ lb.; linseed oil, ½ pt.; warm water, 4 qts.; when well operated, give 1 dr. opium, dissolved in warm water, twice a day, and put a seton in the dewlap.

MANGE.—Mange in calves is caused by a mite burrowing in the skin. *Treatment*: 1. Dress the part with an ointment composed of 4 oz. of lard; 1 oz. of sulphur; 1 dr. of creosote; mix well together; rub into the skin every morning, and give each calf 1 teaspoonful of sulphur, daily, for 2 weeks.—2. 4 oz. of pyroligneous acid; 1 pt. water; mix, and apply daily; at the same time take 2 oz. powdered sassafras; 1 handful powdered charcoal; 1 oz. sulphur; mix well together, and divide into 6 parts; 1 to be given in the feed night and morning. As the mange is infectious, the cattle troubled with it should be removed from the rest of the herd.

MILK FEVER.—A disease of the blood consequent upon a disordered circulation, and is a sort of apoplexy, the brain being inflamed and congested, and the nervous system prostrated. Usually, a cow afflicted with this disease, lies still, with the head on the flank, but sometimes dashes the head about violently. *Treatment*: 1 lb. of sulphate of magnesia; 2 oz. of pulverized Jamaica ginger; divide into 6 powders, 1 to be given 3 times a day, dissolved in ½ pt. of tepid water, alternating every 6 hours with 1 of the following powders; 1 oz. chloride of potas-

sa; ½ oz. pulverized digitalis leaves; ½ dr. tartarized antimony; mix, and divide into 6 powders. Place the cow in a large, well-ventilated box-stall, well supplied with clean, dry straw, and kept clean. If the weather is cold, protect her with warm clothing. The milk should be frequently drawn off, and when unable to rise, she should be turned occasionally, which will afford her temporary relief.

MURRAIN.—A dangerous disease, and seems to attack the entire system of the animal at the same time. The symptoms are, fever, quick pulse, cold horns, swollen eyes, sometimes accompanied with diarrhea. *Treatment*: The first thing to be done, is to separate the sick from the well, as this disease is very contagious. First, bleed the animal freely; then administer a purgative drink, ½ lb. of Epsom salts, dissolved in soft water, twice a day, for several days. If tumors appear upon the body or teats, wash with the following solution: 4 dr. of sulphate of zinc to a qt. of rain water. Everything depends upon good nursing.

NAVEL ILL.—*Treatment*: When the naval bleeds, tie a ligature a short distance from the belly; a pledget of lint, dipped in friar's balsam over it, confined with a bandage, and changed night and morning; and keep the bowels open with linseed oil; then give a cordial drink in a little gruel, once a day, made of powdered caraway, 2 dr.; powdered gentian, 1 dr.; powdered ginger, ½ dr.

PALSY.—*Treatment*: Keep the bowels well open by a drench made of Epsom salts, 1 lb.; powdered caraway, 1 oz.; powdered aniseed, 1 oz.; powdered ginger 2 dr.; mix, and give in 1 qt. warm beer, and use the following liniment: Opodeldoc, 4 oz.; spirits of turpentine, 4 oz.; powdered hartshorn, 4 oz.; mix well together.

PATELLA, Dislocation of.—*Treatment*: Pull the foot forward by a rope passed around the pastern, and push inwards on the patella. It will then be replaced in position. If the joint is injured, fasten the leg forward with a rope fastened around the neck. Foment the joint with hot water, and when the inflammation is reduced, blister with the following: Lard, 4 oz.; powdered cantharides, 1 oz.; mix.

PERITONITIS.—Inflammation of the peritoneum, a serous membrane lining the cavity of the belly, and covering the bowels and other abdominal viscera. The symptoms are, fever; labored breathing, done mostly with the chest; shivering around the flanks and hind parts; the animal paws or crouches with pain. *Treatment*: Give a mild purgative, and in 6 or 8 hours give the following: 2 dr. powdered opium; 1 dr. calomel; 1 qt. gruel; mix and give as 1 dose. Give frequent injections of soap and water. If great weakness follows the action of the purgative, give the following: 2 dr. camphor, dissolved in ½ oz. sulphuric ether; add 4 oz. acetate of ammonia, and give as 1 dose, in ale or gruel.

PLEURISY.—This is an inflammation of the membrane covering the lungs and lining the chest. The symptoms are, fever; breathing quick and painful, and done by the abdominal muscles; the animal shows pain by frequently turning its head to its sides; pressure on the ribs causes intense pain and a peculiar grunt; there is a hacking cough, and the animal remains standing, with its head hung low. *Treatment*: Apply blisters or mustard plasters to the sides. If much fever exists, give the following: 2 dr. tincture of aconite root; ½ oz. fl. extract of belladonna; 3 oz. spirits nitre; 2 oz. nitrate of potash; 2 oz. muriate of ammonia; 1 qt. of water; mix, and give ½ teacupful every 2 or 3 hours. If the animal appears to be much distressed, give 4 oz. of liquor ammonia acetatis, in 4 oz. rose water, 3 times a day, until the animal shows improvement. When the fever is subdued, give the following: 2 dr. gentian; 1 dr. tartrate of iron; 1 dr. ginger; mix, and give in 1 pt. gruel. Give good nourishing food, and good ventilation.

PLEURO-PNEUMONIA.—A contagious disease of the lungs. The first symptoms are a dry, husky cough, of a peculiar character, first heard in the morning, or while the animal is drinking; the appetite becomes sluggish; rumination ceases; staring coat; slight shiverings; scanty urine, of a dark color; the milk becomes smaller in quantity, thin and blue; breathing hurried and accompanied with moans; coughs more frequently; later there will be a discharge of matter from the eyes, and rapid weakening of the system. *Treatment*: In first stages give heavy doses of castor oil, or raw linseed oil, 1 pt. at a time. If a veterinary surgeon can not be obtained, it is best to kill the animals attacked and bury them, as the disease is very contagious and generally regarded as incurable.

PNEUMONIA.—Coughing is the first symptom. The nose is dry, and the animal stands with its back arched and elbows turned out. If forced to move briskly about, it will cough and pant. The disease seems more severe during a thaw than when the weather is colder. There is some running from the eyes. The appetite is invariably good up to 24 hours before death. From 6 to 24 hours before death occurs, the animal is unable to stand. As death approaches, the animal groans quite loudly, the breathing becomes accelerated, and the cough seems to come from a more or less solid body. In coughing, a calf will extend its nose on a level with its neck. *Treatment*: Give a dose of salts, and then the following: Tartar emetic, 1 dr.; camphor, 1 dr.; nitre, 4 dr., in one qt. thick gruel. Sometimes bleeding is necessary; but the chief reliance should be upon tartar emetic; the former to loosen the cough and relieve fever, and the latter to quiet the cough and pain.

RED WATER.—Also called *Hæmaturia*, *Bloody Urine*, *Brown Water*, *Black Water*, and *Moor*. The symptoms are: Bloody urine, loss of appetite, languor, apathy, seclusion, constipation. *Treatment*: Bleed copiously; then give Epsom salts, 1 lb. in 2 qts. of water, every 6 hours, in ½ lb. doses, till the bowels are relieved. The pasture should be changed. If there is considerable fever, or the animal should appear to be really ill from the discharge, she should be taken under shelter and fed on mashes, with a very little hay; or a few turnips or carrots may be allowed her, if they are in season.

RHEUMATISM.—The early symptoms of this complaint are those of common catarrh, with no great cough, but more than usual fever; by

degrees the animal shows some stiffness in moving; and if the hand is pressed upon the chine, or any part of the back, the animal will shrink, as if this gave him pain. In 2 or 3 days the animal appears stiffer in the joints; these afterwards begin to swell, and are evidently painful, particularly when he attempts to move. Sometimes the stiffness extends all over the body, and to such a degree that he is unable to rise without assistance. *Treatment*: Give for a drench, to keep the bowels open, Epsom salts, ½ lb.; powdered caraway seeds, 1 oz.; flour of sulphur, 4 oz.; warm water, 1 qt.; also give once or twice a day, tartar emetic, 1 dr.; camphor, ½ dr.; nitre, 2 dr.; powdered aniseed, 1 oz.; rub well together, and give in 1 qt. thick gruel; if the joints continue much swollen, use for a liniment, spirits of hartshorn, 2 oz.; opodeldoc, 2 oz.; camphor liniment, 4 oz.; laudanum, 1 oz.; mix for use.

RING-BONE. — *Treatment*: Paint with tincture of iodine, or with a solution of corrosive sublimate, 40 gr. to 1 pt. of water.

ROPY MILK.—When cows are suffering from any functional disorder, the milk is at once affected. Sometimes the milk is acid, and soon becomes thick and ropy; is often clotted in the udder, and is drawn in strings and clots. *Treatment*: 1 lb. of Epsom salts, or 1 qt. of linseed oil, may be given, and afterward repeated doses of 1 oz. of hyposulphite of soda daily until the trouble is removed.

RUPTURE, or HERNIA.—This occurs in young colts and calves, and consists in the protrusion of a portion of the bowel and intestine through the navel, forming a small tumor. *Treatment*: 1. Force the bowel up into the belly; gather the loose skin together; tie a well-waxed cord tightly around it, close to the belly, and a strong pin may be forced through the skin below the ligature or cord, to keep it from falling off before the loose skin comes away. In a few days the skin will fall off, leaving a healthy sore. —2. Place a bandage round the body, and a pad over the rupture.

STINGS.—The stings of hornets, wasps and bees, in some cases produce much temporary swelling and pain. *Treatment*: Rub the part with warm vinegar or aqua ammonia. When stung by a reptile, 1 qt. of olive oil should be given to the animal, mixed with 1 oz. of hartshorn. Oil of turpentine may be used when hartshorn cannot be procured.

TEATS, Leaking.—*Treatment*: Leaking teats may be cured by the application of collodion to the teat immediately after milking. To apply it, wipe the teat perfectly dry, and with a small brush or camel's-hair pencil paint the end of the teat over with 3 or 4 coats of collodion. It dries instantly, and, contracting as it dries, closes the orifice. — 2. Another method, is to clip away the skin around the edges of the hole, then cut a small slit across the hole and a little above and below it, and bring the edges together with a stitch. As the wound heals, the hole will close. This should be done when the cow is dry, or a milking tube should be used to draw the milk.

TEATS, Sore.—*Treatment*: 1. Take a full pail of cold water, and wash and rub the sores well. Use the whole pailful of water before milking, which cools the teats and reduces the fever, and the cow will stand perfectly still. After milking, use ½ as much more cold water, cleansing the bag and teats well, and in a few days the sores will be healed. — 2. Take 1 oz. of glycerine, and ¼ as much turpentine; mix, and rub it on the teats after milking. It is not advisable to wet the teats with milk; it is better to wipe them with a wet cloth, or wash them with water and soap and a sponge before milking.

TEXAS FEVER.—A disease accompanied with sympathetic fever. It is usually prevalent from the close of the summer months to the end of autumn. It is impaction of the manyplus with withered and dried grass and herbage, containing no moisture. The stomach refuses to digest it, causing heat, dryness and fever. *Treatment*: Give large doses of Epsom or Glauber salts, dissolved in great quantities of molasses water. If no relief follows in 24 hours, repeat the dose. Large drenches of water with the salts, do not only assist their action, but in many cases wash and dissolve the dry feed into a soft mass or pulp, which will readily pass away.

THROAT, Inflammation of. — *Treatment*: In many cases, if attended to immediately, nothing more will be necessary than confining the animal to a light diet, with frequent drinks of linseed tea, warmth and moisture applied locally in the form of a slippery elm poultice, which may be kept in close contact with the throat by securing it to the horns. In severe cases, steep mullein leaves in vinegar and apply to the parts, with an occasional stimulating injection, together with a gruel. Coal oil or petroleum rubbed on the throat is invaluable.

UDDER, Inflammation of.—Inflammation of the udder appears to result from various causes: Indigestion, over driving, the too long retention of the milk in the udder, and cold. *Treatment*: If the disease be constitutional, as indicated by the suddenness of the attack, administer at once a good dose of Epsom or Glauber salts, combined with a little ginger, and give copious doses of nitre. A modified form of this treatment should be kept up for some little time by means of gentle aperients, and smaller doses of nitre. In the milder form of inflammation use spirit lotions or refrigerant applications, such as ice water, or a mixture of chloride of ammonium and nitre applied immediately after mixing with water. When there are lumps in the udder, the continuous application of warm water is advisable. Whether the cold or hot treatment be indicated, it should be diligently kept up for a day at least. If there is much swelling, support the udder by a bandage passed around the body over the loins. The milk should be removed every 3 or 4 hours; if the milking operation causes pain, a syphon should be used. The hard lumps, or cakes, will be found to disperse best under gentle friction applied by the hand twice a day, for an hour each time, the hand being previously anointed with lard or coal oil. When the surface pits or becomes soft and very hot, liberate the confined pus by means of the lancet.

URINE, Retention of.—The animal attempts frequently, but ineffectually, to pass urine; has

colicky pains, and the hind legs are raised and moved about restlessly. *Treatment:* If the cow is constipated, or not decidedly relaxed, give a castor oil or a saline cathartic (Epsom salts, etc.); and then follow with laudanum injections in ½ oz. doses for a few hours. If there is no relief at the end of 3 or 4 hours, draw off the urine with a catheter. This must be done by a regular surgeon. After using the catheter, repeat the injection and give a light diet and linseed tea for a few days.

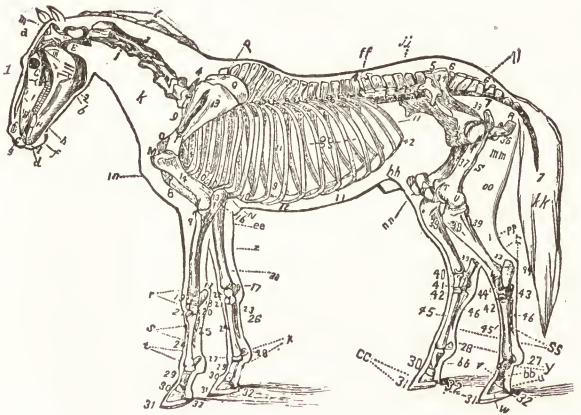
WARBLES. — These are caused by a certain species of gadfly depositing its eggs beneath the skin along the back of the cow during summer. *Treatment:* Extract the larva, and foment with hot water, and when the tenderness has abated, apply a lotion of strong vinegar, 1 pt.; rectified spirits of wine, 2 oz.; extract of Goulard, 1 oz.; spirits of turpentine, 1 oz.; mix together for use.

WOMB, Inflammation of.—Occurs after calving or bulling. The symptoms are great irritation and pain. *Treatment*: Give for a drench. Epsom salts, 1 lb.; powdered caraway seed, 2 oz.; warm gruel, 3 pts. Bathe the womb with Goulard water, or vinegar and water mixed equally.

WOUNDS. — *Treatment*: Clean the wound from all dirt and gravel which would cause irritation and prevent healing of the part, by warm water; then wash several times a day with a 40 per cent. solution of carbolic acid.

THE HORSE.

ANATOMY.



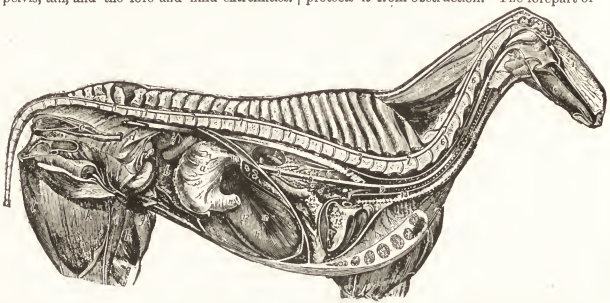
Skeleton and Points of the Horse.

BONES.—1, cranium; 2, lower jaw; 3, cervical vertebræ; 4, 4, dorsal vertebræ; 5, 5, lumbar vertebræ; 6, 6, sacrum; 7, 7, coccygeal vertebræ; 8, sternum; 9, 9, true ribs; 10, 10, cartilages of true ribs; 11, 11, false ribs; 12, 12, cartilages of false ribs; 13, scapula; 14, humerus; 15, radius; 16, elbow; 17, os pisiformes; 18, 19, 20, 21, 22, 23, carpal bones; 24, large metacarpal bone; 25, outer small metacarpal bone; 26, inner small metacarpal bone; 27, 28, sesamoid bones; 29, os suffraginis; 30, os coronal; 31, os pedis; 32, wing of pedal bone; 33, 34, 35, 36, os innominatum; 37, femur; 38, tibia; 39, os calcis; 40, astragalus; 41, 42, 43, 44, tarsal bones; 45, large metatarsal bone; 46, small metatarsal bone.

JOINTS, TEETH, ETC.—A, molar teeth; B, H, canine or tush; C, I, incisors; E, atlas; G, orbit; M, carniform cartilage; N, ensiform cartilage; O, coracoid process of scapula; P, spine; Q, cartilage; R, trochanter major; S, sub-trochanteric ridge crest; T, trochlea; U, external condyle; V, patella; W, hock joint.

POINTS.—a, forehead; b, jaw; c, temples; d, lips; f, nostrils; g, top of nose; h, beard; i, chin; j, neck; k, throat; l, mane; m, fore top; n, chest; o, shoulders; p, withers; q, arm; r, knee; s, shank; t, fetlock joint, u, pastern; v, coronet; w, hoof; x, fetlock; y, back sinews or main tendons; z, plate vein; a a, ebesnut; b b, quarters; c c, toe; d d, heel; e e, elbow; f f, reins; g, g, ribs; h h, flanks; i i, belly; j j, fillets; k k, tail; l l, rump; m m, buttocks; n n, stifle; o o, haunches; p p, thighs; q q, hock; r r, point of hock; s s, instep.

BONY STRUCTURE. — The skeleton of the horse is composed of 247 separate bones, which are united by joints to form the spine, thorax, pelvis, tail, and the fore and hind extremities. inclosed in the horny box of the crust, no inconvenience can arise from an outward pressure; for the bone allows free passsge to the blood and protects it from obstruction. The forepart of

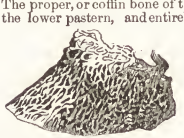


Internal Organs of the Horse.

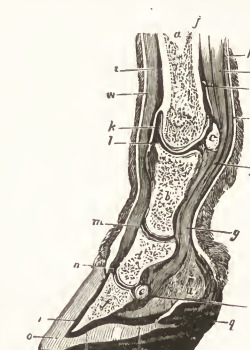
a, stomach; *b*, spleen; *c*, left kidney; *d*, broad ligament of the uterus, with left cornu and ovary displayed; *e*, rectum; *f*, anus; *g*, *h*, *i*, *j*, *k*, *l*, internal muscles of the thigh; 1, occiput; 2, cerebellum; 3, cerebrum; 4, nasal membrane; 5, tongue; 6, 6, cervical vertebræ; 7, 7, 7, 7, spinal cord; 8, pharynx; 9, 9, 9, œsophagus; 10, cardiac orifice of the stomach passing through the diaphragm; 11, pylorus; 12, 12, posterior surface of the diaphragm; 13, 13, trachea; 14, lungs; 15, heart.

The spine is finished anteriorly by the head, which is divided into the cranium and face, and contains the teeth. Suspended from the head is the *os hyoides*, which completes the number of bones. The bones are composed of a tissue peculiar to them, enveloped by a membrane, the *periosteum*. They contain a semi-fluid of a fatty nature, the marrow, and are pierced in various directions by blood-vessels and nerves.

FOOT.—It is necessary to examine the structure of the foot most carefully, not as an object of curiosity connected with the sense of touch, but on account of the numberless diseases and accidents to which it is subject. No part of the horse is so liable to the effects of hard work and mismanagement as this, and there is none which more requires our care both in health and disease. The proper, or coffin bone of the foot, is beneath the lower pastern, and entirely inclosed in the hoof. It fills about ⅓ of the forepart of the hoof, to which it is fitted. It is light, spongy, and filled with numerous holes, through which pass the blood vessels of the foot. These are numerous, considering the important and various secretions there going on; and the circulation could not be kept up if these vessels did not run through the substance of the bone. The holes about the coffin bone carry the blood to the little leaves with which it is covered; those near the lower part go to the sole. As this bone is the coffin bone, besides being thus perforated,



Mesh-work of Veins, without Valves, just under the Secretive Membrane of Hoof.



Vertical Section of the Lower Leg and Foot.

a, cannon, or large metacarpal bone; *b*, large pastern bone; *c*, one of the sesamoid bones; *d*, smaller pastern bone; *e*, navicular bone; *f*, coffin bone; *g*, *g*, *g*, penetrating tendon; *h*, *h*, *h*, penetrated tendon; *i*, extensor tendon; *j*, suspensory ligament; *k*, *k*, capsular ligament; *l*, fetlock joint; *m*, pastern joint; *n*, coffin joint; *o*, horny crust of hoof; *p*, horny sole; *q*, the frog; *r*, sensible lamiæ; *t*, sensible frog; *u*, cushion; *v*, navicular joint.

is curiously roughened for the attachment of numerous little leaves. On its upper surface is a concavity for the head of the lower pastern. In front is a prominence, into which is inserted the extensor tendon of the foot. At the back it is sloped for articulation with the navicular bone; and more, underneath is a depression for the reception of the flexor tendon, continued down the leg, passing over the navicular bone, and then inserted into this bone. On either side are projections, called the heels of the coffin bone, and the bottom is hollowed to match the internal part of the sole. The crust, or wall, is that part which is seen when the foot is placed upon the ground, and reaches from the hair to the ground. It is deepest in front, where it is called the toe; shallower at the sides, which are called quarters, and of least depth behind, where it is termed the heel; it is placed flat upon the ground, but ascends obliquely backward, and possesses different degrees of obliquity in different feet. In a sound hoof, the proper degree of standing is calculated at 45°, or the fourth part of a semicircle. This crust is thicker in front, being about ½ in., and at the quarters and heel is very much thinner. It is also thinner at the inner than the outer quarter, where the most weight is thrown upon. It is under the inner splint bone, on which so much weight rests, and being thinner, it is able to expand more—its elasticity is called more into play, and concussion and injury are avoided.

MUSCLES. — The bottom of the chest at the girth place and between the fore legs, is clothed by the very large pectoral muscles. When these muscles are large and the withers high, the fore part of the trunk is very deep. The muscles of the shoulder are for support and speed. There are very small muscles which stretch from every bone of the spinal column to the next bone in front of it, and are said to clothe the spinal column. These muscles of themselves cause the wriggling movement of the column. The column, however, is acted upon by other muscles than those little ones stretched from bone to bone. The principal muscle of the back extends from the shoulders to the haunches; it is used in raising the fore and hind quarters. The muscles of the hind quarters straighten the legs and give speed. The bones of the extremities are clothed by muscles which act by lifting and extending them in the different gaits. If the bones of the extremities are of proper length and stoutness, then, except in disease, the muscles will either be in good condition, or will be capable of being made so, and they will be massive and present bold, beautiful curved outlines. The muscles of the ear are not easily observed. One of them extends from the base of the ear and turns the ear forward; the second, placed behind the eye, turns it inward and backward; and the third occupies the back of the cheek, and turns the ear outward. One of the most important muscles of the eye, is the iris. It is a very delicate moving muscle, flattened like a sheet of paper and ovoid, having an ovoid hole in its very centre, which is the pupil of the eye through which the light passes. There are 5 or 6 muscles to move the eye. The ends of each muscle are attached, one to the bony socket, the other to the white outer tunic. One muscle is attached to the upper part of the eye; one to the lower; one to the inner or nose side; one on the outer side; so that when the top one contracts, the eye looks upwards, and so forth. There are 2 other muscles, obliquely placed for rolling the eye. The 4 muscles named are called the straight muscles. The superior triangle of the neck is occupied by muscles which are attached to the last 5 bones of the neck. The nostrils are made up of muscles which are covered with skin and hair; are for the purpose of regulating the width of the opening; and are thrown into action the moment the horse has to breathe more quickly.

BREEDS.

REMARKS ON AMERICAN HORSES. — The American and Canadian horses consist of judi-

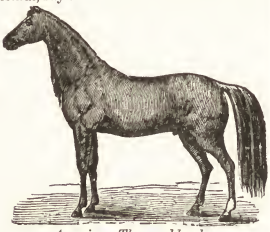
Morgan Horse.

iously-made crosses amongst English, Arabian, Barb, Spanish, and other stock; the climate of the American continent, apparently, having the same effect upon the horse, as respects wiriness of frame, that it has upon the human subject. American trotting horses are celebrated. The Conestoga horse often rises 17 hands; light in the body, with great length of leg; it is a great deal used as a riding horse, and for hunting when of suitable calibre. Among the American roadsters, the Morgan family stand first. They are exceedingly compact, deep-chested, strong-backed, fore legs set wide apart; head small, high and graceful; eyes fine, and well set. The family comprises several varieties, among which the Goss and Gifford rank very high. The Gold Dust Horses of Kentucky are elegant, staunch, fast-going horses, and are good for light farm work; and for the light carriage, in double harness, they are excellent.

AMERICAN SCRUB.—These are horses which are less than half-breeds of any recognized strain, and include the light-weight mongrel,

native, Indian pony, mustang and others. In the market they are also denominated "plugs."

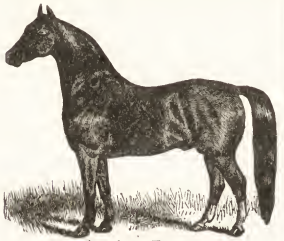
AMERICAN THOROUGHBREDS.—This breed of horses originated in England, and is the oldest and purest breed in existence. They are very valuable to the farmer on account of the reproduction of their leading characteristics to a remarkable degree in their descendants. For energy, endurance, resolution and speed, they have no equal. They are light-boned, and have a long body, with thin neck, small head, wide between the eyes. They have long legs and a deep chest. They are of various colors, but chestnut, bay and brown are the most common.



American Thoroughbred.

They are of great value for crossing upon other breeds, but are not used for any purposes besides racing and breeding.

AMERICAN TROTTING HORSE.—This horse is not a distinct breed, but is generally a cross between a thoroughbred and some hardier native



American Trotter.

horse. In lower Canada, there is a breed of hardy, spirited horses, descended from the larger Percheron horse, which they resemble in form and appearance, though smaller.

ARABIAN.—This horse possesses an elegant frame. The ear is small and beautifully shaped; the neck is light, the shoulders good, and the fore arm very strong. The hind quarters are narrow, indicating speed rather than strength. The legs are strong, less bone and more back sinew than in American horses. The pastern joints are long and fine—too long for strength, and the long pastern causes the horse to trip even on level ground. They seldom exceed 15 hands in height;

Arabian.

their colors being either black, gray, or bay; there being said to be 3 distinct breeds of Arab horses: The Attechi, which does not rank high in general estimation; the Kochlani, highly prized and very hard to procure, of undoubted pedigree; and the Kadischi, a mixed breed. Most of the thoroughbred horses have had some of their best points transmitted to them from Arabian blood.

ASS.—The ass is naturally humble, patient and quiet. He is extremely hardy, both as to the quantity and quality of his food, contenting himself with the most harsh and disagreeable herbs. In the choice of water, he is very nice, drinking only of that which is perfectly clear. He requires very little looking after, and sustains labor beyond most others. He is seldom or never sick, and endures hunger and thirst most resolutely. The milk of the ass is the lightest of all milks, and is excellent for persons in a debilitated condition. But the ass is mainly bred in this country for raising mules, the Maltese jack being most favored for the purpose. Fine jacks are scarce; those crossed with the Spanish variety have the largest size, activity and spirit. The quality of the jack is important, as he mainly controls the quality of the mule offspring. (See *Mule.*)

BOULONNAIS.—This is the most important French draught-horse. His characteristics show that he has a vigorous constitution, and in point of strength he is a Hercules among horses. He is as gentle as he is strong. For so heavy an animal, he is free and quick in his movements. He is endowed with a vigor and energy which is reflected in his gait.

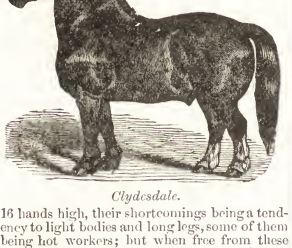
CLEVELAND BAY.—This breed receives its

Cleveland Bay.

name from a district in Yorkshire. The breed

has been so much crossed, with the object of obtaining greater speed, that the original race appears to be fast dying out; they were always a useful horse for those purposes where bulk and power were required, coupled with quick stepping action. The standard color is a bright blood bay, with black legs, mane and tail. When pure, they generally stand from 16 to 17 hands high. The carcass is lengthy, the shoulder lofty, and the withers tapering; the thighs are deep and sinewy; legs longer than in some improved breeds; bone thin and flat, with much muscle; the neck is long, but not very well arched; head long and projecting forwards; the eye uncommonly pert and bold. The whole animal denotes a figure for activity rather than for symmetrical form and points. They carry less flesh than any other breed, and their muscular power is proportionately increased; they have abundance of bone of the right sort.

CLYDESDALE.—As a draught horse of great strength, perhaps the Clydesdale stands unequaled. Scarcely any horse is so well adapted for single-horse carts, to draw heavy loads, and get through such a large amount of work in a single day. They are extremely active, standing about



Clydesdale.

16 hands high, their shortcomings being a tendency to light bodies and long legs, some of them being hot workers; but when free from these defects, they are useful for agricultural purposes. The fashionable color is black or black-brown, with the two hind feet white a little above the fetlock; the fore feet are sometimes white, but it is not liked. A white stripe in the face runs from the muzzle to near the ears, widening between the eyes. The body is short, but very deep, compact and strong. The chest is very wide and capacious; the arm strong; and the legs straight set; the thigh is very deep and sinewy; the barrel round; the ribs closely joined home near to the hook-bone. The neck is of a very proper length, finely arched, showing a very uncommon depth from the bottom of the chest, in a line slanting upwards to the top of the withers. The head is fine, tapering to the muzzle, the ear, small and erect; the eye, prominent and lively.

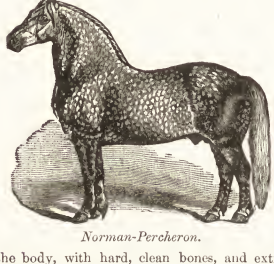
COSSACK.—An inferior race. They are small in size, rough in appearance, and are literally a useful kind of pony, being rough and wiry, and resembling most ponies in their endurance and general qualifications, combined with spirit and a brisk and lively action.

ENGLISH DRAFT.—The old black cart-horse of England was one of the distinctive breeds of English horses from an early period. They are divided into three sub-families; first, the heavy, massive horse raised in the rich marshes and plains of the midland counties expressly for the London brewers; second, the smaller sized, but tolerably heavy horses, generally employed for agricultural purposes, a strong compact animal, but slow in action; and, third, a lighter and more active animal, possessing either some admixture of blood of a smaller breed, or being the descendants of the Flemish discarded coach-horse. The prevailing color among these animals is black, but the large dray horse is not confined to those of a black color. There are many of a bay, and still more of a brown color, as well as numerous grays and roans. The largest are seldom less than 17 hands high, when 2½ yrs. old, at which age they are usually sold.

MULE. — Strong, well-limbed, large, sure-footed, and capable of carrying great burdens and traveling great distances. They are much hardier and stronger than horses, less subject to diseases, capable of living and working to almost twice the age of the horse, and cost very much less to keep. The white mule is the least hardy, though an iron gray is generally a serviceable animal. Cream mules with hair, mane and tail all the same color, are frail; but those with black mane and tail, striped legs, and a black stripe across the shoulders and back, are more hardy; spotted mules are the least valuable of their race. The color is various; action bold, square, free and easy; the walk 4 to 5 miles per hour, the trot 6 to 8, on a dry and moderately level road, but capable of being pushed much faster on the latter gait when required. As mules are hybrid, they are infertile and not bred together. A large, well-made jack is best for breeding. Male colts should be castrated as early as from 4 to 6 months old. (See *Ass.*)

NORMAN-PERCHERON.—These are from two well-known classes, the Norman and the Percheron. The Norman horse is heavy, muscular, closely-built, and weighs sometimes 2,200 to 2,300 lbs.; it is capable of carrying great weights and of going at a good pace. The Percheron of to-day has a clean, bony, and small head; ears short, mobile, erect, and fine pointed; eyes bright, clear, large, and prominent; forehead broad; nostrils large and open, and bright red within; jaws rather wide; chin fine; lips thin; teeth sound and even; neck a little short, yet harmoniously rounding to the body; throttle clean; crest rigid, rather high and gracefully curved; mane abundant, with silky hair; breast broad and deep, with great muscular development; shoulders smooth and sufficiently sloping for the collar to set snug to them; withers high; back short and strongly coupled; body well ribbed up; round, full and straight on the belly, which is much longer than the back; rump broad, long and moderately sloping

to the tail, which is attached high; hips round and smooth at the top, and flat on the sides; quarters wide, well let down, and swelling with powerful muscles; dock strong; tail long, heavy, and gracefully hanging out from the croup when the animal is in full motion; legs flat and wide, standing square and firm, and well under



Norman-Percheron.

the body, with hard, clean bones, and extra large, strong joints, cords and tendons; short from the hocks and knees down; pasterns upright; fetlocks thin; hoofs full size, solid, open, tough and well set up at the heels; color, usually mottled gray; height 15 to16½ hands; weight 1,300 to 1,700 lbs.

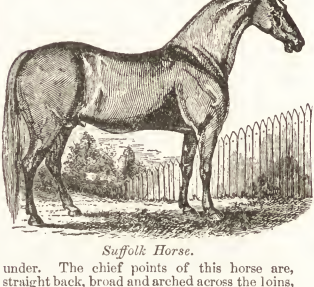
PERSIAN.—The Persian horse is of elegant shape, and ranks, perhaps, next to the Arabian,

Shetland Pony.

being his equal in speed, though not in staying qualities, and is similar in size, seldom rising above 14½ hands.

SHETLAND.—These are of small size, varying from 7½ to 9½ hands in height. Many of them are extremely handsome, and they are very docile, and contented with the hardest fare. They possess enormous strength in comparison with their size, and are useful animals to mount children upon, or draw a small carriage. The head, almost concealed by the shaggy mane, appears smaller than it really is; the shoulders are slanting and muscular; the color generally bay-brown or rusty black.

SUFFOLK.—The Suffolk is a small horse, seldom exceeding 15½ hands in height, and often



Suffolk Horse.

under. The chief points of this horse are, straight back, broad and arched across the loins, with short couples, full and lengthy quarters, with sinewy fore arms and an open chest, though somewhat wanting in depth; the shoulder low, but well set for the collar.

WELSH.—The Welsh pony is about 13 hands in height and possesses a neat head, good shoulders and strong legs and feet. Many of them are of a dun or cream color; and, if the former, marked with a dark stripe down the back, which color extends to the mane and tail. It is often a very handsome little animal, being well shaped, and capable of any amount of endurance. It is contented also with the humblest fare.

Breeding and Rearing.

REMARKS.—The first thing to be acquired, is the knowledge of the parts or points that are supposed to constitute the different qualities; and this can only be done by acute and frequent observation. Without this knowledge, it is useless to proceed, for blunder would only succeed to blunder, and the whole business terminate in failure. For the want of this knowledge, bad breeds of animals of every kind are continued, which is wholly chargeable to the ignorance and apathy of the breeder. In acquiring this knowledge, he must inquire most anxiously into the practice of those who have succeeded; ascertain correctly the causes which have produced the known results, compare them with his own observations, and then try to discover the applicability, in his own case, of similar causes, in order to produce similar results. Pairing should have strict reference to correcting the imperfections of one animal by the corresponding excellence in the other. Bays and chestnuts, with dark manes and tails, are the best colors to breed from; some breeds, however, have characteristic colors. The sire impresses

outward form and color, and the mare the inner and physical form. A pure-blooded sire, coupled with a mare of mixed blood, will produce a foal which resembles the sire more than the mare. Some sires have the power of impressing upon their offspring their characteristics in a remarkable degree; and some mares bring young much resembling the sire. The oftener the mare is served by the same sire, the greater will be likeness of the offspring to the sire. The dam is impressed with the blood of each of her sires, but the first impress is stronger than the succeeding ones. When the sire is changed, often the progeny will be varied. In breeding up to a higher standard, be sure that the sire is of the purest and most strongly-marked characteristics. To keep a stock pure and retain the characteristics of a breed, breed in line with animals having just the points required. Breeding in-and-in, is the breeding of animals closely related. In founding a breed, or refining certain points, breed in-and-in for 3 generations, then take an out cross. (See *Breeding-in* in CATTLE.) Crosses are not always objectionable, but violent crosses are not good. Great care should be taken to preserve the purity of breeds; for this reason pedigrees are established. Kind treatment and careful training have great influence upon hereditary traits; and blindness, and many other diseases, are hereditary in horses.

STALLION.

ADAPTATION TO THE MARE.—To be successful in breeding, care must be taken that there is mutual adaptation in size and form, and also to avoid using a horse which is defective in any particular when the mare has the same defect. A somewhat finer quality may be allowed in the male, but not so far different as to form an unseemly distinction. The qualities of animals that are assorted for propagation should be much alike. The properties will be more usefully developed in the process of like qualities, advancing step by step to better, than in the ill-consorted adaptation of extremes, which in the process of meeting may be expected to yield many irregularities.

AGE FOR BREEDING.—The time of maturity, longevity of the breed, and stamina of the individual, must determine this; but the stallion should be at least 7 or 8 years old; if a very young mare is chosen, the horse should not be less than 8, 10 or 12 years old. If both are very young or very old, the produce is generally small and weakly; but by using a young mare and an old stallion, the services of young and old may be fully utilized.

CHOICE FOR BREEDING. — The stallion should be at least medium sized. He should be masculine in appearance, and possess the beauty, fire, strength and courage of the male. In breeding to a feminine-looking male, the outcome will always be a failure.

MARE.

AGE FOR BREEDING.—A mare is capable of breeding at 3 or 4 years old, though some people commence to breed before the form or strength of the animal is sufficiently developed; and this early breeding is adverse to her proper development, and materially interferes with her growth. If a mare has done but little more than ordinary farm work, she may continue to breed until she is nearly 20 years of age.

CHOICE FOR BREEDING.—The mare exerts an important influence over the quality of her offspring, and great horses usually come from superior dams. The form, disposition, and general character of the colts, are often counterparts of the dam. The breed should be taken into consideration. If it is desired to raise a carriage animal, select a mare with a good, animated countenance; sprightly, not too nervous, nor too sluggish, but with a good muscular structure. The head of the brood mare is a point which should be always regarded; for a mare that has a large head, with a dull, stupid countenance, will not breed a good foal, unless it might be from a very sprightly, ambitious horse. The shoulder blade should be wide and long, extending nearly to the top of the withers, and so well covered with muscle as not to present any undue prominence. The neck should come out from the top of the withers and not low down. The fore leg should be perpendicular, so that the point of the shoulder and the toe will be in a right line. The foot should be sound, and of good, symmetrical shape. The hips should be long, oval, and broad. The hock-joint should be well formed, and not of the "cow-hock," or "sickle-hock" kind.

FOALING, Treatment before.—All mares are better for slow work up to within 2 months of foaling; but they should not be ridden or driven so fast as to occasion exhaustion. Work mares are generally used to within a few days of their time, taking care to keep them at light work and to avoid straining them. When nearly half the time of pregnancy has elapsed, give a little better food. The food should be good clover, and timothy hay, well cut and salted; ground oats and a bran mash, mixed with potatoes and other roots. Feed some corn or meal, but not too much, in order to guard against milk fever. If not intended to be kept at work, she should be turned out into good pasture; but it should not be so rich and succulent as to disagree with the stomach, or make them unwieldy from fat. The former mistake is a constant cause of miscarriage, the bowels becoming relaxed from the improper nature of the food. On the other hand, if it is not sufficiently good, the mare will become thin, and will starve her foal in growth. Mares that have been corn-fed highly all their lives, should have a feed or two daily, after they are 6 months gone, and especially if the autumnal grasses are not rich and plentiful. Excitement of every kind is a fertile source of "slipping" the foal, and everything which is likely to have that effect, should be carefully avoided. The smell of blood and other bad odors, have a very prejudicial influence in this way; and there is no doubt one mare miscarrying, will, in some way, affect others in proximity to her. If a mare has "slipped" a

foal in a previous pregnancy, double care must be taken, as she will be very likely to do so again.

FOALING, Treatment during.—The period of pregnancy varies from 44 to 56 weeks. Small mares generally go a shorter time than large ones, and a mare usually carries a horse colt longer than one which is a female. If the mare has been cared for as suggested above, and be in good health while in foal, little danger will attend the act of giving birth to her young. Should there be, however, false presentations of the fœtus, consult the directions given under cattle. (See *Calving, Treatment during*, in Cows.)

FOALING, Treatment after.— As soon as the foal is born, the mare should be allowed to clean it, and the secondaries be removed by the attendant; a little warm gruel should be given to her; and, if much exhausted by the act of parturition, 1 pt. of strong ale should be given with it as well. It sometimes happens that a mare will not take to her first young foal. In order to cause her to do this, her usual attendant should soothe and quiet her as much as possible, and milk her; and when her udder has been made somewhat empty, she will then usually allow the foal to suck; and until this point is satisfactorily settled, they should not be left alone together, for the mare might do the foal an injury. Nothing but warm gruel and a little hay should be given to the mare for the first 24 hours, in order to prevent heating of the system. For after pains, remove clots from the parts and raise the hind quarters. Give clysters of lukewarm linseed tea, and laudanum or belladonna extract. Syringe out the parts with warm water. Give internally belladonna, opium, or chloroform. Draw away the milk. In a healthy state, the mare very soon recovers from the efforts made in bringing forth the foal. In fine weather she may be allowed to enter her pasture on the second day afterwards. Occasionally the young animal is very active within 6 hours after it comes into the world. For a couple of months, the mare and foal are better kept in a pasture by themselves. Until the mare can get plenty of grass, she should have carrots, bran mashes, and a feed or two of oats. Rye grass is cultivated and cut for mares, daily, by those who raise early foals.

TIME FOR SERVICE.—The time for sending the mare to the horse will vary with the purposes for which her produce is intended. If for racing, it is desirable that she should foal as soon as possible after the 1st of January; and, as she carries her foal about 11 months, the first time of her being in use after the 1st of February, is the period chosen for her. All other horses take their age from the 1st of May. A mare will almost invariably be in heat on the 9th day after foaling, if she is healthy and has received no injury in giving birth to her foal; and in most cases it is best that she should receive the horse at that time, if it is desired that she should be kept for breeding purposes. If she refuse the horse then, try her again on the 7th day following; if she refuse again, try her on the 6th day after that; if she refuse then, she may be considered to probably be with foal.

TURF, Breeding for the.—The first step of the breeder is to decide what kind of stock he wants to raise. If he decides to raise trotters, the next step is to trace out his mare's pedigree. If he finds that she has 5 or 6 generations of trotting ancestors in her pedigree, he can not fail to produce their kind, agreeable to hereditary law. The dam may trot in 2.20; still, if her gait is not hereditary, but acquired, there is no certainty that she will breed her equal; while a mare that cannot trot half as fast as that come down from a very speedy family, will be far more likely to breed trotting colts than the fast mare without any pretensions to the trotting inheritance. In selecting brood mares, preference should be given to a young one.

Foal.

CARE IN GENERAL.—A day or two after the foal is dropped, providing the weather is fine, it may be turned with its dam into a sheltered pasture, in which there is a shed for security from wind and rain. The foal, if separated from the dam, must be put into a yard in the homestead, properly provided with a shelter shed and a supply of fresh water. No more than two animals may be put together, as the smaller the number of any animals that is put into one shed, the better. Colts should be broken to harness at 3 yrs. old, and used in light work for 2 yrs., when they will become matured and fit for full work. If they are used for hard service before their joints become settled or surrounded by a full-grown texture of muscle and sinews to support them, they will become sprained, causing spavins or bony enlargements, that will destroy their future usefulness. Shelter from the weather should be afforded colts of all classes during the winter season; and unless they have this, they soon grow out of form and lose flesh, however well they may be fed. A colt neglected in its first winter never recovers its proper shape.

CASTRATION.—The best time for performing this operation is just before weaning, provided the weather is mild. If, however, his neck is very light, and the withers low, its postponement till the following spring will give a better chance for the development of these parts. Midsummer should be avoided, as the flies prove troublesome, and the colt needs to be kept as quiet as possible, taking only the moderate exercise which he will get in grazing. A large and well-ventilated box is used by many, and to this there is no objection. The colt should first be cast, or thrown, by the use of hobbles. Attach a strong $\frac{3}{4}$ in. rope, 18 ft. long, to one end of a D-shaped ring. There are also 4 loops, 13 in. in length, each of which is attached to a similar ring. Fasten the long rope around the left fore pastern, by drawing it through the ring attached, and inclosing the leg in the loop thus formed. Fasten one of the short loops on each of the other pasterns, by drawing the ring through the loop; thus making a slip-noose around the leg, with the ring hanging clear; the

remaining short loop fasten around the right fore leg, just below the knee. The long rope pass through the rings on the different legs successively, beginning with that on the right fore pastern, thence through on right hind pastern, thence on left hind pastern, and thence through the ring at the knee of the right fore leg. Then throw the rope under the horse's belly to the left, and draw upon it until the feet are pulled together, the colt being backed gently from the head at the same time. This compels him to sit down upon his haunches, and then he can be easily pushed over on his right side. The feet are then drawn closely together, and the rope wrapped twice around the left hind ankle. The colt is then turned on his back, the rope brought under the rump and wrapped around the other ankle. He is now perfectly secure, and may be turned on either side, or left on his back for castration. Grasp the bag or scrotum over the testicle, so as to draw the skin quite tight; make an incision on each side of the seam, well forward, and press the testicles out; the clamp, or ecraseur then put on above the testicles and above the epididimus, or "prides." Care should be taken not to pull on the testicle more than sufficient to admit of the clamp or ecraseur being put on. If the clamp is used, the cords are then cut. If the ecraseur is used, the cords are cut with that instrument. If the clamp is used, it should remain on one day. If, after the operation, the wounds swell, the gashes should be opened at their lower ends with the fingers, so as to admit the discharge of the serous liquid. Keep the horse at work, or in action, as though nothing had happened to him, as in this way the wounds are kept open and the serum cannot accumulate. If there should be excessive bleeding after the operation, this can be checked by tying a string around the scrotum close to the body.

EXERCISE. — Colts should be permitted to gambol as much as they please. Exercise develops muscle, makes an animal active and spirited, and increases the capacity of the lungs and chest.

FEEDING.—Hay, corn, and bran mashes, must be allowed, if it is early in the season, or the grass has scarcely begun to shoot. There is nothing so detrimental to the colt as insufficient food. It is a fundamental principle in breeding, that if the growth of the colt at any time is checked by starvation, beauty, energy, and stoutness will rarely be displayed in after years.

WEANING.—The foal may be weaned in 5 or 6 months after its birth, according to its strength and growth, when it should be either turned into some distant rick-yard, or be housed for 3 weeks or 1 month; or, it may be tied in the adjoining stall, with the partition so open that the dam and colt are in plain view of each other. The first day let the colt nurse twice; the next day once. Feed him upon new mown grass, or fine clover hay, and give him 1 pt. of oats twice per day, and in about 2 weeks he will be weaned.

General Management.

Breaking and Training.

REMARKS.—In managing a horse, the chief point is to teach him confidence in man. It is necessary to be calm, cool, brave and fearless; to be quiet, for then the horse will be put off his guard; to be firm, and to give the animal no advantage, but crowd him up to doing invariably what is wanted.

BACK, Teaching to.—Put the cord (described in *Driving, Breaking to*) upon the horse, using the small loop; draw it with a steady pull; this brings the horse's nose towards his body. Keep a firm hold upon the cord until he steps back a little, using at the same time the word "back." The utmost gentleness must be observed in order not to excite him, and the lesson should not be long enough to tire him; 5 to 10 minutes being the best length, repeated at intervals of a few hours. As soon as he understands what is desired, he will back promptly at command. At first nothing should be behind him; next, he may be tried with a light, empty cart, and afterwards with a loaded cart, great care being taken not to hurt his mouth.

BITTING.—The true way to bit a colt, is to let him bit himself. When the colt is 1 yr. old teach him to hold the bit in his mouth. Use a large, smooth snaffle, so as not to hurt his mouth, with a bar at each side, to prevent it from pulling through either way. This should be attached to the headstall of the bridle, and put on the colt without any reins to it, and let him run loose in a large stable or shed some time, until he becomes a little used to the bit, and will bear it without trying to get it out of his mouth. Repeat this several times before doing anything more with the colt; and as soon as he will bear the bit, attach a single rein to it, without any martingale; also, have a halter on the colt, or a bridle made after the fashion of a halter, with a strap to it, so that he can be held or led about without pulling much on the bit. A horse should be well accustomed to the bit before putting on the bitting harness, and when he is first bit rein his head up to the point where he naturally holds it. The horse will soon learn that he cannot lower his head, and that raising it a little will loosen the bit in his mouth. This will give him an idea of raising his head to loosen the bit; then draw the bitting a little tighter every time it is put on, and he will still raise his head to loosen it. By this means his head and neck will gradually get in the position in which he is wanted to carry it. After some days of this usage a small string of bells may be attached to the girth. Take the colt out of doors with harness on, and, first in the lot, and afterwards in the street, teach him handily to be driven by the reins, and to turn out on meeting teams and turn around corners. Go different routes daily. Always, on returning

home, teach the colt to stand still while being unharnessed. Three week's daily lessons of this kind, and the colt will be fit to hitch to a light but strong sulky.

CARRIAGE, Hitching to.— Lead the horse to and around the carriage; let him look at it, touch it with his nose, and stand by it until he does not care for it; then pull the shafts a little to the left, and stand the horse in front of the off wheel. Let one stand on the right side of the horse and hold him by the bit, while another stands on the left side facing the carriage. This will keep him straight. Run the left hand back and let it rest on his hip, and lay hold of the shafts with the right, bringing them up very gently to the left hand, which still remains stationary. Do not let anything but the arm touch his back, and as soon as the shafts are square over him, let the person on the opposite side take hold of one of them, and lower them very gently to the shaft bearers. Hitch very slowly and deliberately. When the shafts are placed, shake them slightly, so that he will feel them against each side. As soon as he will bear them without scaring, fasten braces, etc., and start him along very slowly. Let one man lead the horse to keep him gentle, while the other gradually works with the lines until he can get behind and drive him. After he has been driven in this way a short distance, get into the vehicle, and all will be right. It is very important to have the horse go gently when he is first hitched; after he has been walked awhile there is not so much danger of scaring.

CATCHING A HORSE.—Besides the old-fashioned way of catching a horse, by shaking in a measure a little grain, the following is a good way: Take finely-grated castor, oils of rhodium and cummin; keep them in separate bottles, well corked; put some of the oil of cummin on your hand, and approach the horse on the windy side. He will then move toward you. As soon as you can reach him, rub some of the cummin on his nose; give him some of the castor on anything he likes, and get a few drops of the oil of rhodium on his tongue. After this, you can make him do nearly everything you want. Treat him kindly, feed well, handle gently, and your victory is certain.

COLTS, To Break.—Colts are generally allowed to run entirely too long before they are taken in hand for breaking, and the consequence is, that when breaking becomes necessary, they are wild and unmanageable, and are only reduced to obedience by a series of violent and barbarous devices, by which they frequently suffer irreparable bodily harm, and learn evil and mischievous habits. The breaking should begin so early and proceed so gradually that the horse should grow up in those habits of obedience and docility which give him in reality his highest value. The colt should be made docile and fearless by familiar handling and petting. No such thing as a whip should ever be allowed to touch the very young foals. Be firm, but not overbearing; it will be found better to overlook the fault than to attempt to correct it and fail; never lose your temper, for the moment you do so, you at the same time lose the advantage you should always have over him. If a colt is never allowed to get an advantage, it will never know that it possesses a power that man cannot control, and if made familiar with strange objects, it will not be skittish and nervous. Never try to beat a colt into doing a thing, for, if nervous, he may turn out a vicious horse, and, if stupid, he may become stubborn. Never trifle nor deceive. When you must draw the whip to compel attention, remember to reward obedience with sugar or some pleasing gift. Condescend to talk to the horse, and be clear in language, for he can hear, and is glad to be coolly and intelligently directed. "Go on!" "Steady!" "Whoa!" are magic words, which should be used to start, to moderate, or to stop the movements of a colt. Repeat them clearly when having occasion to use them, for just what they mean, and the colt will soon obey them, and be proud of his knowledge. As soon as weaned, break to the halter; then commence to take up all its feet and clean the hoofs, thus preventing thrush and slipping, and getting it well used to having its feet handled preparatory to being shod. By the time he is 1 year old, he should allow you to place light articles on his back without any resistance, and should be taught not to be afraid of straps hanging loosely either about the body or heels. This education is best done in the winter, and should be repeated until perfectly broken, and, when harnessed for the first time, he will quietly permit himself to be driven alongside of a quiet horse. Commence breaking to harness when about 1½ yrs. old. Put on all the harness, and spend considerable time in adjusting each part, and buckling and unbuckling everything. Tie traces into breech-rings, pretty closely drawn; buckle both girths; use no blinders on the bridle, and only a loose check-rein. Let the colt stand several hours at a time with the harness on.

DANCE, Training to.—Fasten the animal with 2 side reins between the posts supporting the leaping bar. Take a whip, and as the music plays, gently touch him with it, using the "jik, jik," of the groom, while going on. The horse, being tied to the posts, can move neither backward nor forward; but he will be induced to lift his legs, and thereby gain the rudimentary movement of his lesson. After a while the teacher must mount on his back; the horse being fastened by the side reins. Just when he is to raise his leg, a gentle pull must be given to the rein at the proper side to help the movement. In course of time, the reins must be loosened, and the horse, if tolerably ready, will soon learn to mark time, quick or slow, in answer merely to a slight jerk of the bridle. The rider must then dismount, and, coming before the horse, teach him to dance or keep time, with a wave of the hand, or by a pat on the foot which he is wanted to lift.

DRIVING, Breaking to.—Take a cotton cord, of fine strands, such as is sometimes used for a bed-cord or clothes-line, usually about ⅜ in. thick; hemp, or anything of the kind that is strong enough, will answer the same purpose; let it be about 15 ft. long; tie one end into a hard knot, as would be done to prevent its raveling; tie

another knot about 10 in., or a little more, from the one on the end; but, before drawing it tight, put the knot on the end through. There is now a loop that will not slip, made on the same principle that a rope is tied around the neck of a horse to hitch with, so as not to tighten upon the neck by pulling upon it. This loop should be just large enough to slip over the under jaw of the horse it is desired to train. Put this loop over the lower jaw, then, while standing on the near side, take the cord in the left hand and bring over the neck, by passing the left hand under the neck to the opposite side towards the mane; bring the right hand over the neck, and take the cord from the left and pass back to the loop, and put through from the top side, until the part over the neck is drawn down like a check-rein; then take hold of the end of the rein.

FEAR, To Overcome. — Whatever the horse understands to be harmless, he does not fear; consequently great pains should be taken to cause him to examine and smell such things as are likely to frighten him in after life. This should be attended to in his early education, since early impressions are strong in the horse. A log or stump, by the road-side, if regarded with suspicion, should be approached slowly or cautiously; to the imagination of the horse, such things are supposed to be some great beast that may spring upon him, but which he will soon comprehend to be harmless, if obliged to examine its nature in his own way, by advancing to the object and allowing him to understand it fully by smelling and breathing with the nose. There is a singular fact connected with taming the horse. If he is accustomed to any particular object by seeing it on one side only, he will not be afraid when he sees it with the eye on that side; but he will be afraid if he approaches it on the other side; it is therefore necessary to pacify him on both sides in all cases. After he is accustomed to whatever he is to be made familiar with, on his right side, repeat the operation on the left side in the same manner, as if he had not approached it at all. Whenever the horse is noticed directing his ear to any point whatever, or indicating the slightest disposition to become afraid, instead of pulling the rein to bring the horse forward toward the object causing its nervousness, it should be pulled on the other side. This will instantly divert the attention of the horse from the object which is exciting his suspicion, and usually the horse will pay no more attention to the object, from which he would fly away if forcibly driven on to it by pulling on the wrong rein. To accustom a horse to a drum, place it near him on the ground, and, without facing him, induce him to smell it again and again, until he is thoroughly accustomed to it; then lift it up, and slowly place it on the side of his neck, where he can see it, and tap it gently with a stick or the finger; if he starts, pause and let him carefully examine it. Then re-commence, gradually moving it backwards, until it rests on his withers, by degrees playing louder and louder, pausing always when he seems alarmed, to let him look at it and smell, if needful. In a very few minutes it may be played upon with great force, without his taking any notice. When this practice has been repeated a few times, the horse, however spirited, will rest his nose unmoved on the big drum while the loudest sounds are being produced. To break horses to stand the firing of a gun, place something in the nostrils, to prevent him from smelling the powder; then load the pistol, but very light, so as to make the report as faint as possible; every time it is fired, give him a small piece of apple, with some powder on it; then rub and pat him on the head and neck. When the pistol is first fired, stand close to the horse's shoulders, and rest the arms on his withers. After firing a sufficient number of times, mount the horse and shoot from his back. Keep up this practice for a short time, and the horse will get so used to it that he will not care anything about the firing of a gun at any time or place.

FOLLOW, Teaching to. — Turn him into a large stable, or shed, where there is no chance of escape, with a halter or bridle on him. Go to him, and coax him a little; take hold of his halter, and turn him towards you, at the same time touching him lightly over the hips with a long whip. Lead him the length of the stable, rubbing him on the neck, saying in a steady voice, while leading him, "Come along, boy!" or use his name instead of "boy." In turning, touch him lightly with the whip, to make him step up close to you, and then caress him with the hand. He will soon learn to hurry up, to escape the whip and to be caressed, and can be made to follow around without taking hold of the halter. If he should stop and turn away, give him a few sharp cuts about the hind legs, and he will soon follow, when he must be caressed. When excited, the colt is not in a condition to understand what is required of him, or to be submissive. Be careful not to train the colt till heated and confused. But little should be required at a time, and hold to that point until it is gained thoroughly, before undertaking to do more.

HALTER, To Use.—Never use a rope halter. The cords of the rope are hard, and appear to aggravate and excite distrust rather than confidence; but by all means procure a leather halter, made of bridle leather, so it will feel soft and pliable to the touch and fit tolerably tight on the head, so as not to feel uncomfortable. Before putting a halter on the colt, he must be rendered familiar with it, by caressing him and permitting him to examine the article with his nose; then place a portion of it over his head, occasionally giving it a slight pull, and in a few minutes he will be accustomed to these liberties, and then the halter may be fastened on properly.

HUNTER, To Train for a. — In breaking in a horse that is intended to be a hunter, the necessary routine is very little different to that ordinarily given, except teaching him to jump, and this is done by buckling the reins higher, and keeping the horse at it till he learns to bend himself well, and the rider is enabled to bring him back on his haunches. The main object sought in the education of the intended hunter,

is to get him to bring his hind legs well under him, and, thus carrying a good share of his weight, he is safer in awkward places, and when crossing ridge and furrow in the hunting field, and ordinarily across the country. A fixed bar should be used for him to jump over, and when he has progressed fairly well, he may be ridden over a few low fences; but no high jumps should be allowed to be taken without the hounds, he being brought up gradually to his intended future work. Hunters should be carefully handled at a very early age, if they are intended to become temperate and hardy. They may be ridden gently by a light weight, with good hands, at 3 yrs. old, over small fences. At 4 they ought to be shown hounds, but should only be allowed to follow them at a distance, after the fences are broken down, for, if put to large leaps at that age, they are apt to get alarmed and never make steady fencers afterwards. Above all things avoid getting them into boggy ditches, or riding them at brooks; but they should be practiced at leaping small ditches, if possible, with water in them, the rider facing them at a brisk gallop, for this gives a horse confidence and courage. No matter how carefully a hunter may have been trained, it is hard to say whether the right stuff be in him until he is tried in the field. In a hilly country, nothing has a chance against a pure thoroughbred. Lengthy horses always make the best jumpers, if they have good hind quarters, good loins and good courage. The most dangerous of all horses in the field, is the star-gazer. A hunter should carry his head low, as by so doing he is less liable to fall, and gives his rider a firmer seat. All wild horses lower their crests in leaping. It is, however, the peculiar excellence of going well through dirt which decides the real value of a horse. No matter how wide a horse may be, if he is not deep in the girth, he cannot carry weight, and is very seldom a good winded horse, even under a light man. One of the best things that can be said of a hunter is, that at first sight he appears 2 in. lower than he really is. Short-legged horses leap better and safer than long-legged, and go faster and farther under hard riders. Horses with straight hind legs never can have good mouths. They should have well placed hind legs, with wide hips, well spread gaskins, well knit joints, short cannon bone, oblique pasterns, and large feet. The bone of a hunter's hock cannot be too long.

JUMPING.—The colt should be at least 4 yrs. old before he is taught jumping. Do not urge a horse to a leap which he cannot perform, for failure will discourage him. To commence with, place a bar about knee-high. Begin the instructions by letting one man lead the colt, while another man follows with a whip. The former walks over the bar, encouraging the colt with his voice to follow. The man with the whip is only to prevent the horse backing; the whip should never be applied unless the animal is positively restive. With a little coaxing, he will soon go over, and having once done so, he will readily repeat it. A few pieces of apple may be advantageously used to induce him to leap the bar, and to reward him for doing so. Leading the horse over ½ doz. times will suffice for the first lesson. The next day he may be trotted up to it, or more lessons may be devoted to teaching him to leap at command. With each succeeding lesson the bar may be raised until it is as high as the horse's breast, but beyond this, there is no necessity with common animals intended merely for private riding. Neither should the horse be wearied and disgusted with too long lessons. When perfect in his lessons, a boy may be placed upon his back to ride him over. The boy must be a good rider, or the horse may stop suddenly at the bar and throw him.

MULE, To Break.—Approach and handle him the same as an animal already broken, and, by kindness, in less than a week, the mule will be more tractable and better broken than he would in a month had the whip been used. In commencing to break mules, kicking is the first thing to guard against and overcome. The young mule kicks because he is afraid of a man. He has seen those intrusted with their care beat and abuse the older ones, and he very naturally fears the same treatment as soon as man approaches him. Most persons intrusted with the care of these young and green mules have not had experience enough with them to know that this defect of kicking is soonest remedied by kind treatment. Long experience with the animal will show that, in breaking the mule, whipping and harsh treatment almost invariably make him a worse kicker. He must be convinced, by kindness, that he is not going to be hurt or punished.

PACE, Training to.—Pacing is a favorite gait for a lady's horse. The animal should be taught to start out with the right leg, the left being uncomfortable to the rider as she sits the horse; and the breaker must persevere until the colt habitually starts off with the right leg. To teach the colt to pace, buckle around each hind leg 3 lbs. weight (lead is best); after which ride the animal briskly, at the same time twitching each rein of the bridle alternately; soon he will be thrown into a pace. After training him in this manner several times, detach the weights, and in their stead place 2 lb. weights, and use these several times; then change for something still lighter; leather padding, or even something still lighter, will answer the purpose, and these let him wear until he is perfectly trained, and you will have a smooth and even pacer.

RIDING, To Break for.—The muscles of a colt's back must be gradually trained before permitting much weight to be carried. Keep in mind that he is not accustomed to carry weights, and that to put 150 lbs. on him would be entirely wrong. Give the colt to understand that you are his friend. It will require but a few days to thus train the muscles; then he will bear the weight more easily. After the first 3 days, the horse will carry 125 lbs. easier than at first he could carry 40. Now fasten the saddle on, but not too far forward; buckle the girths tight, and let him remain a few minutes; then approach him gently, pat him on the neck, and draw up the reins tight with the left hand to the withers;

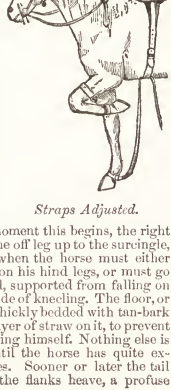
put the foot in the stirrup, and bear gently on the saddle, then pat him gently on the back and rump, speaking very low during the time. Then rise gently, throwing the right leg over the saddle, and sit perfectly still for a few moments; then dismount and caress him, patting his head and back, and after doing so a few times, he will be as submissive as a lamb. To start the colt, do not touch him on the side with the heel, or do anything to frighten or make him jump. Speak kindly to him, and if he does not start, pull him a little to the left until he does so; then let him walk off slowly with the reins loose; walk him around the stable until he gets used to the bit, when he can be turned in any direction and stopped when desired. After taking him out of the stable, be very gentle with him, as he will feel a little more at liberty to jump or run, and be easier frightened than while he was in the stable. When first mounting a colt, take a little the shortest hold on the left rein, so that if anything frightens him he can be prevented from jumping by pulling his head around. If he is stubborn, and will not go, he can be made to move by pulling his head around to one side, when whipping him would have no effect. Turning him around a few times will make him dizzy, and then, by letting him have his head straight, and giving him a little touch with the whip, he will go along without any trouble. Never use martingales on a colt when first driving him; every movement of the hand should go right to the bit in the direction in which it is applied to the reins, without a martingale to change the direction of the force applied.

STAND, Teaching to.—After he is well broken to follow, place him in the centre of the stable. Begin at his head to caress him, gradually working backward. If he move, give him a cut with the whip, and put him back to the same spot from which he started. If he stands, caress him as before, gentling him in this way until it is possible to get round him without making him move. Keep walking around him, and only touch him occasionally. Enlarge the circle when walking around, and if he then moves, give him another cut with the whip, and put him back to his place. If he stands, go to him frequently, and caress him, and then walk around him again. Do not keep him in one position too long at a time, but make him stand in another place, and proceed as before.

STOP, Teaching to.—The word, "whoa!" should be used only to stop a horse when he is in motion; never use it when you approach a horse standing quietly. Horses soon learn to distinguish any word often addressed to them, and they should learn to associate it with some definite and exact duty which they are desired to perform. If any word of command is used indiscriminately, or out of its proper place, the animal becomes confused, and loses the association between the word and the object desired. To teach a horse the meaning of the word "whoa!" the leg-strap may be used; or put a rope around his near fore foot, passing it under the girth; and, as the animal walks along, pull up the foot, saying at the same instant, "whoa!" He will be brought to a stop, and by repeating the lesson he will soon raise the foot and stop, even though the rope is not pulled upon. The object of this lesson is to teach him, that if he jumps when one foot is up, he is liable to be thrown down. The fear of being thrown, seems to be greater than almost any other fear which horses are subject to.

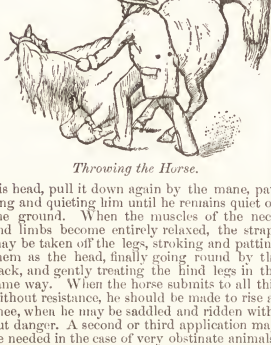
THROWING.—The following is a description of the celebrated Rarey method of taming a horse, and is based upon the fact that there is nothing a horse dreads so much as being thrown. Take a common bridle strap or rope; fasten the end carefully to the forward foot, below the fetlock; pass the other end over the belly-band of the harness and carry it back on the left side to the sulky over the hold-back strap of the breechin, and hold as a third rein in the hand. This strap, or cord, connected with the foot, is a means of control with which the horse can be governed, while moving in the harness, very easily. If the horse attempts to run away, simply pulling upon the strap, throws him instantly upon 3 legs, and he has to stop. If he attempts to kick, his attention is attracted forward instantly, and he finds it impossible. With a violent horse, it is better to let him feel his want of power for doing mischief with the near fore leg strapped up, and the slight degree of fatigue which a few minutes hopping will produce, before a second strap is called into play. When this is done, and the second strap is applied and put through the surcingle, the left rein is taken in the left hand and gently jerked, using, if necessary, the usual slight stimulus with the tongue to make the horse move, which he can only do by raising the off fore leg from the ground in the action known as hopping. The moment this begins, the right hand firmly draws the off leg up to the surcingle, and keeps it there, when the horse must either bound into the air on his hind legs, or must go down on the ground, supported from falling on his side in the attitude of kneeling. The floor, or ground, should be thickly bedded with tan-bark or manure, with a layer of straw on it, to prevent the horse from injuring himself. Nothing else is to be attempted until the horse has quite exhausted his energies. Sooner or later the tail begins to tremble, the flanks heave, a profuse

Leg Straps.



Straps Adjusted.

perspiration breaks out, and the horse lies, or is easily pulled over on his side. If he raises



Throwing the Horse.

his head, pull it down again by the mane, patting and quieting him until he remains quiet on the ground. When the muscles of the neck and limbs become entirely relaxed, the straps may be taken off the legs, stroking and patting them as the head, finally going round by the back, and gently treating the hind legs in the same way. When the horse submits to all this without resistance, he should be made to rise at once, when he may be saddled and ridden without danger. A second or third application may be needed in the case of very obstinate animals.

TROT, Training to.—Use rollers on the front feet. These rollers should be made of wood or horn; made round, about the size of a hickory nut, with a small hole bored with a gimlet in the centre of each, and about a dozen of them strung on a string or narrow strap. The string or strap should be much smaller than the hole. Then tie or buckle very loosely around the fetlock joint, next to the hoof, so that they can play loosely up and down when the animal is moving. As soon as the horse finds that there is something on his feet, he will naturally think that there are stones in his road, and will lift them up higher, and throw them out farther, and soon he will learn to be a good trotter.

TWO-WHEELED VEHICLES, To Train for.—A long-gaited horse gives an unpleasant motion to a chaise, dog-cart, or two-wheeled vehicle of any kind. Now all horses of good action will make good chaise horses if their gait is shortened. To do this, a net must be used. This net is like a breast-collar; it must be 2 or 2½ ft., and should be fastened to the collar and harness, and worn long, reaching to the knees; the cords in the fringe to this, must be about 4 in. apart, and on each cord there must be 4 balls, 1½ in. in diameter. There must be a similar net on the breechin, reaching round the flank and meeting the front one; the net must hang below the gambrils; then use a string of smaller balls on the fore feet, these to be 1 in. in diameter. They will effectually shorten the gait. Care should be taken in the first exercise after putting on the net. Drive or lead the horse around after the harness and net are on, before putting him in the chaise. After a few days' practice he will be a fine chaise horse. There are many horses that are very gentle after starting, but that will not stand to let more than one get in; they will then rear up and start very suddenly, and, if stopped, they become stubborn, and refuse to start when called on. People usually punish them with the whip, or by kicking them sometimes in the belly, which is very dangerous, as they have thus been ruptured. After he is hitched, caress him about the head; then take hold of the reins, and put the foot on the step, and shake the carriage; if he starts, pull gradually on the reins, and at the same time speak low, "Whoa! my boy," or something like it. Then approach his head, and give him a piece of apple; caress him on the head, between the eyes and on the nose and neck; continue this kind of treatment a few minutes, and, when in, don't allow him to start off in a hurry, but walk him off. After a few repetitions of this exercise he will be submissive.

VIOLENT HORSE, To Control.—The velvety nose and lips of a horse are his tenderest parts, and so instantly retroactive upon the whole nervous system as to afford to the skilful trainer a powerful means of control over the most violent animal. It is enough to touch the nostrils, simply passing the finger along the sides of the nose, to stop the activity of the heart and respiration, and stop consciousness in a measure; interchange between tissues and blood is also stopped. Sometimes the fingers may be passed inside the mares. Merely touching these parts may produce some effect; pressing hard upon them has far more effect. It is not essential that the application be made there, as a pressure of the lip only may produce the same thing.

Feeding.

REMARKS.—Horses need feed regularly, and as often as once in 6 hours, at regular times in the day; but they should never be crammed full of hay, especially after a long drive, when they have been without all day, nor just before a hard day's work or a long journey. Long intervals without food produce hunger, and hunger begets voracity; food is bolted, and indigestion and colic follow. This is doubly true and dangerous with horses doing hard work. They come to their long-deferred meal not only hungry, but exhausted; not only is the food bolted, but the stomach is in such a state as to be incapable of thoroughly active digestion, and is overpowered by half the amount of food it could otherwise digest. The kind of work which the horse is intended for, affects not only the quantity of food required, but also its quality. Hay, alone, be it ever so good, is not fit feed for horses, whether working or idle; they need grain; with an occasional feed of roots, bran mash, or something to keep their bowels open. The best feed for horses is about 12 lbs. of hay, and from 3 to 10 qts. of oats, given in regular feeds daily, with a feed of raw potatoes once in the week, when idle or at gentle work, and a small increase when at hard work. In winter, when horses return from work in the evening, a warm feed of roots, such as steamed potatoes, will be useful. In winter horses can work from 8 in the morning to darkness in the

evening, with 1 hour's rest and a feed of corn at noon.

APPLES.—These stimulate the appetite, and give the animal a fine glossy coat. The ration should be small at first.

BARLEY.—This may be given advantageously to horses when mixed with other food. Barley, given to horses just recovering from sickness, has been found to recruit their strength and tempt their appetite. It is best given in the form of mashes, hot water being poured upon the grain, and the vessel kept covered over with a cloth for ½ hour or so. In this form it is easily digestible, and promotes assimilation of other food, in conjunction with which it may be used.

BEANS, English Horse. — These are fed to horses in England. They are injurious when given alone, and should never be used for animals that are not working. They may, however, be given to great advantage when mixed with oats and other grain, and should always be crushed. Beans are heating and astringent in their nature, and may often be given with advantage to animals liable to purge, though too stimulating and binding by themselves. An occasional feed of beans, mixed with his other food, will improve the stamina and spirit of the working horse. Beans should be at least 12 months old before they are used, and care should be taken to keep them from becoming damp and moldy.

BEANS. Locust.—These are a doubtful article of food to have recourse to, not being very digestible, and when given whole are apt to accumulate in the intestines; on this account they should always be split, otherwise severe diarrhea is occasionally produced, which is very difficult to stop at times, the kind of shell in which the bean is enclosed resisting the digestive fluids of the animal's system.

BRAN MASH.—Put ½ peck of bran or pollard into a bucket, and pour on it enough scalding water to wet it thoroughly; stir well with a stick, or work with the hands, and let it stand covered up until new milk warm. If a horse is not in work on Sunday, give it on Saturday evening a bran mash, in lieu of a feed of corn. Bran mash is cooling, and slightly laxative. The bran should always be freshly ground. When intended to be nutritive, oats should be scalded with the bran.

BREAD.—Oat or rye meal, 3 parts; mashed potatoes, 2 parts; a little salt and yeast, to ferment; mix, and bake. Give 4 lb. rations daily. This method effects a great saving over the common plan of feeding horses.

BISCUIT.—This is made of crushed oats and the flour of gray peas, mixed with hemp-seed oil and salt, and is 4 in. in diameter. A day's ration weighs about 4 lbs., and is equal to 10 lbs. of oats. Horses like the biscuit when soaked in water; but, if fed exclusively on them, they lose in flesh, though they are still fit for fatiguing work.

CHAFF.—The proper proportion of hay and straw to be used in the composition of chaff for horses, is generally considered to be 2 bales of clover or meadow hay to 1 of straw, either wheat or oat straw: 8 lbs. of oats and 2 of beans, are considered also to be the proper quantity to add to 20 lbs. of chaff. Large horses, such as are usually employed in wagons, may require 40 lbs. of this mixed food per day; but for the ordinary farm or cart horse about 36 lbs. is considered sufficient. By giving chaff and corn together, the horse is obliged to grind his food, and properly masticate it before swallowing. Horses which eat greedily, often swallow the corn entire, which may be seen in the dung, and which consequently does not do them the good it ought to do.

CLOVER.—Clover, in its green state, is usually considered inferior to the artificial grasses. For soiling horses, though, clover hay is often preferred for chaff to meadow hay, and it will sometimes tempt a sick horse to eat that has neglected his food.

CORN.—In midwinter, when the weather is cold, corn is the best feed for promoting plumpness and warmth in horses; but it is heating, and not good for summer feed, if the horses are idle. Using crushed corn is an injudicious practice; for, to prepare the food for the act of swallowing and for its reception by the stomach, it is not only necessary that it should be broken up, but that it should be thoroughly softened and saturated with the saliva. The horse, finding his corn crushed, and requiring little chewing to break it up, and particularly if he be a greedy feeder, swallows it but partially mingled with the saliva, and not fully prepared for what is to follow. In some cases, bruising the corn is to be recommended; in such, for example, as a horse with some disease of the masticatory organs, or where a horse invariably swallows the greater part of his corn whole; although, in the latter case, he may frequently be prevented from doing so by having a little chaff mixed with the corn. Damaged corn is exceedingly injurious as food for horses, because it brings on inflammation of the bowels and skin diseases.

CORNMEAL.—This is easily penetrated by any liquid. When cornmeal is masticated by a horse, it becomes saturated with saliva, and takes the form of a plastic, adhesive mass, and in this form goes into the stomach of the horse. The muscular movements of the stomach can only move or roll this mass about; but cannot separate or loosen its particles, so as to render it sufficiently porous for the circulation and operation of the gastric juice. It is for this reason that whole corn, or that coarsely ground, may be fed alone to a horse, with less danger of colic or other diseases induced by a fevered stomach, because, in the form of cracked kernels, it cannot adhere into such a solid, plastic mass, and what is not digested will be passed in the droppings. And when this finely ground cornmeal is mixed with a little more than ½ its weight, but several times its bulk, of cut hay, this fibrous hay so completely separates the particles of meal as to form a spongy, porous mass that fluids can pass through freely. When the horse masticates the meal, he also masticates the hay, and the whole goes into the stomach together.

COTTON-SEED MEAL.—This is being used in cut feed to great advantage. Begin with 1 tea-

cupful at a meal, and it can be increased to 1 qt. It produces fat, and a fine, glossy coat. It is apt to ferment in bulk, and must be used fresh. It is a cure for hide-bound.

HAY.—Good, sound hay, is a very important article of food to the horse, but its qualities vary considerably. If allowed to stand too long before cutting, when it has shed the greater portion of its seeds, the value is considerably less than when it has become full of herb and flower. Moldy and inferior hay should never be given to horses, as colic and irritable coughs are often produced by its use. Good upland hay contains twice the nutritive qualities possessed by the inferior sorts that have been harvested too late in the season. The hay should be sprinkled with water in which salt has been dissolved, as it very materially aids the process of digestion. Old hay is more nutritive and wholesome than new hay, on account of its having undergone that slow process of fermentation which sweetens it and develops its saccharine qualities. By feeding on new hay, there is no real sickness, but a general weakness, frequent sweats, loss of appetite, digestion disturbed, diarrhea, relaxation of the muscles, weariness, etc. New hay can replace old hay in the regular rations without injury, and perhaps with advantage; but to feed exclusively on new hay is injurious to horses. Good timothy, blue-grass, or red-top hay, with plenty of oats, may be considered excellent food for both horses and mules during the winter. Kansas prairie hay, though coarse and cheap, is a favorite in the West. It contains a weed that acts favorably on the kidneys. Clover hay, when fed unmixed to horses, often produces a cough. This can always be removed by substituting timothy for a few weeks, after which the feed may consist of ½ clover and ½ timothy, with little or no danger of producing a cough. When the clover hay is fed from large troughs or mangers, instead of racks above the head, horses escape the dust, and consequently the cough.

LINSEED.—This has been a good deal employed in feeding farm horses, boiled with roots or mixed with cut feed, the best method of doing this being to keep it in a bag by itself, so as not to let it get mixed up with the other food in the vessels in which the bulky food is prepared. Although very nourishing, it is of a laxative nature, but possesses assimilating properties that cause it to be very useful. The skins of horses, that are fed upon linseed, are generally very fresh and bright looking. Too free use of linseed is, however, injurious, and must be avoided.

LINSEED OIL.—This is not only a valuable restorative for sick horses, but it is exceedingly useful in cases of inflammation of the membranes peculiar to the organs of respiration and digestion, which it shields and lubricates. Put 2 handfuls of seed into a bucket, and pour 1½ gals. of boiling water upon it; cover it up a short time, then add 2 qts. of cold water, when it will be fit for use. In case of an irritating cough, add some honey.

LUCERNE AND SAINFOIN.—These are very similar in their nature, and when well got make a capital hay, but are chiefly used in their green state, the latter being considered preferable. They are easily digested; the horses thrive that are fed upon them, and put on fat and muscle. They are very efficacious when horses have become hide-bound, for which they are a capital remedy.

OATS.—It is the best plan to bruise the oats that are given to horses, though a strong horse in his prime will be able to masticate his food readily enough; but in the case of old horses, which are not in the full possession of their masticatory powers, and in the case of greedy horses that bolt their food, the bruised oats is certainly preferable. When oats are mixed with bran, it is much less heating. Bad oats become a powerful diuretic, and increase the secretions of the kidneys; and, although the musty smell of oats can be removed by kiln drying, the kiln-dried oats acquire a heating quality, and are not so good for animals as sound oats. Although new oats are much heavier than old ones, the difference is simply caused by the presence of watery matter, which is gradually evaporated; and it will be found the best and safest plan not to tamper with doubtful or inferior food, but supply that of the best quality.

OIL CAKE, Of Linseed or Cotton Seed.—A little oil cake or meal, given to the farm team about the time when shedding the winter coat, will be of great advantage. It will act as a gentle laxative and stimulant, and render more active the various secretive organs of the system, and better fit them for the arduous labors of the season.

PASTURING.—One of the benefits derived from pasturing, is exercise. The slow but constant exercise, thus rendered, is highly beneficial to lame horses; but the exertions demanded by a bare pasture, are very unfavorable to any sprain or lameness arising from disease in the ligaments. Horses that have any disease about the head should not be sent to pasture. Even healthy horses are liable to attacks on the brain when turned to grass, particularly when the weather is hot and the herbage abundant. Horses that have been for more than a year in the stable, and those that have been reined up in harness, often experience difficulty in grazing. The neck is rigid, and the muscles which support the head are short. Very old coach horses, that have short, stiff necks, should not be turned out when they can be kept in. Pasture alone will not be enough for horses at night, that are kept at work through the day. A run in the pasture will be beneficial, but a feed of grain should be given before turning them out. Nothing will do so much good to a horse as turning him out in the spring, but the condition of matters alters very much as the summer advances. The grass gets dry and loses its succulent and aperient quality, while the ground, instead of being soft and moist, is, perhaps, baked hard and made hot by a summer sun. Such is often the result with a horse left out at grass during the entire summer, so that by the end of it he comes back to the stables quite out of condition. To avoid these results, let him enjoy to the full the months of May and June; but when the ground becomes hard, and the flies make their appearance upon the scene, he is then best taken away.

By that time he will have derived the benefits to be had from the change, without being exposed to the disadvantages that afterwards ensue from a too long run at grass. A horse requires no physicking at that time, as the grass acts as a gentle aperient, which carries off various little humors, the result of dry food and partial confinement, and the breathing of an artificial atmosphere.

PEAS.—These are not so heating as beans, and are in a slight degree more nourishing, while they are at the same time easier of digestion. White or Canadian peas are considered the best kind for the use of horses by some. Peas, also, are better crushed, as, on account of their round shape, they are apt to be swallowed whole at times and escape the grinding to which it is necessary they should be subjected. It is not considered advisable, however, to give peas to horses that are required to maintain their full speed, answering better with horses of slow draught. Some horses will eat peas very greedily whenever they get a chance, the result being painfully distended stomachs, which have sometimes actually burst when they have become fully gorged with them, which is to be as much guarded against as the megrims or staggers caused by beans.

ROOTS.—These become a necessity as a winter stock food, and their great value in this connection should commend them to those who have not engaged in their cultivation. *Carrots* are excellent when employed as a tonic for old horses, in order to purify and strengthen the blood; but dangerous for young horses, and especially for stallions; they give them too much blood, make them nervous, irritable, spiteful or vicious, when at work, and predispose them to apoplectic fits if they do not take enough exercise. Horses eat them with avidity, especially when they are mixed with coarse bran.—*Parsnips* are very healthful, and when fed instead of carrots and oats, give great vivacity of spirit and sleekness of coat.—*Potatoes* are frequently given to farm horses, raw, sliced with the chaff; but they form much better food when given boiled, some horses eating them with great relish. When cooked, a proportion of 1 part of potatoes to 3 parts of other food, is about a proper quantity to give; and, as potatoes contain much water, when horses are fed upon them to any extent, it will be prudent to curtail the supply of water somewhat. If the potatoes are kept frozen until they are cooked, the only difference in them is a partial change in the starch to sugar, which goes on slowly even at low temperatures. They thus acquire a sweet taste, but are in no way injured for feeding. By being boiled and cooled, they may be fed to horses with benefit; and if any grain food is used with them, it should be bran or oats, rather than cornmeal.—*Turnips.* These are healthful for horses, and should be cut in slices, or, what is better, pulped finely and mixed with a little meal and some salt. They assist in maintaining the sleek, healthy condition which the horse has acquired on good grass. Rutabagas are better than white turnips.

STRAW.—This may be fed to horses in small quantities without injury. The nutriment should be supplied mainly with grain, for the purpose of the straw is to distend the stomach and aid the animal economy to maintain thrift otherwise than by the nutriment contained in the straw.

WATERING.—A horse needs much more water during a day and night than most people suppose. When a horse wants water, if he does not receive a supply, he endures intense suffering. After being driven until he perspires freely, there will be an imperative demand for water to supply the place of the liquid that has passed off through the pores of the skin; and, after he has filled his stomach with dry feed, a little water is needed to promote digestion, especially when the animal did not receive a generous supply before being fed. When horses are watered frequently they will drink only a few qts. at each draught. This is infinitely better than to allow them to gulp down at one draught 2 or 3 pailfuls. Horses require 4 lbs. of water for each lb. of dry substance in their food. Have the stable fitted with a small water tank, from which the horse may drink as often as he feels inclined. If pure water does not flow at the barn, look into the means for securing it. It is better, however, to water horses from a pond or stream, rather than from a spring or well, because the water from the latter is generally hard and cold, while from the former it is soft and comparatively warm; the horse prefers soft, muddy water, to hard, clear water. A sudden change of water may induce a severe attack of colic. To avoid any ill effect, it is best to mix a handful of oatmeal or bran in strange water, and, if possible, warm it a little. The temperature of springs and wells varies very much, and a difference of 10 or 15° is quite frequent; that is quite sufficient to affect injuriously the condition of the horse, which is an animal that easily suffers from disturbance of the digestive organs. Never give a horse large draughts of cold water when he is overheated. Lukewarm water may be given in small quantities without injury.

WHEAT.—This is occasionally given to horses, but it is not a safe grain to resort to, being somewhat difficult of digestion, and apt to cake in the stomach, so that it requires to be bruised and always given with chopped feed. A horse should not be allowed to drink water immediately after eating wheat, and at first it should be given in small quantities, if the necessity should arise that the horses need to be fed upon it; they will thrive after having become accustomed to it, and when it is used with discretion.

GROOMING.

REMARKS.—Punctuality in all the daily operations appertaining to the stable should be strictly observed. Not only should the horse be watered and fed at regular times, but his entire management should be conducted upon a system of thorough routine. Stable operations ought to begin at the latest at 6 A. M., and in fine weather the door, upon the first entrance of the groom or stable-keeper, should be left open

to admit fresh air; and each animal should receive an inspection in turn, to see if they are all right, particularly those which have been tied up. Little accidents may have happened during the night; a shoe cast, or the first signs of indisposition may be exhibited by an animal; and these should all be carefully noted, in order that necessary remedies may be applied without loss of time. Good grooming to the stable horse is essential; the use of the brush opening the pores of the skin and promoting circulation of the blood, without which the horse cannot be preserved in good health; and good grooming will take the place of exercise in promoting free perspiration. Heat will have the same effect, and thus indolent grooms like a hot stable, because it saves them a great deal of trouble, but at the expense of the constitution of the horse. Much grooming, however, is not required for the farm horse, kept constantly at work, which requires mainly to have all the dirt well brushed off, too much grooming in his case being likely to render his skin more sensitive to the weather. The dandruff which accumulates at the roots of the hair of horses which are turned out altogether, acts as a protection against the cold winds; they thrive best when let alone under such conditions. Grooming, when it can be avoided, should never be done in the stable, but in an adjoining shed; the dust will get upon the hay and corn, fall upon the other horses, and soil the appointments of the stable. A thorough washing with clean water, not too cool, will greatly aid in keeping the working horses in good condition; it removes the dried sweat and dirt much better than dry rubbing. When brought in from work warm with exertion, the horse must be rubbed down and then blanketed; the feet and legs, in muddy weather, must be washed and carefully picked; but, unless they are rubbed quite dry afterwards, it were better not to wash them at all; the safest plan being to rub off the loose dirt with a soft broom, and afterwards wisp them till they are dry; after which curry-comb or rub off the dust entirely.

BALLING. To Prevent.—When the snow upon the roads is cohesive and packs firmly, it collects upon the feet of horses, forming a hard, projecting mass, known as "balling." The trouble may be prevented very easily by the use of gutta-percha. For this purpose the gutta-percha should be erude; to apply it, place the gutta-percha in hot water until it becomes soft, and, having well cleansed the foot, take a piece of the softened gum, and press it into the shoe and foot in such a manner as to fill the angle between them, taking care to force it into the crack between the two. The ball of snow thus has nothing to hold it, and it either does not form or drops out as soon as gathered. When the gutta-percha is applied and well smoothed off with the wet fingers, it may be hardened at once to prevent the horse from getting it out of place by stamping, by the application of snow or ice, or more slowly by a wet sponge or cloth. To remove the gum, apply hot water by means of a sponge or cloth, which will soften it. The same material will last for years. For a horse of medium size ¼ lb. is sufficient for all the feet.

BITS.—The compound bit is composed of 5 principal pieces, viz.: The mouth-piece, the branches, the rings, the curb, and the cross-bar. A compound bit, however, is not always requisite, many ponies and horses being ridden with a simple snaffle, which should be in the corners of the horse's mouth without pressing against it. The curb bit powerfully controls the horse, but with the snaffle he can take a natural position and act with more freedom. The snaffle is preferable for common use in every way; but if the rider cannot control his horse, he must resort to the curb bit, which should be knotted underneath the snaffle. Care should be taken that the bit does not press unnecessarily hard upon the horse's mouth, nor that it is so sharp as to wound it. It may be necessary to have a sharp bit for the headstrong and obstinate animal; yet if it is severely and unjustifiably called into exercise, the animal will, in all probability, plunge and rear and endanger both himself and his rider. The torments which the trappings of the mouth often inflict upon the docile and willing horse, are useless and cruel, and only serve to render the mouth hard, thereby destroying all the pleasure of riding, as well as causing the horse to become fretful and vicious. Rubber bits are the best for winter use on horses. Warm the bit on the bridle, in frosty weather, before putting it in the horse's mouth. The bit, full of frost, coming in contact with the tongue and lips, adheres to these soft tissues the same as it would do if red hot, leaving the animal with a sore mouth.

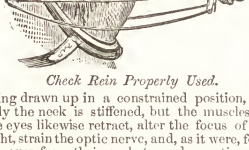
BLINDERS.—Blinders should never be used, and the sight of the horse, for many reasons, should not be interfered with in any way. Horses are only fearful of objects they do not understand, or are not familiar with, and the eye is one of the principal mediums by which this understanding and this familiarity are brought about. Horses can be broken in less time, and better without blinders; but horses that have always worn them will notice the sudden change, and must be treated carefully on the first drive; after that they will drive better without blinders than with them. The horse, when permitted to see, uses his eyes with great judgment; and, if allowed the free use of them, would often save himself by the quickness of his sight from collisions, when the driver would fail to do so by a timely pull on the reins. It would also save many accidents to pedestrians in the streets, as no horse will run over any person he can see.

CHECK-REINS.—When used properly there is no objection to the check-rein. It keeps the horse in shape and prevents him from putting his head to the ground when standing. When the check is drawn so as to derange the natural incline of the head, it causes a stiffness of the neck and a pressure of the cervical and dorsal vertebræ, changes the natural position of the windpipe, and interferes with free respiration. The neck being raised, curves the vertebræ of the back, making it hollow, which has a tendency to draw the hind legs forward under the body, or to thrust the body backward upon them. This is a prolific cause of the knuckling

over the pasterns and springing of the knees. Besides, an undue bearing is brought on the lumbar vertebræ, serious strain is produced on

Check Rein Improperly Used.

the loin and rear parts, and a disordered state of these members is the consequence. Hence come lumbago, spinal meningitis, and other diseases of the spine, contracted heels, navicular joint disease and leg disorders. Moreover, the head



Check Rein Properly Used.

being drawn up in a constrained position, not only the neck is stiffened, but the muscles of the eyes likewise retract, alter the focus of the sight, strain the optic nerve, and, as it were, force the eyes from their sockets, and sometimes so distort them as to prevent the closing of the lids.

CLIPPING, SINGEING AND TRIMMING. — *Clipping.* The coat of the horse is changed twice a year; the long hair of winter coming off in April and May, or sometimes earlier when the stables are warm, and there is no exposure to severe cold. The reason for clipping the hair off horses at the beginning of cold weather, is this: The hair becomes so thick, that when a horse is driven very fast he naturally becomes heated and wet with perspiration, and the hair, holding the moisture, does not permit the horse to dry, and so leaves him very liable to take cold. Clipping is mostly practiced on blooded horses. Horses that are kept moving all the time while out of doors in cool weather, may be clipped with advantage, but no clipped animal should stand exposed, even blanketed, to the cold. Horse clipping should not be performed by any but the professed artist. When a horse is well clipped, his skin should look as level and almost as glossy as if he had on his ordinary summer coat. It should not be done till the new hair has attained nearly its full length, for it cannot be repeated at short intervals like singeing. If it is attempted too soon, the new coat grows unequally, and the skin in a fortnight's time looks rough and ragged. A comb, and 2 or 3 pairs of variously curved scissors are all that are required, with the exception of a singeing lamp, which may be used at last to remove any loose hairs which may have escaped the blades of the scissors. Two men generally work together, so as to get the operation over in from 16 to 20 hours, which time it will take to clip the averaged sized horse properly. While the process is going on, the horse ought to be clothed as far as possible, careful men removing only so much of the covering used as is sufficient to expose the part they are working at, and no more. As soon as the whole body is gone over, as well as the legs, the singeing lamp is lightly passed over the surface, which will leave the hair burned to such an extent as to require a rapid washing with soap and water, followed up by a good strapping and plenty of warm clothing.—*Singeing.* About the end of September is generally the best time for singeing, but much depends on the condition of the horse's coat when these operations should be performed, some animals shedding their coats much earlier than others. Accidents sometimes happen in singeing, the skin being not unfrequently burned, and sometimes the mane and tail are disfigured; and where a coat has been left on too long, or is of a coarse nature, the horse should be clipped first, and then afterwards lightly singed. Singeing should be repeated every 10 days or a fortnight till the coat has done growing, which will thus be kept short and present its natural color. When clipping and singeing are performed, the condition of a horse is vastly improved, and he is much more vigorous and healthy than one that is allowed to keep on his natural winter coat, which often gets wet and dirty, the animal at the same time being dull and lifeless. The horse should have a gentle sweat, be well washed, and rubbed dry after singeing, and then be clothed up, and the next day he will be found ready for his usual work, which he will do in a brisker manner than before the operation was performed. Singeing requires less practice than clipping, but it cannot be done without some little experience; a novice generally burns the skin as well as the hair. On account of so many applications of the lamp, the professed singer is not so often employed as the clipper. The lamp used, is attached to a wide copper comb, made like a rake in principle, and is so arranged that the teeth raise the hair and draw the ends into the flame. Where gas is available, the comb is attached to the gas-pipe by a flexible tube, and the lamp consists merely in a number of holes perforated along the edge of the comb, so that a series of jets of gas are lighted and burn so strongly that the coat is completely removed as near the skin as the teeth of the comb can raise it. If gas cannot be obtained, a wide wick of cotton is inserted in a flat holder, the ends protruding to the level of the teeth, while a reservoir filled with naphtha supplies a constant flame, but not nearly equal in strength to that from gas. In the winter, the arms and backs of the knees, as well as the bosom and the insides of the quarters, will generally want singeing, whether the body is

submitted to the lamp or not; but in the summer, even if any long hairs are left there, they are easily removed by the hand armed with resin. Unless general clipping or singeing is practiced, the front surfaces of the legs do not require trimming at any season of the year.—*Trimming.* The jaws, nostrils and ears are singed, the last named not being touched inside, as the internal hairs are a protection of the delicate lining membrane of the ear from the cold and wet. The long bristles of the nostrils may be either cut off, pulled out, or singed off, but the first plan is the easiest and the most humane. There are, also, some bristles about the eyes, which are generally removed. The hair which grows 1 in. or more in length beneath the jaw, being of the same nature as the rest of the coat, can only be singed off with advantage, and it should be done as fast as it grows, especially if the singeing is not universal, or there will be a different color presented in these parts. The legs are trimmed partly by singeing, and partly either by clipping or pulling out the hairs. Great dexterity is required to manage this performance in a workmanlike manner, so as to avoid the stale and post-like appearance which is presented by a leg clipped all over (without a corresponding clipping of the body), and at the same time to remove all, or nearly all, the superfluous hair. In the summer, a clipped leg is totally inadmissible, and even from the legs of a badly bred horse, the hair may be pulled by gradually working at it for a little time every day with the fingers armed with powdered resin. This prevents the hair slipping through them, and by its aid such a firm hold may be obtained, that perseverance will clear the legs entirely, with the exception generally of a strong lock of hair behind the pastern. When this is very obstinate use the scissors to clear away the hair below the horny growth which is found there; but there should always be left a slight fringe round this, so as to avoid the stiff and sharp outline presented by the clipped leg. A small lock of mane is generally cut just behind the ears where the head of the bridle rests, as it would otherwise lie beneath that part in an untidy manner. In trimming the tail, it is carefully combed out; then held by an assistant's hand placed beneath the root of the dock, as nearly as may be in the position which it assumes in the animal out of doors. While thus poised, the operator takes a pair of sharp scissors, and holding the blades horizontally open, he insinuates one of them through the middle of the tail at the place to be cut, passing it straight backwards and cutting the hair quite level from the central line to the outside on his own left. Then reversing the blades, and keeping to the same level, he cuts towards the right. To make the mane lie smoothly on its proper side, it must be plaited in small locks, and the ends loaded with lead if it cannot be made to lie down without.

CLOTHING.—Horse covers are regarded by many as necessary to protect the animals from cold draughts of air, and are often in a great measure useful in keeping dust from their coats. Horses, however, are clothed too much in some stables, a single sheet being sufficient in summer time, and one good woolen cover all that is required for winter; but keeping them constantly covered makes them tender and liable to take cold. It is far better to give them a warm stable and plenty of straw for bedding, and good food, and leave the blankets to be used only when they are compelled to stand for any length of time out of doors on a cold winter's day; also when they come in from work, steaming hot, they should be allowed to stand a very short time until they are partially cooled off; then put the blankets on for an hour; but be careful and not delay putting on the blanket until they are chilled.

COLLAR. — The collar is a most important thing to look to, and which should be always deep enough to prevent the horse's shoulders from suffering; the usual way to test a fit being to lift the horse's head up to the height he usually carries it when going along, sufficient space being left to insert the hand comfortably between the collar and the horse. It should fit like a comfortable shoe. An excellent plan to secure a good fit, and one that will not injure the collar, is to dip it in water until the leather is thoroughly wet, then put it on the horse, securing the hames firmly, and keeping it there until it becomes dry. It is all the better if heavy loads are to be drawn, as that causes the collar to be more evenly fitted to the neck and shoulder. If possible the collar should be kept on for 4 or 5 hours, when it will become perfectly dry and retain the same shape ever afterwards; and, as it is exactly fitted to the form of the neck, will not produce chafes or sores. In young horses, sweeney, or wasting of the muscles of the shoulder, is often a consequence of unsteady pulling with an ill-fitting collar.

EXERCISE.—Regular exercise is essential for keeping horses in health, as it enlarges the muscles and removes from them the fat which gets into their interstices when well fed and very much confined to a stable. A stable-fed animal needs to have 2 hours exercise daily, if he is to be kept free from disease and in perfect health and working condition; exercise promoting vigor and strength; whereas, if he is kept idle in the stable for 2 or 3 days out of the week, his health will inevitably suffer. Young horses require more exercise than old ones, and the amount of exercise given should be proportioned to the age of the horse. Working horses should be exercised for at least ½ hour every day for which they are not required for work.

FEET, Care of.—There is nothing more necessary to be observed than the feet of horses, which ought to be objects of particular attention. Each morning the feet should be carefully picked and examined, so that it may be seen whether the shoes are fast, and their condition; whether the clinches are not raised so as to cut the horse, and that the heels do not press on the foot. Whether the shoes are worn out or not, they ought to be taken off once in 3 weeks, when the feet grow fast, to see if the hoof requires some attention. Immediately the horse's hoof becomes too high, it begins to contract, and in hot weather, especially if the feet are of a hot and dry description, they should be stop-

ped every night; cow-dung or even horse-dung being better than clay, and the former is improved by having a small quantity of tar mixed with it.

FIRE, To Save from.—Horses are frequently burned to death when barns or stables are on fire, owing to the impossibility of leading or driving them out of the building while their eyes are dazzled by the blaze. But, by simply covering their eyes with a bag, a coat, or a pocket handkerchief, they may be led out of danger without trouble or difficulty. They will the more readily come out if the saddle and bridle, or harness, to which they are accustomed, be thrown over them as usual. Goats ought always to be kept in large stables, because they will face fire, and horses will follow them out, though they would not go out by themselves.

FLIES, To Rid from.— The flies which infest stables are not the common flies, as is generally supposed, but a savage, biting fly. It is this which causes the constant stamping upon those nights when the air is close and heavy. This may be prevented as follows: 1. The horse may be brought into the yard, and a pailful of water, a sponge, and a piece of carbolic or whale-oil soap provided. First, with a corn-broom, the legs of the horse should be washed down, and then the whole body rubbed off with a handful of straw dipped in water; the sponge is then well soaped and passed over the whole body, leaving some soap-suds to dry upon the skin.— 2. Moisten the hair, especially of the tail and nostrils, with a strong decoction of hazel-nut leaves. By means of this decoction, the eggs which the flies lay on the skins of horses are also destroyed.—3. Darkening the stables during the day will keep out many flies. — 4. Kerosene oil, slightly sprinkled on the floor of the stables, will also serve to abate the nuisance. It may be shaken out of a bottle through a hole in the cork. A pint will last a week for the purpose.

HALTER.—There are two kinds of halters, the common halter and the head collar. The common halter is more generally used; but for unruly horses the head collar is best, as it passes around the neck and renders it impossible for the animal to get loose.

HARNESS.—This should always be of the best description and quality; cheap and indifferent harness is apt to give way when any severe strain is put upon it, and the user has to rely upon it most. A good harness is somewhat expensive at first, but if kept in good condition it will last for a long time, and any part that shows signs of wearing should be carefully renewed without loss of time. The harness should be kept clean and soft, that it may not gall the animals. A little powdered aloes rubbed in with the oil will keep away any insects that are likely to infest the harness, and will do no injury to the horse. In cleaning, unbuckle all the parts and wash clean with soft water, soap and a brush. A little turpentine or benzine will take off any gummy substance which the soap fails to remove. Then warm the leather, and as soon as dry on the surface, apply the oil with a paint brush or a swab. Neat's foot oil is best. Hang up the harness in a warm place to dry, but do not let it burn. Keep the leather soft and pliable, by keeping it well charged with oil and grease. The grease should sometimes be preceded by blacking, or the leather will turn red. (See LEATHER AND SKINS.) Water destroys each one of these; but mud and saline moisture from the animals are even more destructive. Mud, in drying, absorbs the grease and opens the pores of the leather, making it a ready prey to the water, while the prespiration from the animals injures the leather, stitching and mountings. It therefore follows that to preserve a harness, the straps should be washed and oiled at intervals as required, and then rubbed with a woolen rag. The rubbing is important, as it, in addition to removing the surplus oil and grease, tends to close the pores and give a finish to the leather. In hanging harness, allow all the straps to hang their full length. Light is essential to the care of leather, and when the harness closet is dark the door should be left open at least half the time during the day. All closets should be well ventilated, and when possible lighted. To clean plated mountings, use a chamois skin with a little tripoli or rotten stone, but they should be scoured as little as possible. A teaspoonful of cayenne pepper, mixed in 1 qt. of oil, if rubbed on the harness, will effectually protect it against the gnawing of rats.

NICKING.—This operation is for altering the carriage of the tail when it is too low for the taste of its owner. The horse should be confined in stocks fitted for that purpose. The tail then should be plaited up and clubbed at the end, turned over a small stick and securely tied with a string. Being provided with a knife, made for that purpose, turn the tail up within a direct line with the back; commence the operation by making an incision about 1 in. from the rump close to the hair; cut the cords in one place on each side, leaving an incision only the size of the knife blade; be very careful not to touch the bone with the knife, for if so, it would create inflammation, and the hair would come out. Great pains should be taken to have the weights equal, in order to keep the tail in a perpendicular direction, and prevent it from turning to either side during the time of healing, as a horse that carries his tail to one side instead of being elegantly nicked, is ruined. The horse many times has had a crooked tail before he has been nicked. To straighten the tail, cut the top cord; the under cord depresses the tail, and the top one raises it. When standing, the tail is straight; you will see at once that it is the top cord. In cutting the cord to straighten, cut the long cord, and the short cord will pass by on a lap and grow together, leaving the tail as strong as ever. Pulling is not required in straightening the tail. A more humane way of setting up the horse's tail, to give him a more stylish appearance, is by simply weighting it, for a few hours each day in the stall, until it attains the desired elevation. This is done by having 2 pulleys at the top of the stall, one at each side, through which are passed 2 ropes, which come together and are fastened to the tail, the ropes having at their other ends weights (bags of sand or of shot are very good for the purpose), which must

be light at first, and may be increased from day to day. The weighting should be continued until the tail has taken a permanent position as desired. This method requires a somewhat longer time than that of cutting the muscles, but while it is being done the horse is never off his work, and suffers infinitely less pain.

SADDLES.—Saddles for riding horses are made of various sizes and weights, some people preferring plain flaps, and others padded ones. To the majority of riders the padded flaps are found the most convenient, as the knee is kept more firmly in its place, and the leg is consequently maintained in firmer position at those times when the horse has occasion to exert himself somewhat violently, as in jumping in hunting, or when the rider has to recover a stumbling horse. The saddle should be sufficiently long and broad to carry the rider's weight fairly distributed over it, so that an equal pressure is applied to the back of the horse; otherwise, if extra weight is thrown upon any one particular part, saddle-galls will be produced, which often take a long time to cure when a horse is constantly ridden, and are often very hard to get rid off. There should be 2 girths to every saddle, the broad girth being used with 2 buckles at each end, which is put on first, and then a narrower one over it, with 1 buckle at each end, about half the width of the other. When this description of girth is not made use of, but the ordinary kind, with a buckle at each end, 2 girths should always be used. Stirrups should always be of sufficient size and not too small, so that the foot may be easily and quickly disengaged. The best saddles are made with spring bars, which release the stirrup-leather when an accident occurs, and these should be kept oiled so as to be always in good working order. The leather of which the stirrups are made should be fine grained, of close, tough texture, as strong as may be, without being too clumsy and heavy. When a horse returns from a long journey, or becomes hot in his work, the saddle must have absorbed a good deal of moisture, and unless it is carefully wiped and cleansed, it soon becomes hard, and not in a proper condition to be made use of by those who value their horses and study their comfort and well-being; for without care the saddle will remain damp, and, if put on in that condition the next day the horse will very likely take cold. To escape this risk, wear a cloth beneath the saddle, which can be easily dried, and, with a little care, it never gets hard.

STABLE UTENSILS.—The implements used in the stable should always be kept ready at hand, for immediate use, in one definite, appointed place; so that either the curry-comb, the body-brush, the dandy or whalebone brush, the mane-comb, or rubber, may be taken up in a moment without search having to be made for them, as well as a wisp of two sorts, one made of straw for rough purposes, and another of soft hay, to be damped and used at a later stage of the horse's grooming. In addition to these, there should be a picker, which is a blunt instrument that should be always ready at hand for the purpose of removing the stones and grit from the horse's feet, to which sharp pieces of flint will sometimes be found attached, as well as the loose particles that are commonly taken up. A sponge is needed to dry the legs after washing, which should never be left wet. Leathers and rubbers are required to rub the horse down after he returns from his work, and wipe him after

Stable Utensils.

dressing. A singeing lamp and a pair of scissors are necessary to remove the long hairs which often give the horse an untidy appearance. A wooden box should be provided to hold the stopping of cow-dung, mixed with tar, for the horse's feet; and there should be a tin can to hold oil, and an oil-brush, to oil the horse's hoofs before leaving the stable to go to work. A pitchfork is wanted to make up the horse's bed, which requires to be equally spread over the floor of the stable, and for the purpose of removing soiled or dirty litter, while a shovel is necessary for taking up the more solid and smaller particles that need removal. These must be supplemented by a good brick broom or two, to sweep up, and make things clean and straight, while a manure basket must needs be provided for the removal of the droppings which should be taken away as soon as possible, and before they get trodden about, which not only causes the stable to be much dirtier, but makes it a more difficult matter to clean it. A stable pail is required for water, which should never be used for any other purpose; and a sieve is wanted for the purpose of cleaning the provender and separating any small stones, dirt or other objectionable matter from it, while quart, peck, and ½ peck measures, should always be at hand with which to measure out each horse's allowance of food.

Stocking.

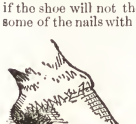
STOCKING.—This stocking is intended to contribute to the comfort of the horse and to its support. It consists of a snug-fitting, elastic

anklet of india rubber, molded to fit the horse's leg, and ribbed and reinforced to prevent sagging and slipping down at the top. It is also perforated to allow free exit for perspiration, and is laced in front as shown. The object of the invention is to provide a support, not always of the length shown, but longer or shorter as may be necessary in sustaining and protecting the tendons, ankles and knee joints of trotting and racing horses, and horses in general, so as to prevent injuries from overstraining or bending in stepping upon stones or rut holes.

SHOEING.

REMARKS.—Colts should never be shod until they are 2 yrs. old; for the feet increase in size with the rapidity of other parts of the frame, and hence the fettering with iron is sure to produce contraction. The time at which a horse's shoes should be reset, must depend very much upon circumstances. If a horse wears his shoes out in less than a month, they had better not be removed; and horses with thin, weak horn, which grows slowly, are, likewise, better left alone between each shoeing, unless their shoes last 7 or 8 weeks, in which case they should be removed once within the time; but horses with strong feet and plenty of horn, that wear their shoes 4 or 5 weeks, should have them removed at the end of a fortnight; and when the horses are doing so little work, or wear their shoes so lightly that they last over 2 months, they should be removed every 2 or 3 weeks, and at the second removal the shoes should be put in the fire, and refitted, or the feet will outgrow the shoes, as the horn grows much quicker when a horse is idle than when he is in full work. In shoeing horses, begin by taking off 1 of the old shoes; the others should always be left on, for the horse to rest upon. All horses stand quieter on shod feet than they can on bare ones; and they are less likely to break the crust; many tender-footed horses are in positive agony when forced to rest on a bare foot, while the opposite one is held up to be shod. First raise all the clinches with the buffer, and if the shoe will not then come off easily, loosen some of the nails with the punch; but never tear

Shoe Left on Too Long.



Properly Shod.

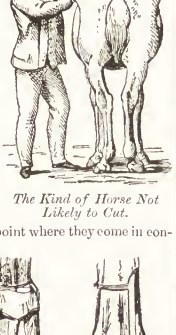
Foot Rasped to Make the Shoe Fit.

the shoe off by main force; it splits the crust, widens the nail holes, and destroys the horn. Rasp down the foot level, watching that the heels are not cut down too low, and take out any stubs that may be left in the crust. The object in preparing the foot for the shoe should be to remove any undue accumulation of horn, designed to prevent its natural bearing, and the free, healthy action of its parts, and this requires the cutting away of about the proportion that contact with the ground would have worn off or so much as had grown since being shod last. Before paring out a foot, think of the state of the roads; and if they are dry, and covered with loose stones, or have been lately repaired, take very little off the sole of any foot, because, if thin, the stones will bruise it; but when the season is wet, and the stones worn in, the sole of a strong foot may be pared a little, until it will yield in a very slight degree to the heaviest pressure made on it with the thumbs. The frog should be allowed to come to the ground, which will prevent, to a certain extent, the concussion which would otherwise take place. The frog should not be cut down, nor should it be touched when healthy, except for the purpose of cleansing. Have the shoe so formed as to size, weight, fitting and fastening, as to combine the most advantages of protection and preserve the natural tread of the foot the best; in weight it should be proportioned to the work or employment of the horse. If the horse walks principally upon the road, his shoes should be rather heavy, and must have a concave surface corresponding with the concave surface of the foot. The shoe should not have high calks at the heels, as they throw the entire bearing forward on the toe, thus, sometimes, causing contraction of the tendons. The shoe should be as big as the foot, so as not to require any cutting down of the hoof to make it fit the shoe, and the heels of the shoe should not be allowed to project backwards beyond the heel of the hoof more than about $\frac{1}{8}$ in. Never put hind shoes on fore feet. Practice cold fitting; a thick shelled foot is not injured by touching it with a red hot shoe that was previously fitted, but a thin shelled foot should never be pressed with a hot shoe. A hot shoe makes the hoof brittle instead of tough. It is better to heel first and put on the toe calk when ready to use the shoe. If the toeing is done last there will be heat enough in the shoe after welding the calk to fit the shoe. Let the heels, which are nearly cold, drop on the walls of the foot, and hold the toe, which is red hot, 1 in. away from the foot while fitting. After the toe is fitted and level, harden the toe and nail on. Put the point of the nail in the middle of the hole, keep the nail upright and drive it straight; it must come out in the right place, low down in the crust without the possibility of wounding the sensitive parts of the foot. Nails should never be driven high, and then in 6 or 8 weeks the foot will have grown sufficiently to enable the shoer to cut out the old nail holes, leaving sound hoofs. If the nails, however, are driven high, at the next shoeing the hoof will not have grown

High Calk.

enough to cut down to the old nail holes, and the water and mud will soak into these holes and cause the hoof to become rotten and brittle. The shank of the nail will pass straight through the substance of the crust, and gain a good, firm hold of it, leaving the strongest part from which to form a clinch. The clinches should be short and broad, and not thinned by rasping away any of their substance, but hammered at once into a slight notch made in the hoof under each; and the rasp should never be allowed to go over them after they have been hammered down, for the sharp steel rasp is almost sure to cut through the soft iron clinch just where it turns down, and leave the appearance of a clinch, when in truth it has been cut off at the bend, and the loose end only remains buried in the notch. Much time is often wasted in polishing the shoe with the file before it is nailed on; but all that is really needed is to remove the burs about the nail holes, file off the sharp edges of the shoe, and round the heels, taking care to apply the file hard to that part of both heels which comes next to the frog, so as to slant it from the ground upward away from the frog; but be careful not to make the ground surface of the web at the heels narrower in so doing.

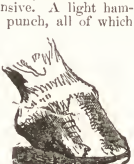
INTERFERING, or CUTTING, To Prevent.—To prevent interfering, pare the foot a little the most on the outside. This will have a tendency to roll the ankles further apart. A side calk on the outside heel will prevent the foot sliding under as it touches ground. The shoes should be light and of narrow web on the inside, with the nail holes near the toe. They should be straight at the point where they come in contact with the opposite leg. In some instances a small piece of leather placed between the sole and the shoe, and allowed to project outwards, has a very good effect in preventing interfering. In the hind leg ¾ shoes will prevent cutting when other plans fail; for here the part that cuts is not situated so far forward as in the fore feet, so that the removal of the iron altogether from the inside quarter, will often accomplish the aim. It sometimes happens that every plan that can be adopted will not prevent cutting, and then the only resource is the adoption of boots or straps. The illustration shows a horse with wide-set legs which will not cut.



The Kind of Horse Not Likely to Cut.

Ankle Boots for Cutting.

LOOSE SHOE, To Replace. — A job like the replacing of a "thrown" shoe, can be done at home. It is not a difficult one, and the needed tools are few and inexpensive. A light hammer, a pair of pincers, a punch, all of which every farmer's workshop should contain for other uses, and a few horse shoe nails, are all that are necessary. If the shoe is only loose, it may be tightened by driving up the old nails and clinching them anew, but if quite loose, it had better be taken off, which can be done with the pincers, care being taken not to break the hoof. All the old nails should be removed by using the punch.



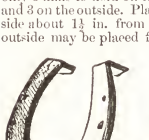
Loose Shoe with Nail Piercing the Foot.

NAILS.—Many of the nails in common use are badly formed; short, wedge-shaped heads, wide at the top and narrow at the bottom, with shanks springing suddenly from the head without any shoulder and ending in a long narrow point, are most unsafe to trust a shoe to. Nails should have heads which are straight-sided at the upper part, and gradually die away at the lower part into the shank so as to form a shoulder which will entirely block the bottom of the nail hole; the point at the end of the shank should be short and broad to form good stout clinches, which will assist in keeping the shoe firmly in its place until it is worn out. The nails should be made of the very best nail rods, and they should not be cooled too quickly, but left spread about to cool by degrees.

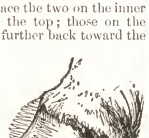
PRICKS, To Cure.—Pricks in shoeing occur from the want of skill in the smith, who drives the nail too near the lamina, and sometimes wounds them. It may be that the nail in its passage upwards is not within ¼ in. of these delicate parts, and the horse may not have flinched during the driving of it, but when he is put to work the nail opposes a hard, unyielding fine to the soft parts, inflammation is established, and possibly even matter is formed, which may end in quittor. When, on the day after shoeing, a horse, which was previously sound, goes lame, and the foot is hot to the touch, it may generally be assumed that a nail or nails have been driven too near to the quick, unless there is evidence of laminitis from other causes. On tapping the crust with a hammer, the horse will flinch at some particular spot, and there is the

nail which is in fault. Sometimes there is little inflammation as yet set up, but the pressure of the nail is sufficient to cause lameness, and in either case the shoe should be taken off. Then, if there is reason to suppose that matter has formed, the opening from which the nail came out should be enlarged, and the matter allowed to escape. If, however, the foot has been merely "bound" it may be either left to nature, with a shoe lightly tacked on, and a wet "swab" round the coronet, or it may be placed in a bran poultice, which last is the safest plan.

SUMMER SHOEING.—The summer shoe needs to present a flat surface to the ground. Make it of the same width and thickness from the toe to the heel. Have the seating deep, so as to prevent the sole pressing upon the shoe as it descends. Have a clip at the toe to prevent the shoe slipping back, but none at the sides, as they not only destroy too much of the hoof, but prevent expansion. Have the fullering deep to receive the nail-heads, and have the nail holes straight—neither inclined inwardly or outwardly. Have only 5 nails to hold on the shoe—2 on the inner and 3 on the outside. Place the two on the inner side about 1½ in. from the top; those on the outside may be placed further back toward the



Shoe With a Clip at the Toe.



Incision for Receiving the Clip.

heel. By placing the nails far back, expansion is prevented, thereby cramping the foot, which makes the animal step short and quick, like one with tight boots. By this plan of shoeing, the whole of the inner quarter and heel are left free to expand, and in consequence of this freedom of expansion, corns, however long they may have existed in the feet, disappear altogether after a horse has been shod a few times in this manner, and never return while the same plan of shoeing is continued. The hind shoe need not be so broad, but a little higher at the heels; in this put 7 nails, as the hind legs propel, and the front legs receive the weight.

SHOE. To Make Durable. — When a horse wears his shoe hard at the toe, turning up the toe makes the shoes last much longer, and is a better practice than welding on a lump of steel. A strong foot will bear the toe to be turned up a good deal; but a flat foot is always weak at the toe and cannot bear removal of any of the horn from it. The best way, therefore, of dealing with a very flat foot is to fit the shoe to it without turning up the toe, then to make the toe of the shoe red hot, and place it in the vice with the ground surface toward you, and in that position rasp the iron away from that part of the toe which would have rested on the ground. A very handy tool can be made for turning up the toe of a shoe, by "shutting" a piece of iron 5 in. long and 1 in. broad, crosswise on to each blade of a pair of smith's tongs; with this tool both limbs of the shoe can be grasped at once, and not only turn up the toe over the end of the anvil, but restore the seating at the toe without bending the shoe or putting it out of shape, which could not be done without a great deal of trouble by holding one limb at a time in the common tongs. Take care that the web is not too narrow, and that the shoe is not too light. A light shoe is apt to bend before it is half worn out; and the pain caused by the pressure of the bent nails against the tender lining of the hoof, throws the horse down and most likely breaks his knees. If the foot should be flat, with a weak, brittle crust, choose a stout shoe; for a horse with such a foot could not go at all on a bent shoe; and the shoe must have a wide web, because the sole is sure to be thin, and will need plenty of cover to protect it. The seating must also be examined, for, if the foot is weak and flat, the shoe must be well seated out, to prevent its pressing upon and bruising the sole; but, if the foot be strong, and the sole arched, there need not be more seating than will allow the point of a picker to pass freely around between the sole and the shoe: otherwise dirt and small stones will get in and bruise the sole as much as the shoe would if it pressed on it.

TENDER FEET, To Shoe.—Many tender-footed horses travel best with a covering over the sole, and leather is commonly used for this purpose. The shoe must be fitted to the foot with as much care as if nothing were to be put under it, and when it is filed up and ready to be put on, lay it with the foot surface downward on the covering, whatever it may be, and mark the form of the shoe upon it with the end of the drawing-knife; then cut the piece out, put it in its place upon the shoe and fix them both in the vice, which will hold them close together while the edge of the covering is carefully cut until it agrees with the edge of the shoe; then turn them in the vice together, so as to bring the heels of the shoe uppermost, and cut out a piece from heel to heel, slightly curved downward in the centre, that nothing may be left projecting for the ground to lay hold of. The next thing to be done, is to smear the whole of the under surface of the foot with common tar, mixed with a little grease, but be sure that gas-tar, instead of the common, is used. Take the oakum, dipped in the tar, pressing it well into the hollow, until the mass rises above the level of the frog on each side, but never put any oakum upon the frog itself, excepting a piece in the cleft to prevent the dirt working in; very little is ever wanted on the sole in front of the frog. The use of the oakum is to protect the foot, but more especially the navicular joint, which lies above and across the frog, from being jarred by stones on a hard road. The ends of the oakum that are placed in the cleft of the frog, are collected together and carried across the body of the frog, to be mixed with the oakum on one side, which keeps it in its place in the cleft and prevents its working out behind. Now nail on the shoe with 5 nails, exactly as if there was nothing under it,

and if the fitting has been attended to, there will be no fear of the shoe shifting or coming off.

WINTER SHOEING.—The winter shoe needs toe and heel pieces to prevent the horse from slipping. Have the inner calk not quite so sharp as the outer one, so that if he steps upon the other foot it will not cut it. A good plan to prevent horses slipping is as follows: The smith, when finishing the shoe, should punch a hole in the 2 ends, and when the shoe is cold tap a screw thread and screw into the shoe when on the foot, a sharp-pointed stud, 1 in. in length, and with shoes thus fitted the horse can travel securely over the worst possible road. When the horse comes to the stable, unscrew the pointed stud, and screw in a button so that no damage can happen to the horse, and the screw holes are prevented from filling.

STABLING.

REMARKS.—The stable should be situated on a well-drained site; but where, from circumstances, it is necessary to occupy a somewhat low position, some substance impervious to water should be interposed between the foundations and upper walls. Stables should be placed in such a position that ready access may be had to them, without the necessity of passing through courts or yards where any animals are kept. They may have a court in front for containing the dung and soiled litter; but it is better that they be contiguous to the yards where the cattle are kept, so that the dung may be mixed with that of the other animals. If circumstances allow, there should be an adjoining cistern for holding water. It is better, for the regularity of superintendence, that all the farm houses be under one roof, and, if more than one stable is necessary, that all the stables be together.

BEDDING.—Every horse should be bedded down at midday. As regards economy of straw, it is essential not to give the horse a chance of eating it. With this view no fresh straw should be placed within his reach. The fresh straw should be brought in first, and put not merely at the bottom, but also in the rear of the stall; then the old litter should be brought in and put at the top and in the front. The horse will not readily eat it, and by the following morning the new straw will have become somewhat tainted, and may then be mixed and dried along with the rest. Great care should be taken in the morning to thoroughly shake up and cleanse the bedding from dung; and any parts which may have become rotten should be thrown out. Good straw rapidly deteriorates if these precautions are not taken. On the other hand, good bedding is often thrown away with the bad, which might be used again. Sawdust makes a good bedding on account of its resinous odor and its repellent effect against vermin.

BOXES.—Loose boxes ("box-stalls") should be attached to every stable where any number of horses are kept, and although a loose box often adjoins the ordinary stalls in many well-arranged stables, they are better situated at a distance, when practicable, in case an animal may have a contagious disease; and sick horses are better away from the healthy ones. A loose box is preferable to a stall in many cases, but the room they take up is against their common use. For a young horse that is only partially worked, or for a sick animal, a loose box is invaluable, where the inmate can lie down comfortably; and for spirited animals which chafe under the confinement of too narrow space. Working farm horses do well enough in stalls; but hunters and riding horses are better in a loose box. The doors should be made to slide along outside, instead of being hung upon hinges, and, as fresh air is always desirable, a rail or bar door is very appropriate; but half doors should be avoided.

CLEANLINESS.—A large mass of dung, unless frozen or kept near the freezing point, will undergo decomposition, and gives off, besides steam, ammonia and other gases. These tend to soften and injure the hoofs of animals, and especially horses, that may be forced to stand continously upon the accumulation of dung. They cause inflammation of the eyes, and injure the general health, interfere with the digestion, and reduce the vigor of the animal. There should be no mass of manure in a stable where horses are kept. A clean floor and pure air are requisites for the best health of the animals. A gutter should be provided to carry off drainage and a tank or pit, filled with absorbents, should be made to receive it. Once a day a few pails of water should be dashed on the floor to wash it off. Then a shovelful of plaster should be scattered about before fresh litter is spread. This will add at least $100 to the value of the manure from a pair of horses in a year, for the urine is worth more than the solid excrement, and would thus be saved, even that portion which escapes into the air or is carried into the house and elsewhere by those who attend the stables. The result of this care will be to keep it free from those odors which attract flies in vast numbers, and which have a very injurious, irritative effect upon the eyes and lungs of the occupants. Sawdust, wetted with sulphuric acid, diluted with about 40 parts of water, and distributed about the stable, is a good deodorizer. Keep the mixture in shallow earthenware vessels. A healthy mode of cleansing the stable and sheds, is to give them a coat of lime wash, applied hot.

FLOORS.—Where it can be done, have a hard clay or earth floor for horses to stand on, in preference to stone, brick, mortar, or wooden floors, the latter being perhaps the most injurious. The cool, moist earth, is the most natural, while it is the pleasantest kind of floor for a horse's feet, keeping them in a sound, healthy condition, if ordinary care is taken of the animal otherwise.

HAY LOFTS.—It will be found more advantageous to the health of the horse, inasmuch as his food will be sweeter and more appetizing, to have as little open communication as possible between the hay loft and the stable, the space which is often left for access to one and the other being best closed with a trap-door. This, also, keeps out the dust.

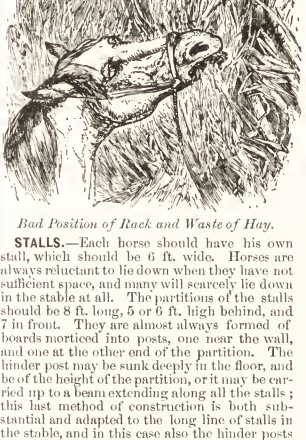
LIGHT.—Stables should be moderately well

lighted; but throwing the direct rays of the sun on the horse's eyes from the front should be avoided. If too dark, the eyes become habituated to this, and, in the absence of the customary stimulus of light, become less able to bear it; and, when suddenly taken into the glare of sunshine, and especially of sunshine reflected from the winter's snow, they are liable to suffer from irritation and inflammation. If, on the other hand, the light falls directly on the horse's eyes from a window in front, the constant glare may, of itself, injure the eyes. The light should be abundant, but should fall from the windows placed behind or to one side of the stables, and not in front.

MANGER.—Its dimensions may be 15 in. wide at the top, 12 in. at the bottom, 9 in. deep, and $2\frac{1}{2}$ ft. long. In this box the corn for the horse is placed at stated times and in a given quantity; and when boiled or prepared food is given, it is likewise placed in it. What is not occupied by the manger, is occupied by the lower rack. The outer edge of both the manger and the rack should be formed of a continuous bar of stout wood, 3 in. thick and 4 in. deep. Into this bar is fixed a ring, through which is to be passed the end of the halter which attaches the horse, with a little iron or large wood weight at its extremity, to keep it tight. Often, however, though not so properly, the end of the halter is merely tied to the ring.

PADDOCK.—A paddock is almost a necessary adjunct where there are many horses, and especially for colts when the breaking is performed at home; a small paddock may be more easily obtained than fields to be placed at the service of horses. Contraction of the feet very often occurs to young horses at training, and this will be in a great measure avoided by the use of a nice shady paddock with good turf. If the colt is turned out into this for an hour or two each morning, and the same time each evening, the middle of the day being devoted to his breaking-in education, he will gradually be preparing himself for the alteration in his diet which will ultimately have to take place; eating his hay in the night, and picking up a little grass during the time he is in the paddock, the little change making him relish his corn when he gets it. For an overworked or tired horse, or one that is a little ailing, if his disorder is of such a nature as may be benefitted by turning out, a paddock is often found to be invaluable. The gentle exercise that is taken by the horse in the natural manner does him a great deal of good, and the change from the stable may be made highly beneficial to him.

RACKS.—These should not be above the level of the animal's head, so that dust and hay seeds may not fall into the eyes. If the hay is supplied from the floor above, it should be passed through a closely-boarded funnel, so that the animal may not reach the hay and pull it down, thus causing great waste. The rack may consist of 2 horizontal rails, into which are fixed upright pins slightly inclining outwards from the lower rail. The pins may be 2 in. in diameter, and 3 in. apart, and the lower rail may be $4\frac{1}{2}$ ft. from the floor. This rack should extend the whole width of the stalls, in every case.



Bad Position of Rack and Waste of Hay.

STALLS.—Each horse should have his own stall, which should be 6 ft. wide. Horses are always reluctant to lie down when they have not sufficient space, and many will scarcely lie down in the stable at all. The partitions of the stalls should be 8 ft. long, 5 or 6 ft. high behind, and 7 in front. They are almost always formed of boards morticed into posts, one near the wall, and one at the other end of the partition. The hinder post may be sunk deeply in the floor, and be of the height of the partition, or it may be carried up to a beam extending along all the stalls; this last method of construction is both substantial and adapted to the long line of stalls in the stable, and in this case also the hinder posts are not sunk into the ground, but let into stone sockets.

TEMPERATURE AND VENTILATION.—When stables are kept hot, the great difference in the temperature within and without, causes horses to catch cold when issueing from them into the open air; and, while a stable should be kept moderately warm, it should be always well ventilated at the top, the foul air always ascending. A horse requires 2,446 cu. ft. of fresh air per hour. There are several modes of ventilating a stable when there is a loft over, the best plan being to resort to tubes carried through the loft to the roof; or, where there is not a loft, by gratings close to the ceiling; but wherever these gratings exist, they should be so arranged as to allow of being enlarged or contracted at pleasure by shutters or coverings. It will be found a good plan to regulate the heat of the stable by a thermometer, which should be always hung up in it; 50° to 55° Fah., is usually considered an appropriate temperature during winter, and 65° a fitting summer heat. The heat of a stable is always found to have a very material effect upon new comers, especially horses that have been turned out to grass; and it will be found the best plan to accustom these, by different stages, to the confinement of the stable, by putting them first into a shed, and gradually bringing them into work and the stable by degrees, as these sudden changes have a great

effect upon the life and constitution of the horse.

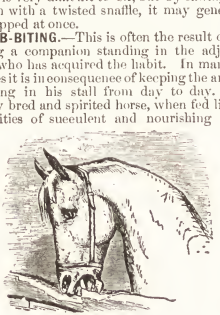
Vices and Habits.

BALKING.—When a horse balks in harness, it is generally from some mismanagement, excitement, confusion, or from not knowing how to pull, but seldom from any unwillingness to perform all that he understands. High-spirited, free-going horses, are the most subject to balking, and only so because drivers do not properly understand how to manage them. Almost any team, when first balked, will start if they are allowed to stand 5 or 10 minutes, as though there was nothing wrong, and then speak to them with a steady voice, and turn them a little to the right or left, so as to get them both in motion before they feel the pinch of the load. A good remedy is to catch up a handful of dirt, and force it into the mouth of the animal. Another is to pass a twine around the lower jaw below the tongue, and tie it quite tight over the top of the head, leaving an end of 2 or 3 ft., by which to pull at, walking in front of the horse. This will be found to be a remedy in all cases, if properly done.

BITING.—This has its origin in horses being teased. If at first only done in play, it should be at once checked and discouraged, or otherwise it will become a habit that will ultimately take the form of viciousness. A muzzle should be used to horses that have this habit confirmed, which neither kindness nor severity will cure.

BUCKING.—This may be described as a series of bounds into the air, which, when they are made up and down in the same place, or nearly so, are called "bucking," from their resemblance to the playful antics of the deer. A bucking horse is very difficult to sit, but by sawing the mouth with a twisted snaffle, it may generally be stopped at once.

CRIB-BITING.—This is often the result of imitating a companion standing in the adjacent stall, who has acquired the habit. In many instances it is in consequence of keeping the animal standing in his stall from day to day. The highly bred and spirited horse, when fed liberal quantities of succulent and nourishing food,



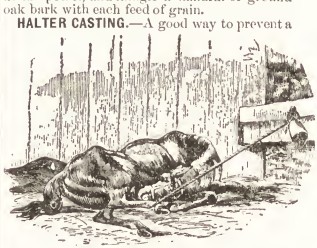
Cribbing.

must be in some mischief when his time is not employed. It is caused, in some instances, in young colts, by partial starvation, or by not keeping sufficient provender before the animal when confined in the stable, to allow him to pick it over at will. In consequence of this neglect in his stable management, he acquires the habit of cribbing on the manger. It is, also, the result of feeding unsound, and consequently unpalatable diet, which no horse will eat unless forced to it by starvation. Lastly, it is occasionally caused by the groom dressing his spirited charger in his stall, or other narrow compartment connected with his stable, where he can and will bite on the partition walls located on either side of him; and this biting at anything within his reach may often be observed in a spirited and nervous horse, when the brush or rubbing cloth is applied to his body or legs by the groom. In the early stage of the acquired habit of cribbing, rubbing common yellow bar soap on the top of the manger rail daily, will often prove an efficacious remedy, or nailing a fresh sheepskin, flesh side up, on the top and outside edge of the manger, will have the same effect. But when the animal cannot be cured by any of these methods, he should be muzzled.

Muzzle to Prevent Cribbing.

EATING THE LITTER.—This is a peculiar appetite, which chiefly occurs either in those horses which are kept short of hay on account of their tendency to fatten, or when the animal possessing it has been stabled for a long time and requires change. In the former case, nothing but the muzzle will be of the slightest service; but, in the latter, a run at grass, or soiling in-doors, for a month or two, will remedy this disorder of the stomach. Rock salt in the manger will sometimes have the desired effect, producing a degree of thirst that will make dry litter distasteful. The stable should be well ventilated, and if the rock salt should fail to effect a cure, add a piece of chalk; if this also fails, dampen the food, and, when feeding it, sprinkle some magnesia upon it, and mingle a handful of ground oak bark with each feed of grain.

HALTER CASTING.—A good way to prevent a

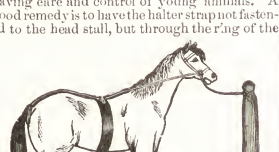


Halter Cast.

horse from getting his foreleg over the halter

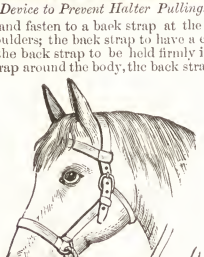
strap, is to pass the halter strap through the hole in the manger, and, instead of tying it to the manger, tie it to a block of wood or other light weight. The weight will take up the slack in strap, and usually prevent this annoyance. But, sometimes, in pawing with his foreleg, or in endeavoring to rub his head with his hind foot, the leg gets over the halter, and in struggling to free himself, the leg is often seriously wounded by the rope, halter, or chain. The spring catch, although it will not prevent this accident, will mitigate its effects, especially when 2 collar reins are used. When neither of these methods will prevent their being cast, they should not be tied, but left loose in box stalls.

HALTER PULLING. — 1. It is usually a habit contracted by the bad management of those having care and control of young animals. A good remedy is to have the halter strap not fastened to the head stall, but through the ring of the



Device to Prevent Halter Pulling.

halter and fasten to a back strap at the top of the shoulders; the back strap to have a crupper to it; the back strap to be held firmly in place by a strap around the body, the back strap pass-



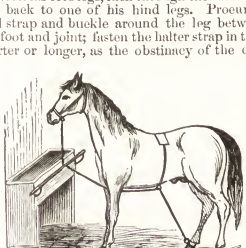
Device to Prevent Halter Pulling.

ing loosely through a loop in it. In this way the horse, in pulling back, pulls on his own tail, and will only make a few efforts of the kind. There is no inconvenience or danger in keeping such an apparatus on until the horse is thoroughly cured. — 2. Another contrivance consists of an ordinary ring halter, with the 2 side rings connected by a strong, flexible cord. Whenever the horse pulls, the inner part of the cord is drawn forcibly against his jaw, and the effect is a severer punishment than he is willing to endure.

HALTER SLIPPING.—This is a trick at which many horses are so clever that scarcely a night passes without their getting loose. It is a very serious habit, for it enables the horse sometimes to gorge himself with food to the imminent danger of staggers; or it exposses him, as he wanders about, to be kicked and injured by other horses, while his restlessness will often keep the whole team awake. If the web of the halter, being first accurately fitted to his neck, is suffered to slip only one way, or a strap is attached to the halter and buckled round the neck, but not sufficiently tight to be of serious inconvenience, the power of slipping it would be taken away.

JIBBING.—Moving restlessly from side to side, or backwards. Bad breaking very often has been the occasion, and it is a very dangerous vice. When horses, that do not commonly show this vice, display it upon occasions, there may be some reason for it, as the withers being wrung or the shoulders galled, and the animal should then be treated with consideration; but a confirmed jibber had better be got rid of as soon as possible. When a horse jibs, in harness, a stone put behind the vehicle will sometimes cause him to go forward, as he finds it much easier than going backward.

JUMPING. — Put a good, stout surcingle around his body; put on his halter, and have the halter strap long enough to go from his head between his fore legs, then through the surcingle and back to one of his hind legs. Procure a thill strap and buckle around the leg between the foot and joint; fasten the halter strap in this, shorter or longer, as the obstinacy of the case



Device to Prevent Jumping and Kicking.

may require. It is also useful to keep colts from running where there is likely to be danger from the result; if the thill strap should cause any soreness on the leg, it may be wound with a woolen cloth, and it would be well to change it from one leg to another occasionally.

KICKING. — A good way to prevent kicking, is to use the device explained in *Jumping*. Kicking in harness may be prevented by attaching to a common halter head-stall a strap about 6 ft. long, over which put a 2 in. ring, then tie

the end of this strap back into the halter; now pass this double strap down between the fore legs, so that the ring will extend just back of the belly-band; then buckle round each hind foot below the fetlocks, short straps with rings attached; to these rings attach a rope, which is passed through the ring upon the halter, just enough to enable the horse to stand naturally. In this condition the horse has sufficient freedom to walk and trot, but the moment he attempts to kick, he reproves himself by the attachment to the head. In cases of kicking the stall, fasten a short trace chain, about 2 ft. long, by a strap to each hind foot. A better way is to have the stalls made wide enough, so that the horse can turn in them easily. Close them with a door or bars, and turn the animal loose. After a while he will forget the habit, and stand tied without further trouble. When the horse is given to kicking, while being shod, he should be humored as much as possible, and the blacksmith should not be allowed to use a horse roughly, or to twitch him, except the latter is strictly required. In shoeing, it is better to let him follow in his turn some steady old horse which goes through the operation quietly, whose example will be beneficial to him. Connect the animal's head and tail by means of a rope fastened to the tail and then to the bit, and draw tightly enough to incline the horse's head to one side; this makes it almost impossible for the horse to kick on the side of the rope.

MANGER, Leaping into. — Some horses that are allowed to remain too long in the stable without exercise, acquire this habit, which, if likely to become confirmed, should be prevented by the use of a short halter, that will not allow him to raise his head high enough to effect his purpose. If a horse should happen to get himself awkwardly fixed in this position, the groom should go up to his head and push him to the opposite side of the stall, and back at the same time.

MANGER, Lying under.—Young horses, that have not long been accustomed to a stable, are most given to this vice; when getting their heads under the manger, they are prevented from rising. To get them out, they need to be drawn backwards by a girth round the breast. The remedy to prevent a recurrence of this, is to board up the space beneath the manger flush with the outer edge of the top.

PAWING. — Short-tempered, irritable horses, paw the floor of the stable sometimes violently, not only making the stable untidy, but wearing out their shoes, and sometimes bruising their feet and spraining their legs. The best plan, when this is carried on to a great extent, is to shackle the 2 legs close together with 2 padded straps, united like a pair of fetters, by a small chain about 1 ft. long.

REARING. — A deep curb and small bit will sometimes make horses rear. The instant one is about to rise, slacken one hand and bend or twist his head with the other, keeping the hands low. This bending compels him to move a hind leg, and of necessity brings his forefeet down. Instantly twist him completely round 2 or 3 times, which will confuse him very much, and completely throw him off his guard. After twisting him around, place his head in the direction he is desired to proceed; apply the spurs, and he will not fail to go forward. If the situation be convenient, press him into a gallop, and apply the spurs and whip 2 or 3 times severely. The horse will not, perhaps, be quite satisfied with the first defeat, but may feel disposed to try again for the mastery. Should this be the case, twist him, etc., as before, and in the second struggle he will be still more easily subdued.

ROLLING.—This is a pleasant and perfectly safe amusement for a horse at grass, but cannot be indulged in in the stable without the chance of his being dangerously entangled with the halter rein and being cast. Yet, although the horse is cast, bruised and half strangled, he will roll again on the following night, and continue to do so as long as he lives. The only remedy is not a very pleasant nor quite safe one, yet it must be had recourse too if the habit of rolling is inveterate. The horse should be tied with length enough of halter to lie down, but not to allow of his head resting on the ground; because, in order to roll over, a horse is obliged to lay his head quite down upon the ground.

RUNNING AWAY.—1. Put on the foot strap, described in *Throwing*, and when he attempts to run, take up his foot, make him run, and trip him every time he will not stop instantly at the word, "whoa!" Should he be of the extremely willful character, he may run on 3 legs. If so feared, attach another strap to the opposite foot. Then make him run, and if he will not run after the taking up the second (which will destroy his confidence at once), then 1 strap will answer just as well. Make the lesson thorough, so that the horse will stop every time you call "whoa!" —2. Place a cord with a running knot around the horse's neck, near the neck strap. To this slip noose attach a pair of reins, which must be thrown over the dash board, ready to be seized at once. When the horse starts and becomes unruly, take up the cord and tighten his throat so that he cannot breathe; he will stop instantly, and will not fail or kick.

TEARING CLOTHES.—This is an unusual sta-

Device to Prevent Tearing the Clothes.

ble habit, and very difficult to cure. There are 2 effectual preventives, one of which consists

in the regular employment of a rough horse-hair cloth, made like that for hops, outside the rug, and which is so disagreeable to the teeth that no horse will attempt to tear it. The other is a pole of ash, about ¾ in. in diameter, with an iron eye attached to each end. One of these is fastened by a short leathern strap or buckle, to the side of the roller pad, while the other has a strap or chain about 1 ft. long, which attaches it to the head collar. The pole should reach about 15 in. beyond the point of the shoulder, and should be fixed on the side which is generally uppermost when the horse lies down, so as not to be under him in that position.

SHYING.—With some young horses, this fault is the result of nervousness, and when that is the case the remedy is in strengthening the nervous system. A young horse given to this fault, must be handled gently but firmly. No better direction can be given for remedying this fault, than to gently lead or drive the horse up to the object, when it is practicable. (See *Fear, To Overcome*, in BREAKING AND TRAINING.)

TONGUE, Lolling of.—Rivet a section of a knife from a mowing machine on his bit; dull the edges and make everything smooth. The knife, running up in his mouth, prevents him from drawing his tongue far enough back to get it over the bit. Carelessness in breaking colts is the cause of this.

JUDGING AND BUYING.

REMARKS.—The buyer must know what he wants, whether a saddle horse, draught horse, racer, hunter, or a horse for family use. And in order to make a selection (especially as the seller's word is rarely to be taken), it is necessary for him to have some knowledge of the points required for these different purposes. This will include the study of the anatomical structure of the horse, and modes of ascertaining his age, defects and vices.

POINTS TO OBSERVE.

ACTION, To Test.—Having attentively looked over the horse as he stands, and found nothing objectionable to the eye, it is prudent to see him through his paces before proceeding to ascertain, by careful examination, the defects, blemishes, etc., which have a tendency to produce unsoundness. He should first be walked, and then trotted, without any whip near him, slowly down the road, allowing him to have the whole of the halter to himself; his head will then be entirely unconstrained, and irregularities in action may be easily detected. The action should be scrutinized most attentively when he steps off, as defects are then most visible. Good action is observed when he starts easily and promptly without stiffness, and when the limbs are moved evenly and in accord one with the other, the hinder limbs being kept well under. The action should be square in walking and trotting, with no paddling with the front legs or straddling behind. The carriage of the head and tail are points to which the eye of a good judge will be directed. If the tail goes to and fro when in action, like a pendulum, it is a good sign of blood and steadiness. He should also be mounted, and the trial be repeated on the stones or hard road, or a rough and stony declivity; for there are many cases of slight lameness which do not show on soft ground at a walking pace, or when the horse is unburdened.

AGE.—Horses, as a rule, are considered at their best from 5 to 10 yrs. of age; much depends on the age at which they are put to work. One method for ascertaining the age of the horse is said to be as follows: After the horse is 9 yrs. old, a wrinkle comes in the eyelid at the upper corner of the lower lid, and every yr. thereafter he has one well-defined wrinkle for each yr. of his age over 9. If, for instance, a horse has 3 wrinkles, he is 12; if 4, he is 13. Add the number of wrinkles to 9, and the age will be obtained. But the safest way of determining the age of a horse is by the appearance of the teeth, which undergo certain changes in the course of years. By the end of the 1st yr. the colt has cut his 12 nippers and 16 grinders, which usually pierce the gums at the following mos. Before birth, the 8 anterior grinders have generally shown themselves, followed about a week after foaling by the 2 central nippers. At the end of the 1st mo. another grinder makes its appearance all round, and in the middle of the 2d the next nipper shows itself. By the end of the 2d mo. the central nippers have attained their full size, and the second are about half grown, requiring another mo. to overtake their fellows. Between the 6th and 9th mos. the corner nippers are cut, and towards the end of the 1st yr. reach their full size. This first set of nippers consists of teeth considerably smaller in size than the permanent teeth and somewhat different in shape. They are more rounded in front and hollow towards the mouth, the outer edge being at first much higher than the inner. As they wear down, these two edges soon become level, but the corner nippers maintain this appearance for a long time. At 6 mos. the central nippers are almost level, with the black mark in their middle wide and faint; and about the 9th mo. the next nipper on each side above and below is also worn down almost to a level surface. In the first mo. of the 2d yr., and sometimes towards the end of the 1st yr., a 4th grinder is cut all round, which commences the set of permanent teeth, the 3 first molars only being shed. At 1½ yrs. the mark in the central nippers is much worn out, and has become very faint; the 2d is also worn flat, but is not so faint; and the corner nippers are flat, but present the mark clearly enough. In colts which have been reared on corn and much hay, the wearing down proceeds more rapidly than in those fed upon grass alone. The 3d yr. is occupied by the commencement of the 2d dentition, which is effect-

ed in the same order in which the milk teeth made their appearance. Both sets are contained within the jaw at birth, the permanent teeth grows very slowly, and the central nippers above and below fall out, and are replaced by permanent ones, which are larger sized and different

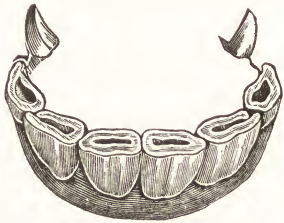
One Year.

Two Years.

Three Years.

Four Years.

Five Years.



Six Years.

Seven Years.

Nine Years.

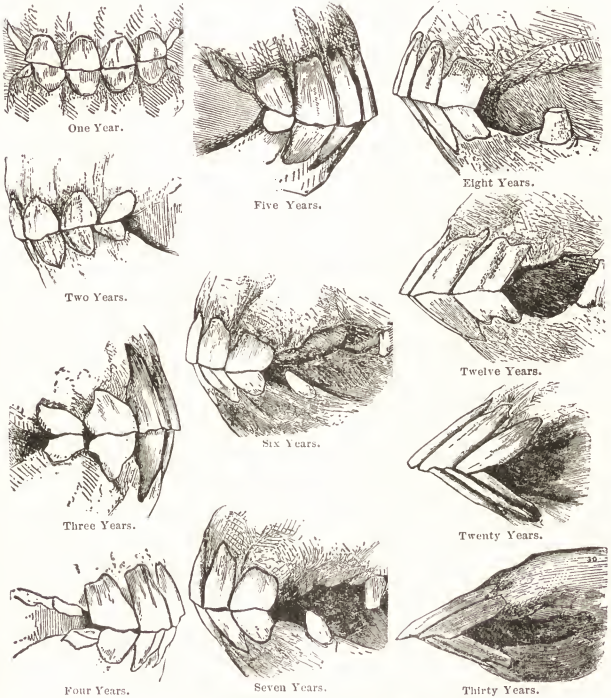
Sixteen Years.

Extreme Age.

Age of the Horse Indicated by the Teeth—Mouth Open.

being small and only partially developed and lying deeper than the milk teeth. Towards the end of this yr. the 6th grinder shows itself, but in form. At about 3½ yrs. the next nipper all around falls out, and is replaced by the permanent tooth. The corner nippers are much worn,

and the mark in them is nearly obliterated. About this time, too, the 2d grinder is shed. At 4 yrs. the central nippers begin to lose their sharp edges, and have grown considerably in substance. The next nipper all round has grown nearly to its full size, but not quite, and its edges are still sharp, with the mark deep and very plain. The corner milk nippers still remain, unless they have been knocked out for purposes of fraud, which is sometimes done to hasten the growth of the permanent teeth, and give the horse the appearance of being 4 or 5 mos. older than he is. Between 4½ to 5 yrs., the corner nippers are shed, and the tush protrudes through the gum. At 5 yrs. the mouth is complete in the number of its teeth; and from this date it becomes necessary to study their aspect in both jaws. In the lower teeth of the same mouth, the edges of the central cavities are much more worn away, the central nipper having only a small black speck in the middle of a smooth surface, while the next is much worn, and the corner teeth, though showing the mark very plainly, bear evidence of having been used. The tush is much grown, with its outer surface regularly convex, and its inner concave, the edges being sharp and well defined. The 6th molar is at its full growth, and the 3d is shed to make room for the permanent tooth in its place. After 5 yrs. no further shedding occurs in any of the teeth. The 6 yr. old mouth is the last upon which any great reliance can be placed, if it is



Age of the Horse Indicated by the Teeth—Mouth Closed.

desired to ascertain the age of the horse to a nicety; but by attentively studying both jaws, a near approximation to the truth may be arrived at. It is ascertained that the nippers of the upper jaw take about 2 yrs. longer to wear out than those of the lower; so that until the horse is 8 yrs. old, his age may be ascertained by referring to them, nearly as well as by the lower nippers at 6. But as different horses wear out their teeth with varying rapidity, it is found that this test cannot be implicitly relied on; and in crib-biters or wind-suckers, the upper teeth wear out wonderfully soon. Up to this age, the nippers stand nearly perpendicular to each other, the 2 sets presenting a slight convexity when viewed together. Afterwards the nippers gradually extend themselves in a straight line from each jaw, and, in the very old horse, from an acute angle between them. At about the 8th yr. the upper nippers present the same appearance as the lower nippers at 6 yrs. old. Both tushes are considerably worn away at their points, and the upper ones more than the lower. At 9 yrs. the upper middle nippers are worn down completely. The next pair have a slight mark left, but their surfaces are quite level, and the corner nippers have only a black stain without any central depression. After 9 yrs. the age of the horse can only be guessed at from his teeth, which gradually grow in length and more in a line with the jaw. The section of each nipper presented to the eye becomes more and more triangular instead of being oval. After the 12th yr. the triangular section disappears, and the tooth becomes nearly round. In very old horses the color of the teeth becomes a dirty yellow, with occasional streaks of brown and black. The tushes wear down to a very small size, and very often one or both drop out.

BACK.—The first thing to notice in judging of a horse, so far as his back is concerned, is the length of it. A long back is a weak one. By superior excellence of structure in other respects, the weakness of the back may, in some measure, be made up, but the horse can never be the horse he would have been, had his back been a shorter one. A horse's back, if short, has strength, and is sure evidence that he can carry or drag a heavy weight a great distance, and not tire; neither will 2 or 3 seasons of turf experiments break him down if he is a speedy animal. There must be length somewhere, or else the horse cannot stride far, but it should be put in below and not above. The length should be between the shoulder-point and the hams of the horse. He should be backed to ascertain if he has received any injury of the spine. If he backs with difficulty, his hind quarters swaying from side to side, and when compelled to retrograde suddenly he appears as if about to fall, he has received some injury.

BELLY.—Ask what the horse is living upon. If it is green food, expect to find a larger belly than when living upon harder and more concentrated food. When the gas in the bowels is much less than common, it gives to the animal an unsightly appearance, and he is said to be "tucked up in his flanks;" but it is easy to be deceived in this. If a horse is pained in moving his hind legs, he will be tucked up in the flanks on the side on which the lame leg is, and tucked up on both flanks, of course, if lame in both hind legs. In this case, the gas in the bowels may not be proportionately less, unless he is otherwise in bad health, but it is more compressed and pushed forwards and encroaches upon his breathing area. Some horses have habitually an appearance of less residual gas in their bowels even when in health. This gives their belly an unsightly, tucked up appearance, but it is not in itself a blemish. This will sometimes occur from overwork.

COLOR.—The best color is dark brown, with black points; the next best color is bay, with black points. Light chestnuts are good; but dark chestnuts are objectionable, as, after 7 yrs. old, their fore feet are often contracted. Grays and whites are not bad colors, but are difficult to keep clean looking; black is a hardy color; white stockings, if they exist largely on the same horse, are objectionable, especially if the absence of pigment or coloring matter extends to the horn of the feet. Of all colors, yellow or Cleveland bays, piebalds, and dark red chestnuts are the most objectionable. But, if the color does not offend the eye, and the horse is otherwise desirable, it ought not to be an obstacle.

EYE.—Pass the hand suddenly before the eyes, and if the horse does not wink, he is blind. Viewed in front, the depths of the eye should be looked into, then sideways, which will assist in ascertaining the clearness and absence of specks on or within its surface. A full and clear eye, with soft, gazelle-like expression, is scarcely ever associated with a bad temper, and will most frequently continue sound if the management of the horse is proper. The eyes should be as large as possible, and not obliquely set in the face, as in the Chinese. The white of the eye should not be too conspicuous. When so, it gives the horse a wild stare, and is an almost unfailing sign of mental aberrations, which lead to biting, kicking, etc. The white of the eye is seen, not on account of there being more of it than usual, but on account of the eyelids being wider apart. When the eyes appear full, with a fleshy circle around them, it is a symptom of badness of eye and the forerunner of blindness, particularly in the heads of coarse and fleshy horses, with heavy countenances, who usually go blind with cataract at 7 yrs. of age. Slight thickenings of the lid or puckering towards the inner corner of the eye, a difference in size, a cloudiness or dullness of the iris, are indications of disease, that a purchaser should beware of. If there is an excess of tears, it denotes debility; all horses with weeping, dull, cloudy eyes, should be rejected as unsound.

FEET.—Always have a horse shown quietly; when there is much noise and bustle, there is generally something wrong, and when the animal is agitated, slight lameness will escape the eye. If one foot is more upright than the other, that foot is diseased; if it is of a different temperature, active disease is going on; if an old standing complaint, the feet will be of different size, and possibly the muscles of the arm and shoulder

diminished in size. Carefully examine the hoofs for cracks, as jockeys have acquired great skill in concealing cracks in the hoofs. If cracks are observable in any degree, reject. Also, both look and feel for ringbones, which are callosities on the bones of the pastern near the foot. If apparent, reject. Examine the front feet, and if the frog has fallen, or settled down between the heels of the shoes, and the heels are contracted, reject him, as he, if not already lame, is liable to become so at any moment. The frog, in its healthy state, must be firm, yet pliable and elastic. If there is any smell, or, if on squeezing the frog, matter exudes, there is thrush. A horse that goes with his forefeet low, is very apt to stumble, and there are some that go so near the ground that they stumble on even roads; and dealers, to remedy this, put heavy shoes on their feet, for the heavier a horse's shoes are, the higher he will lift his feet. To enable the purchaser to arrive at a sound decision, he should know that the inclination of the pasterns is governed by the major flexor tendons, which are situated underneath or behind them. Their slanting, therefore, is regulated by no peculiarity in the forms of the bones themselves, but is controlled by and dependent upon the condition of another structure. A short,

Upright Pastern.

Overshot Pastern.

upright pastern, if it can bear any evidence at all, testifies to a stubborn and unyielding state of the great flexor muscles, the weight being then thrown upon the osseous supports. The play of the pastern denotes nothing more than the healthy elasticity of the flesh upon the tendon proper and on which the osseous structures repose. The bones have no motor power belonging to themselves. The upright and the overshot pastern suggest no change in the more solid frame; but such alterations prove that excessive work

Long Slanting Pastern.

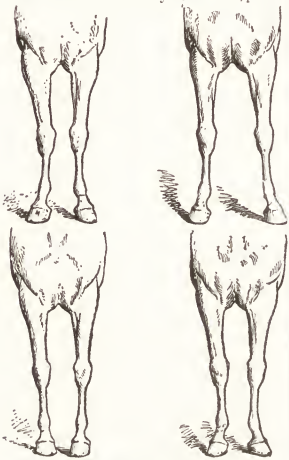
Natural Pastern.

has strained the great flexors of the limb, and destroyed the inherent property of elasticity with which every muscle is endowed by nature. The burden being then supported by an osseous pillar instead of an elastic band, of course jar or concussion ensues upon abnormal change. Thus, alteration in the natural position of an oblique bone, is of great importance to the purchaser; and to judge properly of the pastern joint, the substance swelling forth beneath the elbow must be regarded. Should this portion of the body be mean or wanting in development, hard work will probably induce it to become rigid, or labor may, ultimately, cause the pastern joint to shoot forward and out of its proper position. When the profile of the hoof is irregular, i. marks what is called a "shelly foot." This is decidedly bad. If there are any protuberances or rings round it, the feet have been affected with fever to such a degree as to produce an unequal growth of horn, which frequently leaves some injurious consequences in the internal part of the hoof. If there is any depression or hollow, it betrays separation of the foot from the hoof, and sinking of the coffin bone, and the sole will be found bulging. If the toe of the hind foot is found to extend a little over the shoe, it is to prevent "hammer and click" from being audible. If the toes of the hind feet drag, or the shoe is squared off or worn, disease of the hocks may be suspected; and if the inside of the shoe is beveled off, it is the sign of a cutter. If the foot appears to have been cut unusually deep at the angles where the shoe meets the inside heel, or if there is any peculiarity of shoeing at that part, the examiner may infer that he has corns.

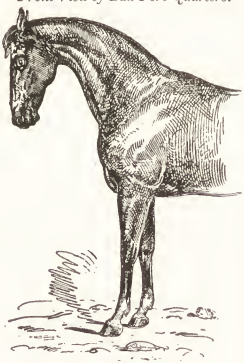
FORE QUARTERS.—The chest should be large and spacious. It may vary somewhat in shape according to the service to which the horse is to be put. A draught horse should have a deep, circular chest; but passing through the different degrees of speed up to the racer and trotter, the chest will increase in depth compared to its roundness, until for the highest rate of speed, the chest must be as deep as a greyhound's, and at the same time not lacking in strength. The chest and breast should be searched for marks of rowels, setons and blisters, for the remains of them render it probable that the horse has been under treatment for inflamed lungs or chest affections. The shoulder blade must in all classes of horses be of good length and breadth to afford space for the attachment of the many powerful muscles which take their origin from it. In the race horse it must be placed very obliquely, in order that the great length of arm required can be placed sufficiently downwards and forward, so as not to interfere with the saddle girth. For draught horses the shoulder blade has need of being extremely broad, and placed more upright, in order to fill the upper half of the collar well when the body is thrown forward. The arm bone must be short

Good Fore Quarters.

and stout, and at a less angle with the scapula. The remaining long bones of the limb from the elbow downwards, cannot be too short and thick in order that the horse may be on short, power-

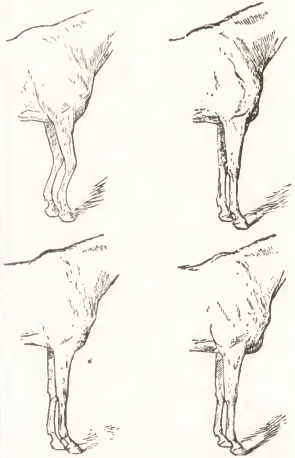


Front View of Bad Fore Quarters.



Side View of Good Fore Quarters.

ful legs. The fore arm and the shins thus appear of nearly equal length. The hunter must have a lengthy scapula, of good breadth, and set well back. The arm must be in length longer than the draught horse, but not so long as the race horse; it also must be placed at an angle with the shoulder blade greater than the work horse, but less than in the race horse. The forearm must be of medium length, also the shin. The shoulders should be examined for tumors. If there are any marks of setons or blisters about the points, it is probable that he has been treated for shoulder lameness. The withers are usually desired high and thin, but they are very commonly too much developed, and if the bony processes stand up like the edge of a razor, without muscle on them, they are to be regarded as objectionable rather than otherwise. Examine the withers for bruises from the saddle. The fore limbs should be set on, so that when the horse is standing, the limb may be neither turned in nor out. The fleshy-legged horse being generally subject to grease, and other infirmities of that kind, should not be chosen. The

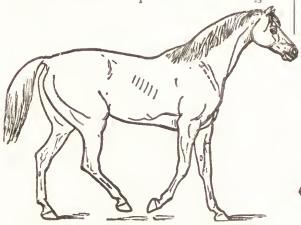


Side View of Bad Fore Quarters.

knees should be examined with the utmost care; 1st, that they correspond in shape; and, 2d, to ascertain whether the skin has been broken by falls; but it does not follow that a mark or scar indicates a stumbler, and an accidental blemish should not at once condemn a well-formed animal. When a scar on the knee is observed in connection with low withers, a thick and upright shoulder and pasterns, with the legs inclined under the bone, it is evident that the faulty formation has produced its natural consequence.

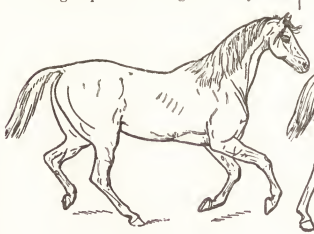
GAITS.—The natural gaits of the horse are the walk, trot and gallop. Whatever the pace may

be in moving forward, the hind quarters are the main propellers and thrust the body forward on the fore legs. This forward motion is effected by one hind leg at a time, as in the walk, trot, amble and rack, or by the two almost simultaneously, as in the canter, gallop and leap. The *Walk* is performed in 1–2–3–4 time, and in regular cadence. The 4 legs move separately, and not by 2's, as in the trot and amble. The hind foot is raised from the ground and moves forward ½ its stride before the fore foot moves. The illustration shows the position of the legs in



Correct Manner for Starting the Walk.

starting to walk. The hind foot is just being placed where the fore foot has just moved from. The other hind foot next follows in succession, and then the other fore foot completes the cadence. The *Amble* is sometimes classed as a modified pace, and is in reality a slow gallop. It is performed by 2 legs alternately moving in exact correspondence with each other; these are of the same side, and one lateral half of the body is moved forward while the weight of the whole is supported on the other. The *Canter* is a slow gallop. There is a great variety in the

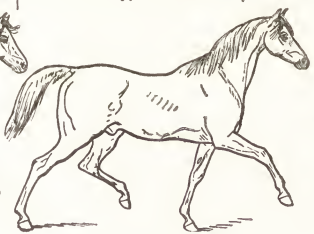


The Canter.

manner of performing the canter, and when it is performed with the right leg leading, it is an extremely elegant and well adapted gait to the female seat. The *Gallop* is performed in 1–2–3–4, but the faster the strides, the more nearly simultaneously will the fore and hind feet be brought down; and when the horse is running at speed, the movement seems to be in 1–2 time. The horse in full gallop, when carefully watched, will be seen to extend himself very much, but not nearly so much as represented by artists. To give the idea of speed, the hind legs are thrust backward, and the fore legs forward in an unnatural position. The *Rack* or *Pace* is a fast kind of amble. It is performed by 2 legs of the same side acting simultaneously, as in the amble, but they are moved with much more rapidity, and the result is a speed greater than the fastest trot by several seconds in the mile. (See *Pace, Training to*, in BREAKING AND TRAINING.) The *Run* is a kind of gallop, but by some it is defined as a trot, in which the limbs each seem to act independently, as in the walk. It is impossible for the rider of a running horse to rise in his stirrups, but as the action is

The Gallop.

very easy there is no occasion for this relief. It cannot be performed at a slow rate. The *Trot* may be described under 3 heads; the jog trot, the true trot, and the flying trot. In each of these, the diagonal legs move together; in the 1st, the time during which each foot is on the ground is much greater than that in which it is in the air; in the 2d, the contrary is the case; and in the 3d, the horse is completely carried off his legs for a considerable space of time, between the several bounds which are made by the 2 feet of opposite sides as they touch the



The True Trot.

ground in succession. The jog trot comes natural to the horse when he is first mounted; and, as long as he is fresh and fiery, the colt will maintain this pace, unless he is permitted to exceed it. The chief difference between the 3 varieties of the trot consists in the rapidity of the propulsion which is going on. In the first, this is very slight, and the more elastic the fetlock joints, the better and softer is this pace. The

feet are raised, but the body is not thrust forward; the consequence is, that the feet are deposited again very close to the spot from which they are taken, and the pace is as slow as the walk. In the true trot, the hind legs move as rapidly as, and with more force than, the fore legs, because they have more work to do in propelling the body, the latter having only to sustain it during the operation.

HEAD AND NECK.—The face should have an intelligent and good-tempered expression, and this is usually found in horses with a broad,

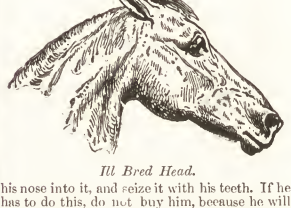
A Well Bred Face.

A Low Bred Face.

flat forehead, a straightly-inclined nose, a moderately square muzzle, with some expansion of nostril, full and prominent eyes, and thin lids. A small, sunken eye, particularly with a Roman nose, gives a horse a sulky, piggish expression, and often denotes obstinacy and bad temper. Again, the sub-maxillary space, or distance between the branches of the lower jaw, should be moderately wide, and not bulging or lumpy toward the chin, otherwise a profile view is considerably depreciated. The side face should be deep. Length of head is not of such importance. It cannot well be too short, so far as the chief requisites are concerned. In order that large quantities of well-masticated food may be swallowed, the back teeth, or grinders,

Well Bred Head.

must have large, flat and regular masticating surfaces. So, also, with the jaw; if there is not ample width between the 2 sides for the development and play of the larynx and windpipe, the wind is sure to be affected, and, in addition, the head cannot be nicely bent on the neck. A defect in this last point is the usual cause of that straight and inelegant setting on of the head which is so common, and which is alike unsightly and prejudicial to the wind and the mouth; for a horse which cannot give way to the pressure of the bit, will become dull in his mouth, and therefore unpleasant to ride or drive. All badly treated gatherings or abscesses are apt to leave behind them 2 evidences of their former presence, viz.: thickening of the skin and parts beneath, and ragged scars. Therefore, always look for these between the jaws of a horse. The skin, in this situation, should be fine, and the hair silky. See that the space between the jaws is not flush with the lower borders of the jaw. See that the lips are not swinging about like pendulums. Very old horses sometimes have pendulous lips from debility. If about to buy such a one, give him a feed of hay, and watch him to see if he can grasp the hay with his lips, or if he has to push



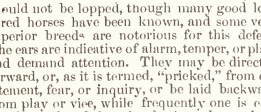
Ill Bred Head.

his nose into it, and seize it with his teeth. If he has to do this, do not buy him, because he will spoil more food than he will eat, from its dropping out of his mouth while chewing; he will take twice the time to feed, and he will never keep in good condition. Sometimes he swings the lips about in trying to seize a morsel, showing that some power in them remains. If this be so, present a pail of water to him, and watch him drink. If he cannot keep his lips pursed, and so keep up a steady drinking effort, and if they are so powerless that he has to dip his whole muzzle into the water, nearly up to his eyes, do not buy him. Hold the nostrils open, and look inside. The pink, or bluish-red membrane which is seen, ought to be covered with drops of water like dew. There ought not to be any ulcers or abrasions seen, or raw spots of any kind. There is always found, however, a very small opening, like a punched-out hole, but this is natural, and no notice need be taken of it. Each nostril should be alternately closed by the hand, to ascertain that the air-passages are not obstructed by polypus, or enlargement of the turbinated bones. If there be any discharge from the nostrils, save a slight watery discharge, it may be that the horse is suffering from a cold, or he may be glandered. The color of the discharge must be noticed, also its thickness; also notice whether it comes from both nostrils, or only one. If it be from cold, it may

be variously colored, even green, as when the horse is feeding on green food in summer. It also may be of any thickness, from wateriness to ropiness, and yet may be from a harmless cold. If, however, it be thick and gluey, and sink when put into cold water, or be tinged with blood, it is most likely that the horse is glandered. The suspicion of glanders is strengthened, if the discharge is coming only from one nostril.

Ill Bred Head.

When buying a horse, see that a discharge from the nose is not cleaned away when the attention is withdrawn. The muzzle should have no streaks of discharge upon it, neither should it be wet as if sponged. A large nostril cannot be dispensed with in horses intended for fast work, and should be desired even in the work horse, for, in drawing heavy loads on a hot day, his breathing may be rendered almost as laborious as that of the highly tasked race horse or hunter. The ear should be of medium size, and should not be lopped, though many good lop-eared horses have been known, and some very superior breeds are notorious for this defect. The ears are indicative of alarm, temper, or play, and demand attention. They may be directed forward, or, as it is termed, "pricked," from excitement, fear, or inquiry, or be laid backward from play or vice, while frequently one is carried forward, and the other backward, especially while going. This is for the purpose of collect-



Young Horse.

Old Horse.

ing all sounds, and such an animal is usually attentive to all that goes on around him. The channel or space between the branches of the lower jaw should be wide. In old age the edges retract, the channel narrows, while the lower margins of the bones appear to the fingers of the examiner, accustomed to handle young horses, to be positively sharp. The neck should be of moderate length, even a moderate-sized head, at the end of an extremely long lever, being too much for the muscles to support. It should come out full and muscular, with a sweep between the withers and the bosom, and should gradually diminish till it runs into the head, with an elegant bend just behind the ear. A very narrow throat, suddenly bent at the upper part, marked as the thropple, is apt to be connected with roaring, and on that account is objected to by horsemen. The neck should be searched to ascertain that both jugular veins are perfect, which is discovered by pressing on the lower part of the neck with sufficient force to stop the return of blood from the head; if the vein be perfect, it will fill and swell from that point upward toward the head.

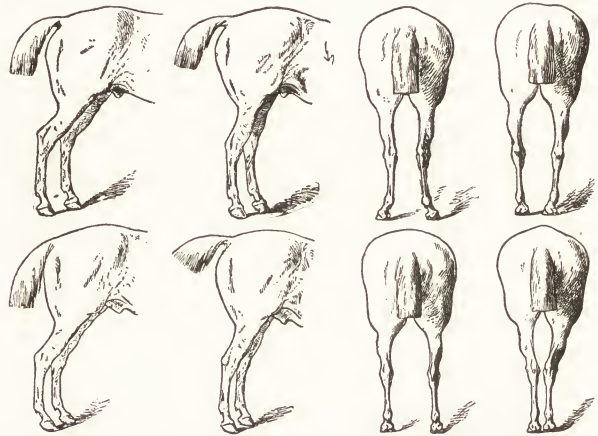
HIND QUARTERS.—For high speed, there should be plenty of length in the 2 bones which unite at the stifle-joint, without which the stride must be more or less limited in extent. In inspecting the leg, the eye alone should not be trusted; but, after minutely comparing the appearance of the 2 limbs, the hand should be passed down both shanks before and behind; any difference, before or behind, points to a deviation from health. In the sound, flat limb, the tendon is well defined, perfectly distinct, and has a hard, tense feel, that resembles the touch of a cord tightly strung. If the back sinews feel thick, the flexor tendons and their sheaths swelled and rounded, leaving no distinctive marks as it were between the one and the other, but all swelled into one mass with the bone, great mischief has, at some time, happened. The hock is one of the most important joints, and should undergo a rigid examination. When standing behind the horse, if one of the hocks is diseased, the bone does not incline gradually as in the sound limb, but there is an abrupt prominence. Though to the unpracticed eye this is not always perceptible on comparing them, yet, by passing the hand down on the inside of both hocks, this abruptness will be felt. If there is any tenderness or heat on pressure, or the marks of recent cutting on the inside of the fetlock, or unequal wear of the shoes, especially at the toe, spavin may be suspected. Sometimes both hocks present an enlarged appearance, though there is neither heat, pain, nor lameness (for hock lameness is frequently intermittent); such hocks are unsound. Certain forms of hock are more subject to disease; those approaching each other, termed low hocks, are predisposed to spavin and curb; those in which the point of the

Good Hind Quarters.

hock inclines too much backward, are liable to spavin; and when the hock is too upright, narrow and straight, it is subject to thoroughpin.

Good Hind Quarters.

LEGAL POINTS.—The inexperienced purchaser can always exact a definite warranty from a responsible seller, or, in default of such warranty, can insist upon a chance to try the horse. In any case where an honest dealer wishes to sell a horse for what the animal is undoubtedly worth, he cannot refuse to warrant a horse in any required particular. Any other course savors strongly of an attempt to deceive one who has no sufficient means of acquiring a knowledge of defects and faults easy to be concealed. Any honest dealer can have no objection to any course that will give the fullest information to the intending purchaser. When a horse is returned, he must be in the same condition in which he was received, except so far as the disease for which he is returned may have progressed in the meantime. Inquire of the seller how he has been accustomed to diet and clothe the animal; whether his feet were stopped; and the same treatment should be pursued till his soundness is ascertained. Note the temperature of the stable; if his new habitation should be hotter, it is probable an inflammatory attack of the lungs may be induced. Beware of putting a saddle on a new horse that does not fit him; while the question of soundness is still doubtful, it is far better to use the saddle he has been accustomed to. If his back becomes galled while trying him (which is not an unusual occurrence), the dealer will object to take him back, unless full compensation is made; and reasonably so, for he is unfitted for sale or for work till it is healed; and it is also a point for calculation whether he may not chance to fall sick while standing in high condition in the stable, in which case the dealer would be subjected to heavy loss. It is, therefore, not prudent to remove his shoes, or in fact do anything with the animal which may cause doubt or cavil, until it is finally decided to keep him. When horses are sold at public auction by dealers, it is usual when a warranty is given, to limit any objection to it to some short period, during which time the auctioneer holds the purchase money in his hands, which is paid over to the vendor if no complaint is made within the time specified, when the transaction is considered closed. If a horse turn out otherwise than according to the warranty given, the horse should be formally tendered to the seller, and the purchase money demanded back. If this is refused, the horse should be sent to a livery stable, and sold by public auction, due notice having been

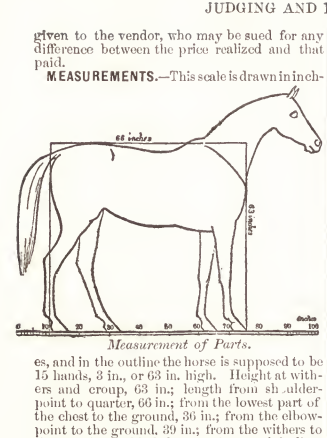


Side View of Bad Hind Quarters.

Back View of Bad Hind Quarters.

given to the vendor, who may be sued for any difference between the price realized and that paid.

MEASUREMENTS.—This scale is drawn in inch-



Measurement of Parts.

es, and in the outline the horse is supposed to be 15 hands, 3 in., or 63 in. high. Height at withers and croup, 63 in.; length from shoulder-point to quarter, 66 in.; from the lowest part of the chest to the ground, 36 in.; from the elbow-point to the ground, 39 in.; from the withers to the poll, just behind the ears, in a straight line, 30 in.; the same measured along the crest, 32 in.; length of head, 22 in.; width across the forehead, 9½ in.; from the withers to the hip, 22 in.; from the stifle to the point of the hock, in the attitude shown in the plan, 28 in.; from the root of the tail to the stifle-joint, 26 in.; from the point of the hock to the ground, 22½ in.; length of arm from the elbow to the pisiform bone, 19½ in.; from the pisiform bone to the ground, 19½ in.; girth varies from 76 to 79 in.; circumference of fore cannon bone, 7½, 8, 8, 8, 8¼ and 9 in.; circumference of arm just below the elbow, 16½ to 18 in. The height of a horse is estimated by the hand of 4 in., a scale of measurement which is confined exclusively to horses. Having regard to most speed there should be the largest dimensions possible, and therefore the greatest height compatible with perfection and symmetry. The greatest power also requires the greatest bulk. A combination of speed and power, as exhibited in the hunter, has its highest expression in horses about 15½ hands high, ½ hand, more or less, being unessential. In a flat outline the length will come to 24 in. in a horse of 15 hands, 3 in., but, measured round the surface, it will be 2 in. more. Again, the lower thigh, or gaskin, should be of about the same length; but if measured from the stifle to the point of the hock, it will be fully 28 in. in a well made horse of high breeding. These measurements, however, will be much greater in proportion than those of the work horse, who requires strength before all things, and whose stride is of no consequence whatever. In him, the length of the upper, or true thigh, is generally as great as that of the thoroughbred, but the lower thigh is much shorter, and the horse stands with a much straighter hind leg, and consequently with his hocks having a very slight angle. Muscular quarters and gaskins are desirable in all breeds.

SKIN.—The skin should feel smooth and look glossy, and the muscles of the body feel hard, not spongy to the touch. In the old horse, the head grows lean and fine, and the features more striking and blood-like; the neck fine, withers short, and the back sinks; the lips exhibit a lean and shriveled appearance, and the lower lip hangs considerably below the upper. In youth they are round and plump, and meet together, and the ridges of the roof of the mouth will be found prominent. In age the middle of the nose will sometimes be found indented by the long-continued pressure of the nose-band of the head-stall. When the skin is rough and harsh, and does not move easily and smoothly to the touch, the horse is a heavy eater, and his digestion is bad. If the hair is rubbed off, especially about the head, flanks and tail, or he is observed rubbing himself against the stall, there is danger of his being mangy, and in this case his coat will be found rough and staring. The skin of the thoroughbred is extremely thin and delicate, and allows the veins to be seen through it, and is covered with fine hair. That of the draught horse is thick. That of the hunter, or power and speed representative, is between the two extremes. Much mane and tail is a sign of low breeding; while, on the contrary, a slight, silky mane, with or without a little wave in the hair, is a desirable thing. The same may be said of the tail.

WIND.—Avoid a horse whose respiratory organs are at all impaired. Any animal so affected should be considered unsound, for impediments in breathing injures him for drawing or any other active service. To test them, ride or drive the horse briskly about ¼ mile; place the ear at the side of the heart, and if a wheezing sound is heard, it is an indication of trouble. Wind may also easily be judged of by the motion of the flanks. A broken-winded horse pinches in his flanks with a very slow motion, and drops them suddenly, which may be easily perceived. Many horses breathe thick that are not broken-winded; indeed, any horse will, in foggy weather, or if foul fed, without sufficient exercise; but, if a horse has been in good keeping, and had proper exercise, and yet has these symptoms, there is some defect, either natural or accidental, such as a narrow chest, or some cold that has affected the lungs. When inspiration appears to be performed readily and quickly, as in health, by a single action, but expiration with difficulty, by an irregular and prolonged movement or double action, the respiratory muscles appearing as if interrupted in the act of expelling the air, and then the flank drops suddenly, it is a symptom of broken wind. The cough should then be tried. The cough of a broken-winded horse, is a peculiar, low, hollow grunt, difficult to describe, but when once heard, easily recognized. The cough can generally be elicited by pinching the larynx or trachea, though occasionally this fails, for some sound horses, as well as broken-winded ones, cannot be made to cough at all.

TRICKS OF DEALERS.

AGE, To Disguise.—A horse is made to appear young by giving the following: Tincture of asafœtida, 1 oz.; tincture of cantharides, 1 oz.; oil of cloves, 1 oz.; oil of cinnamon, 1 oz.; antimony, 2 oz.; fenugreek, 1 oz.; 4th proof brandy, ½ gal.; let it stand 10 days, and then give 10 drops in 1 gal. water. The process of filling up the depressions over an old horse's eyes, is another matter that requires the art of an adept. This is termed "puffing the glims." The skin over the cavity is punctured, and the jockey then fills it with air from his mouth; the aperture closes, and the brow becomes as smooth as that of any young horse.

COLORING.—Jockeys go so far sometimes as to paint a horse all over, if his color is bad; and dyeing in spots for the purpose of producing matched teams, is a common practice. This is a clever trick and not easily detected. The white hairs which appear about the head and eyes of aged animals are frequently pulled out. Black spots may be put on a white horse, by taking powdered quicklime, ½ lb.; litharge, 4 oz.; beat well, and mix the litharge with the lime; put into a vessel, and pour sharp lye over it; boil, and skim off the substance which rises to the surface. This is the coloring matter which must be applied to such parts of the animal as are wished to be dyed black. Red hair may be dyed black with a very similar composition, thus: Boil 4 oz. of lime with 4 oz. of litharge, in fresh water; the scum that rises will have the same effect. If the hair be entirely free from grease, one night will be sufficient to stain it black.

FLESH, To Produce the Appearance of.—It is a custom among horse men who want to sell an inferior animal, to mix antimony, arsenic, and various forms of mercury with their feed. These cause them to make fat rapidly and become sleek and glossy, but often result in terrible blood poisoning, producing slow and agonizing death. A horse may be made to stand by his feed and not eat, if the front teeth and roof of the mouth are greased with common tallow.

GLANDERS, To Hide.—Dealers, at fairs and other places, will frequently endeavor to pass off a glandered horse upon an unwary customer. The usual trick is to stimulate the nostrils till the horse has snorted away all the matter lying in them, and then by injections of an astringent nature, producing a temporary suppression of the discharge. Others cram a pledget of tow up the nostrils. These tricks may be detected by the animal's uneasiness, tossing of his head, efforts to sneeze, the red and vascular appearance of the interior of the nostril, but especially by the fetid breath. A horse is made to appear as if he had the glanders by pouring butter that has been freshly melted into his ears.

HEAVES, To Hide.—To disguise the heaves, the horse is sometimes given ½ lb. of small bird shot, and he will not heave until it passes through him.

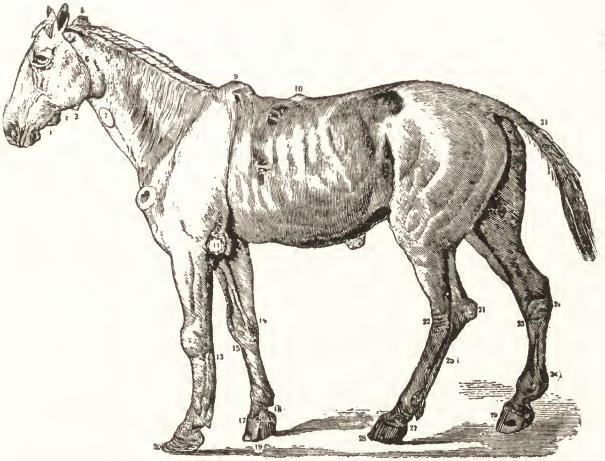
LAMENESS, To Conceal.—About ½ way from the knee to the joint, on the outsides of the leg, make a small incision, and at the back part of the shin bone you will find a small white tendon or cord; cut this tendon or cord off, and sew up the incision with a stitch, and the horse will walk off on the hardest pavement without a limp. A horse is made to appear lame by taking a hair from the tail and passing it through the eye of a small needle; press the skin between the outer and middle tendon or cord of the front leg; shove the needle containing the hair through, then cut off the hair on each side, and let the foot down. In 20 minutes' time the horse will go lame.

LYING.—Of all the means by which the jockey prosecutes his trade, there are none so much relied on or so effective as bold and ingenious lying. This is his great resource. It supplies pedigree, history and warranty. If there be blemishes on the animal, they can be easily explained away by plausible lies; if the horse is lame, it arises from a slight sprain, bad shoeing, or other easily remedied cause; if he stumbles, it is because he has been ill-shod; if he balks, the harness is on wrong, or the horse has an attack of some acute complaint arising from over-feeding, over-driving, or it comes of bad handling; if he kicks, he is only playing; if he leers and bites, it is a sign of courage and vitality; if his coat "stares," he has just been brought in from the country, where he has been running out during the winter; if he is thin and bare, there are a thousand explanations handy; while every good point is exaggerated and held up with art and eloquence.

SPAVIN, To Conceal.—Tincture of cayenne, 1 oz.; laudanum, 2 oz.; alcohol, 1 pt.; the shoulders are rubbed well with warm water, then the above mixture is rubbed on the shoulders and backbone; the horse is then given 1 oz. of laudanum and 1 pt. of gin; his feet are put in warm water as hot as he can bear it; a little spirits of turpentine is rubbed on the feet with a sponge after taking them out of the water; he is then driven about ½ mile or so, when he is found quite limber. If he does not surrender to his pain, a thin cord is tied around the end of his tongue.

STAR, To Make.—Take a piece of coarse towline, just the size of the proposed star; spread on it some warm pitch, and apply it, first shaving the place; leave it on for 4 days, then wash the spot with smart water or elixir of vitriol, 4 times a day, until well; when the hair grows, it will be white.

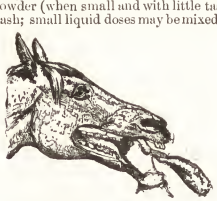
TREATMENT OF DISEASE.



Diseases of the Horse.

1, caries of the lower jaw; 2, fistula of the parotid duct; 3, bony excrescence or exostosis of the lower jaw; 4, swelling by pressure of the bridle; 5, poll evil; 6, inflamed parotid gland; 7, inflamed jugular vein; 8, fungous tumor produced by pressure of the collar; 9, fistula in the withers; 10, saddle gall; 11, tumor of the elbow; 12, induration of the knee; 13, clap of the back shews; 14, malanders; 15, splint; 16, ring-bone; 17, a tread upon the coronet; 18, quittor; 19, sandcrack; 20, contracted or ring-foot of a foundered horse; 21, capped hock; 22, malanders; 23, spavin; 24, curb; 25, swelled sinews; 26, thick leg; 27, grease; 28, a crack in front of the foot, called sandcrack; 29, quarter-crack; 30, ventral hernia; 31, rat-tail.

ADMINISTRATION OF DOSES. — Medicine may be given to the horse as a ball, a drench, or as a powder (when small and with little taste) in the mash; small liquid doses may be mixed in the



Correct Way of Giving a Ball.

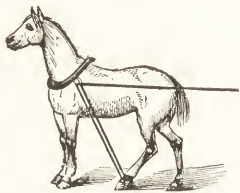
food. In giving a ball, catch firm hold of the tongue with the left hand and draw it down between the incisor teeth; then holding the ball in the right hand, with the fingers inclosing it like a cone, and the arm bare, carry it rapidly to the back of the mouth and deposit it there; withdraw the hand, close the mouth, elevate the head a little, and watch on the left side of the neck for the ball to go down. The nose may be rubbed somewhat roughly in order to divert the horse's attention. Drenches may be given out of a strong-necked bottle, or a horn. Two persons are necessary, the operator standing at the right shoulder, while the assistant is ready to steady the head and aid him on the left. The operator raises the head with his left hand beneath the jaw, and with his right he forces the lip of the horn into the side of the mouth, and, raising the small end, pours the contents in. If the horse is violent, a twitch must be placed on the nose. Do not pass the horn far into the mouth, or use violence, lest a cough should arise, in which case lower the hand instantly. (See *Remarks* in DISEASES OF CATTLE.) To examine the hinder parts, the horse may be

Mode of Distracting the Horse's Attention.

kept quiet by the use of the following: A soft collar with a metal ring is put over the horse's head, and a hobble is fastened to the foot to be

Manner of Giving a Drench.

elevated. By the side of this ring a strong rope is attached; the cord is then passed through the D of the hobble; then it is brought back and run through the side ring or loop; by pulling the rope gradually the leg is brought forward, and he cannot kick. Sometimes lines are attached to both feet to throw the horse, but this is not thought as good a method as that described in *Throwing*, in BREAKING AND TRAINING.



Side Line.

ABORTION.—This is usually the result of accident or overwork. In this disease the parts usually come away naturally and leave no bad results, except, perhaps, a nervous prostration, and a slight rise in pulse and temperature during 1 or 2 days. *Treatment:* The mare should have perfect rest for several days, with soft food and chilled water; if fever ensues, a teaspoonful of saltpeter may be given in the mash morning and evening.

ABSCESS OF THE HEAD.—Generally caused by external injury. A wound is formed on the head, from which issues a watery fluid; the horse becomes dull, refuses his food, and at last falls, and commences knocking his head against the floor, and continues thus until death. *Treatment:* Apply a bran poultice to the abscess till it is brought to a head; then, if it does not break spontaneously, open it with a broad-shouldered lancet. Keep the part clean, trim the hair, and inject into the wound the following: Carbolic acid, 1 dr.; water, 4 oz. If the cavity does not soon fill up, inject a wash of ½ oz. of blue stone with 1 pt. of water.

ANEURISM.—A weakness and consequent expansion or bulging out of the arteries. The large arteries in the abdominal cavity are the ones most commonly affected. If it is suspected, examine the internal parts, by inserting the hand in the rectum; if it exists, a large bulge and distinct pulsation will be felt. *Treatment:* There is no cure when it occurs internally; but, if it is external, cold water, ice, and a compress should be applied to the swelling.

APHTHA (Thrush or Sore Mouth).—This is accompanied by dullness and refusal to feed; both lips swell, the tongue tumefies, becomes red, and generally hangs out of the mouth; around the mouth little lumps appear, which, at first, are stony hard; and others, of a larger size, may be felt upon the tongue; vesicles are developed from these spots, which contain a clear liquid. *Treatment:* Wash the mouth with the following: Borax, 5 oz.; honey or molasses, 2 pts.; water, 1 gal.; mix. Regulate the bowels by a dose of 2 oz., each, of rhubarb and bicarbonate of soda, once or twice a week; and give as a tonic ½ dr. of quinine every morning. Give soft, nourishing food, and keep the animal quiet.

Aphtha or Thrush.

APOPLEXY.—The result of a sudden pressure on the brain, and is usually caused by over exertion, or anything which produces a rush of blood to the head. The horse is a little off his feed; more than usually dull; has a somewhat staggering gait; the last act of voluntary motion is to drink; has little power over the muscles of swallowing, and the fluid returns through the nostrils; foams at the mouth; breathing laborious and loud; death speedily ensues. *Treatment:* Immediately open the jugular vein (see *Bleeding*), and give the following to act on the bowels: Barbadoes aloes, 1 oz.; Epsom salts, 1 oz.; water, 2 pts.

BAGS.—Soft, puffy swellings of the membrane of the mouth. *Treatment:* Cut off a portion of the swelling with a pair of scissors or a knife; after which dress the parts with a little salt or powdered alum.

BITES.—Horses are liable to be bitten by different insects. The bites of the gadfly are sometimes very troublesome in their effects. *Treatment:* Make a strong infusion of the green bark of the elder, and wash the flanks, etc., with it before going out; or with dilute carbolic acid.

BLADDER, Eversion of.—Caused by protracted labor, or straining, in inflammation of the bladder. The bladder will be seen protruding from the lower part of the vulva. *Treatment:* Bathe the bladder with the following: Laudanum, 1 oz.; water, 1 pt. Press the bladder carefully and gently till it is returned to its place. If it is inclined to come out again, put on a compress to hold it in.

BLADDER, Inflammation of (Cystitis).—Commonly caused by the too free use of fly blisters to the back, acrid plants in the food, and reten-

tion of urine. The symptoms are a quick pulse, pain in the hind quarter, evinced by the looks of the animal in that direction, and constant straining to pass the urine, which is thick and mixed with mucus, or, in aggravated cases, with purulent matter. *Treatment:* Purge with linseed or castor oil; then give 2 dr. of laudanum (tinct. of opium), every hour, till pain is relieved.

BLADDER, Stone in the.—The symptoms are a desire to urinate, without any discharge; afterwards the urine flows with ease, but suddenly stops; the stone having been carried to the outlet, blocks up the passage. The animal, after attempting for some time to evacuate the bladder, groans, sighs, and lies down in a careful manner. *Treatment:* The animal should be placed upon his back, with the hind legs drawn well forward; a whalebone staff is passed up the urethra, which may be felt a little below the anus; an incision, 1½ or 2 in. in length, is made directly upon it, obliquely to one side, cutting through the urethra and the neck of the bladder; the forceps are next introduced, and the stone removed; after which the parts are carefully closed by means of the quill suture.

BLEEDING.—This is valuable in cases of congestion, when there is a full, strong pulse, and no fever. When it is necessary to lessen the whole quantity of blood in the system, open the jugular or neck vein. If the inflammation is local, bleed where it can be conveniently done, either from the part affected, or in its vicinity,

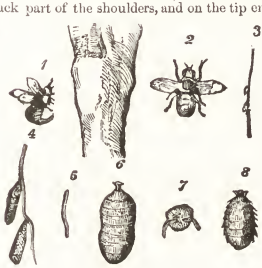
Bleeding.

as by opening the plate vein, superficial vein of the thigh, or temporal arteries. The instruments used, are either the lancet, or the fleam and the blood-stick; but the former requires some practice to manage it properly. In bleeding from the jugular vein the horse must be blindfolded, if the fleam is used, to avoid his shrinking away from the blow; then, with the finger, press upon the vein, to make it fill; place the blade of the fleam upon the vein, as shown in the illustration, and strike it with the blood-stick; then press the blood-pail against the vein, which will cause the blood to flow freely. The quantity of blood to be taken varies according to the age, size, condition and constitution of the horse, and urgency of the symptoms. From a large, strong horse, 4 or 6 qts. of blood will generally be requisite; and this may be repeated in smaller quantities if the symptoms demand it. When the desired quantity has been drawn, the vein must be carefully closed by passing a pin through the centre of the opening, taking up the skin upon both sides, and tying with hair from the mane or tail, or with tow. The pin may be removed in about 24 hours.

BLEEDING, To Stop.—*Treatment:* The best remedy to stop bleeding is a piece of iron simmered for a few minutes in hot water, applied to the wound for a moment, which will at once stop further loss of blood.

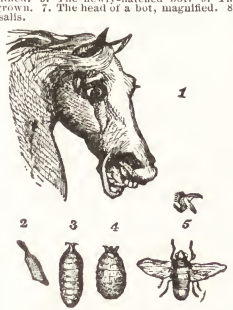
BONY GROWTHS (Osteophytes).—These bony deposits are the result of hard work, which makes the bones sore and inflamed. A bony enlargement can be seen and felt; more or less lameness exists, and the animal is knee sprung. *Treatment:* Give the animal a long rest, and apply the following blister: Biniodide of mercury, 2 dr.; lard, 2 oz.; mix, and rub well in.

BOTS.—There are 2 species of horse bots, the *Œstrus equi* and *Œstrus hæmorrhoidalis*. The female of the 1st deposits her eggs upon the hair on the inside of the knee, on the sides and back part of the shoulders, and on the tip ends



Œstrus Equi.

1. The female fly about to deposit an egg. 2. The male fly. 3. The egg, its natural size. 4. The egg, magnified. 5. The newly-hatched bot. 6. The bot full grown. 7. The head of a bot, magnified. 8. The chrysalis.



Œstrus Hæmorrhoidalis.

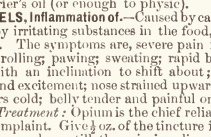
1. The female about to deposit an egg. 2. The egg magnified. 3. The bot. 4. The chrysalis. 5. The male fly.

of the hairs of the mane. The female of the 2d, selects the hair on the lips. The eggs are made to adhere by means of a glutinous liquor secreted with them. The horse licks the spot irritated by

Bots Attached to a Horse's Stomach.

the fly, and gets 1 or more eggs into his mouth; it is hatched by the heat and moisture, passes down the gullet, and attaches itself to the coat of the stomach by its hooks, where it remains until the next spring and then passes out with the dung. On reaching the outer air, it assumes the chrysalis condition, and in 3 or 4 weeks bursts its covering to become a perfect insect. The symptoms are, occasional nipping at the sides; red pimples on the inner surface of the upper lips; rough, unthrifty coat of hair and loss of flesh. *Treatment:* Give 2 qts. new milk in 1 qt. molasses; then 15 minutes afterwards, 2 qts. very strong sage tea; 30 minutes after the tea, 3 pts. of currier's oil (or enough to physic).

BOWELS, Inflammation of.—Caused by catching cold, by irritating substances in the food, or by poison. The symptoms are, severe pain in the belly; rolling; pawing; sweating; rapid breathing, with an inclination to shift about; great fever and excitement; nose strained upward; legs and ears cold; belly tender and painful on pressure. *Treatment:* Opium is the chief reliance in this complaint. Give ½ oz. of the tincture in ½ pt. water, every hour, till the pain is relieved. If there is much fever, give 10 drops tincture aconite root every 2 hours. Apply blankets, wrung out of hot water, to the abdomen, and renew them every 15 minutes. Give 1 pt. linseed oil, and follow with injections of warm (not hot) wa-



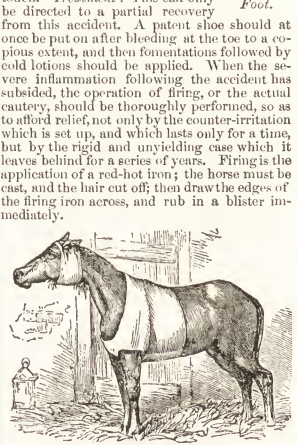
Symptom of Inflammation of the Bowels.

ter, Castile soap, and 1 oz. table salt, every ½ hour, until the bowels move. After the fever has subsided give a few powders of the following: Mix pulverized licorice root, fenugreek and gentian, 2 oz. of each; divide into 6 powders, and give in feed 2 or 3 times a day.

BRAIN, Inflammation of.—It arises from blows over the head, overfeeding, particularly with corn; a tight collar will sometimes produce it. The symptoms are a disinclination to move about; loss of appetite; lining membrane of the eyelids much reddened; eyes present a dull and sleepy appearance; to these succeed delirium or madness. *Treatment:* Bleed freely before the delirious stage comes on. Apply cloths wet in cold water to the head, or bags of broken ice. Open the bowels with the following ball: Barbadoes aloes, 1 oz.; croton oil, 6 drops; pulverized ginger, 1 dr.; mix with water, molasses or honey. Give injections of Castile soap and water. Give no food of any kind for 24 hours, but small quantities of water may be given. After recovery feed lightly.

Broken Down Foot.

BREAKING DOWN. — This is caused by a partial or entire giving way of the fetlock joint downwards, so that the back of it either touches the ground, or nearly so, when the weight is thrown upon it. Usually after the horse is pulled up, he hops on 3 legs, and refuses to put that which is broken down to the ground. In a very few minutes the leg "fills" at the seat of the accident, and becomes hot and very tender to the touch. *Treatment:* This can only be directed to a partial recovery from this accident. A patent shoe should at once be put on after bleeding at the toe to a copious extent, and then fomentations followed by cold lotions should be applied. When the severe inflammation following the accident has subsided, the operation of firing, or the actual cautery, should be thoroughly performed, so as to afford relief, not only by the counter-irritation which is set up, and which lasts only for a time, but by the rigid and unyielding case which it leaves behind for a series of years. Firing is the application of a red-hot iron; the horse must be cast, and the hair cut off; then draw the edges of the firing iron across, and rub in a blister immediately.



Horse Dressed for Bronchitis.

BRONCHITIS, Acute. — Generally caused by exposure. It commences with a chill, fever, harsh cough, labored breathing, mouth hot and dry, with loss of appetite, and in 1 or 2 days a discharge from the nostrils will be observed. *Treatment:* Place the horse in a large, loose box; fill the place with steam; apply scalded hay to the throat by means of an 8-tailed bandage. Fix flan-

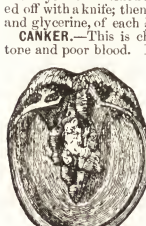
nels, wet with cold water, to the back and side, by means of a waterproof jacket. When the flannels become warm, change them; do this for 2 hours. After that space the flannels may remain on, but must not become dry. Give 10 gr. of tartar emetic, dissolved in 1 tablespoonful of water, with 2 dr. tinct. of opium, 3 times a day. Keep the bowels open with castor oil or Epsom salts, and give as a tonic ½ dr. quinine every morning.

BRONCHITIS, Chronic. — The result of bad treatment of acute bronchitis, and when the attack has been prolonged for some time. It is characterized by a cough which seems to be confirmed, and discharge from the nostrils. The cough is worse after drinking and in the morning. *Treatment:* Take of pulverized gentian and sulphate of iron, 8 oz. each; mix thoroughly and divide into 35 powders, and feed twice a day until all have been given; then make an ointment of red iodide of mercury, 1 dr.; lard, 1 oz.; mix well; apply down the course of the windpipe, and the next day apply sweet oil or lard to keep the skin from cracking. Repeat the application of the ointment in one week.

BURNS AND SCALDS. — *Treatment:* If the burn is severe and there is much pain, use linseed meal poultices locally, and give internally ½ oz. doses tinct. opium till the pain is relieved; then use as a lotion, a saturated solution of bicarbonate of soda, till the burn is healed.

CALLUS, or INDURATION OF THE KNEE.— This is caused by pressure or friction, and sometimes by an injury, which, after remaining sore for some time, finally heals, leaving a thick, hard and enlarged surface. *Treatment:* Paint with tincture of iodine, 3 times a day; in a few days the hardened substance may be scrapped off with a knife; then dress with carbolic acid and glycerine, of each ½ oz.; linseed oil, 1 pt.

CANKER.—This is characterized by want of tone and poor blood. It often follows bruises, punctures, corns, quittors and thrush, and is very difficult to cure. It is more frequently connected with neglected thrush than with any other disease of the foot. It consists of destructive inflammation, with ulceration, which destroys the connection between the sensitive and horny sole and the frog. After a time a foul fungus sprouts from the ulcerations, accompanied with an exceedingly disagreeable discharge. The horn of the sole and frog becomes disorganized and breaks down. *Treatment:* This consists in tonics internally. Take powdered gentian, and powdered sulphate of iron, 8 oz. each; mix, and divide into 35 powders; give 1 powder twice a day. For local treatment, remove all loose horn, and allow all pent-up matter to escape; the exuberant granulations must be carefully cut away, and the parts then washed with a tepid lotion of sulphate or chloride of zinc. After drying the surface, dust it with oxide of zinc; apply tow, dipped in a mixture of tar and lime, and keep it in firm contact with the parts by means of a leather sole, or strips of hoop iron underneath a shoe lightly tacked on. Dress in this manner daily, keeping up the dry pressure for a week.



Confirmed Canker.

CARBUNCLE.—Carbuncle is a gigantic boil. There is a great uneasiness, high fever, and marked prostration. *Treatment:* Move the bowels with Barbadoes aloes, 5 dr.; ginger, 1 dr.; gentian root, 1 dr.; and syrup to combine; mix; make a ball, and give at 1 dose. Apply a linseed poultice locally; and, as soon as evidence of formation of matter exists, do not wait for sloughing, but open at once and freely with a knife or broad lancet. As soon as the sore begins to granulate, change from the poulticing to the following lotion: Carbolic acid, 4 dr.; water, 1 pt.; mix. For the prostration, use the iron powders recommended in *Bronchitis, Chronic*; and for pain, give occasionally ½ fl. oz. of tincture of opium.

CARIES.—Caused by the injuries inflicted by the use of long levers to curb bits, together with tight curb chains. It may be known by a peculiar sore; there is a depression, and in this lies a mass of proud flesh, which is not attached to the surrounding surface, being only fixed to the bottom of the cavity or partially on one side. A watery discharge goes on constantly, and there is continual bleeding from the mouth, on contact with the bit. *Treatment:* This should consist in the adoption of a bit, pressing upon another part of the mouth, changing the curb for a snaffle. Keep the wound open by the use of lunar caustic, daily, which should be pushed deeply into it for a couple of seconds, and it will destroy the unhealthy granulations. Care should be taken not to use the caustic more than is necessary to keep down the fungous growth.

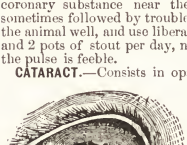
CARTILAGES, Ossified. — A conversion into osseous structure of the cartilages of the foot. The symptoms are, more or less enlargement of the back of the coronet and heel, the part feeling hard and irregular, or lumpy. To ascertain

Test for Ossified Cartilages.

whether the cartilages are ossified, grasp the foot just above the coronet, as shown in the illustration, the fingers on one side, and the thumb upon the other; if the hand is sensible of something hard, and the substance does not yield to pressure, the cartilages are ossified, or approaching this change. *Treatment:* 1. If the horse has recently gone lame, apply a blister to the coronet; repeat it, if necessary. When there is much heat in the part, bleeding from the foot may be adopt-

ed; and afterwards the application of cloths dipped in cold water, with the addition of a wineglassful of tincture of arnica to 1 pt. of water. In confirmed cases, where the parts have become callous, a leather sole to the shoe will take off the vibration, and should be used during the summer season. — 2. Scarification of the skin covering the enlargement with a lancet, encouraging the bleeding by warm water, and followed by the use of cold water as soon as the bleeding has ceased, will sometimes do wonders in recent cases. The scarification should be repeated at intervals of 5 or 6 days, taking care to avoid injury to the coronary substance near the hoofs, which is sometimes followed by troublesome sores. Feed the animal well, and use liberally. Perfect rest, and 2 pots of stout per day, may be allowed if the pulse is feeble.

CATARACT.—Consists in opacity of the crystalline lens, and is generally the result of inflammation of the iris. The progress of the disease is generally marked by an unusual timidity; the animal is alarmed at objects advancing on the road, and covered carts and wagons, of which he formerly took no notice, cause him to shy in the most timid manner. On examining his eyes carefully, instead of the beautifully clear pupil, there is seen either a mass of dull white, generally more opaque in the centre, or an appearance of mottled, semi-transparent soap, or, lastly, 1 or 2 distinct white spots, not quite circular, with irregular edges. *Treatment:* In the early stage, clean the eye by using a lotion of nitrate of silver, 10 gr.; water, 1 oz.; mix, and apply twice a day; give internally, potassium iodide, nux vomica, fenugreek, of each 1 dr.; mix, and give in 1 dose, morning and night for 3 or 4 weeks. Give also the following purgative; 5 dr. Barbadoes aloes; 1 dr. ginger; 1 dr. gentian root; syrup or soap enough to combine with the foregoing powder; make into a ball, and give as 1 dose. Complete cataract can be remedied only by the operation of couching or extraction.



Partial Cataract.

Complete Cataract.

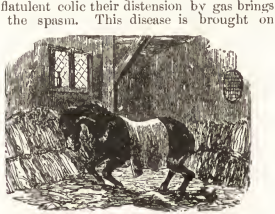
CATARRH, or COLD.—Attended with a slight discharge from the nose, now and then, a slighter weeping from the eyes, increased labor of breathing and cough. *Treatment:* If mild, a little green food, a few mashes, an extra rug and a slight rest, generally accomplish a cure. If severe, give no active medicine. Apply the steaming nose bag 6 times, daily; allow cut grass and mashes for food, with gruel for drink. If weak, give 3 feeds of crushed and scalded oats and beans, daily, with a pot of stout, morning and evening. Good nursing, with pure air and warmth (without exercise) till the disease abates, are necessary.

CHOKING. — This is not of frequent occurrence, but sometimes happens when horses are fed with dry, ground food, and swallow it before it is properly moistened with saliva, and it accumulates in the gullet. *Treatment:* Use a flexible tube, gently; if the choking matter can be felt externally, pour 1 pt. of sweet oil down the throat, and rub outside with the hand.

Steaming Bag.

Choking.

COLIC. — In this disease there is spasm of the muscular coat of the intestines, generally confined to the cæcum and the colon. Various names have been given to its different forms, such as the fret, the gripes, spasmodic colic, etc.; but they all display the above feature. In spasmodic colic the bowels are not unnaturally distended, but in that of flatulent colic their distension by gas brings on the spasm. This disease is brought on by too much food and water at one time, and then immediately putting the horse to work. *Treatment:* Place the horse in a loose box; or remove the carriage from its house, and place a bar across the entrance, and arrange bundles of straw against the walls (as shown in the illustration) to prevent the horse from injuring himself.



Second Stage of Spasmodic Colic.

Give the following drench: 8 oz. raw linseed oil; ½ fl. oz. laudanum; 1 dr. powdered nitre; 8 fl. oz. peppermint water; mix well, and give slowly. If entire relief is not given in 1 hour, repeat the drench. Give proper attention to the diet of the horse, and feed him with sound, sweet and nutritious grain and provender.

CONSTIPATION.—Sometimes caused by the horse not drinking enough, or by inactivity of the liver and other glands that supply the bowels with juices. It may be known by the small amount of fecal matter passed, what is passed being dry and hard; colicky pains are also felt at intervals. *Treatment:* Administer 4 dr. aloes and 1 dr. calomel, rubbed down with gruel; inject soap and water every hour; let the horse have walking exercise, and apply friction to the belly. If, after 12 hours, no effect is produced, let the aloes and calomel be repeated, with the addition of 3 or 4 drops of croton oil, and a wineglassful of spirit of nitre, ether, gin or whisky.

CORNS.—There are 4 varieties of corns, the old, the new, the sappy, and the suppurating, all caused by bruises to the sole, the result, in a vast majority of cases, of bad shoeing. Corns are generally produced at the heel of the forefoot in the corner formed by the outer crust and the frog. The hoof at this point is soft and sensitive and the faulty shape of the shoe causes this sensitive part of the sole to rest upon the shoe, the web of which is too broad. In the angle between the bars and the quarters, the horn of the sole has sometimes a red appearance, and is more spongy and soft than at any other part. The horse flinches when this portion of the horn is pressed upon, and occasional or permanent lameness is produced. *Treatment:* Pare out carefully the seat of the corn, removing all reddened and diseased horn; reduce the crust of the quarter slightly, where it is unduly strong, but leave the bars and frog untouched. They must be preserved, especially in weak feet, to afford a wide bearing for the bar shoe that should afterwards be used. To soften the parts, apply, in bad cases, a poultice for a day or two, and a few drops of nitric acid when the horn is dry and scurfy; keep the hoof soft with soft soap and lard, or any emollient dressing, and pare out the corn every fortnight. In horses subject to corns, shoe and pare out frequently; and along with leather pads, use a bar shoe made with a wide heel on the inside quarter, and nailed only on the outside, or with one nail toward the inside toe.

Small Scarlet Spot Showing a New Corn.

Aspect of Old Corn on a Large Flat Foot.

COUGH.—This is not a disease, but a mere symptom of irritation of the mucous lining of the throat and nostrils by catarrh, dust, gusts of air, etc. *Treatment:* Same as that of *Catarrh*, which see.

CRAMP, Of the Hind Leg.—Quivering or excitement of the muscles of the thigh, accompanied with irritation and fever. It is often mistaken for dislocation of the patella. The muscles will be drawn up in knots, and the horse will be unable to move. *Treatment:* 1. Move the animal, if possible, and the cramp will give way.—2. Bathe the leg with hot water until the muscles relax. Rub dry, and bathe the leg with arnica, or with the following liniment: 1½ oz. arnica tincture; 1 oz. tincture opium; 1½ oz. liquor ammonia; 1 pt. water; mix.

CURB.—Generally caused by a strain from galloping on uneven ground, wrenching the limb, prancing and leaping, etc. It is one of the evils which occur among the better breed of horses, and is one of the many diseases of the hock joint. It consists of an enlargement, or gradual bulging out at the posterior part of the hock. *Treatment:* Apply as a cooling lotion, to reduce the inflammation, 2 oz. sal ammoniac; 2 oz. powdered nitre; 1 pt. vinegar; 1 qt. water; mix for use, and afterwards apply a fly blister.

Clean Hock.

Curby Hock.

A Curb.

DEAFNESS.—Sometimes caused by a blow on the external ear, which produces inflammation, and an abscess forms. *Treatment:* Open the abscess as soon as the presence of matter is ascertained; and keep scrupulously clean with the following lotion: 4 dr. carbolic acid to 1 pt. water.

DEBILITY.—Caused by bleeding in treating diseases, and insufficient and improper diet given to sick horses, when they should have been supported by good and sufficient food during sickness. The symptoms are swelling of the legs, breast, belly and sheath. The horse is very weak, and staggers as he walks. *Treatment:* Give the following tonic balls, once or twice a day, with a liberal amount of good feed and water, and allow him to recover wholly before putting him to hard work: 2 dr. ginger; 1 dr. gentian; ½ oz. Peruvian bark; 1½ oz. fenugreek; mix, and form a ball.

DIABETES.—Frequently caused by kiln-dried oats or new-burnt hay. The symptoms are excessive stalling, and a tendency of the liquid evacuations to be of a sugary nature. *Treatment:* Give wholesome food, and the following ball twice a day: 10 gr. powdered opium; 1 dr. sulphate of zinc; 2 dr. gentian; 1 dr. ginger.

DIAPHRAGM, Spasm of.—Caused by severe runs or rapid harness work, and also by tetanus. It may be known by a spasmodic movement of the body, and a dull, thumping sound arising from the abdomen; small, weak pulse, and difficult respiration. *Treatment:* Give the following ball: Carbonate of ammonia, 1 dr.;

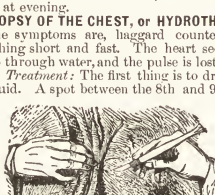
camphor, ½ dr.; powdered ginger, 1 dr.; linseed meal and boiling water sufficient to make into a ball; repeat the dose every 3 hours.

DIARRHEA.—Caused by over exertion, exposure to cold, drinking freely of pump and spring water, and over doses of physic; new oats and hay will sometimes produce it. *Treatment:* Rice or flour milk may be administered as food, and the following drench given every time there is a discharge: 1 dr. powdered opium; ½ oz. tinct. of catechu; 1 pt. chalk mixture; mix.

DISTEMPER.—(See *Throat, Sore.*)

DROPSY, General (Anasarca).—Also called *Moor Ill*; occurs chiefly among horses turned out in marshes or low commons, and may be known by the general swelling of the body, increasing by gravitation in the legs during the standing posture, but showing itself chiefly in the lower side of the body in the early morning, when the horse has been lying down all night. *Treatment:* 1. Give the following to act on the kidneys: 4 dr. nitre; 3 dr. powdered resin; 1 dr. ginger; 1½ oz. spirit of nitrous ether; 2 pts. warm water; mix, and give as a drench every night.—2. Give 1 dr. calomel, once a week, in bran, at evening.

DROPSY OF THE CHEST, or HYDROTHORAX.—The symptoms are, haggard countenance; breathing short and fast. The heart seems to throb through water, and the pulse is lost at the jaw. *Treatment:* The first thing is to draw off the fluid. A spot between the 8th and 9th ribs



Tapping the Chest.

is chosen, and the skin is pulled back; a small slit through the skin is made (see illustration); into that opening a trocar, armed with a stilet, is inserted, and so much force applied as suffices to propel it onward. When there is no resistance felt, the thorax has been entered; the stilet is withdrawn, and the water flows forth. Use a fine trocar; take all the fluid you can obtain. Should the horse appear faint, stop the flow for a few minutes, and then let it proceed more slowly. Give the following ball, night and morning: 1 dr. iodide of iron; ½ gr. strychnia; ½ dr. sulphate of zinc; extract of gentian and powdered quassia, of each a sufficiency. Boiled oats and beans may be allowed in any quantity which the animal will consume. If he will not eat, drench him with oatmeal gruel.

DYSENTERY.—Caused by neglected diarrhea, some acrid substance in the stomach, and foul atmosphere. The symptoms are obscure at the commencement. As in nearly all disorders of the intestines, so in this, there is pain in the abdomen. The pain may be slight at first, or it may be so violent as to be confounded with the pangs of colic; the thirst is excessive; the stench offensive. *Treatment:* Give soft boiled rice; if it is not taken voluntarily, give as a drench, mixed into a thin, liquid form with warm water. If the case is severe, ½ oz. of laudanum may be added to 1 qt. of rice milk, and given every time the bowels act with violence. Or a thin gruel may be made with wheat meal, and the laudanum mixed with that instead of the rice. Once in 2 or 3 days the bowels should be cleared of foul matter, by ½ pt. of linseed or castor oil, aided, if necessary, by large injections of warm saleratus water. If the horse is very much exhausted, 1 pt. of port wine may be substituted for the laudanum with advantage.

DYSPEPSIA.—Generally caused by the animal being constantly fed on the same articles. The symptoms are a cough, staring coat, and loss of appetite; the manure has an offensive smell, and is yellowish in color. *Treatment:* The horse should have a complete change of food, apples, turnips, carrots, scalded oats and bran mashes. If the right time of year, give him 3 or 4 months at grass.

ELBOW, Capped.—Caused by direct pressure against the calk or heel of the shoe. It is an abscess or tumor on the side of the chest just behind the shoulder. *Treatment:* If the tumor is soft and shows signs of containing pus, it should be opened and the matter allowed to escape. Syringe with warm water, and afterwards apply the following lotion: Carbolic acid, ½ oz.; water, 1 pt.; mix, and use 3 or 4 times a day. Keep the bowels in order by an occasional pint dose of linseed or castor oil, if needed; support the strength with the tonic balls, recommended in *Debility*, which see.

A Capped Elbow.

ELEPHANTIASIS, or WATER FARCY.—Usually caused by the animal being fed too highly and not worked enough. The leg is hot, painful and sore, and, when touched, the horse raises it as high as possible. There is also high fever, quick pulse, and mouth hot, with great thirst. *Treatment:* Improve the diet, and never allow the horse to remain a day in the stable without exercise. Saturate the swollen limb with cold water every morning, and have it afterward thoroughly hand rubbed until it is perfectly dry. Should lameness remain after the first day, a few punctures may be made into the limb, but only through the skin. Give the following ball every morning: 1 dr. iodide of iron; 2 gr. powdered cantharides; 1 gr. powdered arsenic; 1 sc. cayenne pepper; 1 dr. sulphate of iron; molasses and linseed meal, a sufficiency; mix. The delay of even a day in treatment, is attended with danger in this disease.

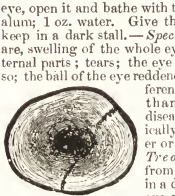
ERYSIPELAS.—This is sometimes caused by the weather being damp, hot and oppressive, and by the animal being neglected and poorly fed. The symptoms are fever, constipation, scanty and high colored urine, loss of appetite, hot and painful swelling. *Treatment:* Tonics and stimulants should be given internally: Epsom salts, 4 oz.; nitrate of potash, 2 oz.; linseed meal, 4

oz.; mix, and give 1 teaspoonful in soft feed, twice a day. Give, also, tincture of iron, 1 oz.; tincture of gentian, 1 oz.; water, 10 oz.; mix, and divide into 12 portions, giving 1 in soft feed, night and morning. Make, locally, a free use of rum or diluted alcohol.

EYE, Cancer of.—The symptoms are, blindness; water flows copiously from the eye. On examination, brilliant yellow substances will be found in the eye. *Treatment:* None is of any service.

EYE, Inflammation of, or OPHTHALMIA.—*Simple.* The most common cause is the introduction of foreign bodies into the eye, or it may occur from a slash of the whip across the head. The symptoms are, closed eyelid, tears; the ball of the eye becomes entirely or partially white. *Treatment:* Remove any foreign body. Insert a flaxseed under the lid several times a day. Fasten a cloth across the forehead, and keep it continually moistened with a decoction of poppy heads, to which some tinct. of arnica has been added. If a small abscess should appear on the surface of the eye, open it and bathe with the following: 5 gr. alum; 1 oz. water. Give the animal rest, and keep in a dark stall.—*Specific.* The symptoms are, swelling of the whole eye, lids, and all internal parts; tears; the eye is closed, or nearly so; the ball of the eye reddened from the circumference; the iris lighter than is natural. The disease appears periodically, terminating sooner or later in blindness. *Treatment:* Remove from the stable and put in a dark shed. Open the eye vein, and puncture the lid if needed; put a cloth, saturated with cold water, over both eyes. Give the following ball twice daily; 2 dr. powdered colchicum; 1 dr. iodide of iron; 1 sc. calomel; make up with extract gentian; as soon as the ball affects the system change it for the following: 3 oz. Fowler's solution of arsenic; 5 oz. muriated tincture of iron; give ½ oz. in a tumbler of water, twice daily. Open the bowels by a gentle purgative; give no hay or grain for several days; bran mashes are all that are needed.

First Appearance of Specific Ophthalmia.



The Eye in Specific Ophthalmia.

EYE, Thread Worms in (Filaria Oculi).—This is a white worm which floats around in the aqueous humor of the eye. There is great pain and inflammation, the horse constantly tossing his head. *Treatment:* An oblique incision should be made into the cornea, when the aqueous humor will pass out, and with it the parasite itself.

EYELIDS, Closing of.—*Treatment:* Apply warm water with a sponge for a period sufficiently long, so as to dissolve or dilute the mucus which causes the lids to stick together. To prevent a recurrence during some diseases of the eyes, smear the lids with sweet oil or cold cream, every night, while the disease lasts.

EYELIDS, Eversion of, or ECTROPIUM.—Caused by an inflamed and thickened conjunctiva, which produces a turning out of the lids. *Treatment:* An elliptical section of the conjunctiva must be removed by an operation, and the eye afterwards treated according to the directions for *Ophthalmia*, which see.

EYELIDS, Inversion of, or ENTROPIUM.—Caused by excessive thickening of the eyelid, which causes the eyelashes to turn in upon the eyeballs, giving rise to irritation. *Treatment:* An elliptical section of the skin must be cut out, and the wound sewed up again.

EYELIDS, Torn.—This is often caused by injuries or accidents. *Treatment:* The wounds may be closed by using fine wire or silk; to heal the wound, apply a solution of pure carbolic acid, 1 dr., and water, 4 oz.; and secure the animal in some way to prevent his rubbing the parts.

EYES, Weakness of.—Generally caused by the unnecessary amount of grain used. *Treatment:* Horses with weak eyes should have light, well ventilated stables, but the windows should not be placed in a position to throw the direct rays of the sun upon the animal's head. Wash the eyes out daily with the following solution: Sugar of lead, 1 dr.; water, 1 pt.

FALSE QUARTER.—This is the result of an accident; the coronary substance is permanently injured; it ceases to secrete sound horn, and a stripe of the crust, defective in strength, runs all the way down from the coronet to the plantar edge. This generally happens at the inner quarter, and is owing to the horse treading on his coronet; but it may also occur on the outside, either from the tread of another horse, or from some kind of external violence. *Treatment:* In cases of crack and granulations, treat as is advised for *Sandcrack*, which see. Put on a bar shoe, with a clip on each side of the false quarter. Pare down the edges of the crack, and ease off the point of bearing on the false quarter. A piece of gutta percha fastened over the false quarter has done good.

False Quarter.

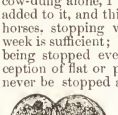
The Only Relief.

FARCY.—Sometimes produced by hard work, bad provender, or bad treatment; poorly ventilated stables overcrowded with horses; inoculation from the virus of glandered or farcied horses. The hair looks rough and unhealthy; one of the legs will swell to a large size (generally the fore leg), become painful, and in a short time break out in small running sores, discharge a thin, unhealthy fluid, and sometimes the discharge is thicker. *Treatment:* give the follow-

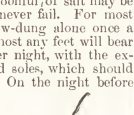
ing ball; 1 dr. sulphate of iron; 1½ dr. powdered gentian; ½ dr. powdered pimento; 20 gr. iodide of potash; 1½ dr. cascarilla bark; mix with molasses. Cut the hair from the enlarged absorbent and rub in a mixture of mercurial and iodine ointment; open the bowels with vegetable food, and give a liberal diet. Open the farcy buds, and cauterize with nitrate of silver.

A Farcy Bud.

FEET, Dryness of.—*Treatment:* Prevented by the use of stopping, which is composed either of cow-dung alone, or cow-dung and clay mixed, or of cow-dung and pitch. The first is, by far, the most powerful application, but it moistens the sole too much if applied every night, and then produces the opposite evil in the shape of thrush. A mixture of equal parts of cow-dung and clay may be used every night with advantage. It should be kept in a strong box of wood, about 1 ft. long and 8 in. wide, with a handle across the top, and should be applied the last thing at night to the soles of the forefeet only, by means of a thin piece of wood, 1 ft. long and 2 in. wide, with which the space within the shoe is completely stuffed. If the feet are obstinately dry, in spite of repeated stoppings with cow-dung alone, 1 tablespoonful of salt may be added to it, and this will never fail. For most horses, stopping with cow-dung alone once a week is sufficient; but almost any feet will bear being stopped every other night, with the exception of flat or pumiced soles, which should never be stopped at all. On the night before

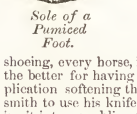


Sole of a Pumiced Foot.

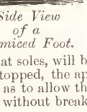


Side View of a Pumiced Foot.

shoeing, every horse, if he has flat soles, will be the better for having his feet stopped, the application softening the horn, so as to allow the smith to use his knife to slice it without breaking it into crumbling fragments.



A Weak Foot.



Sole of a Weak Foot.

FEET, Pumiced.—Caused by the animal being used too soon after an attack of inflammation of the feet, undue work, and from much battering of the feet on the pavement. It may be known by the sole being bulged down towards the ground, and becoming convex, instead of concave; the crust being uneven and furrowed, and much increased in obliqueness. *Treatment:* Relief may be given by putting on a shoe that will guard the sole from receiving pressure, and which will yet protect it from injury. The feet should be anointed with a mixture of tar and grease, to promote the growth and elasticity of the horn.

Dish Shoe for Severe Pumiced Foot.

FEVER.—The symptoms are dullness, and a reluctance to move; a staring coat, and cold legs and feet, with increased warmth of the body. The pulse is quick, soft and variable; breathing a little accelerated, but not much; appetite entirely lost; bowels confined, and urine scanty. *Treatment:* Give 10 drops tincture of aconite root every 2 hours.

FITS, or EPILEPSY.—Occurs only in the foal, and is caused, probably, by debility and solar heat. The young thing will perhaps gallop after its dam, round and round its paddock, and then all at once stop and fall to the ground, where it lies struggling with more or less violence for a few minutes or longer, and then raises its head, stares about, gets up, and is apparently as well as ever. Death seldom takes place during the first attack, but sometimes after 2 or 3 repetitions; the convulsions go on increasing, and the foal becomes comatose and dies. *Treatment:* Give 1 dr. bromide of potassium dissolved in ½ pt. water, 3 times a day until cured.

FOOT, Contraction of.—The causes are neglect and oversight in paring the sole; the too frequent lowering or cutting away of the bars of the foot and heels, and then burning with hot iron; a weak and defective horn; want of moisture and nourishment; and internal laminæ. *Treatment:* This will principally consist in abating any inflammation that may exist, by local bleeding and physic; paring the sole to the utmost extent that it will bear; rasping the quarters as deeply as can be, without their being too much weakened, or the coronary ring at all injured. The horse should be made to stand during the day in wet clay, and at night should have his feet bound up thickly in wet cloths; or he should be turned out into wet pasturage, with tips, or, if possible, without them, and his feet frequently pared out, and the quarters lightly rasped. In 5 or 6 mos. the horn will generally have grown down, when he may be taken up and shod with shoes unattached by nails on the inner side of the foot, and put to gentle work.

FOOT, Nail in the.—(See *Pricks, to Cure*, in SHOEING.)

FROST BITES.—This is a state of numbness or torpification of a part of the body caused by intense cold, which, unless relieved by proper remedies, is liable to be followed by death of the part. Horses are most liable to be troubled with frost bites on the heels and the back part

of the hind legs, which swell badly and are sometimes mistaken for scratches. *Treatment:* Heat should not be applied suddenly, but snow or very cold water. The frozen parts should not be rubbed until the frost has been extracted. After the heat has returned to the parts, use a lotion of rum or diluted alcohol, several times a day, for 3 or 4 days, to prevent soreness.

GALL STONES.—These are the result of incrustations on the walls of the ducts, and may be known by a yellow, bilious appearance, colicky pains, and frequent looking around to the right side. *Treatment:* Give as 1 dose, ½ oz. tinct. opium; 1 pt. linseed oil; mix, and repeat in 2 or 3 hours if necessary.

GLANDERS.—The cause of this disease may be attributed to filth, starvation, or to debilitating diseases, as lung fever, catarrh, or any disease capable of generating pus, which being absorbed into the circulation forms a ferment within the blood. The membrane lining the nostrils assumes a leaden or purple color, accompanied by a thin, acrid, transparent and odorless discharge; the discharge grows thicker, and sinks when placed in water; the membrane lining the nostrils will have sores, ragged and depressed at the top, with varicose veins leading to them from all sides. The appetite fails, and the horse assumes an emaciated and dull appearance; he will be hidebound, and his legs swell during the day, and the swelling go down at night. The ulceration is very bad, and the sores spread into his throat; the body is also sometimes afflicted with sores. *Treatment:* This disease is generally considered incurable, but if the following is adopted early it may prove successful: Give from ½ to 1 oz. doses of sulphite of soda at night, in cut feed, for several weeks, and 5 gr. powdered Spanish flies with it; also every morning and noon a powder consisting of 3 dr. powdered gentian, and 2 dr. powdered sulphate of copper. The tendency is to improve the general health. Give good liberal feed and change it often.

Proof of Glanders.

1. Termination of the lachrymal duct—a natural development. 2. A discolored membrane, disfigured by ulcerative patches.

GLASS EYE (Amaurosis).—Caused by paralysis of the optic nerve. The symptoms are a full dilatation of the pupil, and the iris is so insensible to light that when exposed to the direct rays of the sun it does not contract. *Treatment:* Give the following ball: 6 dr. Barbadoes aloes; 1 dr. pulverized ginger; 2 dr. pulverized gentian root; mix with molasses. In 24 hours after, give ½ dr. doses of pulverized nux vomica, mixed in the feed night and morning, and apply a blister under the ears.

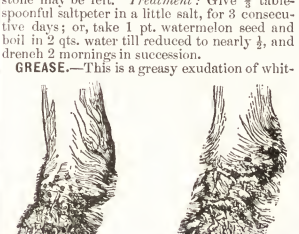
GLAUCOMA.—This is inflammation of the globe of the eye. It may be known by a dilated pupil, sea green color of the interior of the eye, and muddiness of the vitreous humor. *Treatment:* Give 1 dr. calomel and 1 dr. rhubarb once a week; also give 1 dr. iodide of potassium, dissolved in ½ pt. water, every morning.

GOITRE (Bronchocele).—An enlargement of the thyroid gland, and is situated on and in front of the windpipe, about 3 in. from the lower jaw. *Treatment:* Give the following night and morning: ½ dr. iodide of potassium; 1 dr. liquor potassæ; ½ pt. distilled water. Rub the swelling with the following ointment: 1 dr. iodide of lead; 1 oz. simple cerate.

Goitre.

GRAVEL.—This may be known by the animal straining in the effort to pass urine, which escapes in driblets, or not at all. Blood is often passed in clots, and, by introducing the oiled hand into the rectum, up to the bladder, the stone may be felt. *Treatment:* Give ⅔ tablespoonful saltpeter in a little salt, for 3 consecutive days; or, take 1 pt. watermelon seed and boil in 2 qts. water till reduced to nearly ½, and drench 2 mornings in succession.

GREASE.—This is a greasy exudation of whitish, offensive matter from the lower part of the legs. Neglected scratches often run into grease (see *Scratches*); but it is just as likely to appear in warm weather, when it is the result of surfeit. The symptoms are scurfiness and itching of the legs; rubbing the leg with the hoof of the opposite limb; the legs are swollen to the knees, and matter oozes from the pores; lameness; granulations form in ragged bunches; their points becoming like horn. *Treatment:* Cut off all the remaining hair. If hot and scurfy, cleanse with mild soap and hot soft water. Saturate a cloth with the following lotion: Animal glycerine, ½ pt.; chloride of zinc,



First and Second Stages of Grease.

½ oz.; water, 6 qts. Lay it upon the leg. When this cloth becomes warm, remove it and apply another, also wet with the lotion; thus continue applying cool cloths to the limb till the heat abates; afterwards moisten the leg thrice, daily. When cracks and ulcerations are present, adopt the wet cloths, but subsequently use 1 of the following to the sores: Permanganate of potash or phosphoric acid, 1 pt.; water, 6 qts.; or chloride of zinc, 1 oz.; water, 1 gal.; employ thrice, daily. If the granulations have sprouted, remove them with a knife, in 3 operations; likewise, always place in a loose box. Feed liberally; allow old beans; give a handful of ground oak bark with each feed of oats. Night and morning give liquor arsenicalis, 1 oz.; tincture of muriate of iron, 1½ oz.; porter or stout, 1 qt.; 1 pt. for the dose. Chopped roots, speared wheat, hay tea, cut grass, and exercise, are all good for grease.


Third Stage.

GRUBS.—These are the larvæ of some beetle, causing a lump about the size of a raisin, usually on the back. *Treatment:* They may be squeezed out as soon as the head is visible. When discovered previously, an opening may be made with the point of a penknife, and then the larvæ may be gradually squeezed out, avoiding too much haste in the operation, which will only retard the process.

HAIR, Loss of. — Sometimes caused by faulty digestion, disease of the skin, or by blisters, burns, etc. *Treatment:* 8 gr. quinine; 10 gr. finely powdered galls; 5 gr. powdered capsicum; oil of almonds and pure lard, of each, 1 oz.; 20 drops oil of lavender; mix thoroughly, and apply a small quantity to the denuded parts, 2 or 3 times a week. Where there is a falling out of the hair of the mane and tail, take 2 oz. glycerine; 1 oz. sulphur; 2 dr. acetate of lead; 8 oz. water; mix well, and apply by means of a sponge.

HEART, Atrophy of. — This is a wasting away of the substance of the heart. The walls become soft, and do not perform their work in a healthy manner. It may be known by emaciation, listlessness and pallor of the mucous membranes. *Treatment:* Give the following powder in soft food, night and morning: Nux vomica, 1 dr.; sulphate of iron, 1 dr.; fenugreek seed, 1 dr.; mix.

HEART, Enlargement of.—The symptoms are irregular pulse; uneven temperature of the body; one side of the body may be cold, and the other warm. *Treatment:* Iodide of potash, powdered nux vomica, and fenugreek seed, of each, 1 dr.; give as 1 dose in a bran mash, morning and night, for 3 or 4 weeks.

HEART, Inflammation of (Carditis). — An inflammation of the muscular structure of the heart. The animal will be lame generally in the off foreleg, but upon examination no cause will be found sufficient to account for it. This lameness may appear and disappear several times previous to the attacks, leaving the impression that the lameness was rheumatism; then the animal refuses to eat; his heart palpitates violently; he occasionally gasps and gnashes his teeth; has a full, hard and frequent pulse; quickened respiration, and a wild expression of the eyes. *Treatment:* Give cold water freely; also, 1 dr. tinct. digitalis, 3 times a day; if there is high fever, give 10 drops tinct. aconite, once in 2 hours.

HEART, Palpitation of, or THUMPS.—An inflammation of the lining membrane of the heart. The symptoms are, violent palpitation of the heart; pulse full and hard, but not quickened. *Treatment:* Give 1 of the following powders every 3 hours: 1 oz. nitrate of potassa; 2 dr. pulverized digitalis; mix, and divide into 6 powders. Subsequent attacks may be warded off by keeping the bowels regular.

HEAVES, or BROKEN WIND.—The symptoms are a peculiar double-bellows motion of the flanks; respiration quicker than natural; a short peculiar cough, and frequent passing of wind. *Treatment:* If, by rubbing the sides of the throat, a cough is excited, the chances for a cure are favorable; but if the windpipe requires a squeeze in order to produce the cough, there is little use in attempting a cure. Use upon the throat 3 times a week, for 5 or 6 weeks, the following salve, well rubbed in: 2 oz. iodine ointment; 1 oz. blue mercurial ointment; mix well together, and make thin with oil. Give internally, every night, 1 of the following powders: 1 oz. each of sulphate of copper and pulverized ginger; 2 oz. pulverized gentian root; divide into 16 powders. Never give water before work; no hay should be allowed, but give wheat or oat straw. Carrots are peculiarly suited to this disease, and a diet of bran, mixed with carrots, sliced, has sometimes been known to relieve a broken-winded horse most materially.

HIDE-BOUND.—This usually arises from the diseased condition of the secreting vessels; slow inflammation of the liver; the presence of worms; exposure to cold and starvation. It may be known by the skin being extremely tight on the body; the hair, which all stares the wrong way, is dry, and the skin dirty. *Treatment:* Give mixed feed (cut hay, bran, and cornmeal), wet with just enough water to cause the whole to keep together. Give the following powders in the feed every night, for 2 weeks: 3 dr. powdered gentian root; 2 dr. powdered sulphate of iron; mix, and give for 1 dose.

HIP-JOINT LAMENESS. — (See *Strains and Sprains.*)

HOCK, Capped.—This is the result of a bruise of the superficial bursa, which is situated on the point of the hock immediately beneath the skin. The swelling is sometimes slight, being just sufficient to show the point slightly enlarged, and to give a soft, puffy sensation to the fingers, where there ought to be nothing but bone felt beneath the skin. The bursa always rolls freely on the bone, and when large it can be laid hold


Capped Hock.

of and shaken like a bladder of water. *Treatment:* First, draw out the fluid from the bursa with a hypodermic syringe, having a needle of large calibre; then inject the bursa with a mixture of tincture of iodine, 1 dr., and water, 2 dr. After the operation, dress with cold lotion, which there is some difficulty in doing, owing to the prominent nature of the part. A piece of stout calico or fine canvas may, however, be shaped into a cap, carefully fitting the point of the hock; and this being tied by several pieces of tape in front of the leg will allow not only of the application of cold lotions, but of pressure also.

HOOF, Brittleness of. — This is produced by frequent standing in pools of decomposing liquid manure and rotting dung heaps. *Treatment:* Mix 3 oz. of oil tar with 6 oz. of common fish oil; rub this well into the crust and hoof.

HOOKS.—(See *Eye, Inflammation of.*)

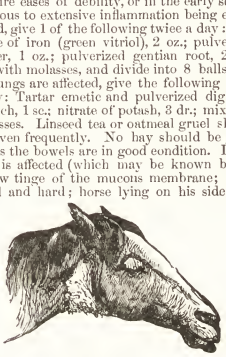
HYDROPHOBIA. — Generally produced by a bite from a rabid animal. The symptoms are a depressed and anxious countenance; inquiring gaze, suddenly lighted up and becoming fierce and menacing from some unknown cause; there

Countenance of a Horse in Hydrophobia.

is a peculiar dread of water, and an irrepressible desire to bite those within reach. *Treatment:* The horse should be shot as soon as the disease is discovered, as it is incurable.

HYSTERIA.—Caused by irritation of the uterus, or some of its nerves. The symptoms are excitement and incapability of standing, and it appears as if some of the bones of the back were broken. *Treatment:* 1. Give 20 drops tincture aconite root, every 2 hours, while the symptoms last. Give the following to build up the strength of the mare: Sulphate of iron, 3 dr.; 3 dr. gentian root; mix, and give in 1 dose, every day, for 1 week or 10 days. Feed well. —2. Give the following purgative ball: 5 dr. Barbadoes aloes; 1 dr. ginger; 1 dr. gentian root: syrup or soap to combine; give as 1 dose. Give also the following anodyne: 3 gr. sulphate of morphia; 1 dr. water; dissolve and inject with hypodermic syringe under the skin of the neck.

INFLUENZA, or EPIDEMIC CATARRH.—Also called *Pink-Eye Distemper* and *Epizootic.* Generally prevails in wet and damp seasons, or when horses are crammed together in stock yards and stables, and filthiness is allowed to predominate. The symptoms are a cough slight watery or thin mucous discharge from the nostrils; eyes become very red; water collects in the inner corner of the eye; pulse very quick; appetite fails; excessive debility; heart sometimes violently agitated; flanks heaving, and feet sometimes hot; in the early stages the membranes of the nose will be found pale, or of a leaden color. In some instances the disease is ushered in with a chill. *Treatment:* If inflammation runs high, give for several days the following: Tartar emetic and nitrate of potash, of each, 2 dr.; make into a ball with molasses, and give at night. Give also in a pail of water, 1 oz. spirits nitre, twice a day, or 2 dr. extract belladonna, dissolved in water. When the inflammation is reduced, give 1 of the following balls, night and morning: Pulverized gentian root and nitrate of potassa, of each, 1 oz.; pulverized Jamaica ginger, ½ oz.; ground fenugreek seeds, 6 dr.; mix with molasses, and divide into 8 balls. In pure cases of debility, or in the early stages, previous to extensive inflammation being established, give 1 of the following twice a day: Sulphate of iron (green vitriol), 2 oz.; pulverized ginger, 1 oz.; pulverized gentian root, 2 oz.; mix with molasses, and divide into 8 balls. If the lungs are affected, give the following twice a day: Tartar emetic and pulverized digitalis, of each, 1 sc.; nitrate of potash, 3 dr.; mix with molasses. Linseed tea or oatmeal gruel should be given frequently. No hay should be given unless the bowels are in good condition. If the liver is affected (which may be known by the yellow tinge of the mucous membrane; dung small and hard; horse lying on his side, and



Blistered Throat.

occasional fits of uneasiness), give the following, but it must not be repeated: 3 dr. Barbadoes aloes; calomel and pulverized digitalis, of each, ½ dr.; make into a ball with molasses. When there is soreness or swelling of the throat, the parts should be freely blistered. If the cough continues troublesome afterwards, a seton should be inserted in the throat in the position shown in the illustration. This disease often spreads rapidly. Green food must be given as early as possible; and in a neighborhood where the

Seton in the Throat.

attack has commenced, each horse should be given 1 or 2 oz. of hyposulphite of soda (according to size), once a day, in water, as a precautionary measure.

INTERFERING, or CUTTING.—Caused by bad shoeing, weakness, malformation, or thinness in flesh. The point where the foot is struck is generally plain; there is a smooth surface on the foot and blood on the hoof. *Treatment:* This requires a nicely-fitting boot placed on the bruised leg to prevent injury. (See *Interfering* in STOCKING.) Have the horse well shod, and apply the following lotion, 3 times a day: 1 oz. muriate of ammonia; 1 oz. nitrate of potash; 1 qt. water; mix.

IRIS, Inflammation of (Iritis). — Caused by cold and exposure. The symptoms are, redness of the eye, and muddy color of the cornea. The iris is a little changed in color. *Treatment:* Apply moist poultices to the eye to allay irritation. Give the following ball: 1 dr. calomel; 1 dr. ginger; 5 dr. Barbadoes aloes; 1 dr. gentian root; molasses or soap, to mix; give as 1 dose. Apply 3 times, daily, with a small camel's hair brush, the following mixture: 12 gr. nitrate of silver; rain water, 4 oz. The brush to be dipped in the mixture and drawn lightly across within the eye. Cover the face of the horse with a green cloth.

ITCH.—(See *Mange.*)

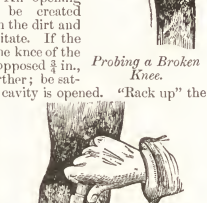
JAUNDICE.—This is the result of an obstruction of the gall duct, causing a yellow discoloration of the mucous membrane. The animal hangs his head, is dull and mopy, and becomes very poor in flesh. *Treatment:* Give 2 dr. calomel, made into a bolus with flaxseed meal and molasses, followed in 24 hours by the following purgative ball: Barbadoes aloes, 5 dr.; ginger, 1 dr.; gentian root, 1 dr.; molasses or soap, to combine; give as 1 dose. The animal should have moderate exercise daily; his body should be kept warm; and if there is pain in the right side, apply a blister. If necessary, the calomel may be repeated in scruple doses once a week.

JUGULAR VEIN, Inflammation of.—(See *Vein, Inflammation of.*)

KIDNEYS, Inflammation of.—Caused by bad provender, hard work, slipping, taking a sudden cold after a hard day's work or drive, or after being under the saddle for a long time; and also by an indiscriminate use of nitre or other diuretics. The symptoms are, quickened and short breathing, suggestive of pain; more or less fever, with quick hard pulse; unwillingness to move the hind legs, which the animal straddles apart when he walks, looking anxiously around to his flanks; urine scanty and high colored, and sometimes bloody. The horse seldom lies down, almost refuses to move about, and crouches beneath pressure made over the kidneys. *Treatment:* Use hot fomentations over the kidneys, and change the cloths often. In the 1st stage, give 10 gr. powdered opium and 15 gr. calomel, sprinkled on the tongue; repeat every hour or two, for a few times, or while the acute stage continues. No food will be necessary during the acute stage, but set before the horse a pailful of good linseed tea, and allow him to drink all he will. If the pulse is quick and hard, give 20 drops aconite root, either between doses of opium and calomel, or after it has been given, and repeat until the pulse becomes slower and softer. Give the horse one month's rest, and use carefully for some time.

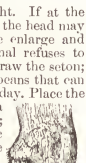
KNEE, Broken.—Knees are always broken by falling on them. There will be a ragged wound, the skin hanging off, the ends of the tendons protruding, and sometimes the white bones of the joint can be seen and felt. *Treatment:* Procure a pail of milkwarm water, and a large sponge. Dip the sponge in the pail, and squeeze out the water above the knee. Continue to do this, but do not dab or sop the wound itself. The water, flowing over the knee, will wash away every impurity. Then, with a probe, gently explore the bag. If dirt has entered it, place a large spatula under the knee; then take a knife with a sharp point, but with its edge blunted the 2 posterior thirds of its length; guard the point with a lump of beeswax; introduce this into the sac, and drive the point through the bottom of the bag. An opening will thereby be created through which the dirt and pus will gravitate. If the probe enters the knee of the flexed leg unopposed $\frac{3}{4}$ in., push it no further; be satisfied that the cavity is opened. "Rack up" the horse's head, and get some cold water, to every qt. of which add 2 oz. tincture of arnica. Pour a little of this into a saucer, and then dip a sponge into the liquid. Squeeze the sponge dry above the joint. Do this every $\frac{1}{2}$ hour, for $3\frac{1}{2}$ days, both by day and night. If at the end of that time all is going well, the head may be released; but should the knee enlarge and become sensitive, while the animal refuses to put the foot to the ground, withdraw the seton; give no hay, but all the oats and beans that can be eaten, with 2 pots of stout each day. Place the horse in slings; apply the arnica lotion until a slough takes place; then resort to the chloride of zinc lotion, 1 sc. to the pt., and continue to use this as has been directed.

Probing a Broken Knee.



Manner of Opening the Dirt Sac.

KNEE, Capped. — This consists in inflammation and effusion of fluid in the superficial bursa under the skin in front of the knee. *Treatment:* The same as that for *Hock, Capped,* which see.



Capped Knee.

KNEE, Sprung. — The cause of this is sprain of the suspensory ligaments, soreness of the feet and joint. It may be known by a deviation from the straight line at the knee and thickness of the back tendons. *Treatment:* Clip the hair from the back tendons and shower with cold water several times a day. Rub well in the following blister: Powdered cantharides, ½ oz.; lard, 2 oz.; mix. The shoes should be removed, the feet pared down, and the heels opened.

LACHRYMAL DUCT, Obstruction of. — This small canal leading from the eyes into the nose to carry away superfluous moisture, is sometimes closed from inflammation, and the water of the eyes flows over the face. *Treatment:* Swab the nostrils with weak tobacco water and afterwards with clear water. If this does not effect a cure, inject warm water up the nasal termination of the duct by means of a fine pointed syringe.

LAMPAS.—Generally occurs in young horses that are kept up and fed upon solid food, which causes irritation of the stomach. *Treatment:* Give a dose of 1 pt. of linseed oil and repeat in 2 days; then give 1 dr. of gentian root, powdered, in the food twice a day. The swollen parts may be scored slightly with a sharp knife and rubbed with powdered borax.

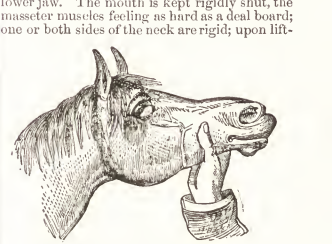
LEG. Fracture of. — The horse has not the power to move, and is in great pain; excitement, sweating, etc. *Treatment:* If in the summer season, place the horse in the field or yard, but in winter in a large, comfortable stable or in the barn-yard, if well protected from wind and storm. Do not give too much bedding nor allow anything to be in the way of the foot, so that it can be carried without interruption. Give 25 drops tinct. aconite root every 5 hours, for the first 20 or 25 hours, to lessen the fever and pain. Place the broken leg in a position as near like the other as possible in shape and also (by actual measurement) to be of the same length, for it is by neglecting the measurement that some are left to unite shorter than the sound leg. When the leg is placed in the same shape and length of the sound one, apply a good coating of tar to the leg, around, below and above the point of fracture. Then wrap the whole leg in carded cotton or coarse tow, and place over this splints cut out of pieces of boards, which will rest evenly upon the leg prepared as above, and fill all unevenness with tow or cotton. Have 3 or 4 splints, so as to hold the leg in position constantly. Secure the whole by carefully applying a strong bandage or by tying with soft cord, and make it perfectly secure, so that the horse will not move the leg where fractured before it has time to unite. Examine the splints daily and see that they do not get loose. The horse may also be suspended in a sling, if thought best to do so.

LEUCOMA.—Consists in more or less opacity of the cornea, existing as a scar resulting from a wound or ulcer, or is the result of acute inflammation of the eye. *Treatment:* Keep the animal in a dark place; give laxative food; also 1 dr. dose of calomel once a week; apply continually the following eye-lotion; 10 gr. nitrate of silver; 1 oz. water; mix.

LEUCORRHŒA. — This is caused by an attack of inflammation which produces a discharge from the vagina or womb; it often follows difficult parturition. *Treatment:* To open the bowels, give the following draught: Linseed oil, 8 oz.; infusion of aloes, 3 oz.; tincture of gentian, 2 oz.; mix, and administer after a fast of several hours; give easily digested food and the following powders in the food morning and night.: Sulphate of iron, 3 oz.; carbonate of soda, 1 oz: ground gentian, 3 oz.; apply the following dressing to the vagina: Tannic acid, 2 dr.; spirits of wine, 1 oz.; laudanum, ½ oz.; water, 1 pt.

LICE.—*Treatment:* They may be destroyed by rubbing into the roots of the hair white precipitate, in powder, taking care to avoid sweating the horse or wetting his skin for some days afterwards.

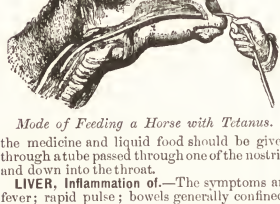
LOCK-JAW, or TETANUS. — This almost always follows some operation, or a severe injury in which a nerve has been implicated, the most frequent causes being the piercing of the sole by a nail, or a prick in shoeing, or the operations of docking, nicking, castration, etc. The symptoms are a permanent rigidity of certain voluntary muscles, and especially of the lower jaw. The mouth is kept rigidly shut, the masseter muscles feeling as hard as a deal board; one or both sides of the neck are rigid; upon lift-



Test for Tetanus.

ing the head, the haw projects over the eye; the nostrils are dilated; the ears erect and stiff, and the countenance as if horror-struck; at first the extremities are seldom involved, but as the disease progresses their control is first lost, and then they become rigid like the neck and head; the patient is scarcely able to stand, and plants his feet widely apart to prop himself up, while at last the tail also becomes a fixture; the pulse varies a good deal, in some cases being quick, small and hard, and in others slow and labored. *Treatment:* Administer a strong purging ball or drink, assisted by injections of 1 pt. linseed oil to 1 gal. warm water, at the same time applying a strong blister from the poll to the rump, and even on the side; when the physic begins to act, give a hypodermic of 3 gr. of sulphate of morphia, dissolved in 2 dr. of warm water, under the skin of the neck every ½ hour, until narcotism is performed; and aid the effect of this anodyne by inhalations of chloroform vapor, as may be needed for relaxation of the symptoms. Place a bucket of cold, thin gruel where the horse can get at it, without an effort to him-

self to reach it. Renew it once a day, and keep it sweet. If the horse is unable to open his mouth,



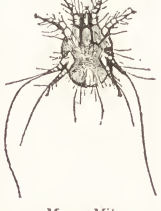
Mode of Feeding a Horse with Tetanus.

the medicine and liquid food should be given through a tube passed through one of the nostrils and down into the throat.

LIVER, Inflammation of.—The symptoms are fever; rapid pulse; bowels generally confined; legs cold; mouth hot; membranes of nose and eyes much reddened; respiration rapid; there are no intervals of rest, the horse is up and down, rolling and pawing continually. *Treatment:* Give 1 pt. linseed oil, with 10 drops croton oil added; and apply a blister over the loins; follow the oil with five drops tincture of aconite root every hour for 5 or 6 hours; then every 3 hours, until about 10 doses have been given. Apply blankets wrung out in scalding water to the belly, and keep up for several hours, and give injections of Castile soap and water. Repeat the oil if necessary. The diet should be confined to green food if possible.

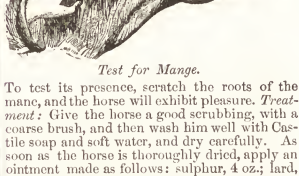
LUNGS, Congestion of.—(See *Pneumonia.*)

MALANDERS AND SALLENDERS. — These eruptions are both of the same nature, differing only in the locality where they are displayed. The former shows itself in the flexure at the back of the knee, and the latter at the bend of the hock. The symptoms are shown in the appearance of a foul scurf mixed with a few thin scabs, the skin underneath being stiff and unyielding. They are generally brought on by washing the legs and leaving them undried. *Treatment:* Wash the parts well with Castile soap, and rub well in the following every night: Cerate of superacetate of lead, 2 oz.; creosote, 10 drops; mix. If the skin continues to be very hard and stiff, a little glycerine should be brushed on 2 or 3 times a week.



Mange Mite.

MANGE, or ITCH.—Due to the irritation and ulceration caused by the burrowing of minute insects. Various causes predispose animals to afford development to the mange parasites and to aggravate their ravages, such as neglect, dirt, starvation, ill-usage, etc., and in curing the ailment these must be remedied. The first symptom is an excessive itching, causing the horse to rub himself eagerly against any obstacle; the skin becomes scabby, the hair falls off in patches, leaving the skin at first smooth, with a few small red patches, each of which contains one of the parasites, technically known as *Acari*; in time the pimples multiply, harden into scabs, under which the acari may be found like mites in cheese. The constant irritation makes the horse feverish, thin and wretched.



Test for Mange.

To test its presence, scratch the roots of the mane, and the horse will exhibit pleasure. *Treatment:* Give the horse a good scrubbing, with a coarse brush, and then wash him well with Castile soap and soft water, and dry carefully. As soon as the horse is thoroughly dried, apply an ointment made as follows: sulphur, 4 oz.; lard, 10 oz.; carbolic acid, ½ oz.; mix.

MEGRIMS.—(See *Brain, Inflammation of.*)

MENINGITIS, Cerebro-Spinal.—This is the result of badly ventilated stables and a plethoric condition of the body. It may be known by the animal exhibiting great uneasiness; excited breathing; inability to swallow; staggering in his gait. *Treatment:* Give the following: 4 oz. bromide of potassa; 2 oz. tinct. belladonna; 2 pts. water; give 2 oz. every 2 hours. Keep hot blankets along the spine, after bathing it well with mustard and water, well rubbed. If the throat is sore, apply a good blister. If the animal does not show signs of improvement in 2 or 3 days, give the following: 4 oz. pulverized capsicum; 1 oz. camphor; mix, and divide into 12 powders; give 1 in a teacupful of water, 3 times a day. Make him a good bed, and turn him over occasionally. If a horse survives the 4th or 5th day he generally recovers.

MOUTH, Excoriated Angles of.—Caused by an

Excoriated Angles of the Mouth.

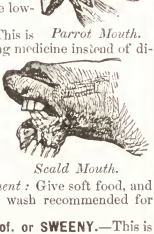
Sensibility of Mouth Destroyed.

abuse of the reins. The bit injures the lower jaw bone, so as to kill a portion of it. The corners of the mouth become very sore, and if allowed to continue doing harm, the mouth loses all sensibility. *Treatment:* Apply the following wash, gently, after every feeding and watering: 2 sc. chloride zinc; 2 pts. water; 2 dr. essence of aniseed.

MOUTH, Parrot.—The upper incisors project over the lower ones, and meeting with no antagonist, they grow very long, and from their form are likened to the bill of a parrot. The horse is unable to graze. *Treatment:* File off the teeth even with the lower ones.

Parrot Mouth.

MOUTH, Scald.—This is caused by giving strong medicine instead of diluting it as directed. The whole inside of the mouth will be found to be swollen; saliva flows from it with constant motion and repeated smacking of the lips; if it is very bad, it will skin in spots. *Treatment:* Give soft food, and use 3 times a day the wash recommended for *Aphtha*, which see.

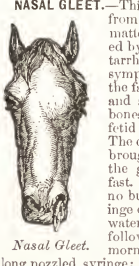


Scald Mouth.

MUSCLES, Atrophy of, or SWEENY.—This is a shrinking of the muscular tissue, and may be known by the hollow surface which will be found in the place of the muscle, and is caused by sprains, bruises or severe pressure. *Treatment:* Frequent applications of the tincture of cantharides will generally re-develop the muscles; but if it does not, after 3 or 4 weeks, setons should be inserted over the shrunken portions, about 2 or 3 in. apart, the extent of the atrophy; about twice a week apply a fly blister to the setons; let the setons remain in 3 or 4 weeks; give gentle exercise.

MUSCLES, Rupture of.—This is the result of severe sprains or over exertion. The symptoms are lameness, pain and swelling, and inability to move. *Treatment:* To allay the inflammation, bathe with warm water, and apply the following liniment: Tincture of arnica, 1 oz.; tincture of opium, 1 oz.; water to make 1 pt.; mix, and apply 3 times a day; when the inflammation is subdued, apply tincture of cantharides till the part is blistered; grease the part till it is healed, after which blister again, and repeat this treatment during several weeks, giving mild exercise.

NASAL GLEET.—This is a chronic discharge from the nostrils of a whitish matter, and is generally caused by neglecting to treat catarrh and colds properly. The symptoms are, distortion of the face; partial enlargement and softening of the facial bones; irregular discharge of fetid pus from one nostril. The discharge is increased or brought down by feeding off the ground, or by trotting fast. *Treatment:* If there is no bulging of the bone, syringe out the nostril with warm water, and inject a little of the following lotion night and morning for a month, using a long nozzled syringe: 2 dr. carbolic acid; 1 pt. water; mix. Give the following ball, once every 24 hours: ½ oz. balsam copaiba; 4 gr. powdered cantharides; cubebs, a sufficiency. If the foregoing should affect the urinary system, change it for ½ dr. doses of extract of belladonna, dissolved in 1 wineglass of water. Give these every 4th day, and on such occasions repeat the belladonna every hour, until the appetite has been destroyed.



Nasal Gleet.

NAVICULAR DISEASE.—Caused by hard work upon pavements, producing slight inflammation, which is neglected, and the horse is kept at work, so that the inflammation continues until it ends in ulceration. The symptoms are, an undue amount of heat in the foot, the pointing of the toe, and a peculiar rounding forward of the fetlock joint. *Treatment:* Bleed the foot, pare the sole thin, and cover the foot with linseed poultices for a week; keep a seton in the foot for a month; the pastern also may be blistered. In bad cases, resort to neurotomy, but do so upon the second attack of lameness; because continued disease disorganizes the internal structure of the hoof, and also occasions the sound foot to be attacked by navicular disease.

Navicular Disease.

NECROSIS, or DEAD BONE.—This is the result of external violence, which causes the bone to perish. It may be known by openings in the skin and flesh, from which pus exudes and sometimes a piece of dead bone will pass out with the pus. Caries is present when the bone is impaired only, and necrosis when the bone is entirely dead, and the functions have entirely ceased. *Treatment:* Make the openings large, to allow the pus to escape freely; keep the parts clean, and, if the disease is on the surface, dress 3 times a day with the following lotion: Carbolic acid, ½ oz.; linseed oil, ½ pt.; mix. If the cavities are deep, inject the following lotion: Carbolic acid, 1 part; water, 30 parts; mix, and inject 3 times a day.

OVERREACH.—A tread upon the heel of the coronet of the fore foot by the shoe of the corresponding hind foot, and either inflicted by the toe, or by the inner edge of the inside of the shoe. *Treatment:* The weight of the fore shoe should be mostly on each side, and the web at the toe as narrow as possible. The hind shoe must be set back from the toe about ½ in., and the toe calk as far back on the web as possible; the toe of the hoof should project over the shoe. The bruises may be treated by the application of tincture of arnica in full strength, which

Tread upon Hind Foot, Heavy Horses.

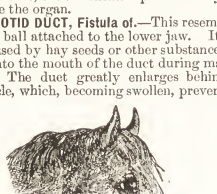
Tread upon Hind Foot, Light Horses.

will dry them up and prevent suppuration. If, however, the heel is very much bruised, a poultice must be applied; but even then a little tincture of arnica should be sprinkled on it. When the bruise is so severe that a slough or core comes away, the wound may be dressed with a piece of lint, dipped in a solution of nitrate of silver, 8 gr. to the oz. of distilled water, and over this a bran poultice. In most cases it is better to foment the part well and then apply the tincture of arnica.

PARALYSIS, or PALSY.—Usually the result of lead poisoning, injuries to the back, sunstroke, etc. The horse lies helpless, and while he can move himself forward, is powerless behind, and the muscles are as soft and quiet as they would be after death. *Treatment:* Open the bowels if they are the least costive and give internally 1 of the following powders night and morning; nux vomica, 1 oz.; pulverized gentian root, 2 oz.; Jamaica ginger, 1 oz.; mix, and divide into 12 powders. Apply warm sheep-skins to the loins, succeeded by the following application: 1 pt. of linseed oil; 4 oz. spirits hartshorn; shake well before using. Perfect rest and moderate diet are necessary.

PARAPHIMOSIS.—In this disease the penis protrudes from the sheath, and on account of the constriction of the prepuce, the animal is unable to retract it. It may be caused by an accident, an operation, by castration, or debility. *Treatment:* It should be bathed with cold water, and the following lotion applied 3 times a day: Sugar of lead, 1 oz.; water, 1 pt.; mix; pass a bandage across the loins to support the penis. If this fails to cure, slit the sheath up a little ways and replace the organ.

PAROTID DUCT, Fistula of.—This resembles a round ball attached to the lower jaw. It may be caused by hay seeds or other substances getting into the mouth of the duct during mastication. The duct greatly enlarges behind the obstacle, which, becoming swollen, prevents the



Parotid Duct Distended by Salivary Calculus.

secretion from entering the mouth. Great agony is occasioned by every mouthful masticated. The duct bursts, and a fistulous opening is established, through which the saliva jerks at each motion of the jaw. From the absence of a secretion important to digestion, the flesh wastes, and the animal soon assumes a miserable appearance. *Treatment:* Make an adhesive fluid with gum mastic and spirits of wine; or with india rubber and sulphuric ether. When the horse is not feeding, pare the hardened edges from the wound; cover the orifice with a piece of strained india rubber; over this put a layer of cotton; fasten one end to the horse's cheek by means of the adhesive fluid; that having dried, fasten the other end tightly down. Place other layers of cotton over this, allowing each layer to cross the other, and fastening all to the cheek. Fasten the head up; allow the horse to remain thus until the cotton falls off, and only give gruel for food. Put tan under the feet; and should the first trial not succeed, repeat it.

PAROTID GLAND, Inflammation of.—Usually caused by cold or from injury. It may be known by the swelling, soreness, hot, dry mouth, and more or less fever. *Treatment:* Bathe the swollen glands with hot water and place linseed poultices upon them; give the following mixture: Tincture aconite root, 1 dr.; fluid extract belladonna, 2 dr.; sweet spirits nitre, 2 oz.; carbonate of ammonia, 1 oz.; nitrate of potash, 1 oz.; water to make 1 pt.; mix, and give a teaspoonful every 2 hours.

PATELLA, Dislocation of.—This is displacement of the whirlbone of the stifle, and may be known by the horse being unable to bring the leg under his body. *Treatment:* Attach a rope to the pastern of the leg which is dislocated; carry the end of the rope through a ring, or over a beam at or about the horse's head; place the ends of the rope in the hands of 1 or 2 strong men (telling them not to pull till a man is placed at the head of the horse to keep him steady); have another man at the leg with 1 hand placed firmly on the point of the hock-joint pulling towards himself, and the other pushing firmly against the dislocated joint; then let the men on the rope pull firmly and gently, till the foot is brought fairly in under the horse's body; after which remove the rope, and keep the horse quiet for a day or two.

PHARYNX, Inflammation of.—This is usually the result of an inflammation of the top of the gullet; caused by some obstruction lodging there. The symptoms are pain in swallowing, violent coughing, and when liquids are poured down they are quickly forced out through the nostrils. *Treatment:* Pass the hand to the back of the mouth, and remove the foreign substance, if it can be seized, but, if not, the forceps or a piece of hooked wire must be used, and the obstruction removed in a gentle manner, as it will require much time and patience.

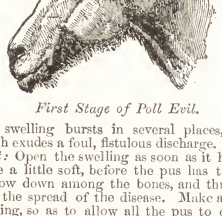
PHIMOSIS.—This is a constriction of the prepuce or sheath at its extremity, which may entirely prevent the passage of urine, and is caused by wounds or blows inflicted on the sheath, swelling of the sheath in castration, or by the sting of venomous insects. *Treatment:* Give plenty of exercise, fomentations, diuretics, and hand friction; if these fail to relieve, divide the constricting prepuce just so far as to allow of the escape of the penis, and promote free urination.

PLEURISY.—Caused by exposure to cold when the body is in a heated condition, or by broken ribs or wounds. The symptoms are a chill, fever, and occasional painful and short cough, and careful breathing, and a disinclin-

ation to turn short; a peculiar line will usually be seen running from the haunch, round the belly to the breast bone. *Treatment:* Blister both sides of the chest, and bathe the legs in hot water; or boil bran, and then put an old pantaloon leg on over his, and fill in around with hot bran; this will get up a circulation in the extremities. Then give 10 gr. tartar emetic; 2 dr. laudanum; 2 dr. tincture digitalis; and 1 dr. nitre, once in 2 hours, till relief is experienced. Keep well covered with warm clothing; keep the legs warm by hot applications and bandages. Use 1 oz. cream tartar, in 2 qts. tepid water, for a drink.

PNEUMONIA, or LUNG FEVER.—One of the most frequent causes of this disease, is to drive against a cold wind after being taken from a warm, tight and poorly ventilated stable, where several horses have remained through the night; or some different alterations of heat, cold, or moisture in an animal not accustomed to work, or in one not in proper condition to work. The horse will often have a discharge from the nostrils; a chill, followed by fever, which is increased for a short time; cold legs and ears, quick and wiry pulse, quick and difficult breathing, pain in the chest, which is aggravated by coughing, and a quivering of the muscles of the side and breast. *Treatment:* Give tartar emetic, every 3 hours, in 10 gr. doses, with 2 dr. of laudanum and 1 dr. of nitre, to increase the action of the kidneys; apply mustard to the chest externally, or, if the disease is severe, blister both sides of the chest. The diet should consist of bran mashes, gruel, and a little hay or green food; the bowels must be kept open by salts or oil. A cool, airy stable, and warm clothing are indispensable.

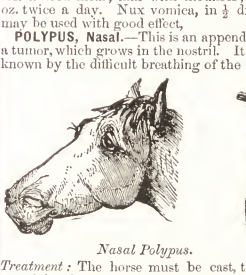
POLL EVIL.—Produced by a blow on the prominent ridge at the top of the poll. It may be known by a painful swelling on the poll. The nose is protruded, and the head kept as motionless as possible; the animal hangs back when it is feeding from the manger. Pressure, or enforced motion, excites resistance and swelling.



First Stage of Poll Evil.

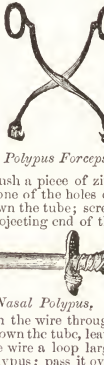
The swelling bursts in several places, from which exudes a foul, fistulous discharge. *Treatment:* Open the swelling as soon as it has become a little soft, before the pus has time to burrow down among the bones, and thus prevent the spread of the disease. Make a large opening, so as to allow all the pus to escape, and clean out well, if necessary, with a swab, so as to remove all the pus, and do this twice a day, as long as any pus remains. Syringe out with a solution of carbolic acid, ½ oz. to each pt. of soft water. Give internally the following: 4 oz. pulverized Socotrine aloes; 4 oz. soft soap; 1½ lbs. linseed meal; mix with molasses; dose, 1 oz. twice a day. Nux vomica, in ½ dr. doses, may be used with good effect,

POLYPUS, Nasal.—This is an appendage like a tumor, which grows in the nostril. It may be known by the difficult breathing of the animal.

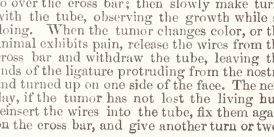


Nasal Polypus.

Treatment: The horse must be cast, the side containing the polypus being uppermost. Catch firm hold of the polypus with the forceps for the purpose, then revolve them several times, which motion will twist and rupture it. Or, procure a fine hollow tube, 18 in. long, having at one end a cover made to screw on and off; the opposite extremity must be open, and should have a cross bar attached externally, 1 in. from the termination. Upon the cover bore 2 holes, sufficiently large to admit a fine wire; push a piece of zinc wire, 1½ yds. long, through one of the holes on the unscrewed cover and down the tube; screw on the cover; fasten the projecting end of the



Polypus Forceps.



Tube for Removal of Nasal Polypus.

wire to the cross bar; return the wire through the other hole, and passing down the tube, leave it hanging free; form of the wire a loop large enough to surround the polypus; pass it over the head of the polypus; by means of the tube work the loop forward, tightening the wire as the size of the polypus diminishes. When the wire is round the pedicle, fix it by winding it also over the cross bar; then slowly make turns with the tube, observing the growth while so doing. When the tumor changes color, or the animal exhibits pain, release the wires from the cross bar and withdraw the tube, leaving the ends of the ligature protruding from the nostril and turned up on one side of the face. The next day, if the tumor has not lost the living hue, reinsert the wires into the tube, fix them again on the cross bar, and give another turn or two;

when the tumor appears dead, twist the tube till the pedicle gives way.

POX.—This disease usually attacks the limbs, but sometimes other parts of the body. It shows itself by slight fever for 2 or 3 days, and swelling of the affected part; then lumps break out, which are at first red, and then enlarge and become yellow. *Treatment:* Bathe the parts with warm water, once or twice a day, and then grease them over when dry. Give a laxative diet. If fever runs high, give the following ball: 1 dr. gentian root; 1 dr. ginger; 5 dr. Barbadoes aloes; syrup enough to mix; make as a ball, and give as 1 dose.

PRURIGO, or ITCHING SKIN.—The causes are generally a most liberal use of nutritious food, such as beans, salt, etc., and also a want of exercise and work. It may be known by the skin becoming thickened and scaly, which is attended by constant itching. *Treatment:* Take away some hay. Give 2 bundles of grass per day. Allow 2 bran mashes each day till the bowels are open. Apply either of the following washes: Animal glycerine, 1 part; rose water, 2 parts. Or, sulphuric acid, 1 part; water, 10 parts. Or, acetic acid, 1 part; water, 7 parts. Drink: Liquor arsenicalis, 1 oz.; tincture of muriate of iron, 1½ oz.; water, 1 pt.; ½ pt. to be given every night. Withdraw the drink a week after the disease has disappeared. Allow a pot of porter and an extra feed of oats each day.

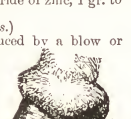
PUERPERAL FEVER.—This disease follows parturition, and is rendered worse by neglect and exposure to cold. There is fever, quickened pulse, ears and extremities cold, constipation and inflamed udder. *Treatment:* The animal should be kept warm, and have good ventilation. Give soft food and pure water, in which mix a tablespoonful of sweet spirits of nitre, morning and night. Give 1 dr. calomel, and 10 gr. powdered opium, 3 times a day. If there is constipation, give ½ pt. raw linseed oil every other day.

PURPURA HEMORRHAGICA.— This is often the result of typhoid catarrh, and also arises from defective ventilation, uncleanliness, bad water, etc. The attack is sudden. The body, head and limbs enlarge; consciousness is partially lost. The horse stands, and the breathing is quickened. Through the skin there exudes serum, with blood. The nostrils and lips enlarge, and part of the swollen tongue protrudes from the mouth. The appetite is not quite lost, though deglutition is difficult. Thirst is great. *Treatment:* Bleed till the animal appears relieved. A second bleeding may be demanded, but it should be adopted with caution. Give ½ oz. of chloroform in 1 pt. linseed oil, in the 1st stage; repeat the dose in ½ hour. No amendment following, give 2 oz. of sulphuric ether in 1 pt. of cold water; in ½ hour repeat the dose, if necessary. Perform tracheotomy, to ease the breathing. Incise the protruding tongue; then squeeze out the fluid, and return the organ to the mouth. Should the skin slough, bathe the part with a solution of chloride of zinc, 1 gr. to 1 oz. of water.

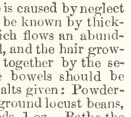
Purpura Hemorrhagica.

QUINSY.—(See *Bronchitis.*)

QUITTOR. — Often produced by a blow or tread from another horse, but will take place from any severe bruise, an abscess forming in the coronet, mostly on the inside, and often affecting the cartilages. The symptoms are lameness, heat and tenderness of the part, occasional redness of the horn, and absence of puncture. *Treatment:* Remove the animal's shoe, to cut away any dead or discolored horn, so as to reach the seat of the suppuration, and to allow it to escape by a more direct outlet; then apply hot water fomentations and poultices for a few days. Should the sores show an indisposition to heal, the parts should be washed with a tolerably strong solution of sulphate of zinc, or of bichloride of mercury, 25 gr. of the latter to 1 oz. of water. The application of strong caustics is to be avoided.



Quittor Before the Pus Has Broken Out.



Quittor After the Pus Has Broken Out.

RAT-TAILS.—This disease is caused by neglect of simple eczema. It may be known by thickening of the skin, from which flows an abundant fluid; scales are formed, and the hair growing from the parts is glued together by the secretions. *Treatment:* The bowels should be opened, and the following salts given: Powdered nitrate of potash, 4 dr.; ground locust beans, 1 oz.; ground coriander seeds, 1 oz. Bathe the affected parts, and apply the following lotion: Goulard's extract, 2 fl. oz.; carbonate of ammonia, 1 dr.; laudanum, 2 fl. oz. Give the following dose internally: Sulphur, 12 oz.; arsenic, 1 dr.; bruised coriander seed, 6 oz.; divide into 12 powers, and give 1 daily.

RHEUMATISM, or FOUNDER.—It is of 2 kinds, acute and chronic. *Acute.* This may be caused by sudden changes of temperature, over exertion on hard roads, over feeding, large draughts of cold water, standing in snow or ice water while warm; or it may be a sequel to strangles, influenza, etc. The horse stands upon his heels, with fore feet and legs stretched out as far as he can get them, so as to throw the weight off as much as possible; and he can scarcely be made to move; has fever and considerable constitutional disturbance; is extremely excitable, and breathes fast and laboriously. The coronet and hoof feel very hot, and, when wetted, may be seen to steam. *Treatment:* 1. Put the horse in a sling; to the end of the cord append weights; soak the feet in warm water, in which a portion of an alkali has been dissolved. As soon as the hoof is softened, release the feet from the water and remove the shoes. Cut down the rim of the hoof all round to such an extent that only the

sole and the frog touches the ground. Do not pare away anything from the sole or frog. Then place him on an earthen floor and not on a plank floor, unless it is kept well littered. Envelop the feet in large, soft, cold poultices of equal parts of bran and linseed meal. If much tenderness prevails, scarify the skin above the hoof and place the feet in warm water to stimulate bleeding. Give 5 dr. of aloes, and 1 dr. each of podophyllin and capsicum, made into a ball. Give every hour from the beginning of the attack, 10 drops tincture of aconite root, until 6 doses are given. If after 2 or 3 days the fever and pain in the feet do not decrease, thin down the sole at the toe, and make an incision sufficiently deep to start bleeding, and encourage by immersing the feet in warm water; then apply a blister

Soaking a Horse's Feet for Rheumatism.

round the pastern. Give loosening food. Subsequently give liberty out of doors when the weather permits. — 2. Bed the horse well in a roomy box-stall, so that he can lie down; give 20 drops tincture aconite root, in ½ pt. cold water, every 4 hours, until 6 or 8 doses have been given; apply a cloth, wet with ice water, to the feet, and keep wet with the same for several days until pain is allayed. Give plenty of cold water to drink, and rest until recovered; feed on grass and mashes. *Chronic.* First shown by a slight soreness or lameness, generally appearing in both fore feet. *Treatment:* Put the horse in a sling, as directed for acute form, and proceed in the same manner to remove the shoes. Omit all bleeding. If the bowels are costive, allow a portion of green food until the evil is removed; but do not produce purgation. Give night and morning, 1 qt. of stout; allow 2 drinks, each containing 1 oz. ether, in ½ pt. water, during the day. Give ½ dr. doses of belladonna to allay any symptoms of pain. Give sound oats previously ground, and a moderate allowance of old beans. The water should be whitened and all hay withheld.

RIBS, Broken.—The ribs are often broken by colliding with objects while running away, and by blows or kicks from other horses. There is displacement; there will be either bulging in or out; sometimes bleeding from the nose; loss of appetite for a day or two, and more or less fever. *Treatment:* Move the horse carefully to his box, and place a bandage with sureingle directly over the fracture, drawing them middling tight to prevent working of the ribs. To control the fever, the following mixture may be used: 1 dr. tincture aconite root; 2 dr. fl. extract of belladonna; water, to make 4 oz.; mix, and give 1 teaspoonful every 2 hours. Give soft food; let the horse have perfect rest for several weeks.

RICKETS, or BIG HEAD. — A disease of the bony structure. It is a gradual softening and enlargement of the bones, which become spongy and porous from want of proper nutrition. *Treatment:* Give the animal liberal, wholesome and very nutritious food, such as oats, barley and bran, mixed or steamed, as chewing is often slow, painful and difficult. During the summer season pasturage is beneficial. For internal use, tonic remedies may be employed, such as 1 dr. of peroxide of iron, and 2 dr., each, of powdered boneset and gentian, mixed together, and such a dose given among food, morning and evening, during every other week.

RINGBONE.—Usually the result of weakness, hereditary predisposition, concussion or sprain of the joint. The symptoms are, lameness, soreness and swelling, which either forms lumps on the pastern, or runs in a circle clear around the joint. *Treatment:* Pare off the toe; then apply wet bandages to reduce the inflammation; and for every qt. of water used for this purpose, add 1 teaspoonful, each, of arnica and alum. Give the animal at the same time a dose of physic, 5 dr. aloes, or 1 lb. Glauber salts. When the tenderness has subsided, apply a blister, composed of 1 dr.

Severe Ringbone.

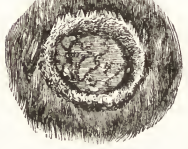
1. The joint between the pastern bones, showing the groove in which the tendon of the extensor pedis muscle reposed.
2. The joint between the lower pastern and the bone of the foot.

of cantharides; 1 dr. of iodide of mercury; 5 gr. of camphor; 1 oz. lard; mix all together. Cut off the hair from the front and back of the joint, and apply rubbing in thoroughly. When the blister is well formed, wash off and dampen the surface daily with a lotion composed of 1 part compound tincture of iodine, and 3 parts water. In very bad cases the blistering may have to be repeated.

Aggravated Case of Ringbone.

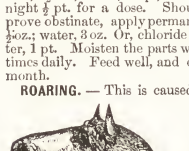
Horse with Ringbone Straining Up-hill.

RINGWORM.—This is produced by the formation of a fungoid crust in a circular form, which causes the hairs to break off and become stumpy; the crust becomes white and soon breaks down into a powdery condition; and there is itching and irritation of the skin. *Treatment:* Be very clean. Wash night and morning, and, afterwards, apply the following ointment: Animal glycerine, 1 oz.; spermaceti, 1 oz.; iodide of lead, 2 dr. A drink is likewise of use when employed with the ointment. Liquor arsenicalis, 1 oz.; tincture of muriate of iron, 1½ oz.; water, 1 qt.; mix, and give every night ½ pt. for a dose. Should the ulceration prove obstinate, apply permanganate of potash, ½ oz.; water, 3 oz. Or, chloride of zinc, 2 sc.; water, 1 pt. Moisten the parts with a soft brush, 6 times daily. Feed well, and do not work for 1 month.



Ringworm.

ROARING. — This is caused when a partial obstruction to the passage of air to and from the lungs takes place, which thus causes the noise that gives its name to the disease; in the case of carriage-horses, it is often caused by tight reining. The symptoms are a hard, dry, and frequent cough; difficult swallowing, the fluids returning by the nostrils; mucous membrane red, and pulse frequent. *Treatment:* If it is caused by an obstruction in the air-tube, from an injury or from the effect of an operation, relief may be obtained by the application of a blister or seton. If it arises from a thickened state of the membrane of the bronchial tubes, apply irritants, such as biniodide of mercury, to the exterior of the part affected, or insert a seton on both sides.



Listening for the Sound Indicating Roaring.

RUPTURE. or HERNIA.—Generally the result of kicks, blows, strains in jumping, falling or pulling. It may be known by a soft swelling on a surface that should be smooth. *Treatment:* Push the part back; introduce skewers crosswise through the skin over the opening, and wind silk round the skin below the ends of the skewers, middling tight; put on a compress, and give the part considerable pressure. Other operations are performed by veterinary surgeons, such as opening the skin and sewing up the opening in the abdominal wall with cat-gut sutures, injecting salt and water under the skin, etc.

SADDLE AND HARNESS GALLS.—*Treatment:* 1. Arrange the harness so as to give an even bearing on the back or shoulders. Bathe the parts several times a day with 1 pt. water, and ½ pt. tinct. myrrh.—2. Dress the parts with common salt dissolved in water, and the brine mixed with ¼ its bulk of friar's balsam. When the sores become firm and hard like warts, apply the following ointment: 1 part of red iodide of mercury to 8 parts of hog's lard, well mixed together; rub well into the parts; if they do not disappear in 5 or 6 days, repeat the application; apply lard once a day between each application, and occasionally wash the parts with warm water, and lard or oil the part when dry.

SANDCRACK. — Caused frequently by bad shoeing, a false step, or by over exertion when drawing a load. It may be known by a fissure in the hoof, which begins at the coronet, the thin edge first breaking away. *Treatment:* Always pare out the crack, so as to convert it into a groove. When the crack is partial, draw a line with a heated iron above and below the fissure. If the separation is all the way down the hoof, make a semi-circular line near the coronet with the hot iron, or draw lines from the coronet to the crack, in the shape of a V, with the hot iron. If the split is not clear through the hoof, the edges may be drawn together by pushing thin wire in short pieces through the holes across the fissure, and bending the ends over so they will meet; then melt a little beeswax, by means of a heated iron, into the crack. When it occurs at the toe, cleanse the wound with chloride of zinc lotion, 1 gr. to the oz. of water, and then cut them off. Afterward place the foot in a poultice. Subsequent-

Quarter Sandcrack.

Partial Quarter Sandcrack Dressed and Shod.

Eradicating Sandcrack.

ly, pare down the edges of the crack while the horn is soft. Use the lotion frequently. Draw lines from the coronet to the crack, so as to cut off communication between the

Split Hoof.

Bar Shoe for Toe Sand Crack.

newly-secreted horn. Shoe with a bar shoe, having the seat of the crack well eased off, and also a clip on either side. If the horse must work, lay a piece of tow saturated with the lotion into the crack; bind the hoof tightly with wax-end; tie over all a strip of cloth, and give this a coating of tar. When the horse returns, inspect the part. Wash out any grit with the chloride of zinc lotion. Feed liberally on prepared food.

Foot Dressed for Toe Sandcrack.

SCRATCHES, or CHAPPED HEELS. — This disease is generally caused by filthy stables, where the animal stands constantly in manure; by overwork, or by traveling long in the mud, and by not being properly groomed at night. The symptoms are a dry and scurvy state of the skin of the heel, accompanied by redness, heat, and itching. (See *Grease.*) *Treatment:* Give a dose of 12 oz. Epsom salts, then 1 oz. hyposulphite of soda, daily, for 2 or 3 weeks. The part should be dressed with acetate of lead, a little of which should be rubbed in every night. Next morning some glycerine should be brushed on at least an hour before the exercise, and renewed before the daily work is commenced. This will prevent all risk of the skin cracking, while the ointment will act beneficially on the vessels of the part.

Scratches.

SCROTUM, Dropsy of. — The symptoms are enlargement, tenderness and softness. *Treatment:* The water should be drawn off with a small trocar and canula, and tincture of iodine injected into the dropsical cavity, so as to cause it to close up by provoking adhesive inflammation.

SEEDY TOE. — This is caused by inherent weakness, undue shocks, or founder. It may be known by tapping the toe with a hammer, and if it is disunited, it will give a hollow sound. *Treatment:* Find the extent of the separation with a thin probe; cut away the whole of the detached horn; place the horse in a loose box, and feed liberally; once every fortnight, for 2 months, cut away so much of the outer wall as may be still disunited. It will take 3 or 4 months for the hoof to grow down.

Seedy Toe after Removal of Shoe.

Hoof after Removal of Seedy Toe.

Section of a Horse's Foot Affected With Seedy Toe.

SHEATHS, Foul. — *Treatment:* Pare the nails of the right hand smooth, and take as much clean lard, free from salt, as can be held by the points of the fingers and thumb; insert the hand to the bottom of the sheath, and as the hand is withdrawn leave all the lard. Repeat the operation 2 or 3 times at intervals of about 2 days, and in 9 cases out of 10 the horse will be all right. If not, wash out carefully with lukewarm water.

SIDE BONE. — Generally caused by severe bruises or other injury to the feet. It may be known by striking near the lateral cartilages with a hammer, when the animal will show signs of pain; the cartilages become stiff, hard and enlarged, the action stilty, and the feet contracted. *Treatment:* Bathe with water continuously and place the following fly blister on the spots: Spanish flies, coarsely powdered, 8 oz.; oil of turpentine, 2 qts.; steep for 3 weeks; strain, and add 1 qt. of olive oil.

SKULL. Fracture of.—Commonly caused by bruises, kicks and blows. It may be known by the external marks of violence, fever, and either stupor or delirium. *Treatment:* Remove the portion of bone that presses into the skull, by trephining the bone, and treat as for a simple wound. If fever sets in, apply poultices of chopped ice and bran.

SPAVIN. — There are several forms of this disease. Sickle-hocked or cow-hocked horses, are said to be most subject to it. To examine

The Manner in which to Feel for a Spavin.

a horse for spavin, view the suspected joint from before, from behind, and from either side. After-

A Sickle-Hocked or Cow-Hocked Horse.

wards feel the hock. *Bog* spavin, generally caused by bruises, sprains, or by wounds or pricks from nails. It may be known by the extension of the bursa or sheath of the true hock joint, and by the soft, yet firm swelling. *Treatment:* Bathe it continually with water, and apply a hot, soft oil meal poultice for 2 or 3 days. When the pain and lameness have disappeared, the following ointment should be applied: Tincture of iodine, 3 oz.; aqua ammonia, 1 oz.; turpentine, 1 oz.; glycerine, 1 oz.; mix; and, after the skin has become sore, grease with lard until it heals. *Bone* spavin may result from eonstitutional causes, hard work, or bad shoeing. It is characterized by an objection to put the heel to the ground; by frequent stumbling or knuckling under of the lower joint; and by stepping on the toe when running, causing the undue wearing at the toe of the shoe. *Treatment:* Bathe the parts with warm water, and let the animal have rest or cessation from hard work, or putting to moderate work on soft ground. The bony deposit, or inflammation, may be removed by repeated blisters. Use a hot iron only as the last resort. *Blood* spavin. Similar to bog, but more extended, and generally involves the front, inside and outside of the joint, giving it a rounded appearance. The swelling is soft and fluctuating. Young horses and colts, especially if driven or worked hard, are more liable to have this form of spavin than older horses. *Treatment:* ½ lb. blood root; 1 qt. alcohol; 2 oz. tannin; ½ lb. alum; mix, and let it stand, shaking it several times a day till the strength is all in the alcohol, and bathe the spavin twice a day, rubbing it in with the hand. *Occult* spavin. Similar to bone in its nature, the difference being that the location is within the joint, so that no enlargement is seen, which makes it more difficult to come to a definite conclusion as to its location, and consequently the horse is often blistered and tormented in nearly all parts of the leg but in the right place. The causes and effects are the same as

Position of a Spavined Foot. *Position of a Healthy Foot in Trotting.*

bone spavin, and it should be treated in the same way. When convalescent, give the following: ½ oz. pulverized fenugreek seed; 1 oz. sulphate of iron; 2 oz. gentian root; ½ oz. nux vomica; mix, and divide into 12 powders; give 1 night and morning in the feed. Give a few carrots, and a little new grass, if it is to be had; a little walking exercise every day will be beneficial. Do not put to work for several days after recovery.

SPLINT.—This is produced by inflammation of the shank bone from fast driving, or from the animal having been overworked when young. The symptoms are heat, tenderness, pain, and often lameness. Dishing, or carrying the front leg outward, when trotting, is thought by some to be an indication of splint, but many horses do this that have no splints. *Treatment:* The periosteum must be cut down and divided by a small narrow knife, to relieve the tension and irritation. Cut the hair short; rub a little of the following ointment into the skin, covering the splint every night, until a free, watery discharge is produced from the surface: Biniodide of mercury, 2 dr.; lard, 1 oz.; mix. If, after a fortnight, the splint does not appear much reduced in size, the ointment should be re-applied, and repeated at similar intervals.

Different Kinds of Splint.

1. A high splint near the knee.
2. Low splint far from the knee.
3. A small bony growth on the front of the leg, which is also called a splint.

Serious Splints.

1. A splint, involving the bones of the knee joint.
2. A splint, interfering with the action of the back sinews.
3. A small splint situated under the tendon of an extensor muscle.

STAGGERS.—(See *Brain, Inflammation of.*)

STOCKED or SWOLLEN LEGS.—(See *Debility.*)
STOMACH, Inflammation of.—(See *Bowels, Inflammation of.*)
STONE BRUISES.—The symptoms are lameness, and a tender and painful spot on the foot. *Treatment:* Same as that for *Overreach*, which see.

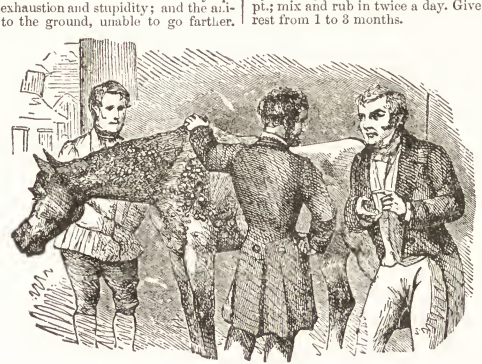
Dishing.

Stone Impacted Between the Sole and the Web of the Shoe.

STRANGLES.—(See *Throat, Sore.*)
SUNSTROKE.—Caused by over exertion or exposure to the sun in hot weather. The symptoms are exhaustion and stupidity; and the animal falls to the ground, unable to go farther.

Fractured Hip.

lock, hip, back, stifle joint, flexor tendon, suspensory ligaments, etc., caused by slipping, falling, overwork, etc. Whatever part is affected the treatment is essentially the same. Fracture of the hip also requires the same treatment, as the bones cannot be got at to be set. The animal will always remain one-sided; but he may be just as useful as ever for ordinary work. *Treatment:* Apply cold douches to the part, pouring the water sometimes from a height; keep the affected part swathed in cloths, wet with rum or diluted alcohol. After the inflammation has somewhat subsided, use the following liniment: Tincture of arnica, tincture of opium, aqua ammonia, of each 2 oz.; water, 1 pt.; mix and rub in twice a day. Give the horse rest from 1 to 3 months.



Surfeit.

Treatment: Remove the horse from the harness to a cool, shady place. Give 2 oz. of sulphuric ether, 20 drops of tincture of aconite root, and a bottle of ale, or porter, as a drench, to sustain the vital powers, and to act as a stimulant in equalizing the circulation. Chopped ice should be placed in a coarse towel, or bag, and laid between the ears and over the forehead. If the legs are cold, swathe them in woolen bandages.

STRAINS AND SPRAINS.—These are accompanied by swelling, heat and tenderness. Every joint is liable to sprain, but the more common sprains will be found in the pastern or fetlock, hip, back, stifle joint, flexor tendon, suspensory ligaments, etc., caused by slipping, falling, overwork, etc. Whatever part is affected the treatment is essentially the same. Fracture of the hip also requires the same treatment, as the bones cannot be got at to be set. The animal will always remain one-sided; but he may be just as useful as ever for ordinary work. *Treatment:* Apply cold douches to the part, pouring the water sometimes from a height; keep the affected part swathed in cloths, wet with rum or diluted alcohol. After the inflammation has somewhat subsided, use the following liniment: Tincture of arnica, tincture of opium, aqua ammonia, of each 2 oz.; water, 1 pt.; mix and rub in twice a day. Give the horse rest from 1 to 3 months.

SURFEIT.—Sometimes caused by indigestion, or by sweating the horse when he is in a plethoric condition, and then exposing him to a chill. It may be known by numerous small scabs on the skin, matting the hair, and chiefly met with on the loins and quarters. *Treatment:* Regular exercise and grooming must be fully attended to, using the wisp only in dressing the skin, when eruption shows itself, and avoiding the brush and curry-comb. Give 1 oz. nitre, with a mash, twice a week, or the following balls: 3 dr. nitre; 3 dr. sulphur; 2 dr. sulphuret of antimony; linseed meal and water to form 2 balls.

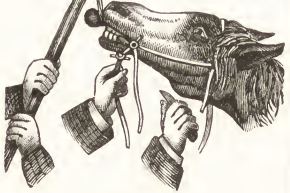
THOROUGHPIN.—This is generally the result of too hard work where the strain upon the hind legs is very great. It may be known by soft swellings just in front of the point of the hock. *Treatment:* This should be by pressure, kept up for a long time, by means of a carefully adjusted truss, alternated with cold affusion, and the use afterwards of tincture of arnica, diluted with water, as a wash.

Thoroughpin.

THROAT, Sore, or LARYNGITIS.—The symptoms are perpetual deglutition of saliva; want of appetite; inability to swallow a draught of liquid, the fluid returning partly by the nostrils, and each gulp being accompanied by an audible effort; in some cases a purulent discharge issues from the nose, and it is then called strangles. *Treatment:* House in a large, well-littered, loose box, and clothe warmly. Give gruel for drink; green food, with 8 feeds of bruised scalded oats, also beans daily. If the bowels are obstinate, give a drink composed of the following: 4 oz. solution of aloes; ½ oz. ess. aniseed; 1 pt. water. Should the throat not amend, steam the nostrils by securing a nose-bag on the head, placing bran and boiling water in the bottom of it. Soak soft hay in boiling water, and fix it upon the throat by means of an 8-tailed bandage. Give 2 pots of stout daily, and blister the throat. No alteration ensuing, mop out the fauces with a sponge wet with nitrate of silver, 5 gr.; water, 1 oz. Give a ball, daily, composed of oak bark and molasses, a sufficiency of each to form a mass. Should the swollen glands of the neck suppurate, open with a lancet. A twitch on the nose will be sufficient to keep the horse quiet. Keep it thoroughly clean by sponging with the following: 2 dr. carbolic acid, 1 pt. water.

Appearance of Strangles.

Eight-tailed Bandage.



Opening the Abscess.

THRUSH.—This disease is generally caused by moisture, bruises or filth, and may be known by the disagreeable discharge of offensive matter, if a stick or blade is run into the fissure. *Treatment:* First poultice with linseed meal, put on hot, and let it remain 12 hours. then use the following paste: 2 oz. blue vitriol; 1 oz. white vitriol; powdered as finely as possible; mix well with 1 lb. of tar and 2 lbs. of lard; apply this in the cleft, by putting it on tow and pushing it in; let it remain 12 hours; then cleanse out with soft water and soap. When dry, make a second application; also renew the poultice at night, until all inflammation disappears.

Thrush in Hind Foot.

Thrush in Fore Foot, with Thick Crust, Concave Sole, and Small Frog.

TONGUE, Sore.—Sometimes caused by injuries from the halter chain, or by striking against the teeth. *Treatment:* Wash with a saturated solution of borax. If the tongue bleeds, apply turpentine as an astringent.

TOOTHACHE.—Caused by carious teeth, and may be known by the head being depressed, the eyes closed, and tears running down the face. *Treatment:* To safely examine the mouth, a balling iron should be used to keep the jaws open. If the tooth is ulcerated, extract it at once; if not, it may be cleansed and the cavity filled with gutta percha. If tender, destroy the nerve with crystallized carbolic acid and powdered opium, before filling.

TYPHOID FEVER.—This disease may be known by the strength becoming reduced; the breath fetid, and the mouth loaded with a black discharge from the tongue and gums. *Treatment:* As few cases recover, it is best to leave the animal chiefly to nature, simply regulating the bowels by injections, and supporting the strength by 1 dr. of quinine every morning, and ½ pt. whisky, 2 or 3 times a day. For nourishment, give freely as a drink a strong infusion of hay and oats.

URETHRA, Inflammation of.—Generally caused by small stones, gravel, or irritating substances in the urinary passage, or injury to the penis. It may be known by the passage of urine being slow and painful, soreness and swelling in the sheath and penis, and by the discharge of pus. *Treatment:* Give 1 pt. raw linseed oil, and foment the sore part with hot water; rinse out any gravel, and inject once or twice a day with a lotion made as follows: ½ oz. sugar of lead; 1 oz. vinegar; 1 qt. water; mix.

URETHRA, Spasm of—(See *Bladder, Inflammation of.*)

URETHRA, Stricture of.—Produced by irritating substances in the urine. It may be known by painful urination, the urine being passed in

a fine stream. *Treatment:* A small catheter should be passed in every day, gradually increasing the size of it, and gently pushing it by the stricture.

URINE, Bloody.—Caused by violence, affecting the bladder, loins or kidneys, or by abscess, tubercle, or cancer in the kidneys. The symptoms are, the existence of bloody urine, unaccompanied by pain or irritation. *Treatment:* Little can be done in severe cases, and mild ones only require rest, and a dose of physic. Green food should be given, and the diet should be attended to as for *Diabetes*, which see.

URINE, Retention of.—(See *Bladder, Inflammation of*; *Bladder, Stones in the*, and *Gravel.*)

VEIN, Inflammation of. — Generally caused by the operation of bleeding being performed in a clumsy manner, or with a blunt or rusty instrument. It may be known by great pain, heat and tenderness; the inflammation spreads to surrounding parts, and there is considerable tumefaction. *Treatment:* Give the following every 8 hours: Nitrate of potash, 2 dr.; tepid water, 6 fl. oz.; tincture aconite, 10 drops; mix. Apply linseed poultices over the vein, and tie up the animal's head to prevent him from rubbing the parts.

WARTS.—These are small tumors which form on any part of the body. *Treatment:* Take corrosive sublimate and red precipitate, powdered and mixed, equal parts. If the wart is large and loose, tie a fine, strong cord around it close to the skin. In a short time the wart will come off; then apply the powder until the wart is eaten down below the skin; then wash off and rub on a little sweet oil, and it will soon heal over. If the wart is dry, scratch it with a pin or point of a knife until it bleeds, then rub on the powder. It will make a dry scab; pick off the scab, and put on the powder again until it is all eaten off.

Warts.

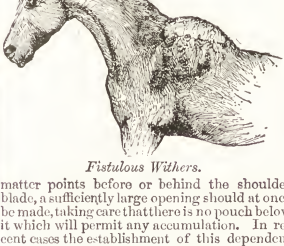
WINDGALLS. — The symptoms are, small enlargements, generally upon the hind legs and below the hocks; no lameness; 2 windgalls appear above the pastern, 1 beneath that joint; after extraordinary labor the round swellings disappear and the course of the flexor tendons becomes puffy. Sometimes continued irritation will cause the windgalls to greatly enlarge and ultimately provoke their ease to change into bone. During these changes, the horse is very lame. *Treatment:* Fold pieces of rag; wet them; put these on the windgalls; place on the rags pieces of cork, and over the cork lace on an india rubber bandage. Mind this bandage is constantly worn save when ridden or driven. Rest is the only alleviation for the change of structure.

Situations and Shapes of Windgalls.

WIND SUCKING.—This generally arises from feeding on chaff, bad hay and musty oats. The horse smacks his lips, attempting to confine air within the mouth, arches his neck, and, with a belching action, inflates the stomach. *Treatment:* Place a strap around the throat, tightening it sufficiently to prevent the animal from distending the neck and straightening the pharynx.

Windgalls as They Appear Dissected.

WITHERS, Fistulous.—When a saddle has been allowed to press upon the spinous processes of the dorsal vertebræ, it produces inflammation, which, neglected, leads to the formation of an abscess. But the situation of the part is such that matter cannot escape, even if the skin over the points of the bones is perforated, and it has a tendency to burrow down among the muscles connecting the shoulder blade with the trunk. The consequence is, there is extensive inflammation, often lameness of the shoulder, and a constant discharge comes from the swelling. *Treatment:* An opening should be made as low down as possible on the right side, taking care that it will allow all the matter to run out as fast as it forms. The reason why the right side should be chosen is, that most horses lie down on that side; but if the subject of fistulous withers is in the habit of lying on the left side, the opening should be made there in preference. When the matter points before or behind the shoulder blade, a sufficiently large opening should at once be made, taking care that there is no pouch below it which will permit any accumulation. In recent cases the establishment of this dependent opening will alone suffice to effect a cure; but in those of long standing the lining of the fistulous passage or passages has become converted into a substance almost resembling cartilage, and refuses to throw out healthy granulation, so as to lead to adhesion of its walls. Here a stimulus must be applied to their interior, which may be either mechanical, in the shape of a seton tape passed through from end to end and left



Fistulous Withers.

there; or, chemical, by means of injections. The latter are best composed of chloride of zinc, diluted with water; 1 dr. of this should be mixed in 1 pt. of water, and carefully injected into every part of the sinus twice or thrice a week.

WOLF-TEETH.—These are small supernumerary molar teeth, which do no harm, except perhaps causing a slight irritation. *Treatment:* They may be removed very easily, being but slightly inserted in their sockets.

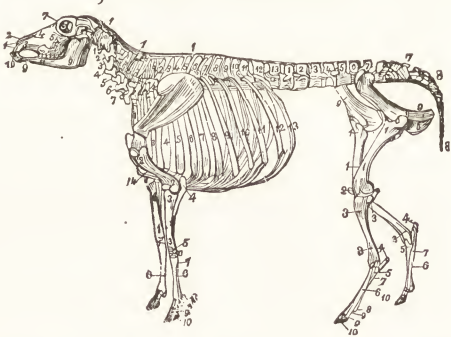
WOMB, Inflammation of. — The symptoms and treatment are the same as those of *Puerperal Fever*, which see.

WORMS.—There are several kinds of worms which infest the horse: *Lumbrici.* Long, round worms, which are sometimes 18 in. long. They prey upon the weakly, whether old or young. *Treatment:* 3 dr. calomel; 1 dr. tartar emetic; make into 3 balls; give 1 every night for 3 nights; 1 day after the last ball, give the following purgative ball: 1 oz. aloes; ½ oz. cream tartar; ½ oz. Castile soap; mix with molasses. *Pin Worms.* This variety inhabits the rectum, and causes great itching posteriorly; which causes the horse to rub its hair off against the wall. *Treatment:* 1 oz. catechu; 1 qt. water; dissolve and give as an injection; repeat for 7 mornings. On the 8th day, give a mash; at night follow with ½ oz. aloes, and 1 dr. calomel. Repeat the above if necessary. Injections of tobacco smoke work well. *Tænia* or *Tapeworm.* These trouble the young mostly; are usually caused by starving the mare when with foal, and by breeding from old animals. The symptoms are, checked development, large abdomen, ravenous appetite, unhealthy coat, thin body and fœtid breath. *Treatment:* Give spirits of turpentine. For a colt, 3 mos. old, give from ¼ to ½ oz.; 6 mos. old, ½ to 1 oz.; 1 yr., 1 to 1½ oz.; 2 yrs., 1½ to 2 oz.; 4 yrs., 3 to 4 oz. Take 1 lb. quassia chips, and pour 3 pts. of boiling water on them; then mix a proportional dose of the quassia infusion with the turpentine, and mix together by stirring in well, with yolks of eggs; add 20 gr. powdered gum camphor, and give the dose the first thing in the morning. Feed well, and give every morning until the coat is glossy, 1 dr. muriated tinct. of iron, and 1 dr. Fowler's solution.

WOUNDS.—*Treatment:* Foment frequently with hot water, and apply tincture of friar's balsam, 2 oz.; compound tincture of myrrh and aloes, 2 oz.; if unhealthy granulations arise, wash, previously to using the tincture, with blue stone, 1 oz.; soft water, 1 pt. Wounds generally heal better without sewing, if it can be avoided. If suppuration is inevitable, use carbolic acid combined with glycerine or linseed oil, in the proportion of 1 to 20; apply night and morning with a feather. The wound must be kept clean, and, in the case of backs and shoulders, all pressure removed by small pads of curled horse hair, sewed on the harness above and below the sore.

SHEEP.

ANATOMY AND BREEDS.



Skeleton and Points of the Sheep.

HEAD.—1, intermaxillary bone; 2, nasal bones; 3, upper jaw; 4, union of nasal and upper jaw bone; 5, union of molar and lachrymal bones; 6, orbits of the eye; 7, frontal bone; 9, lower jaw; 10, incisor teeth or nippers; 11, molars or grinders.

TRUNK.—1, ligament of the neck, supporting the head; 1 to 8, several vertebræ or bones of the neck; 1 to 14, 13 vertebræ or bones of the back; 1 to 7, 6 vertebræ of the loins; 7, sacral bone; 8, bones of the tail, varying from 12 to 21; 9, haunches and pelvis; 1 to 9, 8 true ribs with cartilages; 9 to 14, 5 false ribs; 14, breast bone.

FORELEG.—1, scapula or shoulder blade; 2, humerus or lower part of shoulder; 3, radius or bone of forearm; 4, ulna or elbow; 5, knee; 6, metacarpal or shank bones; 7, a rudiment of the smaller metacarpal; 8, one of the sesamoid bones; 9, two first bones of the foot, the pasterns; 10, proper bones of the foot.

HIND LEG.—1, thigh bone; 2, patella; 3, tibia or bone of the upper part of the leg; 4, point of the hock; 5, other bones of the hock; 6, metatarsal bone or bone of hind leg; 7, rudiment of small metatarsal; 8, sesamoid bone; 9, two first bones of the foot, the pasterns; 10, proper bone of the foot.

BONY STRUCTURE.—The structure of the sheep resembles that of the ox and the horse, having a corresponding number of joints in the limbs, with the exception of the 4 bones below the fetlock being double. The sheep, when full grown, has 8 incisor teeth in the lower jaw, none in the upper, and 24 grinders, 6 on a side in the upper jaw, and 6 in the lower; in all 32 teeth. At birth, usually, the 2 central incisors are through, and in 5 or 6 weeks all the incisors will appear. The 2 first, or milk incisors, will be shed at 12 or 15 mos., and 2 permanent ones appear. At 2 yrs. and past, 2 more permanent teeth appear; at 3 yrs. and past, 6 permanent teeth, and at 4 yrs., 8.

BLACK-FACED HIGHLAND.—The oldest breed known in Scotland, and noted for great hardiness. The face black; muzzle thick; horns of the ram massive and spirally curled; eyes bright and wild; body square and compact; docile, easily handled, and herd well. Mutton of fine flavor, and when fat, weigh from 60 to 70 lbs. The ewes are careful mothers.

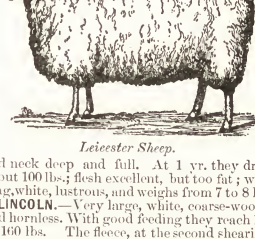
COTSWOLD.—Hardy, heavy shearers, quick feeders, and mature early; wool strong, white and mellow, but rather coarse; averaging 7 or 8 lbs. per fleece. By crossing them upon Merino, or native ewes, the first cross will be nearly equal to that of the thoroughbred, both in size and quality, and the fleece is in demand at prices beyond the Merino or pure-bred Cotswold. They will go to market under liberal keep at 18 mos. old, weighing 150 to 200 lbs., live weight, and will command top prices in the best markets. There is no mutton breed that will feed out at so early an age and cross with as much profit. Being a pure-bred sheep, the rams are better for crossing than any other of the English breeds.

Yearling Cotswold Sheep.

DORSET.—Hardy, strong, active; heavily horned; larger than the Highland; prolific; both rams and ewes are horned; they produce twice in the season. At 2 yrs. they dress 100 lbs. The fleece is close, soft and white, and weighs about 6 lbs.

HAMPSHIRE-DOWN.—A mixed breed, originated by crossing the Southdown on the native breed of Hampshire. Lambs at 1 yr. weigh 100 lbs. Their fleece weighs 6 to 7 lbs., and is excellent combing wool. The mutton is excellent in flavor, and juicy. They are hornless; have black faces, a Roman nose, a large head, and a massive, compact, and well-formed frame.

LEICESTER.—A much esteemed English breed. The sheep are hornless; head small and clean; eyes prominent and animated; shoulders and neck deep and full. At 1 yr. they dress about 100 lbs.; flesh excellent, but too fat; wool long, white, lustrous, and weighs from 7 to 8 lbs.



Leicester Sheep.

LINCOLN.—Very large, white, coarse-wooled and hornless. With good feeding they reach 120 to 160 lbs. The fleece, at the second shearing, weighs from 10 to 15 lbs.; the fiber measures 9 in. in length; hardy and prolific; large feeders, and require succulent grasses and skillful care.

MERINO.—The Merino sheep is, so to speak, a cosmopolitan animal, and may be met with in the most widely-divided latitudes, for it has been introduced into Germany, France, England, at the Cape of Good Hope, Australia, Canada, and the United States of America. It is distinguished by the fineness and felting quality of its wool and weight. Its defects are unprofitable and unthrifty form, voracity of appetite, tendency to barrenness, neglect of young, and inferior flavor of mutton. The wool,

Merino Sheep.

lying closer and thicker than in other breeds of sheep, and being abundant in yolk, is covered with a dirty crust, often full of cracks. Legs long, small in the bone; breast and back narrow; the sides somewhat flat; fore shoulders and bosoms heavy. The horns of the male are comparatively large, curved, more or less spiral; head large; forehead rather low. Male and female have a peculiar coarse growth of hair on the forehead and cheeks; the other part of the face has a velvety appearance. Under the throat there is a looseness of skin, which gives the appearance of throatiness, or hollowness in the pile; the pile, when pressed, is hard and unyielding, on account of the thickness with which it grows upon the pelt, and the abundance of yolk detaining the dirt which falls upon it.

OXFORD-DOWN. — A comparatively new breed; a cross between the Cotswold and Hampshire-Down. They mature early; dress 80 to 90 lbs. of excellent mutton at 14 mos.; are hardy, herd well, and are good feeders. The fleece is thick and curly, averaging from 10 to 15 lbs.; wool even in quality and excellent for worsted manufactures; and is from 6 to 7 in. long.

ROMNEY-MARSH.—A native of England; hardy; improved by crossing with the Leicester. They have a thick, broad head and neck, and a tuft of wool on the forehead; wool long, somewhat coarse, but sound, bright and glossy.

SHROPSHIRE-DOWN. — Originally horned, but crossing with Cotswold, and later with Leicester and Southdown, has produced a sheep without horns. Face and legs spotted gray; head small and firm; ears handsome; neck thick but handsome. The fleece is long, glossy, and will yield about 7 lbs. of washed wool. Ewes prolific and good mothers.

SOUTHDOWN.—This is probably the most popular breed in England with the butcher and consumer, and the prices fetched at the annual lettings and sales prove that it is still considered one of the most generally useful sorts. It is noted for fine mutton; ewes very prolific: wool fine and curled, with spiral ends, and well adapted to carding. The head of medium length; lips thin; under jaw fine and thin; ears tolerably wide apart, and well covered with wool; neck of a proportionate length, thin

Southdown Sheep.

next the head, and enlarging toward the shoulders; breast wide and deep, projecting well forward between the fore legs.

WHITE-FACED HIGHLAND. — A native of Wales. Mutton superior in quality; weighs 8 to 10 lbs a quarter. Hardy; good nurses. Face white, rusty brown, or speckled with gray. The fleece is famous for not shrinking, but seldom weighs more than 2 lbs.

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Breeding and Rearing.

REMARKS.—Sheep are one of the principle sources of agricultural wealth, and furnish, both to commerce and manufacture, products of no inconsiderable importance. Flocks of sheep, from the dung which they leave behind them, are wonderful improvers of the soil. The folding of these animals in a field intended for the cultivation of corn causes beneficial effects which are felt for three consecutive years. Thus their utility in rural economy has long been known. Their wool, for a very considerable period, was considered their most valuable production; but now they supply so vast a quantity of wholesome, agreeable, and very nourishing food, that it is doubtful in which way they most benefit the human family. The fat of sheep, which forms tallow, is likewise one of their most important products; in some breeds it forms a layer from 7 to 8 inches thick along the ribs and around the loins. Their skin, deprived of the wool, is also applied to numerous purposes. Of this integument are made most of the thin leathers which are used in the manufacture of shoes and gloves. When prepared by other processes, it takes in commerce the names of chamois, parchment, vellum, etc. Lastly, milk and cheese are other useful products which are furnished to us by these useful creatures. Ewe's milk, which is remarkable for its richness, is used in many countries as an article of food, but it is more generally applied to the manufacture of cheese. The most valuable commodities which are produced by sheep, both in a manufacturing and agricultural point of view, may be summed up as wool and meat. In order to supply these two products in perfection, it is necessary that the animal should present a certain type of conformation. With regard to the months and seasons named in this department, they are of course modified by the climate and location of each country. We acknowledge our indebtedness to Mr. Armatage's valuable and more complete works, "The Sheep Doctor," and "The Sheep; Its Varieties and Management in Health and Disease."

SELECTION, Rules for. — 1. When buying rams, select always from the same breeder whose reputation is guaranteed. — 2. Avoid flocks only recently established, and thus escape the consequences of wide crossing.—3.

Avoid all animals having the tendency to,or evidence of, hereditary ailments and defects. A delicate constitution is equally as hereditary as physical perfection.—4. Systematic in-breeding is the only source of excellence: that is, a rigorous rejection of faulty sheep, male or female, and breeding only from perfect animals.—5. In-breeding, even with close relations, as sire and daughter or son and mother, if so be that each have perfect health and sound physical qualities, is in keeping with the principle of producing excellence and sound stock. Experience proves that a good ram lamb, excelling his sire, put to his own mother, will produce better stock than even himself or his sire.—6. In-bred animals do not "throw back;" therefore close breeding preserves the strain and acts as a barrier to the introduction of foreign tendencies of every kind.—7. The prominent conditions of successful reproduction are judicious selection and in-breeding. Without these the flock-master may work for a lifetime unsuccessfully.—8. The experience derived from the mating or in-breeding of wild animals is wide of the mark. They do not select, but intermingle, the worst animal having the unopposed opportunity of begetting offspring worse than himself. This applies to form, habits and vice, equally with all physical defects and qualities. —9. If there be no good and suitable rams on the station, they should be purchased from some well-known breeder, and a fair price paid for them, for it is false economy to purchase inferior rams at any price. The more you pay for rams they will (or at least should) be, and of course the more you will get for your wool. When the first dropping of these ewes by the rams you have purchased are about 20 mos. old, select 50 of the very best of them, and purchasing from the same party who supplied you with your first rams a very superior one, put him to your 50 selected ewes, or to 100, if you can find that number of sufficiently good quality. If you breed from the 50 only, you will possibly have, at weaning-time, 20 or 22 ram lambs; from these select the very best one, and when the proper time arrives, put him and his sire to the first selected 50, together with the 22 or so of his own age, provided the whole of the 22 are good; but should any of the 22 be inferior, in consequence of their dams throwing back, cull them at once, and keep only such as are faultless, or nearly so. By these means, as the old rams give up, you replace them with better stock, as the father of the young rams was worth about $225, whilst the old ones cost probably no more than $22.50 or $27 each. Thus, in the first instance, you buy better sheep than your own; consequently, the first lambs of that drop must be better than their mothers; and these again, being put to rams very much superior to either father or mother, must improve your flock rapidly.

RAM.

CHOICE FOR BREEDING.—It is of great importance that the ram be thoroughbred, whether the breeder's object be wool or mutton. In choosing a ram, the following points are requisite: The maximum wool with the minimum of yolk; the greatest amount of muscle done up in the least wrapping of skin; an animal that will reproduce himself the greatest number of times—constitution, wool, mutton.

INFLUENCE UPON PROGENY.—Males do but little influence the number of the young, the female having the power; but a male, being a twin or a triplet, will sire a daughter or daughters which will breed twins or triplets. Every male conveys the qualities of his dam to his daughters because they follow their sire's mother in ability to produce young.

SERVICE.—Keep the ram apart in an inclosure with a couple of ewes only; have the ewes brought singly, and allow only one leap to each. By this method a ram impregnates twice the number of ewes he would do, if turned loose among them, especially a young ram. The period during which the ram is to go with the ewes must be regulated by climate, and the quantity of spring food provided. The rams should be shorn about a fortnight previous to being turned among the ewes, and kept in an open shed up to that time, in order that they may gradually become accustomed to the loss of their coats, otherwise, in case of their being turned into the open field when recently shorn, they suffer in health and condition during the night frosts, which often happen in the early part of the month of May. In the south of England the ram is turned with the ewes in August for the main crop of lambs. In the later districts of England the ram is put with the ewes—1 to 60 or 70—and both are put in good pastures, and kept in good condition by ample feeding. The rams are not taken from among the ewes in ordinary farm practice in the autumn; and on the moorland farms of Scotland they are not generally admitted to the ewes until November. The ram is generally removed from among the ewes in lowland districts toward the end of this month.

EWE.

FOOD.—Ewes that are to bear lambs, should be well fed, and begin winter in good condition A little grain will do much to insure strong lambs. Keep nursing ewes by themselves, and give scalded bran and oatmeal daily. Sugar beets or potatoes, sliced and sprinkled with 1 qt. of middlings or bran, for each, will produce abundant and rich milk.

LAMBING, Time for.—The ewe flock needs constant care in March, which is in most districts the chief lambing season. The lambing season commences on all lowland farms in February, and the constant care and attention of the shepherd are then required. Ewes of some breeds of sheep will lamb in January. They should be provided with shelter, food and attendance. They seldom need turnips till near the end of the year, most farmers having grass sufficient for the ewe flock till they are

near lambing, when they should have turnips regularly given them. If it is desirable to obtain early lambs, they should come in January or February; but it is indispensable to have suitable accommodations, where the ewes may be kept separate and comfortable, and not pinched by cold. To secure lambs early, the sheep should be coupled in August or September, if it is desirable to raise early lambs for market; and, as the best prices are obtained early in the year, it is important to have the lambs come as early as they can be well looked after.

LAMBING, Treatment Before.—To enable the ewe to produce her lamb with safety, she should not be too well fed; high condition will dispose to fever; and with too poor keep the ewe will not have strength to go through safely, nor will she have milk enough; 1 pt. of bran or oats, or an ear of corn every day, will be useful. Ewes that will have early lambs should be separated and carefully tended; and, at night, they should be folded in a sheltered place. Ewes in lamb are likely to take cold, and when exposed to wet and cold, or allowed to lie on the ground, are apt to suffer abortion. One point is also deserving of much attention, which is, that few things contribute more to the health and well-doing of ewes in lamb than by causing them to take a fair amount of exercise every day. About three weeks before lambing, mix with the pulped turnips and chaff brewer's grains, bean meal, crushed oats, or some other extra food, to bring the milk upon them; and the same feeding is continued after they have lambed until there is a full bite of grass for them. Also allow them a limited quantity of hay some weeks before they lamb, so that the lambs may be fat and ready for market as early as possible. It is requisite to provide suitable lambing paddocks or pens for the lambing season, to which the ewes can be taken every night. In them, and also about the pasture fields, or adjoining fields, shelter pens should be constructed, into which a ewe about to lamb, or immediately after she has lambed, should be put, if the weather is unfavorable. These pens are made with straw-wattled hurdles, five hurdles making a double pen, three being set down parallel with each other, and so near that the other two hurdles form the back and front. As the season draws nigh every preparation is made, and the allowance of food is increased. The ewes being heavy with lamb, require additional support. When their "time is up," ewes should be constantly watched for a few days upon the pastures where they have been wintered. As soon as the lambs begin to fall, they are collected into a roomy field, provided as above, in the corner of which, adjoining the shepherd's house, are the lambing paddocks, into which they are driven every dark and unfavorable night. In fine open moonlight nights they are sometimes left out, as it is desirable that the paddocks or lambing pens should be freed from taint, *i. e.*, be sweetened occasionally. Tainted straw or gangrenous droppings are sometimes fatal to ewes if they come in contact with the wounded uterus. On many large farms in parts of the country, ewes are generally if not universally lambed while on turnips. In such cases lambing-yards, or pens of sufficient capacity, should be provided, with a temporary house for the shepherd. It is constant and untiring attention that is required. It is only in special cases that the shepherd's skill and experience are brought into requisition.

LAMBING, Treatment During.—The ewe goes with the lamb for 5 mos. The period of lambing having commenced, the attendant should observe every ewe that appears to be in labor, but should not be in haste to render assistance, until the strength of the ewe appears to be declining. If she is to be driven to the fold, let it be done gently. Before assistance is given see that the fœtus is coming properly, which is with the head crouched between the forelegs; if wrong, it must be turned to the proper position. In case of twin lambs, the one which is least advanced must be put back, and the extraction of the other assisted. If the fœtus be dead, extract immediately. The following are useful to produce parturition:—1. A decoction of horsemint, or any other kind of mint.—2. Bruised ergot of rye, 1 dr.; boiling water, 1 pt.; infuse for ½ hour, and give ½ part; repeat if necessary. The ewe is occasionally subject to after-pains; 20 drops of laudanum should be given in a little gruel, and repeated every 2 hours till the pains abate. It will always be prudent to bleed if not better soon after the second dose.

LAMBING, Treatment After.—Ewes should be allowed rest, quiet, and good feed. If any do not seem to give milk enough, separate them from the rest and give oatmeal gruel, roots, bran slops, and, if possible, second-growth grass. As the ewes lamb, they should be drafted off to other pastures, and the lambs ought there to have access to a fenced enclosure, where they can enjoy a ration of corn and cake to themselves. Ewes should be well treated on the pastures, receiving cut mangolds, and oats and peas daily, until there is a full bite of grass, and the lambs are well grown and able to help themselves.

LAMB.

CARE.—After the lamb is dropped, the ewe will generally lick it dry; if she refuses, it should be wiped dry. The lamb will soon attempt to suckle; if it does not, assist it. If the ewe refuses the lamb, she should be held while it suckles; repeat a few days until she owns it. If the lamb is intended for market, let it eat while young. Feeding may begin at about 3 weeks of age; Indian meal or oatmeal gruel may be given. The ewe should be fed bran, oil cake or oatmeal; heating food, like corn, should not be given.

CASTRATION. — Castration should be performed when they are 10 days or 2 weeks old. They should be in health, and the weather fine, but no twarm. An incision is made into the scrotum on each side, through which the testi-

ches are successively protruded, and they are taken away by severing the spermatic cord. A simple operation.

CHILLED LAMBS, To Relieve. — Bring the lamb into the house, and lay it on a warm blanket on the floor before the fire, so that it may receive all the warmth possible. Beat up 1 egg, and place the cup containing it in a basin of hot water, and stir until warm; feed it to the lamb, and in less than 1 hour it will be ready to go back to the yard.

FEEDING.—Lambs should be fed very lightly at first, for fear of starting the wool. Oats are better than corn, and the feed for each may be increased so that at the end of 2 or 3 weeks it reaches ½ pt. If corn is fed instead, less will suffice. A small amount of grain during winter, with plenty of hay, straw, pure water, good shelter, dry litter, ventilation, and a little salt once a week, will keep lambs growing and in health through winter. A mixture of 1 part of oats and 2 parts of bran is excellent to feed lambs. When the ewe has no milk, feed the lamb on condensed milk diluted with warm water, 2 parts water to 1 of milk.

TRAINING.—By training a pet lamb to come at call, and afterward putting it with the flock, the owner can call his sheep wherever they hear him, and the pet will come, followed by the other sheep.

WEANING.—The period of weaning differs according to the locality of the farm, and the quality of pasture. In a mountainous situation, and where the land is inferior, weaning often takes place when the lambs are not more than 3 mos. old; it requires all the time to the beginning of winter to bring the ewes ready for the ram or fat for market. The time is from the 1st to the middle of July, and the lambs are separated from the ewes. Take away a portion of the ewe's milk at intervals, to prevent distension of the udder; dry them by degrees. Put the lambs into a good pasture in the summer, to make up for the loss of milk. When the grass begins to fail, supply with turnips, which, with hay are to be their food during winter.

General Management.

Feeding and Fattening.

REMARKS.—A sheep, to be well and hearty, must not be starved at any period. It must feel comfortable to grow wool every day. A sheep out of condition is subjected to ailments that, in good condition, would not have affected him. September and October are favorable months for fattening stock, as severe storms are then few. The temperature is neither very warm nor very cold. During this season a larger proportion of food consumed by animals is converted into fat and muscle. Exercise during hot weather is fatiguing and requires the expenditure of muscular power. During severe cold a large proportion of the food consumed is employed in the production of heat, where animals have little or no shelter. Sheep must be kept dry, have a ration of roots or grain, and be kept from fields in the spring, if lambs are expected to live. No good farmer should allow the first blade of grass to entice his sheep. Coarse wooled, large sheep, will thrive in confinement, and it is wrong to imagine that, after running in the fields through the winter, in the spring they can be fatted up by extra food all at once.

FEEDING.—When sheep are well fed in winter, the wool starts to grow, but if any starving takes place, the fibre will have a weak place in it, and be unfit for combing wool. Those intended for the butcher after shearing in May should receive from the 1st of November, peas, oats, or oil-cake, commencing with ¼ pt. of the first, ¾ pt. of the second, or ½ lb. of the third; and increasing gradually up to ¾ pt., 1 pt., and 1 lb., respectively each. They will eat with these from 15 up to 25 lbs. of cut Swedes each daily, according to the weight of the animals. It is a fair rule to go by, that an animal when full grown will eat daily of green food a weight equal to ¼ the weight of its carcass when in fair condition; and it may be assumed that the oil-cake given will reduce the quantity of Swedes required by about 8 lbs. of the latter for every pound of the former. A good crop of Swedes pulled and cut, the sheep being folded on the the land, will keep 10 sheep for 5 months per acre; the same crop may be assumed as equal to the keep of 13 or 14 under shed.—*Beans.* There is no more valuable food than beans. In the production of fat they are inferior to corn and the small grains, but superior in the production of flesh. All young animals are benefited by beans.—*Bran.* Breeding ewes thrive better upon bran than upon corn. Bran supplies nourishment better. Oats are next in value. Mixed food is the best; 1 bush., each, of corn, rye, buckwheat, oats and bran, mixed, combine the most nutritious food elements; 1 pt., daily, will be a fair allowance.—*Buckwheat* may be fed, but it should be given lightly; ½ gill the first few days, gradually increasing the amount.—*Corn.* Sheep may be carried through an average winter with the food furnished by the corn field.—*Clover Hay.* Sheep fatten readily on good clover hay, if cut in full bloom, to retain the juices.—*Pine Boughs.* If given once or twice a week, they will create an appetite, prevent disease and increase health.—*Potatoes.* Sheep thrive upon raw potatoes.—*Salt.* Sheep are fond of it, and it is said to be a preventive of rot, worms, braxy and other diseases. It increases appetite, promotes digestion, modifies their natural timidity, and may be given in moderate quantities 2 or 3 times a week. It is said to improve the quantity and quality of the wool. Sheep fed on roots or succulent food are benefited by salt, which prevents swelling or flatulence.—*Water.* Give plenty of water at all seasons, and have it ac-

cessible to them. Where it cannot be furnished by streams, springs or wells, the flock should be allowed to drink for some length of time every night. Where such is the custom, sheep will seldom frequent impure ponds, and will remain at the yard under sheds until daylight, when they will return to the pasture without a shepherd. If water cannot be given more than once a day, it should be given at night, as grazing takes away the desire for water, and thirst does not begin to be felt until after the effects of morning feeding are past and the grass is dry and parched.

FOLDS.—A considerable quantity of manure may be saved by folding at night during the winter, though such practice would be injurious in warm weather. As a rule, sheep carefully sheltered from severe weather, will be in better condition, and their wool finer and softer than if left exposed. The objection to folding at night is that in warm weather they feed at night time, and it is an objection to have to withdraw them from their feeding grounds just when they feed best. They can be taken in at the close of twilight and put out at daybreak, and thus have the cool of the day to feed in. See that they have a dry and soft bed. Plenty of bedding is very important. The buildings must be clean, and the floor strewn with straw for bedding. At least twice a week this should be carted out. To prevent the yard from becoming a slough of mud, the eaves of the shed can be guttered with 2 planks, nailed edges together, forming a trough, which will convey the water from the yard through the means of other troughs arranged for the purpose. Place the racks in a line, facing the open part of the sheds, leaving a space for the sheep to pass in and out. Make each rack of a single plank, 20 ft. long, 12 in. wide, and 2 in. thick, into each edge of one side of which, rounds 3 ft. long may be inserted to incline outward at the tops. Leave a space of 5 in. between each round, and set in 2 or 3 at each end, to prevent the sheep from jumping into the racks. Mount each one upon 4 legs, 2 feet high, giving them a sufficient spread. Place the troughs convenient to the root house, make them of plank, giving a length of 20 feet, a width of 12 in., and a depth of 4 in., to each. Over each trough, fix a plank on supports, rising from each end, and tenoned to fit into mortice holes in the plank. A long nail, passing through each tenon, will keep the cover in its place, thus preventing jumping into the troughs. Before the hay racks are filled, the sheep must be turned out, to keep them from getting seed in their wool; and if the racks are well filled in the morning, each will feed 100 sheep during the day, provided they can pick at a little green food.

HERDING.—The practice of close herding to keep sheep from running themselves poor, is erroneous. Sheep thrive when traveling 5 to 7 miles per day; but they should not be driven. All that is necessary is to keep them headed in the desired direction, and they will feed as they go. If this method is adopted with a flock that has been accustomed to close herding, they will run furiously for the first week, but when they see that they are not stopped, they soon settle down so as to consume ½ day going out from 2 to 4 miles, and the other ½ coming home. The herder should refrain from following so closely as to annoy the sheep by the presence of his dog. Sheep should not be driven unless it is urgently necessary, as in fetching them home against a storm, or when they become stubborn. To protect from dogs, put a bell upon about 15 or 20 sheep in a flock of 100; 2 goats can drive away a dozen dogs. As soon as dogs enter the field at night, the goats attack them. Horses and sheep pasture well together, the horses protecting the latter from dogs.

PASTURING.—The pasture should be changed every few weeks. In pasturing sheep and lambs the benefit is not only to the animal, but to the pastures, which are greatly improved. Sheep are indiscriminate feeders, and will bite grass, shrubs, weeds and every green thing that starts in spring, and thus destroy and keep down most of the foul stuff that usurps the place of grass; and they tend to leave pastures clean for grass to grow. Their manure, also, is absorbed by the earth and becomes plant food, and accomplishes what cannot well be done by grubbing or top-dressing to renovate land. If sheep graze wheat during the winter and early spring they will destroy numbers of the eggs and larvæ of chinch bugs, army worms and Hessian fly, which lay their eggs in spring and fall, and hatch the first warm spell. In many instances wheat has been saved from destruction by the grazing of sheep. Blue grass affords excellent winter pasturage, but early sown rye is a good substitute for this. The value of winter pasture can scarcely be estimated too highly. The idea that distaste for ordinary winter food is created, finds no warrant in the experience of those who have tested the policy. The advantages of winter pasture are found in the wholesome effect upon the animal system, by mingling the green and the dry food. Another consideration is the fact that exercise, which is essential to thrift, is secured while the few bites are being snatched from the frozen ground. It is important that the fences around sheep pastures should be close and well kept, especially that walls should be well laid up and gaps in rail fences stopped.

SHEARING. — This is an annual operation, usually taking place at the end of May or 1st of June, the precise period depending on the state of the animals, those in high condition being ready sooner than are lean, the wool coming off readily at that time. It is best not to wash sheep, as they are apt to catch cold, and the wool often becomes dirty before shearing. But if they are washed, the first object is to provide a convenient place. It is common for men to stand in the water for it, by which they sometimes get bad colds and rheumatic complaints, and must besides be supplied with gin; so disagreeably situated, they hurry over the work, and the wool suffers. A stream or pond offers the requisite opportunity for doing it well, and at the same time comfortably to the men. Rail off a portion of the water for the sheep to walk into by a sloped mouth at one end, and to walk

out by another at the other end, with a depth sufficient at one part for them to swim; pave the whole; the breadth need not be more than 6 or 7 feet; at one spot let in on each side of this passage, where the depth is just sufficient for the water to flow over the sheep's back, a cask, either fixed or loaded, for a man to stand in dry. The sheep being in the water between them, they wash in perfection, and pushing them on, they swim through the deep part, and walk out at the other mouth, where is a clean pen, or a very clean, dry pasture, to receive them. Of course there is a way to the tubs, and a pen at the first mouth of the water, whence the sheep are turned into it, where they may be soaking a few minutes before being driven to the washers. The shearing is done after a few days, during which the sheep should be kept in a dry meadow. The best method practiced is to lay the sheep on a bench or scaffold as high as suits the shearer, with the hind legs stretched out and tied; then put a rope or strap over the neck and through the bench, so as to keep the sheep from floundering or throwing its head up, with the feet toward you; then begin on the hind leg, and shear toward the head and back. When the first side is done, turn the sheep, with his feet under, so as to bring the back to you, and complete the shearing. This leaves the fleece whole.

WOOL.—The wool covering the ribs, back, shoulders and side of the neck, is considered finest; and next, that clothing the upper part of the legs and thighs, and extending up to within a short distance of the haunch and tail. A coarser kind covers the uper part of the neck, throat, breast, belly, and lower parts of the legs. Temperature, pasture, food and management, exert great influence on the fineness of the wool; and the value of the sheep is in proportion to the equal quality of the wool on all parts of the body. Soundness and elasticity are important properties, especially in long wool, in which they are indispensable. Fine wool has a regular fibre, free from coarse hairs; fineness of staple is always accompanied by an equal growth of wool over all parts of the animal, and marked by an absence of shaggy spots seen on poor and half-fed sheep. Felting on the back of sheep very much injures the quality of wool; and though this occurs among heavy breeds, yet it is commonly the result of a scanty supply of food. A desirable quality is softness of pile. This depends on the fineness of the fibre; and as the yolk imparts richness and pliability, as well as nourishment to the wool, it necessarily exerts some influence on the softness of the pile. The color of wool is of importance; for the purchaser never loses sight of purity and perfect whiteness. Sheep should never be lifted by the wool. When about to catch one, move carefully toward the one to be taken, until you are sufficiently near to spring quickly and seize the animal with both hands; then pass one hand round the body, grasp the brisket, and lift the sheep clear from the ground. The wool must not be pulled. If the sheep is heavy, let one hand and wrist be put around the neck, and the arm pressed against the leg.

WOOL, To Clean.—Make a hot bath composed of water, 4 parts; urine, 1 part; enter the wool, opening it out, to admit the full action of the liquid; after 20 minutes' immersion, remove from the liquid, and allow it to drain; then rinse it clean in running water, and spread out to dry. The liquid is good for subsequent operations; only keep up the proportion and use no soap.

TREATMENT OF DISEASE.

ABORTION.—Various causes produce it, such as exposure to severe weather, fatigue in snow, leaping ditches, crowding through narrow gateways, being worried by dogs, over-driving, a too free use of salt; but mostly by the unlimited use of turnips and succulent food, so as to cause diarrhea. It may occur at all periods of pregnancy, more especially when the ewe is about half gone. The first symptoms are dullness and refusal to feed; the ewe will mope and be heard to bleat unusually; followed by restlessness, often trembling, with slight labor pains, and in the course of 12 hours by abortion. *Treatment:* Prevent, by avoiding the causes mentioned above.

ANEMIA.—This is vulgarly called *Pale Disease.* Most common in young stock from 3 mos. to 1½ yr. old. There is weakness, loss of appetite, drooping head, the skin loses its reddish cast, the nose becomes pale, the eyes are devoid of the minute blood vessels seen under the eyelids in health. As the disease approaches death, the blood turns to water, and a ghastly whiteness is visible throughout. Sheep, when attacked are found infested with long, flat worms, which look like the tape-worm of the human family, only not as large. These worms increase in numbers and gradually destroy the blood, sooner or later ending in death, if the cause is not removed. *Treatment:* For 3 mornings give ¾ tablespoonful turpentine, with 2 tablespoonfuls raw linseed oil, to each lamb or sheep; skip 3 mornings; then give the same dose 3 mornings again. Continue this until the worms are removed. During this time give liberally of tincture of iron, ½ teaspoonful, once or twice a day. The animal should be removed to comfortable quarters during the above treatment.

APOPLEXY, or STAGGERS.—Cerebral apoplexy is the result of high feeding, and the system adopted for producing extraordinary plethora. Thus high-class sheep prepared for exhibition, and excited by traveling, have been known to fall dead in the show-yard. Hot weather, luxuriant grass, and over-exertion, or long journeys by rail, operate fatally on over-plethoric animals. Sudden as this disease usually is, there are however, premonitory signs, such as refusal to feed, loss of the cud, dullness,

congested membranes, hurried and heaving respiration. In acute cases the animal is first seen to stagger, or reel, fall, and after violent struggles dies, the whole of the stages being often completed within 15 or 20 minutes. At the commencement of the usual attack the signs are as follows: pulse full and somewhat accelerated, breathing loud and stertorous, nostrils dilated, blindness is evident, the eyes being open, but amaurotic, and as he moves about he falls over anything in the way. Some sheep will stand persistently, and ultimately will fall and die on the spot, others succumb when forced to move, and after falling, seldom move, and die very shortly. In all such fatal cases there is room for more than a secret belief that the accepted causes minister to some occult form of tissue degeneration within the brain. *Treatment:*—1. Bleeding, only while the pulse is full; in later stages it hastens death.—2. Strong purgatives, with enemas; and strong derivatives to the loins and spine, as liniment of ammonia, etc. Belladonna, nitro-glycerine, and bromide of potassium, to dissipate cerebral congestion, or injection of atropia hypodermically, and when tonics are required, strychnia or nux vomica to restore tone to the nerve tissue. —3. Give, for a purging drench, Epsom salts, 2 oz.; linseed oil, 2 oz.; warm water, 4 oz.; repeated every 6 hours, if the bowels are not well opened, and give once or twice a day tartar emetic, 2 gr.; nitre 1 dr.; gruel, 2 oz.; mix.—4. The advent of one or more such cases should induce the owner to investigate the causes, and he must discriminate carefully between this disease and others which also exert their effects through the medium of luxuriant pastures and highly nutritious food. The apparently healthy should be bled and purged, means of daily exercise also given, and food somewhat less stimulating be provided, a dose of saltpetre or chlorate of potash being placed in the troughs daily. Sheep recovering from the immediate shock of apoplexy are exceedingly liable to an attack of phrenitis, and ultimately succumb to that disease.

ANTHRAX.—Blood-poisoning among sheep, taking the various forms of anthrax, may have their origin in the organic impurities of water, food, etc. Pastures near the farmyard, laid down during many years, are often loaded with the putrid elements of manure to an extent far beyond its power to assimilate, and they are taken up unchanged by the vegetation, to its great detriment as food for stock. The importation of wool, coming from foreign countries never free from anthrax, largely contains the poisonous germs. The hoofs, horns and hides of cattle transmitted from similar places are equally dangerous commodities. But refuse wool proves a most widely destructive agent, as it is turned out of the cloth manufactories of the United Kingdom in the form of shoddy manure. Land fertilized with these preparations is often constituted a permanent home of the disease, the most virulent and fatal forms being developed among cattle, and even mankind. Palliative and preventive measures are recommended rather than active remedies, including the removal of dead animals, and separation of diseased from healthy ones, as well as small doses of purgative medicine, followed by small doses of nitre.

BLADDER, Weakness of.—Sheep in low condition, having passed through a trying winter, or the effects of protracted disease, are sometimes unable to discharge efficiently the contents of the bladder in a continuous stream. There are no evidences of pain, but the attempts to urinate are frequent; the animal stands passively prepared, without straining, and succeeds only in discharging a small quantity in an intermittent flow. The cause is want of tone in the bladder, notably the muscular coat, arising from general debility of the system or a previous attack of inflammation. *Treatment:* Promote regular action of the bowels by means of enemas; give linseed mucilage as a drink, and let the food be composed of the best kinds, supplied judiciously, with ample opportunity for exercise. The remedies should comprise tonics, as saccharated carbonate of iron, 1 oz.; gentian and ginger, of each, 2 oz.; linseed mucilage, 1 pt.; divide into 4 or 6 doses. The iron, gentian and ginger may be mixed and divided into 4 or 6 powders, 1 of which may be given in manger food, morning and night; 1 or 2 gr. of finely powdered cantharides may be added to each dose of the tonic powders, and continued a few days, missing 1 or 2, and renewing the dose in like manner as required, until the full tone and functions of the bladder are restored. Uncertain and dangerous results are common where cantharides are administered incautiously and irregularly, or when continued too long. Careful attention to the directions already given are therefore essential.

BOTS.—The symptoms are nausea, weakness, sneezing, slow pace, turning the head, holding it down, and pushing against the nearest object; a shining, pus-like matter flows from the nostrils, often adhering so firmly to the apertures as to close them up, and cause difficulty of breathing; dullness, indifference, swelling of gums and mouth, ulceration and convulsions. It also makes the sheep turn round frequently, as if they were infested with hydatids, which occasions the disease called the gid. *Treatment:* They are either taken out alive, by trepanning the skull, as for hydatids, or an attempt is made, by injection into the nostril of animal oil, diluted with water, to kill them.

BOWELS, Inflammation of.—The symptoms are, restlessness; resting on one side, and then on the other; walking up and down, as if looking for a place to lie down. *Treatment:* 2 oz. castor oil; 5 gr. calomel; 2 dr. laudanum; 2 oz. molasses; beat up with an egg and as much water as will be sufficient for a small drench. Repeat in $\frac{1}{2}$ doses every 6 hours.

BRAIN, Hydatids on, or GID.—A complaint proceeding from the presence of bladder worms (a species of tapeworm) in the brain, lodged in a sac or bladder, which presses upon the brain. *Treatment:* When once seated, nothing can be done, though the skull is often examined for a

soft spot on the bone, where the water is collected. Perforate the skull with a trocar, accompanied by a tube, through which the water may escape; after which, apply a few drops of essence of myrrh to the aperture; shelter the animal and dress the wound.

BRAIN. Inflammation of. — Often attacks the healthiest sheep of all ages, more frequently in hot weather. The eyes protrude, are bloodshot and bright; the countenance eager and ferocious. The animal is in constant motion; he gallops about, attacking his fellows, the shepherd, and sometimes a post or tree; he is laboring under delirium, and this continues until he is exhausted. He then stands still, or lies down, panting dreadfully, when he starts afresh, as delirious and as ungovernable as before. *Treatment:* Bleed from the jugular vein until the animal falls; then give a purging drench. The sheep should be removed into a less luxuriant pasture.

BRAXY.—A blood disorder, having special manifestations due to sudden changes in the quality of the food, as when sheep are folded on turnips, rich pastures, etc., and otherwise forced in order to prepare them speedily for the butcher. The symptoms, as a rule, are very speedily developed, and very few premonitory signs are observed. When such are present, they consist of unusual excitement, bloodshot eyes, full and rapid pulse, accelerated respiration, mouth, body and limbs are hot, costive bowels, deficient and highly colored urine, with a peculiar staggering gait, in which the creature takes short steps. Colic, as indicated by uneasiness, lying down and rising repeatedly, is characteristic of some cases; while others separate themselves, and stand persistently with the back raised, head depressed, hanging ears, clapped fleece, dull eyes, and swollen abdomen. In the more violent cases, the above mark the commencement of the critical stage, when the feces are voided with pain and covered with mucus, or even blood; the heart throbs violently, and colic causes great uneasiness, between the paroxysms of which sudden insensibility comes on, and passes into distressing convulsions, in which the animal expires. In some instances the final struggle takes place while the animal stands, or has just risen to its feet. He then throws the head upward and backward, the fore limbs refuse their support, and he falls forward, death speedily following more or less painful convulsions. *Treatment:* Accumulated experience not only declares the uselessness of medical treatment, but strongly condemns it. When the symptoms are sufficiently recognizable the fate of the animal is already sealed, the termination, by a rapid and agonizing death, being very near at hand. The advent of the disease in one or more animals should prompt the owner to make a strict examination of the whole flock. Those in which the premonitory signs are even but slightly present should have immediate attention, a sharp run of 200 yards or more having the effect of stimulating the circulation as well as the digestive organs, at the termination of which it is a judicious proceeding to extract blood from the facial vein, jugular, plate or saphena vein. Purgatives with stimulants should immediately follow, the action of these being promoted by enemas of soap and warm water. A proper action of the bowels, with an improvement in the general appearance of the animal, will suggest a change of diet, some of the forms of a less nutritious quality, conjoined with the use of cooling salts, as the nitrate or chlorate of potash, being regularly supplied, and with these the opportunity for free exercise daily must not on any account be omitted.

BRONCHITIS.—This affects adult sheep when subjected to severe wet and cold, especially after being washed or shorn. Other conditions of exposure also bring it on, especially when food runs short in quality as well as quantity. Lambs are peculiarly liable to it, as a result of being too early subjected to cold, and especially prolonged wet weather. The symptoms comprise severe constitutional disturbance—fever, in which the circulation of blood is rapid, as denoted by the pulse, accompanied with a corresponding elevation of temperature. The first will number probably 100 beats, and the latter, as registered by the thermometer, may be 106° to 107° F. The cough is persistent, wheezy, troublesome, and even distressingly painful; the inspirations are short and difficult, and loud breathing sounds are heard in the bronchiæ by applying the ear to the bottom of the windpipe in front of the chest. *Treatment:*—1. Bleeding robust patients is tolerated only at the very outset, and when the pulse is full and strong. All depletive measures are hurtful beyond this stage.—2. The following proves a good fever draught: Take solution of acetate of ammonia, 1 fl. oz.; extract of belladonna, 20 gr.; cold water, 5 fl. oz. Make an emulsion by rubbing the extract of belladonna with successive portions of the water, then add the ammonia. This must be prepared as required. Stimulants may be added when necessary, as nitrous ether, or aromatic spirits of ammonia, when there are signs of prostration. The usual requirements for shelter, warmth, good bedding, and comfortable quarters must not be omitted as important factors in the cure of the patient.

CATARRH.—Sheep run at the nose sometimes on account of cold, but often it is chronic catarrh, which is not easily cured. The symptoms are, a thick yellow discharge from the nose. It clings to the nostrils, and obstructs the air passages, and is frequently accompanied by a cough. *Treatment:* If sheep are made to inhale the steam from hot vinegar, or a decoction of hops, they will throw out a great deal of mucus, which will be loosened by inhalation. The steam may be made by dropping a live coal into a vessel containing the liquid, or by inserting a hot iron. After the mucus has been discharged, smear the nostrils with pine tar. Scotch snuff dropped into the nostrils will cause the sheep to throw out the mucus, but this remedy is not so effective as the steaming. A hood may be put on the head of the sheep to prevent the steam from escaping, and the head of the animal must be held over the vessel.

Sheep affected with catarrh should not be exposed to cold storms or winds, as either will increase the malady.

CHICKEN-POX.—This affection bears close analogy to the *Varicella Bovum*, or chicken-pox of cattle, and has been described by various Continental writers. The symptoms arise in the form of slight constitutional disturbance, with the formation of pustules on the coronet of the hind feet, and on rare occasions only on the fore feet or lips. They are constantly found on the udder and teats, at first being minute, hard, and inflamed knots in the skin, which eventually suppurate, dry up, and leave a scab on the site. The duration of the disease lasts from 12 to 14 days. The disease has been described as an acute form of ecthyma, and is also considered by some as a variety of true sheep-pox. *Treatment:* Very little satisfaction arises from the best efforts in this direction. During constipation in the early stages the following drench may be given:—1. Take linseed oil, 4 or 5 fl. oz.; solution of the acetate of ammonia, 1 fl. oz.; sulphuric or chlorie ether, 1 fl. dr.; mix, and administer slowly.—2. The mouth may be dressed with the following: Take of alumn, in fine powder, ½ oz.; tincture of myrrh, 1 fl. oz.; sulphurie acid, 20 drops; soft water, 1 qt.; mix the alum with ½ of the water, add the acid, and stir with a stick until a clear solution is obtained; then put in the tincture and fill up with the remainder of the water, when the lotion is ready for use.

CHOKING.—This accident occasionally arises from the accumulation of food, or the lodgment of a portion of root in some part of the throat or gullet, when signs of severe distress are developed. Rupture of the gullet, or even the stomach, may ensue, the first arising from the obstruction, the latter in consequence of gaseous distension and interference with the functions of distension. When the obstruction is in the upper part of the throat, it may be reached by a long iron spoon, etc., and withdrawn; and at the outset, when situate within the upper portion of the gullet, the substance being small, it may be caused to pass downwards by gentle mechanical pressure outside with the hand, especially if a small quantity of the mixture about to be referred to is poured into the mouth and allowed to reach the spot. When the obstruction is still lower down in the gullet, and apparently fixed, a dose of the mixture, in conjunction with gentle manipulation, may cause it to descend. The most suitable remedy for this purpose is composed of 4 oz. of raw linseed oil, to which ½ oz. of sulphuric ether has been thoroughly mixed; 1 oz. of the mixture may be first tried, and the manipulation resumed, other portions being administered as required until the whole has been given. When this fails, the probang must be used with as little delay as possible, and in the following manner, avoiding force as much as possible, otherwise the gullet may be seriously wounded, an event which terminates fatally. The sheep is turned on his rump by a stout person, who from behind holds the fore feet in his hands, and with his knees grips him firmly at the shoulders. The operator, standing in front, fixes the gag in the mouth, or uses his hand for the purpose, and gently passes the probang, bulb end downwards, toward the obstruction, which, when reached, may be steadily pushed downwards into the stomach. During this operation the course of the mouth and gullet must preserve a straight line as far as is possible, which will greatly assist the operation. When this fails, the practitioner opens the gullet, providing the situation of the offending body is quite visible, and removes it through the incision. The wound is then closed by sutures, and usually heals without trouble, the animal being fed on soft diet for some time, and the wound protected by a bandage. In the absence of a suitable probang, one of which should always form part of the accessories of sheep industry, a stout cane or rod of hickory, elm, etc., about 5-16th of an inch in diameter, may answer efficiently, the end being protected by means of a piece of stout chamois leather, covering a piece of cork trimmed to form a ball-shaped protuberance about ¾ in. in diameter. To insure an easy passage, the whole should first be smeared with oil.

CHOLERA.—Hundreds of lambs die annually with this disease. Few flocks escape without a loss of 3 or 4, and many lose from 25 to 50. A thin lamb, or one poorly suckled or hand fed, seldom dies with cholera. *Treatment:* Stir as much salt into ½ gal. of pine tar as it will take. The lambs will then soon learn to lick the tar.

COLIC, Wind.—Also called *Blown* or *Bloat*. When sheep are first turned on a pasture more nutritious than that to which they have been accustomed, if they are not watched and kept moving during the day, and folded elsewhere at night, they are apt to overload the paunch, so that it can no longer contract upon and expel its contents; fermentation ensues, and the expulsion of gas; the paunch is extended to the utmost, and the animal often suffocated. *Treatment:* Pass a common elastic tube down the gullet into the paunch. Give a hypodermic of 1 gr. sulphate of morphine in solution under the skin of the neck, repeated every half hour, until evident narcosis. When a sheep is first seized, he will often be relieved by being driven gently about for an hour or two and put into a bare pasture. In the act of moving, these pillars will be occasionally separated a little from each other, and the gas will escape; but the animal must not be galloped or driven by dogs, lest the stomach be ruptured. After relief of the painful distension, give the following: Glauber's salts, 1 oz.; hot water, 1 oz.; peppermint water, 4 oz.; tincture ginger, 1 dr.; tincture gentian, 2 dr.; every 6 hours till the bowels are opened, and ½ the quanty the next 4 mornings.

CONSTIPATION, or STRETCHES.— Derangement of the stomach and intestines, as known by non-passage of excrement, is common to ovine animals of all ages. Adult sheep suffer on land of very dry nature, especially when the pasturage contains grasses and plants possessing astringent characters. An abnormal hardness, with scarcity of feces should lead to close examination, or enteritis, dysentery, etc., may

supervene. Injections of warm water (oil is preferable) or soap and water should be used, which will direct attention to the state of the anus, and consequently suggest the removal of feces, wool locks, etc., and other obstructions. Linseed oil is a safe and effective remedy for sheep of all ages, both as a purgative and injection. In young animals constipation may be treated by a mixture of warm milk, about 100° F., to which molasses has been added, to produce a reddish-brown color. A small syringe must be used, and 2 or 3 oz., according to size of lamb, must be injected. During the operation the lamb is held by the hind legs, and raised to a perpendicular position, the fore feet only being allowed to touch the ground. Some flock-masters use 2 or 3 spoonfuls of hog's lard as a purgative. Constipation in young lambs is a common result of being fed on cow's milk; sometimes the first milk of the mother brings about the same result; and young lambs allowed to drain the udder of the ewe after a long fast often suffer acutely. In addition to injections for this complaint, linseed or castor oil are safe purgatives, and are beneficially combined with rhubarb, ipecacuanha, ginger, gentian, etc., by which combined useful effects are derived. For constipation in newly born lambs, purge the ewe, and unload the rectum of the lamb by mechanical means. In more severe cases the lamb must be treated direct, and with promptitude, as constipation is frequently the precursor of serious and fatal complaints. An infusion of Eupatorium perfoliatum and pumpkin-seed tea are sometimes employed as laxatives in doses of 6 teaspoonfuls, and their action is said to be prompt and efficient. It is important to observe that on the removal of constipation the return to ordinary kinds of food must be observed with the greatest care. Small and frequent allowances of moist, laxative aliment only should be allowed, until the stomach has resumed its natural functions and the system has regained its usual tone.

COSTIVENESS.—This is not an infrequent complaint, and must be speedily attacked; for it is either the accompaniment of fever, or it will speedily lead to fever. *Treatment:* If there is fever, give tinct. of aconite root in 10-drop doses every 2 hours. Then give 1 sc. calomel; 1 oz. Epsom salts; 1 sc. ginger; 1 dr. gentian; 2 oz. warm water; 1 oz. linseed oil; give either alone or with gruel, to a full-grown sheep; and from ½ to ¾ to a lamb, according to age. After the operation of the cathartic, give as a tonic simple doses of quinine twice a day for 1 week or more.

CROUP.—This is common to lambs bred in localities subject to cold and damp, and also to those in high exposed situations. A severe form of sore throat—laryngitis—attacks the animal suddenly; the breathing is described as painful and wheezy, being seriously intensified by changes of temperature, and notably at morning or night. At these times the attendant cough is aggravated by spasms of the larynx, producing serious distress. Fever is intense; pulse will number from 90 to 100 beats, and the thermometer registers 107° F. or more. The specific sign in this malady consists of the formation of false membranes on the inner surfaces of the larynx, or throat—albuminous shreds—as a result of the violent inflammation in the mucous surfaces. These, in ordinary course, are discharged, on or about the third day, by the violence of coughing. *Treatment:* When a number of animals are affected, their effectual treatment is a somewhat doubtful matter, unless careful individuals take up the task as a special duty. Fresh air and perfect ventilation, with freedom from cold draughts, are all-essential. These being secured, warmth to the skin should be maintained by suitable clothing. The next essential is a suitable degree of moisture in the atmosphere, which is readily liberated from heated water. A smart blister should be applied to the outside of the throat; this may consist of the usual oil of cantharides or mustard, to which turpentine has been added. The activity of the cough may be mitigated by aconite, chloric ether, chloral hydrate, tincture of opium, lobelia, etc. The mucilage of marshmallow, slippery elm, etc., are also available for the same purpose. In extreme cases it may be needful to dress the affected parts of the throat internally with a mild caustic, for which nitrate of silver is most useful, about 8 or 10 gr. being dissolved in 1 oz. of water. This should be applied by means of a roll of tow or piece of sponge firmly secured to the end of a suitable cane, piece of stick, or whalebone. Sudden prostration of strength is not an uncommon stage in the progress of this disease, which requires the administration of stimulants, as the aromatic spirits of ammonia, and tonics, as gentian, quinine, etc.

DIABETES, or PROFUSE URINATION.—An abnormal discharge of urine, probably not in all cases meriting the term diabetes, may exist in consequence of mere functional derangement, the original cause being the irritant properties of plants, etc.; forming the food of the animal. In such cases the odor of the plant may prove a guide to the cause. Diabetes, however, attends upon wasting diseases, especially those which result from improper food and defective management generally. The symptoms comprise a chronic form of dyspepsia, rapid loss of flesh, pale membranes, irregular bowels, unequal temperature, small, weak, and irregular pulse, abnormal appetite, and inclination to eat rubbish. The prominent symptom is profuse urination, coupled with increasing weakness. The animal wanders away alone, and is eventually found dead in some isolated spot, or has fallen into a brook, river, pit, or over the rocks. In these cases the cause is not always properly made out, death being ascribed to the accident instead of the disease. *Treatment:* Rarely successful. Mild aperients are needed to correct the prevailing dyspepsia, which are to be followed by iodine, phosphate of iron, etc., the food being of the best and most nutritious character, as well as of easy digestion, and supplied with sound judgment. Warm and sheltered quarters, good beds, and efficient nursing are pre-eminently necessary.

DIARRHEA.—Frequently attacks lambs when

they are but a day old and carries them off in a day. Oftener it does not appear until they are nearly a week old, and the lambs have not then a much better chance. But if they are 2 or 3 mos. old, and have gained a little strength, they may, perhaps, weather the disease. Sheep changed from dry food to grass, frequently have it. *Treatment:* Remove the sheep from dry pasture and give only dry food for a few days. For lambs give the following:—1. 2 oz. prepared chalk; 2 dr. powdered canella bark; ½ oz. tincture catechu; ½ oz. laudanum; 1 pt. water.—2. 2 oz. castor oil; 2 dr. laudanum; ½ to ½ is a dose for a lamb.

ECZEMA.—A form of erythema attended with the formation of numerous small vesicles or bladders. These by bursting leave the skin and wool moist with their contents, and occasion great irritation, causing the animal to rub the affected parts against some object, as a wall, post, etc., eventually producing a sore. Newly washed or shorn animals are affected, especially as a result of cold weather succeeding the operation. Successive crops of vesicles appear for a time, invading fresh skin, and thus the disease is continuous. Plethoric animals are the common subjects. *Treatment:*—1. Administer an aperient; Epsom salts, 4 to 6 oz.; gentian, 1 to 2 dr.; ginger, 1 to 2 dr.; mix, and administer in linseed mucilage. Follow with daily doses of the nitrate of potash in the food.—2. Laudanum, water, and glycerine may be used as a lotion.—3. An ointment of morphia, belladonna and lard is exceedingly efficacious.—4. Regular diet, exercise, cleanliness, etc., are important auxiliaries in the process of cure.

EPILEPSY.—In this disease the animal suffers from convulsions. The duration of the fit varies; sometimes it terminates at the expiration of a few minutes; at other times, ½ hour elapses before it is perfectly conscious. *Treatment:* Give dr. doses of bromide potassium, 3 times a day, dissolved in gruel.

EYES, Inflammation of.—*Treatment:* When there is much inflammation, bleed slightly from the facial vein, that is the vein which runs down obliquely from the eye, and bathe the eyes with the following: Nitrate of silver, 5 gr.; water, 1 oz.; laudanum, 15 drops; dissolve the nitrate of silver in the water; add the laudanum, and mix.

FLEAS.—*Treatment:* Mix 10 parts benzine, 5 parts common soap, and 85 parts water. Generally one or two applications to the fleece are enough.

FLEECE, To Prevent Diseases of.—To prevent sheep from contracting disease, wash them twice a year. The following is a good contrivance: Have a ditch dug 8 ft. in depth, a little over 1 ft. wide and 100 ft. long; in this put 600 gals. water; 200 lbs. sulphur; 100 lbs. lime; 6 lbs. soda; all of which heat to 130°; for a small flock, this size and the quantities of materials can be reduced *pro rata*. Drive the sheep into a trap at one end, and they will be compelled to swim through to the other side, thus securing a bath and taking their medicine at the same time.

FOOT ROT.—A disease where the hoofs unite with the bony structure, and in the cleft between the hoofs. If not attended to at once, it suppurates and the hoofs come off. The first symptom is lameness. The foot is hot, and the animal shrinks if it is firmly pressed. It is particularly hot and painful in the cleft between the two hoofs; and there is generally enlargement about the coronet. There is an increased secretion, usually fetid, and often there is a wound about the coronet, discharging a thin, stinking fluid; sometimes there is a separation of horn from the parts beneath, and that too frequently preceding the dropping off of the hoof. *Treatment:*—1. Pare off all the diseased portion; wash off the matter and apply the following: Turpentine, 2 oz.; sulphuric acid, 2 dr.; lard, 1 lb.; tar, ½ pt. After treatment, the animal should be kept on a dry footing. As soon as the disease appears in a flock, the sheep affected should be isolated at once.—2. 1 oz. corrosive sublimate; 1 oz. blue vitriol; 1 oz. spirits of salts; 1 oz. verdigris; 1 oz. horse turpentine; ¾ oz. spirits turpentine; 4 oz. mercurial ointment; mix well, and keep tied down in a bottle when not in use. Apply every 2 days.

HEAD, Grubs in.—Caused by the worm hatched in the nostrils from eggs of the sheep gadfly. The eyes become weak, watery and swollen, and the sheep makes violent efforts to clear the nostrils. *Treatment:* Prevention is the best remedy. Set traps for the flys, and smear the sheep's nose with tar during fly-season. Scattering slaked lime about the feeding places causes the sheep to sneeze, which expels the grubs. Scotch snuff injected into the nostrils will also expel them.

HEART, Dilatation of the.—This condition consists of an enlargement of one of the cavities of the heart, without material addition to the substance of the organ. The causes are those which produce enlargement. The symptoms comprise absolute lack of power, appetite, and energy; difficult breathing, increasing weakness, palpitations, tendency to faint, coldness of the limbs, etc. In this, as in enlargement of the heart, the animal must be kept very quiet; the forcing system of feeding must be abandoned, and preparation for the butcher accomplished slowly.

INDIGESTION and DEBILITY.—(*See Costiveness.*)

INFLUENZA.—This may be distinguished from a cold, or from bronchitis, by the discharge from the nostrils being more profuse and the eyes nearly closed, great uneasiness of the head, and a sudden prostration of strength. *Treatment:* The same as for *Catarrh*, which see.

ITCH, or SCAB.—An ailment that will spread rapidly through a large flock, causing the animals afflicted by it to lose flesh rapidly, and besides this they lose ½ their fleece. It is purely of a local nature, and due to an insect which attaches itself to the skin, and, in the movements necessary for the purposes of life, produces violent irritation, destruction of animal tissue, suppuration or formation of matter, ending in a subsequent incrustation over the affected parts. The skin of the affected parts first assumes a red appearance, shortly followed by a feeling of roughness under the finger,

which is due first to the slight raising of the cuticle, and very shortly to the formation of small white and hard spots, from the points of which yellow exudation rapidly follows; or they may be replaced by many small hard nodules, which successively become vesicles and pustules. The latter furnish the material for the scab or crust in the form of pus, which dries, and in the process becomes an isolated, round, and hard mass. In a subsequent stage further pustules form within the intermediate spaces, their contents uniting with the previous crop, that is, becoming confluent or running together. In this way the continued invasion of the acari produce new and large surfaces of diseased skin, constituting the state from which the vulgar term "scab" has been applied to the disease. Other changes also take place. The presence of pustular states cannot exist without calling into action the natural active processes for the removal of the diseased products. The lymphatic vessels and glands commence to absorb the effusion, the nature of which sets up some irritation within; they swell and become enlarged. This is especially aggravated by the extent of the abraded surfaces and subsequent attacks of the fly. *Treatment:*—1. Apply a mixture of 1 part of mercurial ointment with 11 parts of sulphur ointment.—2. Another useful remedy, which is more cleanly and agreeable, is composed as follows: Take "Sanitas" oil, 1 part; olive oil, 10 to 15 parts. Apply freely by means of a brush, taking care to break up the scabs and insure the entrance of the dressing beneath.—3. Take sulphur, 2 oz.; powdered sassafras, 1 oz.; honey sufficient to make into a paste. Dose, a tablespoonful every morning. Use, at the same time, a wash made of 1 gill pyroligneous acid, and 1 qt. water, mixed. Apply with a sponge. If a few applications do not remove the difficulty, take ½ pt. fir balsam, and 1 oz. sulphur, well mixed, and anoint the sores daily.—4. Use for a lotion, corrosive sublimate, 1 oz.; sal ammoniac, 4 oz.; spirits turpentine, 1 pt.; hot water, 2 gals.; dissolve the sublimate and sal ammoniac in water; then add the turpentine; separate the wool, remove the scab, and apply the lotion.

JAUNDICE, or ROT.—Consists of a superabundant discharge of bile, or an obstruction of the biliary tubes; and in either case a quantity of bile enters into the circulation, penetrates the capillary vessels, and tinges the skin. *Treatment:* Give repeatedly for a purge, 2 oz. Epsom salts; ½ dr. powdered ginger; 2 dr. aniseed; ½ pt. warm water. If this be too weakening, give 2 dr. powdered gentian; 1 dr. powdered Peruvian bark; ½ dr. powdered ginger; ¼ pt. warm water.

KIDNEYS, Inflammation of.—A derangement of these organs may result from external violence, or it may depend on the animal having eaten stimulating or poisonous plants. Its symptoms are, pain in the region of the kidneys; the back is arched, the walk stiff and painful, with the legs widely separated; there is a frequent desire to make water, and that is highly colored or bloody; the appetite is more or less impaired, and there is considerable thirst. *Treatment:* Give 1 oz. poplar bark, finely powdered; 1 teaspoonful finely powdered pleurisy root. Make a mucilage of the poplar bark, by stirring in boiling water; then add the pleurisy root; the whole to be given in the course of 24 hours. The diet should consist of a mixture of linseed, boiled carrots and meal.

LARYNGITIS.—Inflammation of the throat is of common occurrence during the repeated changes, and especially the ungenial states of the weather during spring and autumn. The usual signs of fever are observed, more or less intense, with proportionate increase of respiration, sometimes giving rise to panting; the head is held low and the muzzle protrudes, an attempt to obtain a free, straight passage for easy breathing; there is difficulty in swallowing, and it occasions a hard, tickling cough. These signs soon acquire intensity; the cough is troublesome and painful; the throat is also painful under pressure, the cough being reproduced by it. These conditions prevent the animal from taking food, or, if he attempts to feed, he cannot swallow, and the aliment is retained in the mouth, which is liberated in conjunction with much saliva if the jaws are separated by the insertion of a finger. The trachea or windpipe is also more or less affected, as shown by slight pressure inducing a cough and inconvenience in respiration. Sometimes swelling of the throat is seen externally. Under ordinary circumstances, weather being more genial and shelter, etc., available, the disease declines, and terminates by resolution, convalescence being established in a week or 10 days. Unfavorable cases terminate in bronchitis or sporadic pleuro-pneumonia. *Treatment:*—1. Ample protection from wind and wet is all-important, especially when the changes are severe and continued, affecting numbers of animals. Move the bowels by frequent warm enemas. Do not attempt to cause the animal to swallow medicines, or the result may be death by choking the passage to the lungs, etc.—2. The following may be used as an electuary: Take boratic acid, 1 part; linseed meal, 1 part; treacle, a sufficiency; mix the acid and meal in a mortar, afterwards add treacle to make a stiff paste; ½ teaspoonful to be placed on the back of the tongue, or between the teeth, 3 or 4 times a day.

LICE.—They run up and down over the body of sheep, causing a separation of the wool from the skin. They may be occasioned by dirt, insufficient food, or want of bodily exercise, or by previous disease. *Treatment:*—1. Use the following washes: 2 lbs. arsenic; 4 lbs. soft soap; dissolve in 30 gals. water.—2. 1 oz. corrosive sublimate; 2 oz. spirits of wine; rub the corrosive sublimate in the spirit until it is dissolved, then add 1 oz. cream of tartar; 4 oz. bay salt; dissolve the whole in 2 qts. water, and apply a little of it with a small piece of sponge wherever the lice appear.—3. Apply freely a mixture of 1 part sulphur with 7 of salt.

LIVER, Yellow Atrophy of the.—This form of derangement, unmistakably due to dietetic irregularities, constitutes a widespread source of loss among the flocks of New Zealand. The

symptoms are snatching movement of the right fore limbs after rest, with occasional lameness; dropping of both ears, at first only when at rest, afterwards constantly; a watery discharge from the eyes, and a peculiar and striking expression of face; disinclination to move, and apparent inability to bring the hind limbs forward, the feet seeming to be put down almost from whence they were lifted. The nose is protruded, the breathing becomes labored; the wool may be easily pulled out; and the sheep, having usually selected a quiet and shaded place, sinks and expires. Frequently from 36 to 48 hours elapse between the early marked symptoms and death, though often the time is much shorter, and a sheep will be found sometimes dying or dead which had previously shown no marked signs of illness. In all paddocks where these deaths occur it has been found that there is present in enormous excess food in which the albuminoid ratio must be probably 1.35. So great indeed is the profusion in which trifolia are found, that a sheep may almost lie down and obtain all it can consume without moving. Sheep will suffer from acute and extensive degenerative changes in the liver when kept under such conditions, especially in a climate like this. *Treatment:* The sheep should be removed to a paddock in which there is not a great profusion of food, and in which they will take exercise in search of it. Food must be at their disposal in such variety as will insure the presence of the well-known ingredients which are absolutely essential to the maintenance of a proper nutritive balance. Beyond this, a dose of laxative medicine, and a convenient supply of water, in which a little chlorate of potash may be dissolved, will be the only treatment necessary. When changes of pasture cannot be effected, the affected flock should be quietly driven into a stock-yard, or into sheep-pens, where such are available, each night, and only allowed on the pasture by day. Care must be taken to avoid overcrowding in the pens.

LOCKJAW, or TETANUS.—Caused by wounds on some part of the body. The jaws become set and the animal soon dies. The malady is usually fatal, and treatment is of little avail. *Treatment:* Keep the sheep warm and quiet; move the bowels as soon as possible with castor oil, and follow this with belladonna; when the animal begins to recover, give gruels.

LUNGS, Inflammation of, or PNEUMONIA.—The symptoms are dullness, hanging of the ears, quick breathing, cough, and discharge from the nostrils. *Treatment:* Dissolve 1 dr. tartar emetic in 2 oz. hot water; add 2 oz. laudanum; give 2 tablespoonfuls 3 times a day. After this a dose of salts should be given.

MEASLES, or RUBEOLA.—The manifestations of the disease are irritative fever, accompanied with elevation of temperature, catarrhal states, swelling of the head and throat, constipation, loss of appetite, etc. On or about the second or third day an eruption appears on the thin parts of the skin, chiefly confined to the inner sides of the thighs, also the sides of the body, chest, face, etc., consisting of perceptible elevation, with redness, which disappears on pressure. At the central part the swelling is also hard, from which point in the course of another day, arises a wheal or pimple, others also arising more or less on the surrounding surface, where such points of hardness were first observed. In 2 or 3 more days the acute signs are allayed, the spots become brown, the cuticle peels off, and the disease subsides by the ninth or eleventh day under ordinary circumstances. A peculiar odor of the skin is exhaled in the earlier stages, and the disease is propagated by the discharges from the nostrils and the scales from the skin. Fatal terminations are marked by the setting in of diarrhœa, on or about the ninth day. *Treatment:* From these characters the need of a definite method of segregation is indicated. The bowels should be moved during constipation by means of mild cathartics, as Epsom salts, followed by daily doses of saltpetre, hyposulphite of soda, etc., and a most essential proceeding is the daily application of "Sanitas" to the affected portions of the skin. Animals having recovered from the disease should be dipped in a "Sanitas" bath at the earliest and most suitable opportunity.

MICROBES.—Rural districts, islands of the sea, and mountains are free from microbes. In other words, fresh air, oxygen, kills them admirably. Open the windows and admit the health-giving breezes, which is death to all germs the result of filth. Lakes and rivers, free from sewage and decomposing refuse, do not contain bacilli. The direct or diffused rays of sunlight effectually destroys the pests. This is the universal remedy. As a sanitary arrangement, it is said that an open drain for conveying the fluids, etc., from houses is a sure preventive of disease. This old truth remains the same—given fresh air, pure water, with suitable food and exercise, health is preserved. Danger lies in the tendency to overlook or cover up the sources of disease, which are fairly well known, and, as a rule, may be suitably dealt with. Accept the axiom of the scientists, viz., "Mortality is lessened by hygiene," which simply means cleanliness in habitations, persons, and clothing, with pure air and water: and, as far as domestic animals are concerned, purity of stables, cow-sheds, sheep-folds, etc.

RICKETS.—This may be defined as inability to bear the weight of the body or the strain of muscular exertion. In this affection, as it occurs in sheep, the softening of the bones, arising from a want of earthy material, more particularly the earthy phosphates, with greater or less deformity, is the natural result of impaired function, having its origin in causes both remote as well as of a predisposing character. *Treatment:* That most likely to be of benefit will be of the character which will afford the necessary material for bone construction. Food rich in phosphates, as the cereals and oil-cakes, and even special forms of the salt as medicine, should be supplied, young lambs and sheep being additionally fed with fresh cow's milk. Rams and ewes apparently of rickety constitution should be rejected for breeding, especially if they have been known to yield offspring

tainted or affected with the malady. The number of the ewes for putting to the ram should be carefully estimated, and regulated so as to insure conservation of the vital powers. This is too frequently overlooked in the eagerness for gain. Ewes and rams at the time of mating should be in perfect health; liberal feeding with sufficient exercise are also called for during pregnancy, and when the yeaning time comes on, these precautions should not be relaxed, but regulated as the wants and condition of the animal may suggest.

ROT.—(*See Jaundice.*)

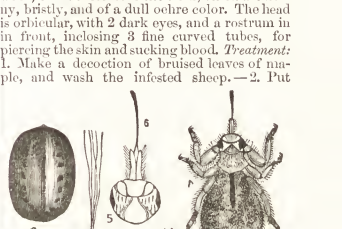
RUPTURE, or HERNIA.—This consists of the appearance, usually, of a tumor on the outer side of the abdomen, the contents of which are a portion or portions of the abdominal viscera. The most common form in sheep is situate at the navel, and is known by the term Exomphalus. The usual characteristics are a well-defined swelling, usually soft and fluctuating, which under ordinary manipulation disappears within the abdomen, and returns to its former size when pressure is removed. *Treatment:* Various methods are adopted. The most common consists in laying the animal upon its back, returning the bowel, and placing a ligature round the sac formed by the skin, which must be close to the abdomen. The circulation being thus cut off, the lower portion dies, and healing of the upper part ensues with adhesion to the orifice, thus closing it entirely. The orifice also may contract when pressure of the intestine is removed.

SHEEP LAUREL, Poisoning by.—When sheep eat of this shrub in great quantities, a disease is contracted called *Hoven*, with impactation of the rumen, accompanied by staggering gait, sleepiness, and inability to walk. *Treatment:* Give 2 dr. spirits ammonia in 1 tumblerful of cold water, once every hour, till 3 or 4 doses are given; withholding the medicine when the animal recovers, though only 1 dose has been given.

SMALL-POX.—This disease, although bearing the same name as that which attacks the human subject, is a perfectly distinct malady, and incapable of being communicated to man. In about 10 days from the time of the animal's having imbibed the contagion, feverish symptoms set in with a mucus discharge from the nose. Red inflammatory pimples begin to develop, first appearing where the skin is thin. After the pimples have been out about 3 days they assume a white appearance, and are filled with serum and pus. Some of the vessels dry up, leaving brown scabs; others, especially in the severer cases, run together, and the scarf skin is detached, leaving an ulcerated surface. It is in this ulcerated stage that the prostration reaches its height, and that most sheep die. *Treatment:* The affected animals must be kept separate from the healthy ones. Give 30 gr. chlorate potash, 3 times a day. Give nutritious food to tempt the appetite, such as bruised oil-cake, bran, and steeped oats.

SORE HEAD.—Often produced by the striking of the fly, especially in woody countries. Next to the tail, the head is most frequently and seriously attacked, and in defending themselves, the sheep are continually striking their heads with their hind feet, until at length a considerable sore or ulcer is formed. No sooner is this done than the fly persecutes the poor animal with tenfold fury, anxious to lay its eggs on or near the wound; and the ulcer will often spread so rapidly as to be difficult to heal, and occasionally it will destroy the sheep. *Treatment:* Procure a covering for the head, made of soft leather or brown paper. This should be cut so as to protect the whole of the head, and yet not to come too close to the eyes; then use the following lotion: 2 dr. carbolic acid; 1 pt. water.

TICKS.—This is one of the most annoying pests of sheep, and is not easily got rid of. When it becomes numerous it affects the health, lessens the growth of wool, and absorbs the vitalizing oil thrown out. The pupæ (shining bodies, like the pips of small apples, and similar in color) may be found attached to the wool; from these issue the ticks, which are horny, bristly, and of a dull ochre color. The head is orbicular, with 2 dark eyes, and a rostrum in in front, inclosing 3 fine curved tubes, for piercing the skin and sucking blood. *Treatment:* 1. Make a decoction of bruised leaves of maple, and wash the infested sheep.—2. Put



Sheep Tick.

1. Pupa. 2 Pupa magnified. 3. Tick. 4. Tick magnified. 5. Head. 6. Rostrum.

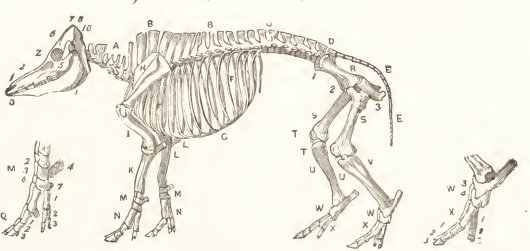
brown snuff into the wool. This is sure death to ticks.—3. Use mercurial ointment carefully, and in small quantities.

WOUNDS AND FRACTURES.—*Treatment:* If any sheep is hurt, catch it at once and wash the wound; and, if it is fly-time, apply spirits of turpentine daily, and wash with something healing. A broken limb must not be roughly stretched or handled, but the divided edges of the bone brought gently and as perfectly opposite, close and fitting again to each other as possible, and kept together by some strips of adhesive plaster, or pitch, spread upon leather, wound round the part. Over this splints should be placed, reaching a little beyond the joint above and below, and these confined with more plaster or waxed thread. A little lint or linen rag should be placed under the end of the splints, to prevent injuring the part beneath. This being done, the leg should not be meddled with until the bandage becomes loose, which will be in about 10 days. The splints must be replaced once, and, at the expiration of another 10 days, the edges of the bone will generally be found to

have united; the animal should be kept a little while longer as quiet as possible, and if the bone is not quite firm, apply the starch bandage to keep all firm, until perfectly healed. If swelling takes place after the splints have been employed, they have been put on too tight, or they do not press equally. They should not be taken off at once, but with a sharp and strong pair of scissors, 2 or 3 notches should be cut through the edge of the bandage above and below. This will afford sufficient room for re-establishment of the circulation, and the swelling will subside without the fracture having been disturbed.

SWINE.

ANATOMY AND BREEDS.



Skeleton of the Hog.

A, cervical vertebræ; B, B, dorsal vertebræ; C, lumbar vertebræ; D, sabrum; E, E, coccygeal bones; F, F, ribs; G, costal cartilages; H, scapula; I, humerus; K, K, radius; L, ulna; M, carpus or knee; 1, scaphoid; 2, semilunar; 3, cuneiform; 4, trapezium; 5, trapezoid; 6, os magnum; 7, unciform; 8, pisiform; N, N, large metacarpal or cannon; O, small metacarpal; P, P, sesamoid bones; Q, Q, phalanges; 1, os suffraginis or pastern bone; 2, os coronæ; 3, os pedis; R, pelvis (fore leg phalanges, 1, 2, 3); I, ilium; 2, pubis; 3, ischium; S, femur; T, patella; U, tibia; V, magnum; 4, cuneiform medium; 5, cuneiform parvum; 6, cuboid; 3, 6 cubo cuneiform; X, large metatarsal (hind leg, phalanges 1, 2, 3); Y, small metatarsal; Z, head; 1, inferior maxilla, 2, superior maxilla; 3, anterior maxilla; 4, nasal bone; 5, molar; 6, frontal; 7, parietal; 8, occipital; 9, lachrymal; 10, squamous-temporal; 11, petrous-temporal.

Swine have 44 teeth: 12 incisors, 6 upper and 6 lower; 4 canines or tusks, 2 upper and 2 lower; 28 molars, 14 upper and 14 lower. The pig is born with 4 incisors and 4 tusks On the 8th or 10th day, the 2d or 3d temporary molars appear. The 4 nippers, 2 on the upper and 2 on the under jaw, appear at 4 weeks old. The 1st temporary molars appear in the 5th or 6th week. At the age of 3 mos., the intermediate incisors appear. At 6 mos. the wolf teeth appear, and the 3d permanent molars. At 9 mos. the permanent tusks, permanent corner incisors, and the 2d permanent molars appear. At 12 mos. the permanent nippers appear; and at 18 mos. the 3 temporary molars will have shed, and the permanent ones appear. At 18 mos. the permanent intermediate incisors and the permanent rear molars will appear, and at 21 mos. these will be fully developed. After this, the age can only be determined by the wear of the teeth and the increasing length of the tushes.

BERKSHIRE.—One of the most popular of modern breeds. It came from the shire of that name in England, but has been much modified. It is now uniformly black, with some white on the face, feet, and tip of the tail, and these white markings are important. The hogs vary from medium to very large size; have a short, slightly dished face, with erect ears; short neck; noticeably broad back, straight, or slightly arched, with strong but finely boned legs. They

Berkshire.

have great vitality, fatten readily, and the meat is of fine quality, having a large amount of lean in proportion to fat. They require more feed in proportion to their weight than the breeds abounding in lard.

CHESHIRE.—One of the offshoots of the race common to the northern part of England. They are excellent bacon pigs, the sides being long, broad, and thin, and the flesh and fat streaked. They are good grass eaters, but by feeding on

corn have become more inclined to fat than the English races.

CHESTER WHITE.—One of the few American breeds. It took its name from its color and a county in Pennsylvania, in which, by various crosses, it was produced. Its size is large, nose straight, ears drooping, body long and deep, hams good, flank frequently light. In almost every State there are experienced breeders who prefer this breed to any other.

Chester White.

CHINESE.—Originally from Asia. There are 2 species, white and black; the former better shaped than the latter, but less hardy and prolific. Both are small limbed, ears and head fine, round in the carcass, thin skinned, and, when quite fat, the end of the snout only can be seen. They seldom reach great weight; are rather difficult to rear, and the sows are bad nurses. Their flesh is somewhat tender for bacon, rather fat, and their hind quarters so deficient in proportion to the size of the other parts, that they cut up to considerable disadvantage for hams. But their great aptitude to fatten, and the extreme delicacy of their meat, render them very valuable. The black are thrifty, and fatten on a small quantity of food. They are crossed with other breeds to considerable advantage, producing several kinds possessing properties superior to those of the parent stock. They are very prolific. There is also a mixed breed, patched with black and white; some with thick, pointed ears, like the true species, which they otherwise resemble in form; while in others the ears are rounded, and hang down.

ESSEX.—A small to medium sized, pure black breed, with fine dishing face, fine bones, great disposition to lay on flesh, and very quiet. It is admirably suited for crossing on coarse, rough hogs, but is counted too small for the great pork regions of the West.

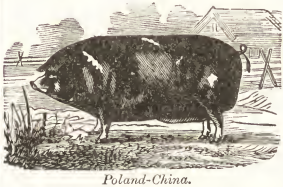
JERSEY RED.—The name most commonly given to a breed of large, strong, slightly coarse,

Jersey Red.

very hardy, healthy, and prolific hogs of a red or dark sandy color. They are sometimes called Durocs and Red Berkshires, although it is claimed by some that these are distinct breeds. Hogs of this general type have long been bred in New Jersey. They sometimes weigh from 500 to 600 lbs.; do not mature as soon as some other breeds; but are great favorites with many.

LANCASHIRE.—Divided into the short-faced, the middle breed, and the large. The short-faced are white, with short face, prick ears, and small bones. The middle breed partakes of the quality of the small breed and the size of the large. The large breed is the largest breed of swine known. They are short haired, hearty, and have flat backs, with large, square hams.

POLAND-CHINA.—Originated from various crosses and good selection by breeders in southwestern Ohio, and has been steadily improved for ¼ century or more. It is nearly black, often with the Berkshire markings, but white is not an evidence of impurity. The ears droop; the

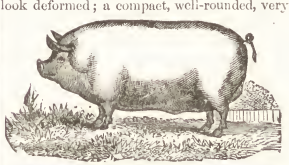


Poland-China.

size is that of the largest; the form like that of other good large breeds. It is quiet in disposition, matures early for a large breed, fattens well when young, and its flesh is of fair quality.

SIAMESE.—The animals are small, and have a cylindrical body, with the back somewhat hollow, and the belly trailing near the ground, on account of the shortness of the limbs. The bristles are soft, the color is usually black, and the skin externally of a rich copper color. The ears are short, small, and somewhat erect. The animals are not over hardy or prolific, and the females do not yield the same quantity of milk; but they arrive very soon at maturity; fatten on a small quantity of food, and their flesh is white and delicate.

SUFFOLK.—A small to medium-sized white hog, with peculiarities readily distinguishable. They have short, dished faces, so much so as to look deformed; a compact, well-rounded, very



Suffolk.

deep body on short legs and with heavy hams. They lay on fat with readiness; are quiet; mature early, but are sometimes shy breeders.

YORKSHIRE.—One of the best breeds. They are well haired, hardy, vigorous, prolific, and are good nurses, and weigh from 200 lbs. upwards.

Breeding and Rearing.

Boar.

AGE FOR BREEDING. — The boar may be coupled at from 6 to 8 mos. old, but it is better not to allow him to serve until 10 mos. old.

CHOICE FOR BREEDING.—Look to constitutional vigor; perfect form, without this, will degenerate the whole herd. The ideal boar has a short head, wide between the eyes; fine muzzle; lively eyes; silky ears; long, fine abundant hair, without bristles; short, well knit, straight legs; high, arching, short, full neck; full and rather compactly built body; strong masculine appearance.

Sow.

AGE FOR BREEDING.—Sows should not be allowed to breed until they are 1 yr. old, and if the female is kept much longer, it improves the size and vigor of the pigs.

CHOICE FOR BREEDING.— A brood sow should be a good milker; if deficient in this, she should not be retained as a breeder. An abundance of milk for the first 8 or 10 weeks of existence is the best preparation young pigs can have to fit them for profitable growth. Milking qualities in swine are as transmissible to progeny as in cattle. This trait may be greatly improved by retaining only good milkers for breeders, as well as by feeding them when young with a view to their development as milk producers rather than as fat producers. Spring and early summer litters are usually the best from which to select young brood sows. They can be kept through summer almost entirely on grass, which will make them grow nicely, and the exercise required in grazing will keep them in good health. At this period all animals naturally lay up fat which afterwards goes to enrich the milk. Hence, while not allowed to become over fat, they should yet be so fat as to supply this demand of nature, and retain the general vigor of the system.

FARROWING, Season for. — The best season for sows to farrow is April or early in May; an April pig is worth ¼ more than a July pig, and more than double a September pig. Some breeds can be fattened at any age, but will not fatten as well at 1 yr. or as much as at 15 to 18 mos.; a hog must arrive at full maturity before it is fattened. An April pig can be kept till a year from the following January at less expense and trouble than a September pig.

FARROWING, Treatment before. — Breeding sows are generally kept too fat. They will not bear when in this condition either so large or healthy pigs, and they are more liable to a wrong presentation, which is dangerous to both mother and young. A breeding sow should never be fed so liberally that she will attain her full growth. This is a condition for a porker and not for a breeding animal. A condition of half fat or thrift is the right one. There is large loss in making unnecessary growth with breeding sows in food which is thus wasted, and causing the sow to be too large and unwieldy, which makes her more liable to lie upon her pigs and crush them. Such sows will be slow to move, whereas, if lighter and more active, they would get up quicker when they heard the cry of a little one.

FARROWING, Treatment during.—Two litters of pigs may be obtained from the same sow in 1 year. The sow usually goes with pig 4 months. A week or 10 days before pigging, the sow should be separated from others, or the young may be devoured. If the mother shows any signs of devouring her young, muzzle her, and smear the little ones with whale oil and aloes.

FARROWING, Treatment after. — Sows should be fed lightly for a few days after the pigs are born, or there may be a surfeit of milk, which will cause the pigs to scour, taking more than they can digest, and causing caking of the udder and fever, which will check the flow of milk, and make it dry up. When this is the case, they should be thoroughly bathed with water, or vinegar, as hot as it can be applied. Thorough rubbing is also beneficial. Sometimes the mother's milk will not flow for a number of hours after the pigs are born. This condition may be known by the pigs appearing hungry and unsatisfied, and not lying quietly in the nest after sucking. Excellent food for increasing milk may be prepared by grinding corn and oats together in equal quantities by measurement, and making a slop of the mixture. To this may be added a little oilmeal with profit.

Pigs.

CARE.—The young animals, being tender, are liable to be destroyed after birth by the motion of the sow; to guard against this, they should be watched and the young ones removed as they are brought forth. During the 1st and 2d days after birth, or until they acquire strength, they should be removed from the sow, and occasionally admitted to suck.

CASTRATING.—The males may be castrated when about 1 mo. old; and a like operation, though not necessary, may be performed, at the same age, on such females as are not intended for breeding.

FEEDING.—Pigs need careful attention the first 3 or 4 weeks; about this period the pig reaches a point where the milk of a sow is not sufficient to keep up healthy growth, and, unless taught to eat before this time, there will always be trouble. The way to avoid it, is to teach them to eat and drink at the earliest age. This may be done by placing a little milk or other food, in liquid or semi-liquid form, in a

trough near them, but where the sow can not get at it. By the time the pigs are a week old they will learn to eat heartily. Give them plenty of nutritious food from this time on, and there will be no difficulty.

WEANING.—When they have been liberally supplied with food, weaning need not be deferred longer than 6 or 7 weeks; when delayed beyond this, the sow will be in low condition as the time of bringing forth young again approaches. When weaned, the young pigs should be fed 3 times a day on nutritious and chiefly farinaceous food, combined with milk or whey; and, in a few weeks, they will consume ordinary roots. Pigs, after being weaned, are sometimes allowed to go through the pastures, and depend on these for their food. In this case they frequently do great injury. The best plan is to confine them in pens, allowing them occasionally to go through the feeding-yard, to pick up any food scattered through it; and, in addition, supply them with a little green food, as clover during summer, and turnips or potatoes during winter.

General Management.

COMPARATIVE COST OF RAISING PORK AND CORN. — By the results of experiments, 1 bush. of corn, weighing 56 lbs., will produce 10½ lbs. of pork. Deducting 1-5 to come at the net wt., would give 8 3-5 lbs. of pork as the product of 1 bush. of corn, or 1 lb. of pork as the product of 6⅔ lbs. of corn; 3 4-5 lbs. of cooked cornmeal make 1 lb. of pork. Allowing that it requires 6⅔ lbs. of corn to make 1 lb. of pork(exclusive of the labor of the care of hogs), the proportion which the price of corn bears to that of pork, is exhibited as follows:

Corn per bush. Cents.	Pork per lb. Cents.	Corn per bush. Cents.	Pork per lb. Cents.
12½	1.50	38	4.52
15	1.78	40	4.76
17	2.	42	5.
20	2.38	45	5.35
22	2.62	50	5.95
25	2.96	55	6.54
30	3.57	60	7.14
33	3.92	65	7.74
35	4.	70	8.57

By reversing the above, the price of corn per bush. can be obtained at different prices per lb. for pork. The use of the above comparison is obvious. For instance, should corn be selling for 50 cts. per bushel, and pork for only 5 cts. per lb., it would be most profitable to sell the corn; but should corn be selling at 40 cts. per bush., and pork for 6 cts. per lb., it would be most profitable to reduce the corn to pork, and sell the latter. To find the price of pork per lb., taking the price of corn per bush. as the standard, divide the price of corn by 8.40 (the number of lbs. of pork produced by 1 bush. of corn). To find the price of corn per bush., taking the price of pork per lb. as the standard, multiply the price of 1 lb. of pork by 8.40.

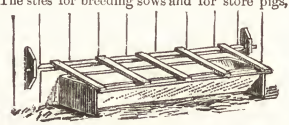
FEEDING AND FATTENING. — Feed about 3 times each day. When fed once or twice, hogs eat too ravenously, impair digestion and make themselves uncomfortable. Never add fresh food to any left in the trough from a former meal. If worth preserving, take it out, work it up with fresh food, and clean out the trough. When the substances employed in fattening have been juicy rather than nutritious, the flesh will be improved by feeding with bran meal, mixed with the other food. This is essential for bacon, as it hardens the flesh, and renders it mellow and firm. Some time previous to killing, the food may consist of about ⅔ steamed potatoes or roots, and ⅓ ground peas, barley, oats, bran, or corn, enlarging the quantity of farinaceous food as the animal fattens. *Apples*, boiled with meal, are good.—*Artichokes* are nutritious, and are said to prevent cholera. — *Ashes*, given in small quantities to pigs while fattening, are very beneficial, as their food is generally rich in phosphoric acid and deficient in lime.—*Beans* will be eaten by pigs, if thoroughly boiled, though they are not fond of them. Swine, fed on beans, will produce soft, spongy pork.—*Bran*, except in small quantities, is not valuable for fattening pigs. But, when rich, concentrated food is given, such as corn, barley, peas, or oil-cake, pigs should be allowed all the bran they will eat, placed in a separate trough. In this way it becomes useful and almost indispensable to the pig feeder. It is also very useful for breeding sows. — *Cabbage* contains a large per cent. of phosphoric acid, and is valuable food for young pigs. — *Charcoal* is a useful medicine, the best regulator of the stomach, correcting acidity and imparting appetite to the human patient. As the principal forte of the hog is to eat as much as possible, his organs of digestion are liable to derangement. Charcoal is perfectly harmless, and aids digestion. — *Corn* will produce the largest amount of fat when ripe. While the foliage is green, nearly every portion of the stalk will be eaten. Ears of corn sufficiently matured for the table make admirable food for hogs. If at any time they refuse to eat dried corn, try coarse ground cornmeal instead of corn on the ear; it may be that continued feeding of whole corn has made their teeth sore, and grinding it will help them along. — *Hay*. Cut the hay as short as oats, and mix with bran shorts or middlings, and feed as other food. Hogs learn to like it, and if soaked in swill, it is highly relished. In winter, use for hog feed the same hay that is fed to the horses, and while it saves bran shorts, or other food, it puts on flesh rapidly. —*Oil Cake*, fed in large quantities, injures the quality of the pork, but small quantities of it can be fed with advantage to the health and growth of the pigs, without any apparent injury to the lard or pork. It is useful for breeding sows, keeps the bowels loose, and increases the quality and quantity of milk. — *Peas*. Hogs are fond of peas, and, when cheap, they should be given, as they afford rich manure; ½ peas and ½ corn are better than either alone. Peas make

firm pork. — *Potatoes.* Pigs will not always eat and never can be fattened upon raw potatoes; while, if they are boiled, next to boiled peas, perhaps, they will bring them to the greatest weight, and greater perfection than anything, admitting that 3 or 4 weeks' feeding upon corn, oats or barley is necessary to make the pork firm and impart flavor. — *Pumpkin,* raw, is excellent for intestinal parasites, and hogs are fond of it. — *Water* should always be within their reach. — *Salt* should be placed where they can get it. It is a necessary ingredient of the blood and gives tone to the digestive organs.

PASTURING. — A pasture surrounded by a strong fence is essential for keeping hogs that are to rely on green food during summer. Every farmer who is not able to fence a pasture, may get a few boards, build a portable fence and make a small inclosure for hogs and move it as circumstances require. It will make pork-raising more profitable than to keep hogs confined in pens all the time. Hogs cannot be herded like cattle, and it is not well to keep them in an inclosure with other stock. An acre should be allowed for every 5 hogs and pigs. Hogs are more likely to remain healthy if they have the run of a large lot that is clean and well supplied with water, than if kept in close quarters, filthy and poorly supplied with water. Clover will produce most food, and the kind of green food that is best relished. As it does not come forward very early in the spring, and is liable to suffer from drouth that usually occurs in midsummer, a hog pasture should contain a plat of one of the true grasses.

RINGING.—It is not best to ring swine, except those intended for fattening. Breeding swine should never have rings. To ring a swine, have a strong cord, 6 or 8 ft. long, with a ring on the end, for making a noose that will slip freely. Now get the swine into a close place, and make a running noose with the cord and ring; step beside the hog to be caught, and drop the noose down at the point of the nose on a line with that of the mouth, and draw back gently and steadily until the cord enters the nostrils at the mouth like a bit in the mouth of a horse. As the hog moves back, so must the operator, and keep his place beside the animal until his nose is drawn up close back of the tusks, when the cord may be thrown over a post and the animal drawn up just so as not to draw the feet off the floor. Let the open ring be placed astride the gristly part of the nose, and when it is ready to set in the gristle of the snout about $\frac{3}{8}$ in. back, close it firmly and promptly, and unloose the squealer and he will go and root no more until the ring comes out, which may be in 1 mo. and perhaps not for 6 mos. But the farmer must not allow swine to run on good sod land without rings. Care must be taken not to insert the ring so as to touch the bony part of the nose, or the nose will swell and keep sore, and the pig will lose flesh. If the rings are properly inserted, there is no loss of appetite.

SHELTERING.—Upon whatever scale the piggery is erected, it should be raised upon a little declination, to allow of drainage of urine, to keep the animals dry, and divided into sties of between 6 and 7 ft wide, and 14 or 15 ft. long; the back part should be covered with a low roof, sufficiently large to allow a fatting hog to lie down conveniently. Sties are sometimes left open in front; but although ventilation should be attended to in cold weather, they should be boarded nearly to the top, allowing only of a door to enter, and 2 in. open space at the bottom to carry off urine. The boards, if placed in a groove of the frame work, can be removed at pleasure, to clean the sty or to render it cool. A good place for the food is a trough outside the front paling of the pen, with a hole in it just large enough to admit the head; by which waste may be avoided, and the trough can be cleaned and then filled without entering the court. The illustration shows a good way to make troughs. The sties for breeding sows and for store pigs,



Hog Trough.

may be wider, and the trough should have a sufficient number of apertures for the little pigs' heads, together with a separate trough, having a larger opening, for the sow, as well as high enough to prevent the sucking pigs from getting into it. It is a good plan to have a small spout of water directed through the sties, not only for easy cleansing, but to afford opportunity to drink. A cool, airy, nearly dark place to lie in during summer can be provided at a small cost, and it will pay largely in the increased growth of the hog, and prevent loss of fat. Hogs sleeping in straw never become rough and scrawny, but their skin and hair are clean, sleek and healthy. An earth bed (not mud) is good for hogs; and, if dusty, there is little danger of vermin. A warm, dry pen, with a dirt floor, and banked up so as to keep out wind, is a safe place for hogs, and can be cheaply constructed. A heap of stable manure is a bad place for a bed. It is impossible for them to inhale the gases arising from it, night after night, and remain healthy. Such a bed is a prolific source of weak backs and rheumatism. The filthy state in which many fattening hogs are kept, has a tendency to give a rank taste to the meat and render it positively unwholesome. A common mode of penning hogs is a rail pen, without protection from the weather. Such pens are not fit to keep animals in. Hogs, so kept, will not take on fat, and a great part of the food fed is wasted, while the hogs will consume a considerable amount of filth, which is detrimental to their health and to the health of those who consume the meat.

TREATMENT OF DISEASE.

REMARKS.—It is very difficult to get swine to take medicine. The best mode of administering it, is to mix it in the food or drink. If too sick to eat, put them in a pen; pass a slip-noose over the upper jaw, and, the mouth being open, pour down the liquid from a horn or bottle. Salt and ashes mixed in the drink of hogs has a tendency to ward off disease. A solution of copperas is also useful to purge them from worms. Charcoal is one of the best remedies for the disordered state into which they drift. A good way to administer it is in the form of burnt corn.

APOPLEXY.—A hog, in the act of feeding, or when moving across the sty, falls suddenly. He will be motionless for a while, and then convulsions come on; the eyes seem protruded, the head and neck swell, and the veins of the neck will be brought into sight. *Treatment:* Bleed copiously, then give 2 or 3 oz. Epsom salts. Diminish the quantity and heating character of the food, and give daily 2 dr. sulphur in the 1st meal.

BRAIN, Inflammation of.— Vulgarly called *Blind Staggers*. The symptoms are, foaming at the mouth, rearing on the hind legs, champing and grinding of the teeth. *Treatment:* Bleed; then give cathartic medicine according to the state of the bowels.

CATARRH.— *Treatment:* Give a liberal allowance of gruel made with powdered elm or marshmallows, and 1 teaspoonful of balsam copaiba, or fir balsam, every night. The animal must be kept comfortably warm.

CHOKING. — Often produced by feeding on roots, particularly uncut roots, like the potato. The animal slavers at the mouth, tries to raise the obstruction from the throat, groans, and appears in great pain. Then the belly begins to swell, from the amount of gases in the paunch. *Treatment:* The obstruction, if not too large, can sometimes be thrust forward by introducing a flexible rod, or tube, carefully into the throat. If the obstruction is low down, and a tube is to be inserted, 1 pt. olive or linseed oil first turned down the throat will so lubricate the parts as to aid the operation, and the power applied must be steady. A hollow tube is best, and if the object is passed on into the paunch, the tube should remain a short time to permit the gas to escape. In case the animal is badly swelled, give 3 dr. chloride of lime, or ammonia, in 1 pt. water. Care should be taken to allow no solid food for some days.

CHOLERA.—During the last few years this disease has become prevalent and fatal, and thus far nothing has been established as a specific for its cure. The symptoms are, drooping of the head and ears; great thirst; refusal of food; the hair looks dead and is loose on the skin; drawing up of the back, and falling in of the flank; wasting away of the flesh; in some cases there is vomiting and diarrhea, with copious discharges of dark, bilious, and offensive matter; in other cases the discharges are hard, black balls; the animal becomes weak. The disease sometimes proves fatal in a few days, and in other cases runs several days. *Treatment:* Remove the sick hogs from others and use disinfectants liberally; put them in good, clean pens with plenty of fresh slacked lime sprinkled in them. The following are well recommended remedies: 1. 1½ lbs. pure chlorate of potash; 1 lb. sub-carbonate of iron; 1 lb. powdered may-apple root; 1 lb. Prussian blue; 1 lb. powdered worm seed; 12 oz. pure arsenious acid; powder well and mix; to full grown hogs give 1 teaspoonful twice per day; pigs ½ the amount, for 3 days, then once per day until they are well. When diarrhea is present, give each hog ½ teaspoonful powdered alum once a day, until the bowels check up, in connection with the above treatment. When cholera is prevalent, give the medicine 3 times a week as a preventive. Give for food boiled vegetables, or boiled oats, rye or barley.—2. Take 1 lb. pure hickory ashes, 1 lb. black antimony, 2 lbs. sulphur, ½ lb. fenugreek, ½ lb. resin, ½ lb. saltpetre, ½ lb. ginger, 2 lbs. cream tartar, and 1 pt. fine salt; pulverize and mix well together. To prevent the disease, give each hog 1 teaspoonful 3 times daily. If the hog can not eat, drench him with the medicine. To destroy the cause, the hogs should have a sheltered place of rest, with plenty of dry absorbent earth to lie on; good air, sheds sweetened by whitewashing once in 3 mos., clean water to drink, and salt, sulphur and sulphurous soft coal or charcoal accessible. An entire change of food from corn to potatoes, mangolds and carrots, cooked and raw as often as once a week.

COLIC.—*Treatment:* 1 teaspoonful powdered caraway seeds; ½ teaspoonful powdered asafetida; 1 teaspoonful laudanum. Give as 1 dose, and repeat in 1 hour, if relief is not obtained.

COSTIVENESS.—Caused by confining hogs. *Treatment:* Give Epsom salts, or 10 gr. calomel in the animal's favorite food.

DEBILITY.—(See *Indigestion.*)

DIARRHEA.—This disease rarely attacks old hogs, but is often fatal to young pigs if not attended to in time. *Treatment:* 1. Give fresh skimmed milk, thickened with wheat flour.—2. Charred corn cobs, or charred corn have a good effect.—3. If the pigs are large enough to eat, give them dry, raw flour or corn, rye or wheat whole.

DROPSY.—The animal is sad and depressed, the appetite fails, respiration is performed with difficulty, and the belly swells. *Treatment:* Keep the animal on a light, nutritive diet, and give a handful of juniper berries, or cedar buds, daily. If these fail, give 1 tablespoonful of fir balsam daily.

EAR, Grubs in.—Caused by a fly depositing its eggs in the ear. *Treatment:* Put a few drops of nitric acid in some water and fill the ear with it.

EAR, Sore.—There are very often troublesome cracks and sores at the back of the large lop-ears of some breeds. *Treatment:* Wash the ears 2 or 3 times a day with a solution of nitrate of silver, 10 gr. to 1 oz. water.

EPILEPSY.—*Treatment:* Put the animal in a well ventilated and clean situation; give a bountiful supply of valerian tea, and sprinkle a small quantity of scraped horseradish in the food; or give 1 teaspoonful bromide of potassium 3 times a day.

EYE, Inflammation of, or OPHTHALMIA.—Caused by sudden changes in temperature, unclean sties, want of pure air, and imperfect light. *Treatment:* Keep the animal on thin gruel, and allow 2 teaspoonfuls of cream of tartar per day. Wash the eyes with an infusion of marshmallows until a cure is effected.

FEVER, Contagious.— This disease is very contagious and may be carried quite a distance in the air. The symptoms are, refusal of food; lying under the litter; great thirst; heat and soreness of the skin, with black spots and red patches; sunken eyes; staggering gait; rapid and weak pulse; belly very sore and tender upon pressure; the bowels are sometimes costive, but generally about the 3rd or 4th day diarrhea sets in, and slime and blood are passed. *Treatment:* Burn or bury deeply all dead animals. Give to the sick ones pure well water, acidulated with sulphuric acid, to drink. If constipated, give 2 oz. castor oil, and an injection of warm water; then give the whole of the following 2 or 3 times a day: Nitrate potassa, bisulphate of soda, of each, 20 gr.; mix in 1 pt. gruel. When blood is passed give 20 drops oil of turpentine twice a day. When they shows signs of improvement give tonics twice a day.

HEART. Palpitation of, or THUMPS.—Usually this disorder affects pigs when confined in a close pen. The symptoms are heaving of the sides, which increases to such an extent that pigs thus affected will not eat and rapidly become emaciated and soon die from weakness. *Treatment:* Give 1 dr. bromide of potassium, dissolved in 1 gill water, mixed with the food, twice a day.

INDIGESTION.—*Treatment:* 1. Give prepared chalk, or a small amount of magnesia in the food.—2. Let the hogs have access to the following: 1 peck ashes to 1 pt. salt; 2 lbs. pulverized copperas; ½ lb. black antimony; ½ lb. sulphur; 1 peck charcoal; mix and put where it will be kept dry.

INFLUENZA, or EPIDEMIC CATARRH.—Caused by the introduction into the system of a poison germ, which propagates itself, and increases in the blood and tissues in a manner allied to the growth of a ferment in a saccharine solution. The symptoms are, difficult breathing; short hoarse cough; fever; constipation and sometimes diarrhea; the head is stretched out and drooping. The duration of the disease is about 15 days. *Treatment:* If the disease is far advanced, kill the hog and bury it deep. If any of the animals show slight indication of the disease, separate them from the others and give the following: 20 gr. powdered white hellebore; ½ pt. milk. When this has vomited the animal, give 2 gr. tartar emetic, 3 times a day, till the disease subsides. If there is costiveness, give 10 gr. calomel once a week.

ITCH, OR MANGE.—*Treatment:* 1. Anoint with equal parts lard and brimstone.—2. 1 lb. flour sulphur; 4 oz. Venice turpentine; 2 lbs lard; 4 oz. mercurial ointment; rub well together.

JAUNDICE.—Distinguished by a peculiar yellow tint in the white of the eye, and sometimes in the lips, accompanied by loss of appetite. *Treatment:* ½ oz. powdered golden seal; ½ oz. powdered sulphur; ½ oz. powdered blue flag; 1 lb. flaxseed; mix and divide into 4 parts; give 1 every night; also once a week give 5 gr. calomel. The food must be boiled, adding a little salt.

LICE.—*Treatment:* 1. Wash the pig all over with crude petroleum; the next day give him a thorough washing with warm water and soap, using a scrubbing-brush.—2. Lard and Scotch snuff, mixed, and rubbed along the back and behind the ears, will destroy them.—3. Rub kerosene on with a woolen rag wherever lice are seen; 2 or 3 applications are necessary, as some eggs may hatch. Pigs should be provided with scratching-posts, having holes bored for pegs at different heights, to accommodate pigs of different sizes.

LUNGS, Inflammation of, or PNEUMONIA.—The early symptom is a cough. The disease rapidly progresses; the animal heaves at the flanks; has a distressing cough, which sometimes almost suffocates him; he refuses to eat, and fever runs high. *Treatment:* Give 2 gr. tartar emetic 3 times a day, and 1 dr. laudanum every night.

MEASLES.—The skin is red and pimpled. It shows that there has been general inflammation resulting from the fattening process being carried too far. The hog rubs himself more than usual, while the skin is free from pimples and scurf. *Treatment:* Remove the animal to a warm place; feed gruel; give 1 teaspoonful sulphur daily with a drink of bittersweet tea; if the eruption does not reappear on the surface, rub with the following: 1 oz. oil cedar, in sufficient alcohol to dissolve it; then add ½ pt. whisky and 1 teaspoonful sulphur.

PARALYSIS.— Caused by cold and damp quarters or exposure to cold rains; more frequent in young pigs than in older ones. *Treatment:* Rub turpentine, or mustard paste upon the loins, over the spine.

PNEUMO-ENTERITIS. Contagious.—A form of hog cholera; inflammation of the lungs and bowels, with red or purple blotches on the skin; caused by filthy pens and foul water. There are 2 forms. In one, the animal is dull and without appetite; there is cough, an attempt to vomit, and constipated bowels. The ears, neck, throat and breast are covered with dark red or purple blotches; breath labored, and the hind limbs become paralyzed. Fetid diarrhea sometimes sets in before death. The other form of this disease commences similarly, but there is great difficulty in swallowing; and a red and purple line about the throat. The throat becomes so swollen that the animal may die in 1 hour. *Treatment:* Give castor oil; when it operates, give nitrate of soda, 20 gr.; nitrate of potash, 20 gr.; mixed with gruel. When the parts are swollen, foment with hot water and sulphate of iron. Keep up the strength by 10

gr. quinine every morning, and ½ dr. laudanum every night.

QUINSY.—(See *Influenza.*)

RED ERUPTION.— Analogous to scarlet fever, and appears in the form of red pustules on the back and belly, which extend to the whole body. *Treatment:* ½ oz. powdered bloodroot; 1 pt. boiling vinegar. When cool, rub on the external surface. Diet with boiled vegetables, coarse meal, etc.; give a small dose of sulphur every night.

RHEUMATISM. — Caused by exposure and wallowing in filth. The symptoms are muscular rigidity of the system; loss of appetite and unwillingness to leave the sty. *Treatment:* Keep the animal on a boiled diet, given warm; avoid exposure and filth, and give a dose of the following: Equal parts powdered sulphur, powdered sassafras, powdered cinnamon, and powdered saltpetre, or nitrate of potash; give ½ teaspoonful in warm gruel. If this does not give immediate relief, dip an old cloth in hot water, and fold it around the animal's body; repeat if necessary, until the muscular system is relaxed. Wipe the animal dry and place in a warm situation, with a good bed of straw.

ROT.—The tails of young pigs drop or rot off. *Treatment:* Give a little sulphur in the food; or rub oil or grease daily on the affected parts. It may be detected by roughness or scabbiness at the point where separation is likely to occur.

TRICHINA.—This is a small worm in the flesh of the hog. When the infected pork is eaten it produces a disease called *Trichinosis.* The cause of trichina in hogs is attributed to eating dead rats, mice, cats, etc. A trichinous hog can never be detected in life, but after death the parasite can be seen through a powerful microscope. Trichinosis is generally fatal; the only preventive is to eat no pork unless thoroughly cooked.

SLAUGHTERING AND CURING.

PRESERVING MEAT FRESH. — 1. To 6 lbs. salt, add 1 lb. brown sugar, 2 oz. saltpetre, 3 oz. saleratus, and ½ lb. finely powdered charcoal; dissolve in sufficient water to cover the meat 2 in. with brine; pack close and weight down. Sufficient for 50 lbs. of meat. By soaking the meat in cold water a few hours before using, it will add to its freshness. — 2. It is said that meat will be preserved fresh for 2 weeks in sour milk or buttermilk. — 3. As soon as the animal heat is out of the meat, slice it up ready for cooking. Prepare a large jar by scalding well with hot salt and water. Mix salt and pulverized saltpetre in the proportion of 1 tablespoonful saltpetre to 1 teacupful salt; cover the bottom of the jar with a sprinkle of salt and pepper; put down a layer of meat, sprinkle with salt and pepper, the same as if just going on the table, and continue in this manner until the jar is full; fold a cloth or towel and wet it in strong salt and water, in which a little of the saltpetre is dissolved; press the cloth closely over the meat and set in a cool place. It is a good plan to let the meat lie over night after it is sliced, before packing. Then drain of all the blood that oozes from it. It will be necessary to change the cloth occasionally, or take it off and wash it, first in cold water, then scald in salt and water, as at first. In this way farmers can have fresh meat the year round.

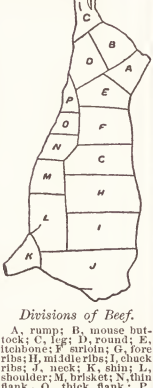
CATTLE.

REMARKS ON KILLING.—The veal from a calf, less than 4 weeks old, is unfit for food and is unwholesome; after 6 weeks the calf requires more food than the mother can give it, and the change to grass, or hay, or meal, materially alters the character of the flesh, which becomes darker and less juicy. Calves are sometimes bled; this makes the meat white, but detracts from its flavor. The amount of meat obtained from a domestic animal sold by its live weight, is variable; animals yield as much as 70 per cent. of meat, while others give 50 per cent.; the mean weight produced is calculated at 58 per cent. of the live weight in beef cattle. An ox of the live weight of 1,332 lbs. yields meat, 771.4 lbs.; skin, 110.2; grease, 87; blood, 55.1; feet and hoofs, 22; head, 11; tongue 6.6; lungs and heart, 15.33; liver and spleen, 20.05; intestines, 66.15; loss and evaporation, 154.352; making the total 1,332 lbs. (See *Weighing Cattle by Measurement*, in HEAVY LIVE STOCK.) Cattle may be killed by firing a rifle ball into the forehead, between and above the eyes. Another method is to stun the animal by a blow with the head of an ax in the same place. When he has fallen, cut the throat with a sharp butcher knife; make the gash square across the front of the throat, and deep enough to reach the spinal column. Now hang the animal on a frame by the hind legs. A good frame can be made of strong oak wood. A heavy gambrel should be placed under the large tendons above the hock joints. Place the gambrel over the hooks, or attach it to the cross nail of the frame by strong cords; then raise the frame by drawing forward the uprights, until the carcass leaves the ground.

CUTTING BEEF.—This should be commenced as soon as the blood ceases to flow. Cut the skin from the throat along the centre of the brisket and belly into a line between the centre of the thighs to the tail; divide the skin of the legs in the same manner on the inside, the cuts running down to the former cut; sever the fore feet at the knee joints and the hind feet about 3 in. below the hock-joints; remove the skin from the upper side of the animal to the back-bone; turn him over and skin the other side; remove the entrails while lying, or first hang up the carcass by the hind legs, and then remove them; now wash the carcass; after cooling divide it into halves by splitting the back-bone; leave it hanging from 12 to 24 hrs.; then divide accord-

ing to the divisions figured in the illustration.

CANNING.—Remove the bones from fresh meat, parboil the flesh, put into a clean tin can, and fill up with rich soup; solder on the lid, piereed with a small hole. Next put the tin into a bath of brine and heat until steam issues from the hole; then solder up and remove the can from the bath. In a short time the pressure of the air will induce a slight concavity of the top and bottom of the can. If the process has been successfully performed, this concavity will be permanent; but if, at any future time, the concavity has ceased, or the ends become slightly convex, it is a sure sign that the meat has become putrid.



Divisions of Beef.

A, rump; B, mouse buttock; C, leg; D, round; E, itchbone; F sarloin; G, fore ribs; H, middle ribs; I, chuck ribs; J, neck; K, shin; L, shoulder; M, brisket; N, thin flank; O, thick flank; P, veiny piece.

CORNING.—1. Put into a cask 12 gals. water, 12 qts. salt, and 1 lb. saltpetre; stir until all is dissolved. Salt your meat, rubbing it well, and lay it in a separate tub, taking care to have the skin side down. Let it lie thus for 10 days; then put into the brine (still with the skin side down), weighting it down with boards and a large stone. This brine will keep from November to Mareh. Meat may be added from time to time, always taking care to have salt rubbed over it and the blood drained off.—2. A pickle for beef is made as follows: 6 lbs. salt, 1 lb. sugar, and 4 oz. saltpetre, are boiled in 4 gals. water, skimmed, and cooled. The meat is packed closely in a barrel or vat and the pickle poured over it. The pickle may be preserved and used year after year, by boiling and skimming it to remove the coagulated albumen which comes from the meat, and which would soon cause it to spoil, and also adding some salt and sugar to replace that which the meat has absorbed.

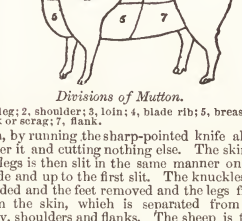
CURING TONGUE.—Throw a handful of salt over the tongue, seeing that it is sprinkled on both sides, and let it remain to drain until the following day; make a pickle of 1 tablespoonful common salt, ½ that quantity of saltpetre, and the same quantity of coarse sugar as of salt; rub this mixture well into the tongue, every day for a week; it will then be found necessary to add another tablespoonful of salt; in 4 more days the tongue will be cured sufficiently. Sometimes the tongue is merely left in the brine and turned daily; this method will be found to occupy a month or 5 weeks before it is cured. When the tongue is to be dried, affix a paper to it with a date; smoke over a wood fire 4 days, unless wrapped in paper, and then as many weeks will be required to cure the tongue.

TALLOW.—(See same in SOAP AND CANDLES.)

SHEEP.

REMARKS ON KILLING.—To obtain the best mutton the sheep should be killed between 3 and 5 yrs. of age. The quality depends on the feeding and the breed. The veins and arteries of the neck are cut with a sharp pointed knife thrust through the throat. In dressing sheep the 4 legs are tied together and the sheep laid on a bench, with the head and neck projecting.

CUTTING MUTTON.—The carcass is turned on the back, the legs loosened, and the skin divided from the root of the tail along the belly to the



Divisions of Mutton.

1, leg; 2, shoulder; 3, loin; 4, blade rib; 5, breast; 6, neck or scrag; 7, flank.

chin, by running the sharp-pointed knife along under it and cutting nothing else. The skin of the legs is then slit in the same manner on the inside and up to the first slit. The knuckles are divided and the feet removed and the legs freed from the skin, which is separated from the belly, shoulders and flanks. The sheep is then hung up by the gambrels on a cross-stick, which stretches them apart, and the skin flayed off from the rump to the head. When the skin is removed the belly is opened carefully and the intestines taken out without breaking them. The sheep is usually cut up according to the above illustration.

DRYING.—Cut the flesh into slices from 2 to 6 oz. in weight; immerse a small portion at a time in boiling water for 5 or 6 minutes, using only just water enough to cover the meat, and adding water to keep the liquor up to its original quantity. Lay the meat to dry on open trellis-work in a drying stove, keeping the temperature at about 122° Fahr. In about 2 days the meat will be completely dry, having lost about ½ its weight. Add a little salt and spice, especially coriander, to the liquor in which the meat was immersed, and then evaporate it to a gelatinous consistence. When the flesh is dry, dip it, piece by piece, in the gelatinous matter liquefied by a gentle heat, and replace it in the stove to dry, repeating this varnishing and drying 2 or 3 times, so as to get the coating uniformly thick. Meat thus dried will keep good for a year.

MUTTON HAMS. To Cure.—Choose fat, sound mutton; rub thoroughly with a mixture in the proportion of 1 part sugar to 2 of salt, adding ½

oz. each saltpetre and black pepper to each lb. of the mixture; place the meat in a covered vessel and turn and beat it twice a day for 3 consecutive days; on the 4th day wipe the scum from the meat, wash it with strong vinegar, and again rub it with the mixture; the day after beat and turn it; repeat these alternate operations for 10 days, being careful to remove the scum before each rubbing, and to turn the meat every time; after this it must be soaked for 10 days. To be used the same as smoked venison or dried beef.

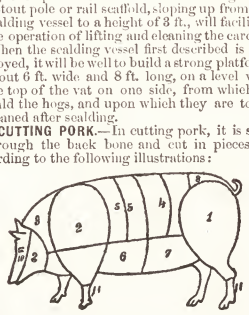
MUTTON HAMS, To Pickle.—1. Rub the hams with a mixture of sugar, pepper and saltpetre, allowing 4 oz. of the former and 1 oz. each of the 2 latter to every 12 lbs., and 1½ lbs. salt to the same quantity; after the meat is thoroughly rubbed, cover it with the salt, and turn and beat it every day; at the end of a week add a teacupful of vinegar to the brine and continue the turning and beating; after 3 weeks take it from the brine, wash with fresh water, then with strong vinegar, and hang in a cool cellar for a week or less according to the weather. It should be soaked in cold water about 1 hour before boiling. — 2. 3 gals. soft water; 1 lb. coarse sugar; 3 lbs. of common salt; boil and remove the scum, and, when cold, pour over the meat. In 2 or 3 weeks the ham will be excellent for baking or boiling. It may be smoked if preferred.

TALLOW.—(See same in SOAP AND CANDLES.)

SWINE.

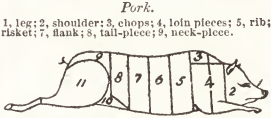
REMARKS ON KILLING.—It is better to kill early than late. As soon as cold weather comes, pigs will gain little, if any, and often lose during cold storms. A cold northwest wind, with a clear sky, indicates suitable weather for the slaughtering; but an east wind, no matter how low the thermometer may fall, implies unsettled weather with prospect of moist temperature. While a very cold temperature is not desirable, it should be sufficiently low to secure a freeze at night. A mean daily temperature of 40° is considered favorable for killing. Let the hog out of the pen, which is apt to be a hard place for a scuffle. He will soon tire of running, and may be seized by the hind leg, the noose slipped over his snout and he laid on his back ready for sticking. The blood may be drawn by an insertion of the knife a little before the front legs directly down towards the spine. Further cutting is useless, injuring the meat. At the great slaughter-houses the victims are dispatched by a single stab. As soon as bleeding ceases, dip the hog in a scalding vat. A barrel or cask is insufficient in which to scald a hog. A good scalding vessel consists of a box 6 to 7 ft. long, 30 in. wide at the top, and 24 in. deep, with the sides flaring. This should be provided with a sheet iron bottom, well supported on the under side, and set over a stone or brick foundation, in which there is a chamber for making fire to heat the water in the vessel above, and by which it can be kept heated for any number of hogs. At its rear should be a pipe or chimney, and the sides banked up with earth. On the bottom of the vat must be laid wooden strips on a slatted frame to prevent the hog coming in contact with the iron bottom. When this is not practicable, a box sunk into the ground, or a hogshead partly let into the ground and slightly inclined, will answer, though it is difficult to keep water at the right temperature. With the latter arrangement a stout pole or rail scaffold, sloping up from the scalding vessel to a height of 3 ft., will facilitate the operation of lifting and cleaning the carcass. When the scalding vessel first described is employed, it will be well to build a strong platform, about 6 ft. wide and 8 ft. long, on a level with the top of the vat on one side, from which to scald the hogs, and upon which they are to be cleaned after scalding.

CUTTING PORK.—In cutting pork, it is split through the back bone and cut in pieces according to the following illustrations:



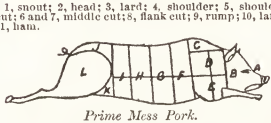
Pork.

1, leg; 2, shoulder; 3, chops; 4, loin pieces; 5, rib; 6, brisket; 7, flank; 8, tail-piece; 9, neck-piece.



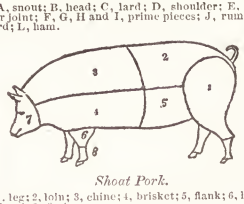
Mess Pork.

1, snout; 2, head; 3, lard; 4, shoulder; 5, shoulder cut; 6 and 7, middle cut; 8, flank cut; 9, rump; 10, lard; 11, ham.



Prime Mess Pork.

A, snout; B, head; C, lard; D, shoulder; E, shoulder joint; F, G, H and I, prime pieces; J, rump; K, lard; L, ham.



Shoat Pork.

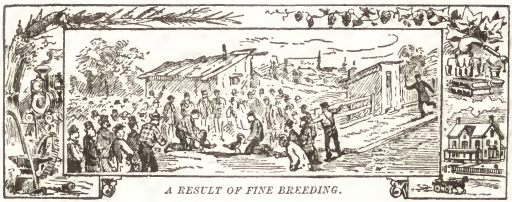
1, leg; 2, loin; 3, chine; 4, brisket; 5, flank; 6, hocks; 7, head; 8, feet.

HAM AND BACON, To Cure.—As soon as the animal heat is gone, salt with plenty of the purest salt and about ½ oz. saltpetre to 100 lbs. pork. As soon as the meat is salted to taste,

which will generally be in about 5 weeks, take it out, and if any of it has been covered with brine, let it drain a little. Then take black pepper, finely ground, and dust all over as much as will stick; then hang it up in a clean, dry, airy place. If all this is done as it should be, you will have no further trouble with it. Another way is to dry-salt the hams, and prepare for the smoke house in the usual way. When the time for smoking comes, instead of lighting a fire, buy a bottle of pyroligneous acid, at the drug store, and, with a clean brush or rag, rub it over the fleshy surface of the meat. Repeat this in 2 weeks, and then lay the meat aside. The room where it hangs will smell like smoke for weeks; for pyroligneous acid is nothing else than bottled smoke. After the meat has taken sufficient salt, which will be in 4 to 6 weeks, according to the size of the hogs, and counting out any weather cold enough to freeze the meat in the meat house, take it up, knock the salt off, and string each piece ready for hanging; then wash clean in tepid water, and while wet roll it in hickory ashes before hanging. Smoke it well with billets of green hickory, and about the 1st of March put the joints in cotton bags, tie closely, and hang up in the house. Never use pine, oak or walnut, or any other quite strong scented wood. A smoke house ought to be dark, and the smoke so supplied as not to heat the meat.—3. To each green ham of 18 lbs., apply 1 dessertspoonful saltpetre and ¼ lb. brown sugar, to the fleshy side and about the hock; cover the fleshy side with fine salt ½ in. thick, and pack in tubs, to remain from 3 to 6 weeks, according to size. Before smoking, rub off any salt that may remain on the ham, and cover well with ground pepper, particularly about the bone and hock. Hang up and drain for 2 days; smoke with green wood 8 weeks, or until the rind assumes a light chestnut color. The pepper is a very effectual preventive of the fly.—4. Dissolve salt in cold water until it will float a potato; then for 12 lbs. ham, add 1 oz. saltpetre dissolved in water, and add it to the brine as you pour it on the meat. Have a kind of skewer made of iron a few in. long, a little wider than thick, sharp at one end, with a hole in it large enough to pass stout twine through; with it put strings in the leg end of the hams before putting in the brine, then pack tight in the cask, with the string end up. They will be ready to smoke in 6 weeks, but standing longer will do no harm. Have them smoked and packed away either in oats or marsh hay before the first fly makes its appearance in the spring. The animal heat must be all out before putting in brine, or they will be tainted.

HAM, To Keep.—1. Take an old flour barrel, or other dry cask; put a good layer of coarse salt in the bottom, and then put down a ham; cover with coarse salt, and put down another; and so on till the cask is full, or all put in; put the cask in a cool, dry place; and the hams will come out good.—2. Put the hams in thick paper sacks, such as millers use to put flour in, made of manilla paper; wrap the ham in several thicknesses of old paper, to keep moisture from striking through and spoiling the sack; tie up tightly, first twisting the top around well; then hang it anywhere; the fly will not find its way into the ham. This paper is strong enough to bear the weight of the ham.

LARD, To Render.—1. To render leaf lard, skin carefully, wash, drain, cut into bits, put into a tin pail, and set into a pot of boiling water. After melting, throw in a small quantity of salt to make the sediment settle, then simmer ½ hour or until clear. Strain through a coarse cloth into jars. Tie over with bladders or paper and cloth, the latter dipped in melted grease. The other fatty portions, wash, drain, cut into bits, and put into an iron kettle over a slow fire. Add a teacupful of water to prevent burning. When the bits of fat are reduced, take out the fibres with a skimmer. Watch, and toward the last stir constantly. The fire should be moderate from first to last. Sprinkle in a little salt, and when the fat looks clear take from the fire; when cool enough strain through a sieve or coarse cloth into jars. When straining, do not press the cloth as long as the clear fat will run through, and when you do squeeze it strain that part into another jar. Lard keeps best in small vessels. Keep covered in a cool, dark place.—2. Cut the fat up into pieces 2 in. square; fill a vessel, holding about 3 gals., with the pieces; put in 1 pt. of boiled lye, made from oak and hickory ashes; strain before using; boil gently over a slow fire, until the cracklings have turned brown; strain, and set aside to cool.

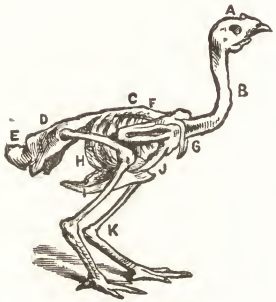


A RESULT OF FINE BREEDING.

POULTRY.

CHICKENS.

ANATOMY AND BREEDS.

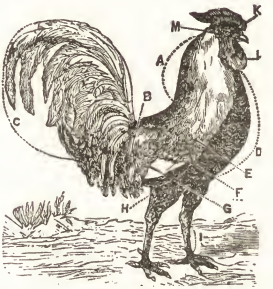


Skeleton of a Fowl.

A, head; B, neck; C, back or spine; D, hip; E, rump; F, shoulder; G, collar bone; H, chest; I, breast-bone; J, wing bones; K, leg.

Leg and Foot of a Fowl.

The leg is composed of *d*, thigh bone; *e*, shin bone; *f*, bone of the foot; *g*, claws; *h*, knee; *i*, heel.



Points of a Fowl.

A, neck hackle; B, saddle hackle; C, tail; D, breast; E, upper wing coverts; F, lower wing coverts; G, primary quill; H, thighs; I, legs; K, comb; L, wattles; M, ear-lobe.

BANKIVA. — A native of Java. Has a red indented comb, red wattles, and ash-gray legs and feet. The cock has a thin indented or scalloped comb and wattles under the mouth; the tail elevated above the rump, and the feathers disposed somewhat in the form of titles; neck feathers long, hanging, rounded at the tips, and of fine gold color; head and neck fawn color; wing-coverts dusky brownish and black; tail and belly black. The hen is of a dusky ash-gray and yellowish color; comb and beard much smaller than the cock, with no feathers on the neck beside the long hackles.

BANTAM. — So called on account of their small size. All cocks over 28 oz., and hens over 24, are disqualified. They are distinguished by

their stylish bearing; are chiefly valued as pets; were formerly prized according to the amount of feathers on their legs, but this is now considered their defect. The characteristics of a well bred bantam are a beak short and curved; the head narrow, with a rounded forehead; bright eye; small ear lobes; short back; breast prominent; round, full body, and carriage erect. A rose comb is considered essential in most varieties, and always to be preferred. The male bird should not weigh more than 20 oz.; the female not more than 15. From their tender flesh, they are substituted for chick-

Seabright Bantam Hen.

Bantams.

ens, and their eggs are considered a delicacy for weak stomachs. The varieties are *Game, Golden Seabright, Silver Seabright, Rose-combed Black, Rose-combed White, Japanese, Pekin,* and *Booted White.*

BRAHMA.—A breed of large size, the cocks weighing from 10 to 12 lbs. It is divided into dark and light. The dark are characterized as follows: The head of the cock is surmounted by a pea-comb; wattles full; beak strong; neck short and curved; back short, wide and flat; tail small, upright; back almost white; saddle feathers white, striped with black; breast broad, full and carried well forward; legs short and well feathered. A standard light brahma hen has a pea comb, bright red wattles, a good sized neck; the neck hackle feathers are edged with white, with a broad, black stripe down the centre; back broad and white; tail small and black; legs yellow and well feathered. The cock resembles the hen in color, has no distinct sex markings, but is built on a masculine model. They are good setters and mothers; fine winter layers, and fatten easily.

Brahma Hen.

BREDA.—A long, thin fowl, with black plumage and feathered legs; wattles, large; both cock and hen, combless; eggs, size of a duck's, and very often unfertile. Weight of cock, 6 lbs.; of hen 5½ lbs.

COCHIN, or SHANGHAI. — Imported from China. They fatten easily, and the hens are good winter layers. The male is from 22 to 25 in., and the female 18 to 22 in. high. There are several varieties, of which the favorites are buff and cinnamon colored; there is a white variety, for which large sums have been realized. The *Black Cochin* is, without doubt, the most profitable of the Cochin varieties. They are not so large as the buff or partridge, but large enough to make a fine table fowl, and better layers. The cocks when 18 mos. old weigh from 10 to 12 lbs., and hens from 7½ to 9 lbs. They are active, and less subject to disease and less inclined to set. They are a rich, glossy black; have a single comb, medium size; short neck, curved, and covered with a rich, glossy hackle; broad back, with a gentle slant toward the tail, which is short; breast full and broad. The *Buff Cochins* have a clear buff head; hackle, wings, saddle and back of a rich, deep golden buff; comb and wattles, brilliant red. *Partridge:* The cock

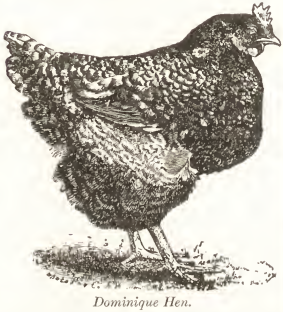
Partridge Cochins.

has bright red hackles and saddle feathers, with a well defined black stripe down the middle of each feather; the back and wing-bow of a dark, rich red, with a wide, lustrous, greenish-black bar across the wings; the quills rich bay on the outer webs, the secondaries ending in black tips; the tail glossy black. Not unfrequently, some white appears at the base of the feathers. Fashion demands a black breast. In the hen, the neck-hackle feathers are bright gold, each having a broad black stripe down the centre. The remainder of the plumage light

brown, well and distinctly pencilled with dark brown. It is important that the pencilling should reach well up the front of the breast; the shafts of feathers creamy-white, contrasting with the darker colors of the webs of the feathers. These fowls are of a domestic disposition. A very low fence, 3 or 4 ft. high, prohibits their straying. They are hardy, if not over-fed. The chickens are raised without difficulty. One of the best varieties for laying eggs in winter, if properly managed. The *White Cochins* are heavy and among the best foragers. The face, comb, and wattles are red; plumage white throughout; legs bright yellow.

CREVE COEUR.—Prolific egg producers, grow rapidly, and have white juicy flesh; non-setters. Not surpassed for whiteness of flesh by any. Their black legs are objected to, but they have no effect on flavor or tenderness of flesh. Young birds fatten when 3 mos. old, and have been made to weigh 4 lbs. at that age; at 6 mos. they weigh 7 lbs.

DOMINIQUE.—Their qualities are extreme hardiness, fast growers, among the best of lay-



Dominique Hen.

ers, and form that of the ideal fowl. Quality of flesh good, plump, and of a nice yellow skin. With an ordinary good run 12 or 14 laying hens can be bred to 1 cock; closely confined, 8 is enough. The eggs are fertile.

DORKINGS.—The color is pure white, and their distinctive mark is 5 claws on each foot, the 5th claw being little more than an apology. They are large, well shaped and good layers. No fence lower than 7 ft. will keep them in; they will not bear neglect, are long arriving at maturity, seldom come to full size until after the 2nd molt, need a long season, and should be early hatched. They require warm quarters in cold weather, remain longer in egg production, and when not producing eggs they are making most juicy, white, and delicate flesh. Capons and poulardes are frequently made of these fowls, which grow to an enormous size when castrated. The other varieties are the *Blue, Brown, Red, Silver Duck-wing, Yellow Duck-wing, Ginger Red, Gray, Red Pile, White Pile, Spangled* and *White*, with combinations.

Dorkings.

FRIZZLED.—A native of Java and Japan. All the feathers are turned and frizzled; smaller than the common species, more wild, and less suitable for domestic purposes. Flesh, firm and delicate.

GAME.—Rather slender in body, neck, bill and legs; and the colors, particularly of the cock, are bright and showy. The flesh is white, tender, and delicate; eggs small, but, like the flesh, much esteemed for delicacy. The plumage, especially that of the *Red*, is beautiful and rich; size below common, and symmetry of limbs comparable with those of the race-horse and the deer. They are pugnacious and will fight till they die. The *Black-breasted Red* is the most favorite.

Game Cock.

Guinea Fowl.

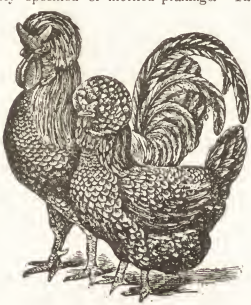
GUINEA FOWLS.—Not strictly speaking a breed of, but they assimilate with the domestic

species in habits and feeding. The cocks and hens are nearly alike. They have a peculiar gait and cry. The head is covered with a kind of casque, with wattles under its bill; plumage either black or dark gray, sprinkled with uniform white spots. They are natives of Guinea and South America. They are active destroyers of the Colorado beetle, and lay an abundance of eggs, smaller than those of the common hen, and speckled.

HAMBURG.—These have a handsome plumage and form; are great layers and non-setters; tender and require good care. They are about the size of the common fowl and their flesh is dark. *Silver-Spangled* and *Black* are best. The other varieties are the *Golden Penciled*, *Golden Spangled*, *Silver Penciled* and *White Hamburg*.

Silver Spangled Hamburg.

HOUDAN. — Large, heavy, short legged, five-toed fowls, with small light bones, and irregularly speckled or mottled plumage. Their merits as table fowls are of the highest excellence. They mature with rapidity, feather early, and are hardy. The old birds are robust, the eggs are numerous, and almost invariably fertile. They have a bulky appearance; plumage black and white spangled; a crest of the same color; comb triple. They are of extraordinary fecundity; lay large white eggs, and the chickens are fit for the table at 4 mos. old. The weight of adult is from 7 to 8 lbs. in which bones figure only for $\frac{1}{3}$. The chickens weigh, when 4 mos. old, without the intestines, about $4\frac{1}{2}$ lbs.



Houdans.

JAVA. — Resembles the Malay in shape, but somewhat colored like the Dorking; probably a cross. In qualities resemble the Malay, but not so valuable as a cross with other breeds.

Java Hen.

LA FLECHE.—Resembles the Spanish, but exceeds it in size; cocks often weigh from 8 to 10 lbs. Both sexes have a large, long body and powerful legs; plumage dense black, with green reflections; excellent layers and non-setters; the flesh white, and of good quality.

LANGHSHAN. — The plumage is black, of a greenish lustre; they have a stately walk; combs straight but small. They are as large as the Brahmas and feathered on the legs; lay early; have white flesh; feather quickly; are hardy, and good winter layers. They are superior market chicks. They have one fault (if it can be so called)—black legs; but, as they dress white, and the meat is fine-grained, the objection is a small one compared with their excellence in every other respect.

LEGHORN.—A quiet, hardy and docile fowl; legs and skin usually yellow; wattles full and large. There is no fowl among the improved breeds cultivated in this country that will produce so large number of eggs as the *Brown* and *White Leghorns*. The *Black Leghorns* are prolific in this respect. Leghorns are the dependence for eggs, but when flesh is desired, size is against them.

White Leghorn Cock.

MALAY. — They have long legs and large

bones; flesh finely flavored, when properly fattened; and their eggs are so large and rich that 2 of them are equal to 3 of those of ordinary fowls. The color of the feathers is black, or dark brown, streaked with yellow; legs large and coarse; tall, strong-beaked, and powerful; the cock has a harsh crow. It is said that a cross between the Malay and common fowl produces a breed superior to its progenitors. They look the very brigands of poultrydom; egg about 2½ oz., its shell pale chocolate-colored; moderate layers; good setters and mothers if they have roomy nests. Chickens feather slowly and should not be hatched after June.

OSTRICH.—This breed are hardy and lay

Ostrich Fowls.

from 40 to 50 eggs before setting; weigh from 7 to 9 lbs.; have short legs and plump, thick body; color, blue-black.

PLYMOUTH ROCK.—Came into prominence within the last 10 years, because of its adaptation for farmers and market. They are a made-up breed, and originated in New England by crossing a Dominique cock on a black hen of the large Asiatic stock. Careful breeding has resulted in an evenly barred, and hawk-colored fowl, with clean yellow legs and single comb. They have plump bodies and short shanks; skin not so yellow as the Cochin, and when dressed for market, does not look so clean as the Cochin, but they are more desirable for the table. A well bred Plymouth Rock will be in good form at 5 mos. old and in its prime at 6 mos. A cock and hen, when matured, weigh, alive, 18 lbs. The average weight is probably 2 lbs. less. They are good layers.

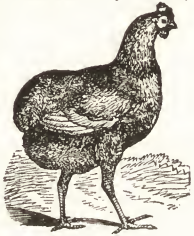
Plymouth Rock Cock.

POLAND.—Imported from Poland. Their color is shining black, with white tops on the head of cock and hen; head flat, surmounted by a fleshy protuberance, out of which spring the crown feathers, white or black, with the head in the

Black Polands.

centre of the crown. They are kept as ornamental, but are one of the most useful varieties, and called everlasting layers. They require more warmth, and attention than the common breed, and are more subject to disease. Their topknots should be occasionally clipped, or they grow into the eyes and nearly blind them.

RUMPLESS, or RUMPKIN.—They are entirely without tail and without that lump terminating the spine, from which the tail feathers issue; and the saddle feathers fall over behind in profusion. They are moderate layers; the eggs average 2⅜ oz.



Rumpless Hen.

SPANISH.—A large size; lay enormous eggs, but do not set well; plumage black; comb loose; and the skin behind the ears white. Two breeds, remarkable for beauty,

Spanish Cock.

are the *Gold-spangled* and *Silver-spangled Po-* | *lands*, sometimes mixed with the Spanish.

Care and Management.

REMARKS.—Fowls feel changes from moderate to extreme weather. Over this stage the Brahma appears to pass with little difficulty, if well fed, and comes into laying early in Dec.

BREEDING.—A cockerel mated with 3 adult hens will give a larger number of male than female chicks—especially with the earlier broods. Later broods will be uncertain. Mating an adult cock with not more than 3 pullets will be uncertain, one sex as likely as the other may predominate. Mating an adult cock with 5 pullets will give an excess of pullets, but, as in the first instance, there will be most male birds from the earlier eggs. Young birds, or adult birds mated together, will give uncertain results, but the fewer the hens and the more vigorous the cock, the greater the proportion of males, and the most numerous from early eggs.

CAPONIZING.—This will cause the fowl to grow fully ½ larger than the ordinary male fowl. Their flesh is delicate and juicy, and they command prices higher than common poultry. To prepare cockerels for caponizing, shut them up without food or drink for 24 hours previous to operation; if the intestines are full the operation will be difficult and dangerous. Cockerels should be operated upon between 3 and 4 mos. of age. Those of any breed may be caponized, but larger breeds are best. A cross between the Light Brahmas and Partridge Cochins produce extra large cockerels, but only the first cross is desirable. A set of caponizing instruments consists of a pointed hook, a steel splint with a broad flat hook at each end, a pair of tweezers, and a pair of concave forceps. First kill a young cockerel and examine it, so that you will be able to tell the position of the organs to be removed. They are within the cavity of the abdomen, attached to the back, one on each side of the spine, are light colored, and the size varies much with age and breed. Practice on chickens that have been killed, until sure that it can be performed quickly and safely; then try the living bird.

Position of the Fowl in Caponizing.

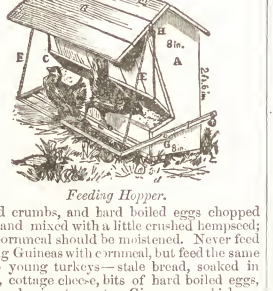
Confine the fowl to a board, left side down, by weights or straps which will securely fasten legs and wings, the latter being drawn well over the back, and the legs extended backward, the upper one drawn farthest out; head and neck free. Remove the feathers from a spot a little larger than a silver dollar, at the point near the hip, upon the line between the thigh and shoulder. Draw the skin back while you make a cut 1½ in. long between the last 2 ribs, and lastly through the thin membrane that lines the abdominal cavity. In making the last cut take care not to injure the intestines. Now take the splint and separate the ribs by attaching one of the hooks to each rib, and then, allowing the splint to spread, push the intestines away with a teaspoon handle; find the testicles; take hold of the membrane that covers them and hold it with the tweezers; tear it open with the hook; grasp the spermatic cord with tweezers; then twist off the testicle with the forceps. Remove the other in the same way. The left testicle is usually farther back than the right, and should be removed first. Take care not to injure the intestines or rupture the large blood-vessels attached to the organs removed. The operation completed, take out the splint, allow the skin to resume its place, stick on some of the feathers that were removed, which will absorb the blood and cover the wound. Give plenty of drink, but feed sparingly on soft cooked food for a few days, or until they begin to move around pretty lively.

EGGS, To Pack.—Eggs are best packed in boxes with divisions of stiff paper to keep them from touching, or being injured by jarring. The following are good ways to preserve eggs:

EGGS. To Preserve.—1. Coat the eggs with lard or clean grease; pack in bran.—2. Wrap each egg in soft paper, twisting each end of the paper so that it can not loosen from the egg; take a bag of coarse muslin, made in the shape of a pillow-slip, draw up one end in your hand, tie strong string around it tightly, leaving the ends long enough to tie a loop; place the eggs in this bag, ends down. It does not matter which end, but be sure not to have them on the side. Put 50 in one bag. Draw up the open end of the bag firmly against the eggs, and tie it like the other end.—3. Put 12 or more eggs into a small willow-basket and immerse this for 5 seconds in boiling water, containing about 5 lbs. brown sugar per gal.; place the eggs on trays to dry; pack, when cool, small ends down, in an intimate mixture of 1 part of finely powdered charcoal and 2 of dry bran. They will last 6 mos., or more. Scalding water causes the formation of a skin of hard albumen next the inner surface of the shell, and the sugar closes the pores.—4. Cover the eggs, by means of a bit of wool, with butter in which has been dissolved 2 or 3 per cent. of salicylic acid. Each egg, after coating, is placed in a box, filled with fine, dry sawdust. If care be taken that the eggs do not touch, and are perfectly covered with sawdust, they will keep fresh for months.—5. As the eggs are taken from the nest, brush each one with a thin solution of gum Arabic, being careful to leave no portion of the shell uncovered. The ½ of each egg must first be done, and left to dry before the remainder is touched, that the gum may not be rubbed off any part by contact while wet with the hand as it is held to be var-

nished, or with the table when laid down to harden.

FEEDING.—Keep chickens for the first fortnight upon alternate feedings of cornmeal,



Feeding Hopper.

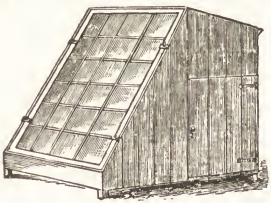
bread crumbs, and hard boiled eggs chopped fine, and mixed with a little crushed hempseed; the cornmeal should be moistened. Never feed young Guineas with cornmeal, but feed the same as to young turkeys—stale bread, soaked in milk, cottage cheese, bits of hard boiled eggs, chopped onion tops, etc. Give young chickens, when feathering, wheat, grits, or rice boiled dry, green food, cabbage, and lettuce. Remember, that a little food, given every 2 hours, is a chief rule. Food should be given warm in cold weather. The gain is 20 per cent. by feeding cooked food. Corn can be cooked to advantage. But fowls tire of a cooked diet entirely; substitute grain occasionally. Vary the cooked food, as potatoes 1 day, cabbage or onions another, etc. Cracker crumbs are good to mix with the meal. *Bran*, alone, should not be fed, on account of its swelling and caking in the crop. Moisten it with warm water, add powdered charcoal, 1 teaspoon to 1 qt. bran, and give scraps of fat or cooked vegetables; as an egg producing food, it is unequaled.—*Buckwheat* is fattening, an egg producer, and is relished.—*Cabbage* is best given whole.—*Charcoal* should be liberally fed, broken in small lumps and put where the fowls can get it.—*Lime and Bone.* Air-slaked lime should be scattered over the floor of the chicken house to remove unhealthy odors, and scattered around the yard. Laying fowls need bone for eggs and shells. For old fowls feed finely ground bone mixed with feed, or coarsely ground into bits; in the latter form it assists the gizzard. Ground oyster shells are valuable.—*Meat.* Feed scraps 3 or 4 times a week, with other food, when there are no worms or insects.—*Milk* may be given with coarse cornmeal, scalded together until a stiff mass; or it may be curdled, separated from the whey and given dry, but not sour.—*Millet* is excellent, and easily swallowed.—*Oats* may be used to advantage for breeding fowls, especially Asiatic varieties.—*Red Pepper* has a beneficial effect on fowls.—*Salt* in small quantity is good, but if not used to it, a very moderate quantity is poisonous.—*Sand and Gravel* should be used during the breeding season to act as grinders for hard food. Sprinkle sand over the floor of the house after cleaning, and on the droppings if the house is not cleaned every week or two.—*Sunflower* seeds may be fed freely; they promote laying and health.

FEEDING HOPPER.—The illustration shows a feeding hopper. A, shows the end view, 8 in. wide, 2 ft. 6 in. high, and 3 ft. long; B, roof, which projects over the perch; C, lid of the manger; E, E, cords attached to the lid of the manger and to the perch; I, end bar of the perch, with a weight attached to the end to balance the lid; H, pulley; G, fulcrum. When a fowl wants food, it hops upon the perch, and its weight raises the lid. When the fowl jumps off, the lid closes.

FATTENING.—Fowls should be fed liberally from the time they are hatched. It is a mistake to suppose that they can be kept low when young, and got up to great size by feeding when put up to fatten. With liberal feeding they become fit for fattening at the age of about 4 mos. in summer, and from 5 to 6 in winter. Cramming is sometimes practiced with a feeding machine, which is made to expel its contents through a tube of rubber, in response to pressure of the operator's foot upon a pedal; the amount passing through the tube is indicated on a dial. The operator seizes with the left hand the neck of the chicken, and, pressing on each side of the beak, the bird is forced to open its mouth, while with his right hand he introduces the nozzle of the tube communicating with the reservoir of food, and conveys into the stomach the food. A skillful operator can cram 400 chickens per hour. In this way it requires an average of 15 days to fatten a duck, 18 for a chicken, 20 for a goose, and 25 for a turkey. The pullets are fed 3 times a day and the ducks 4 times. The food used for chickens is barley and cornmeal, mixed with milk into a dough so thin that no liquid is necessary; the ordinary quantity given is from 7-10 to 1 4-10 gill each time. Pullets are not allowed drink, but ducks are given water at intervals. Only birds between 3 and 6 mos. old are treated thus.

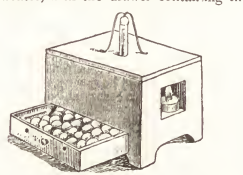
HATCHING, Natural.—Eggs of average size are best for hatching. Rough-shelled eggs should not be chosen, as they are often sterile. Smooth-shelled eggs are proper. Observers claim that sex can not be determined by the shape of the egg. The hen testifies her desire to set by clucking, searching for eggs to set upon, and restlessness. When this is not naturally excited, some breeders promote the disposition by applications, such as nettles, to the belly. Hens that have molted early often set before November. When a hen desires to set, give her a few nest eggs and let her alone for a day or two until the fever is well on, then remove her after dark to the nest and put her gently on the eggs; fasten a board in front of the box, leave it there till after dark the next evening, then remove it. In 9 cases out of 10 the hen will come off the next morning, eat her breakfast and return; then you may give her the eggs you desire to hatch. If she refuses to return, put her back, and fasten her in for another day and night. The setting hen needs feed and water once a day. Setters are sometimes shut up by them-

selves to keep others from disturbing them. A setting hen should be started right, and left much to herself. If early chicks are to be raised, a warm house is needed; a small yard should be attached to each nest, so that the hen can wallow in dirt and ashes placed for that purpose. If a hen is not set until April 1st, set her in a barrel, placed on the warm side of a fence; the barrel should be tight and set in the ground 6 in.; the end that is to be left open should be lower than the other end to let water run out, if any should get in. The nest should be made by first covering the middle of the barrel with fine moist loam several inches in length. In this the nest should be made with soft hay. From fresh eggs the chicks are usually all out by the morning of the 22d day; the strongest first. Remove shells and addled eggs, but leave the chickens in the nest for 1 day; feed the hen and give water; give nothing to the chickens; warmth is what they need. Giving young chickens a peppercorn, or other stimulant, is a bad practice. When 24 hours' old, place the hen under a coop in a dry out-house open to the south, and upon a surface of dry sand 3 or 4 in. deep, so that she can bask at pleasure. Put water outside, within reach of the hen, and give her the same food as the chickens. The difficulty that interferes with rearing early chickens is to overcome the long night of from 15 to 16 hours, when they are without food. There is only one substitute, and that is warmth, derived from the hen. She should not have more than 5 chickens; if she have 9 they would, while small, be covered; but they grow, and she cannot cover them during the night. Allow a hen 5 chickens, and she will rear 4. She can cover them till the nights get short and warm. The hen should be under the coop till the chickens are at least 10 weeks old; and at night cover the coop with matting or a piece of old carpet. Let the chickens have plenty of curd, egg chopped fine, oatmeal mixed with new milk, and some onion tops. Feed often. Let them have milk to drink. Feed the hen the same. No warmth is so beneficial as that from generous feeding. Guinea eggs are best hatched by putting them under a game fowl or bantam; when the chicks appear, keep them under cover where they can have plenty of air and dry gravel; feed once every 3 hours at least. Early chickens are desirable, but they are troublesome to raise in winter. To overcome this and keep the chicks warm during cold weather, a few coops of the style shown in the engraving are necessary. They are 4 ft. long, 3 wide, and 4 high, and large enough to give ventilation when closed. The nest is made in one corner of the coop, and when the young are hatched they may be confined in it. The front is a common hot-bed sash, 3x4 ft., and can be raised at pleasure. The coop is placed in a corner of the poultry house, near the glass front, and being thus warmed during the day, will retain warmth through the night. In the coldest weather a blanket may be thrown over it.

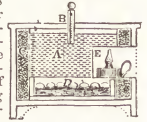


Hatching Coop.

HATCHING, Artificial.—The construction and operation of the hatching box and artificial mother, are so simple that any one can make and use them. The 1st illustration represents the incubator, with the drawer containing the eggs partly drawn out. The 2d shows a section of the same. The upper part of the box contains a zinc reservoir (A) with a space left (E) for the introduction of the lamp, and a small tube (B) passing through the top of the box, which serves for filling it with water, and holding a thermometer, which, plunged into the water, indicates the temperature. Thermometer tubes may be held in position by inserting through a perforated cork; the temperature of the water may then be seen at a glance. The drawer for the eggs (D) is immediately beneath the reservoir; it is provided with two small holes for ventilation, and holds about 40 eggs. A small thermometer is also kept in the drawer to indicate the temperature of air surrounding the eggs. A space is left around the reservoir, and on 3 sides of the drawer, for a filling of sawdust or other non-conducting material. A flat tin lamp with 2 round wicks, is used, but a properly constructed kerosene burner would answer. Soft hay is spread in the bottom of the drawer; the eggs are put in, it is then closed and warmed by the water above. The temperature of the water is kept at 122°, or enough higher or lower to keep the eggs at 104° to 106°. Once or twice each day the drawer is opened, the eggs turned and left for ¼ hour in the open air before replacing. At the end of 21 days, the chickens come out,

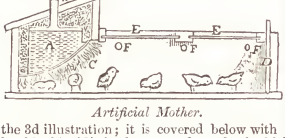


Artificial Incubator, with Drawer Partly Open.



Section of Incubator.

and are left 24 hours in the drawers, without feed, before being taken to the artificial mother. This operation follows the natural method; the eggs receive their heat from above; are turned each day, and ventilated, as in the case when under the mother. The holes for ventilation in the drawer are small, and probably could be dispensed with. The artificial mother is provided with a zinc reservoir (A) of the shape shown in



Artificial Mother.

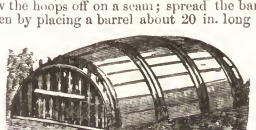
the 3d illustration; it is covered below with a lamb's skin (C), in the warmed wool of which the chickens nestle themselves. This reservoir is only filled in cold weather, once a day, the water being first brought to a temperature of 160° to 175°. The tube (B) passing up from this reservoir is used for filling, and the one at the side (D) for emptying. The top of the box (F, E) is of glass, arranged to slide open at pleasure; there are three ventilating holes on each side the box (F, F, F), and a gate at the end. The chickens are placed in this when 24 hours old, and kept there 1 week; they are then gradually habituated to the outside air, the gate being constantly open for them. Fresh water and feed are given 5 times each day, it being considered essential to give only small rations, and frequently.

LAYING.—Hens lay from early spring, to midsummer, when they cease; then commence again; again cease toward mid-winter, and commence again. When the period of laying approaches, it is known by the brightening of the red in the combs and wattles, archness of gait, glistening eyes, and frequent cackling. She then looks for her nest, and after going in and out of it for some days, and making a hollow in it, she lays. Nests may be made in boxes in which a chalk egg or two should be put. They may be made of short straw. In some instances, a hen makes choice of a nest, and when she finds this preoccupied, she will wait until it is vacated. Some hens lay 1 egg every day, and others 1 every other day. Eggs ought to be taken from the nest every afternoon, for, if left, the heat of the hens when laying the next day will corrupt them. The supply of eggs depends on the food furnished. Never over feed. Hard food, such as corn, barley, wheat, buckwheat, etc., once a day, is necessary; but the principal supply should be soft food, scalded. Corn and oats ground together, and wheat bran, mixed in equal proportions, well scalded, is best. Give this in the morning and grain at night. Never feed oftener than twice a day, and if they have fields to roam feed ½ what they would naturally eat. Occasionally give a little ground mustard, ginger or pepper, but do not always be doctoring.

MARKETING.—Fatten the fowls, and let them remain 24 hrs. without food previous to killing. Instead of wringing their necks, cut their heads off; hang them up by their legs to bleed; pick while warm; do not tear the skin; the wings should not be cut off, but picked; if the head be cut off, the skin of the neck should be tied over the end. Cut off the heads of ducks and geese. All the offal should be taken out from behind. Never send to market with the intestines in; this does great injury to the flesh. After removing the intestines, wipe out the blood with a cloth; but no water should be used. With a moist cloth take off the blood upon the carcass; hang in a cool, dry room until ready to market. Do not remove the gizzard; if the fowl be fat, make a larger hole, turn the leaves out, and fasten with a small skewer. Prepared in this way, poultry will be nicer and entitled to a better price.

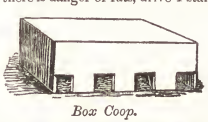
SETTING, To Prevent.—Put water, 2 in. deep, into a barrel; place the hen in it, and cover with a board; leave her 24 hrs., when the setting fever will have left her.

SHELTERING.—An open, airy fowl house is best, provided neither rain, snow, nor wind reaches the body. Pure air is essential to the health; close quarters and high feed are sure to make them sick. Roosts protected from storms and currents of air should be provided, and the fowls bedded down during cold weather. Spring pullets will lay regularly during winter; so also will mature hens of large breeds, and non setters, provided they recover from molting, which takes place between August and November. With larger breeds, such as the Brahmas and Cochins, high roosts are objectionable; use low roosting benches, made of 2 in. strips, laid flatwise, rounded off for the top, and with legs spread apart at the bottom, to prevent tipping over. They are made 18 in. high, and 4 to 5 ft. long. The following are good home-made coops: 1. Take an old barrel; tack the hoops on each side of every seam. After clinching the nails, saw the hoops off on a seam; spread the barrel open by placing a barrel about 20 in. long for



Barrel Coop.

the back of the coop.—2. Take an inverted box, saw out places in one side for doorways. When there is danger of rats, drive 4 stakes, 1 or



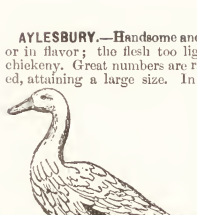
Box Coop.

1½ ft. long, into the ground; on these place inverted tin basins; then place the coop on them.

Ducks.

Breeds.

AYLESBURY.—Handsome and strong; inferior in flavor; the flesh too light colored, and chickeny. Great numbers are raised and fattened, attaining a large size. In ordinary condition they range from 10 to 15 lbs. a pair, and are largest at 2 to 3 years old. Towards spring, and during breeding, all ducks lose flesh and become light. These are hardy, easy to raise, and the eggs usually fertile if the ducks are not kept too fat. No breed excels this for laying; they commence in March and lay till July or August. They mature early; and at 6 weeks old are fit for market, weighing about 3 lbs.



Aylesbury Duck.

BLACK, or DUSKY.—They breed from Canada to the Gulf of Mexico, in any lake or marsh. The nest is built under bushes, beside logs, and often on high ground a distance from water. They cover the eggs when leaving the nest, to conceal them from crows and other birds. Only 1 brood is raised a year at the North, though 2 are common at the South. The young are covered with brown down, are taken to water as soon as hatched, grow rapidly, and at 4 or 5 mos. equal their parents. They feed on bugs, seeds, and roots of grasses. In captivity they lose all activity and grace, retaining but one instinct, fidelity to one mate. Several generations of crossing are required to destroy this characteristic. The body is brownish black, margined with reddish brown; head brownish yellow; upper part black, with green cast at the sides; wing coverts grayish brown; tail short, and rounded. The length of the male 22 in.; weight, 3 lbs.

CALL.—Round and compact in form; gray or white; the gray resembles the Rowen, while the white resembles the Aylesbury.

EIDER.—Perfectly tame. The duck is mottled gray and brown, and hardly to be distinguished at a short distance when upon her nest. It is she who fur'shes the eider down. The drake has a showy back, white plumage, and is a conspicuous bird, but not so tame as his mate. When the nest has been repeatedly robbed of the down, and the duck finds difficulty in replacing it, the drake comes to the rescue, and supplies her with down from his own breast.

MUSCOVY.—A distinct species; larger than the common duck; has a red membrane covering the cheeks and behind the eyes; has a musky odor. In a wild state, the drake is brownish-black, with a broad white patch on the wings; the female is smaller and more obscurely colored. In the domestic state it exhibits every variety of color. It is easily fattened, a prolific breeder, a voracious feeder, but profitable to rear. The male will pair with the common duck.

Muscovy Ducks.

PEKIN.—Their color is snowy white; very handsome for small bodies of water or the lawn. They have yellow colored bills and legs, free from black spots. They can be raised anywhere; do not require much water until several months old, and even then they will do well with a small trough of water, if they have grass range. They mature early and can be marketed in July and August at high prices. It takes in warm weather 3 weeks to hatch them. At birth they are larger and stronger than other varieties and when developed weigh about 18 lbs. to the pair. They lay 150 eggs per year. During the summer they require but little food, if they have a good range and access to the chicken yard.

ROWEN.—One of the most useful and hardy; plumage dark and rich; awkward in gait, and dull in countenance; especially adapted for putting on flesh, which is dark, but excellent; prolific layers. They ought to be of the largest size, for, if small, it is probable they are not far removed from the wild breed, and in that case will be apt to stray away, and be less prolific in eggs, though both eggs and flesh will be higher flavored.

Care and Management.

EGGS.—The eggs of the duck are known from the common fowl by their bluish color and larger size, the shell being smoother, not so thick, and with fewer pores. When boiled, the

white is never curdy, like that of a new-laid hen's egg, but transparent, while the yolk is darker in color; the flavor not so delicate. For omelets, puddings and pastry, duck eggs are better than hen's eggs, giving a finer color and flavor.

FEEDING.—Young ducks should be fed upon cornmeal or curds, kept in a warm place at night and not let out early in the morning. They should be kept from water to swim in, as it always does them harm. When ducks grow large they will provide for themselves a considerable part of the year. They live on grain strewed about the poultry-yard, the sweepings of barns, mealy substances, the residue of breweries, herbage, roots and fruits. They are fond of boiled potatoes, and these have been substituted for maize and barley. Every kind of flesh or offal forwards their growth. Ducks often try to swallow a whole fish, or a frog, which heats them, if they do not immediately throw it up. Slugs, spiders and toads suit their appetite.

FATTENING.—When ducks are being fattened allow no pond, only a trough of water. Butchers' offal is excellent and does not give the flesh a rank flavor. Acorns injure the flavor, and barley renders it insipid. It expedites fattening to have coops, quiet, and darkness. Ground malt, mixed with water, is excellent. When ducks have been rendered tolerably fat by being at large, they are cooped in a dark place and taken out morning and evening to be crammed. This may be done by crossing their wings on the knees, opening their bills with the left hand, while with the right they are stuffed with boiled maize. Many are suffocated by the operation; but their flesh is not the worse, provided they are bled. It requires a fortnight for the process. The sign of their being fat enough, is when the tail opens like a fan, from the fat pressing on the roots of the feathers.

HATCHING.—The domestic duck is not disposed to hatch; to induce it to do so, towards the end of laying, 2 or 3 other eggs may be left in each nest, taking care every morning to take away the oldest laid, that they may not be spoiled; 8 to 10 eggs may be given; they should not be sprinkled with cold water. The duck cannot go to her food and it must be placed before her. First broods are usually best, because the summer helps to strengthen the ducklings. The ducklings are no sooner excluded than the mother takes them to the water, where they dabble and eat, and many of them perish, if the weather is cold.

LAYING.—Ducks begin to lay towards the end of February, and earlier; some will lay 50 and even nearly double that number. They do not lay later than May, unless they be well fed. In the wild state there is only one duck to a drake, therefore in domestication the fewer the better. At the laying season, ducks require to be looked after, for they are not so easily brought to lay in nests as common fowls, but stray away to lay, and sometimes drop their eggs in water. As ducks usually lay at night or early in the morning, to secure their eggs, confine them, when they must lay.

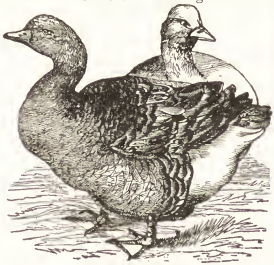
PONDS.—In order to keep ducks a pond should be provided, if there be no water convenient; and, if the pond will admit, have an island in it, planted with aquatic plants.

SHELTER.—Ducks should have a house with a brick or stone floor, which should be frequently washed. Give straw for bedding every 2 days.

GEESE.

BREEDS.

AFRICAN.—A large goose, with straight neck, and head carried level in walking. The head



Common Geese.

is brown, and bill hooked. Rare in the U. S.

CHINESE.—A well known variety embracing several kinds; the geese smaller than Toulouse, but fine birds; the white variety with red legs is beautiful; flesh good; fatten easily, and are prolific.

COMMON.—These are divided into large and small, and white and gray. The gray are the best and prove the most prolific.

EMBDEN.—The most valuable domesticated breed. They have heavy bodies, strong necks; white plumage and blue eyes. They are heavy, weighing 20 lbs.

HAWAIIAN.—These geese commence laying in April. In the wild state they lay but 2 or 3 eggs, while in domestication they sometimes lay 8 or 10. They are fond of human society; are less aquatic than other geese, rarely remain in the water long, and show little disposition to fly.

TOULOUSE.—Chiefly remarkable for size. The head is a slaty blue, marked with bars; neck dark brown; breast slaty blue; belly white; bill orange red, and feet flesh color; of a mild and easy disposition, which conduce to fattening, at little cost; flesh tender and well-flavored.

Care and Management.

FEEDING. — Feed young goslings cornmeal ground with the cob, mixed into dough, rather

Toulouse Goose.

dry, with a little salt; teach them to eat regularly; throw a morsel at a time, in the midst of a flock, or the old geese will get the most. Goslings soon become tame and will eat as long as one will feed them. At the end of the 3rd week feed twice a day; after the 6th not at all, till ready to fatten them for market. If goslings are taught to eat, well fed, and kept dry till feathered, success is certain. The older geese should be fed corn and wheat screenings; put their grain in water, so that they will have to put their heads in to get at it.

FATTENING.—Geese may be brought to great fatness; at which period kill them, otherwise they become lean and many of them die. Geese may be fattened when young, and after they have attained full growth. The methods at each period are nearly the same. Give boiled oats 3 times a day, with plenty of milk; this will fatten them in a month. For stubble geese, besides oats, give split beans, meal and water, and coop them up in narrow pens, so low that they can neither stand upright nor move; keep clean, by renewing the litter. A few feathers are previously plucked out from the rump, and from under the wings. The maize required for feeding is boiled and put into a trough, with clean water, and they are permitted to eat when they feel inclined; they eat a great deal, but in about 3 weeks their appetite falls off. As soon as this is perceived, they are crammed. A lean goose is confined in a small coop, narrow enough to prevent it from turning. Water is supplied in a trough, having some bits of charcoal in it. A bush. of maize is enough food for a month. It is soaked in water and the goose crammed morning and evening, but allowed to eat and drink as much as it chooses. About the 22d day, a quantity of poppy-oil is mixed with the maize. In a month, it is seized with difficulty of breathing, and a lump of fat under each wing indicates that it is time to kill it, lest it should be choked with fat, and die.

HATCHING.—Geese are good mothers, but not good hatchers; 2 to 4 are enough for 1 gander; eggs may be set under hens; 3 or 4 are enough for a moderate sized hen. When a goose appears tractable, let her hatch 1 brood, and when those hatched under hens are big enough, they will all go together. While geese are setting, dust them with dry sulphur, to cleanse them from vermin. After the 28th day the eggs should be put in milkwarm water a few moments each day. This softens the shell, enables one to throw away the rotten, and to count the goslings. Goslings are a month hatching, and must be taken from the mother; for, feeling the young under her, she might leave the rest unhatched. Having separated them, they must be kept in flat wicker pens, or baskets, covered with a cloth and lined with wool. When the whole brood has come forth, the first hatched may be returned to the mother. Sometimes, when the eggs are nearly hatched, the shell is broken to help the goslings out. Have the nest tight, and keep the goslings in over 1 night after all are hatched. Make a triangular pen where the grass is short, and move to a new place every day. Put in a shallow dish of water, and keep it fresh. Feed little and often, while small, and at the end of 1 week they may be turned into a pasture; but shelter at night. If a gosling gets wet and begins to droop, carry it to the fire and dry it.

LAYING.—When well kept, geese will lay 3 times a year, from 5 to 12 eggs each time; if the eggs be removed as soon as laid, a goose may be made, by proper feeding, to lay from 20 to 50 eggs. They begin to lay in March; it may be known by her carrying straws to form her nest. They should be watched, lest they lay in some by-place. As soon as geese want to lay, coop them up under their roof, where nests made of straw have been prepared. If they can once be induced to lay in this nest, they will continue to do so till their number of eggs is completed. To have early goslings, geese should be brought to lay early by keeping them in a warm, clean place, and feeding them on stimulating food.

PONDS.—To raise geese successfully, have a pond, or running water, into which they may go at pleasure.

SHELTERING.—Geese need a clean, dry place to sleep in. It is not well to keep geese with poultry; for, when confined in the poultry yard, they will harrass the hens and turkeys.

Turkeys.

REMARKS. — In selecting a turkey cock, see that he is large and majestic. Both cock and hen should have short legs, full shapes, energy in movement, and be healthy. A turkey cock is in his prime in his 3d year, and the hen in her 2d year.

BREEDS.—Diversity of color is about all that constitutes varieties, the *Black, White, Copper, Brown, Bronze, Dusky Gray,* etc. As to relative value, there is doubt. The brown and ashy gray are not remarkable; but the black are superior as regards hardiness, rearing and the quality of flesh; and they are very prolific.

FEEDING. — Turkeys nearly feed themselves in the farmer's yards and fields; if not so fortunate, scatter oats or corn among them, or feed boiled potatoes or Swedish turnips: feed only so much corn as they will eat up clean. For summer feeding use buckwheat, barley, or screenings of wheat.

Turkey.

For autumn and for fattening, yellow corn, as that gives a rich color to the skin; give milk regularly; chopped onions, bread crumbs, corn bread, cheese curds, or any clean food to insure health.

FATTENING. — Feed meal, boiled potatoes, oats, and mix pulverized charcoal with their food. After 6 mos. cram, like fowls, with the same kind of food, but they need not be closely confined, though a dark place is recommended. It requires 6 weeks to fat, and it would be barbarous to confine them in pens; they may be left in close farm yards. To have large turkeys, cocks should be kept over for fattening until nearly 2 years old; but a young turkey hen, in spring, is much better in flavor. Early feeding of young turkeys is similar to that recommended for fowls; egg is a favorite food; they may soon have nettles and parsley, made into balls, and grits or meal boiled thick, which they will peck from the hand.

HATCHING. — It is better for turkeys to be hatched early. The earliest eggs must be hatched under a common hen, for the turkey, when young, seldom sets on her first clutch, and it is not profitable for her to do so. Never keep over 2 or 3 breeding females ordinarily; if a business, one can keep as many breeders as accommodations admit. Turkeys do not want to be cramped; they like extensive grounds and freedom; the more there are, the greater area required. The male should be changed every year; or, if reserved, the females should be of distinct blood. Choose a quiet hen for a setter, and a quiet place for her nest. A hen will cover from 15 to 18 eggs; while sitting, she should not be disturbed, nor taken from the nest after hatching, for at least 24 hrs.; if contented, allow her to stay longer. The young turkeys gain strength by being quiet for a day or two at first. Watch the hatching, and if a chick is not likely to come out strong, the shell may be broken, and the chick saved. After the hen and her brood is taken from the nest, give her a large, airy coop, where the grass is closely mown off, and the chicks can bask in the sun, run, and pick up bugs and insects.

LAYING.—Hens that have been well kept, lay before they are 1 yr. old, if the season be open. The laying period comes on at 9 mos., and seldom later than 10 mos. from the shell. One fecundation, it is said, renders all the eggs of that laying fertile; some allow 1 cock to every 12 or 14 hens. The laying season is known by the liveliness and strut of the hen, and a peculiar cry. This takes place in March. When let out in the morning, examine the hens, and keep in such as are about to lay. While the hen is laying, the cock should be kept from her. The eggs must be taken as soon as laid, and they will keep if put in a basket and kept dry. The hen will hatch other eggs than her own.

SHELTERING.—In keeping turkeys, let them have a large shed, protected from the weather. The perches should be high, and a ladder must be supplied, as they are apt to injure themselves in their descent. During warm weather let them select their roosting places, but watch, lest they stray, and in cold weather get their toes frosted. Young turkeys, not well feathered, should not be allowed to run in the dew, for a chill will prove fatal. Allow them to roam, but long before night pen them in a roomy coop, after feeding.

TREATMENT OF DISEASE.

APOPLEXY. — Cause, a full habit of body; occurs in overfed birds, and most common among laying hens. Without warning, they fall, roll on their backs, struggle for a minute or two, then rise, stupid and giddy, and return to their food. *Treatment:* Wash the head in cold water, and keep a wet rag on the head. Give 2 gr. calomel, mixed with 5 gr. rhubarb; if it does not operate in 3 hours, give 1 dessertspoonful castor oil. Keep the bird warm and quiet, on light food, and in a dark coop, until recovery.

ASTHMA. — Gaping, panting, and difficult breathing. *Treatment:* Give warmth, with small repeated doses of sulphur, mixed with butter and cayenne pepper.

BALDNESS. — Loss of feathers from the head and neck; caused by want of wholesome and green food. *Treatment:* Rub the place with mercurial ointment, and give a 5 gr. Plummer's pill every 2d day for 1 week. Give green food.

BLINDNESS.—*Treatment:* Wash with warm water; then put a few drops of green tea into the eyes.

BUMBLE FOOT.—A large bunch on the sole or heel, which sometimes suppurates and forms a callosity. Caused by alighting from a high perch, or from perching on a flat pole, the whole weight coming on the ball of the foot. *Treatment:* Prevent by proper roosting poles. Round perches are best. The pole for a full-grown fowl should be 1½ in. in diameter. One sufficiently large to bear the weight is all that is neces-

sary. When roosting on a tree, fowls seek the branches that are small and easy to clasp the toes around. Square or large perches cause crooked breast bones.

CANKER. — In this disease the mouth and throat become filled with a cheesy substance of offensive odor, sometimes causing stoppage of windpipe, suffocation and death. *Treatment:* Take out all cheesy matter with a small spoon and pincers, and wipe out the mucus from the mouth, nostrils and eyes. Prepare a solution of chlorinated soda; dilute it with 6 parts water; wash the head, eyes, nostrils, mouth and throat out, using a soft swab; in 20 minutes give a feed of chopped meat, mixed with bread soaked in ale or spirits and water, and sprinkled with cayenne pepper; keep up this diet until well.

CATARRH.—Cause, cold and dampness. The symptoms are a watery or sticky discharge from the nostrils, and swelling of the eyelids; in worse cases the face is swollen at the sides, and the disease has the appearance of roup. *Treatment:* Remove to a dry, warm situation. Give mashed boiled potatoes, dusted with black pepper. In severe cases, treat in the same manner as roup.

CHILLS.—*Treatment:* Give ground malt and barley-meal in equal quantities, adding a little powdered caraway or coriander seed.

CHOLERA.—*Treatment:* Mix with skim milk and place in small troughs, whenever there is any appearance of the disease, 2 tablespoonfuls of the following: 2 oz. each flowers of sulphur, powdered alum, resin, cayenne pepper and copperas. Let these be stirred into 6 qts. cornmeal.

CONSUMPTION.—Cause, confining chickens in unhealthy places. The symptoms are not strongly marked in the early stages, but in the advanced state there is wasting, cough, and expectoration of matter. *Treatment:* Prevent by wholesome diet, and good housing. In advanced stages it is incurable. Give cod-liver oil mixed with barley meal. Temperature is the principal thing to see to.

COSTIVENESS.—Cause, dry diet, without access to vegetables, and want of good water. *Treatment:* 1. Give soaked bread, with warm skim milk.—2. A meal of fresh meat, or hot potatoes, mixed with lard.

CRAMP.—Cause, damp and cold. The feet are contracted and the fowl unable to move its legs. *Treatment:* Dryness and warmth, with oatmeal mashed with ale for diet.

CROP-BOUND.—The crop is overcharged, and unable to expel its contents into the stomach. The bird being hungry stuffs his crop until it becomes a mass. *Treatment:* With a sharp penknife cut through the skin and upper part of the crop, and remove the impacted mass by some blunt pointed instrument. If it has remained many days and is offensive, pour some warm water into the crop. The incision, if small, may be left; but if large, a stitch or two should be taken. Give soft food for a day or two. Sometimes a dessertspoonful of gin will stimulate the crop to overcome the mass, and render the knife unnecessary.

CROUP. — *Treatment:* Remove the croup membranes from the mouth with a feather; then touch the parts with a feather dipped in a solution of nitrate of silver, 10 gr. to 1 oz. of rain water. Feed no raw grain, but well boiled oatmeal or cornmeal will be excellent. Put ½ oz. carbonate of soda in every qt. of water drank, and change their roosting-place to a new building. If this last cannot be done, clean the place, and wash it over with a solution at the rate of 1 oz. carbolic acid to 1 qt. water.

DIARRHEA.—*Treatment:* When brought on by green or soft food, the diet must be changed, and water given sparingly. Give powdered chalk and rhubarb, of each 5 gr.; 3 gr. cayenne pepper; if this does not check it give the following every 4 or 5 hours: Powdered opium, and powdered ipecacuanha, of each, 1 gr.

DISTEMPER.—An affection of the head and throat of young fowls. The symptoms are listlessness; remaining on the roost; face and comb red, and puffy under the eyes; no appetite. A white froth appears in the corner of the eye the 2d day. *Treatment:* Wash the head and beak clean, and clear the tear tube by blowing through the nose into the throat; bathe the head and wash the throat with a solution of carbolic acid—1 part of acid to 10 of water. Keep quiet and allow only water for a day or so. In aggravated cases, steam the head and throat, give a dessertspoonful of castor oil, and repeat the carbolic acid treatment at short intervals.

EGG ORGANS, Inflammation of.—Cause, overfeeding. The symptoms are, going on to the nest without laying; laying shell-less eggs; dropping eggs from perch or elsewhere. *Treatment:* Low diet of boiled mashed potatoes and boiled rice for a week or more; give a dessertspoonful of castor oil, and a pill containing 1 gr. calomel, and 1-12 gr. of tartar emetic every 2d day for a week.

FEATHERS, Loss of. — *Treatment:* Give, internally, cayenne pepper and sulphur, ¼ each, mixed with fresh butter. Let the fowls have access to plenty of lime. The diet should be changed, and cleanliness and fresh air secured.

GAPES. — A worm infesting the windpipe. Cause, impure and stagnant water. The symptoms are gaping, coughing and sneezing, inactivity, ruffled feathers and loss of appetite. *Treatment:* 1. Take the chicken in the hand, and insert a small-sized wing feather, dipped in kerosene oil, down the throat; turn it round 2 or 3 times, and you will find a small red worm attached to it. Feed wheat screenings and cracked corn or dry feed.—2. Give water to drink impregnated with camphor.

GIDDINESS.—(See *Apoplexy.*)

INDIGESTION.—Cause, overfeeding and want of exercise. *Treatment:* Give less food; turn the fowl into an open walk, and mix powdered gentian and cayenne pepper in the food.

LEGS, Scaly.—Resulting from debris left by small lice in the shank of fowls. They burrow between and under the feet and legs, and the deposits seen are dead insects and the destroyed scales of the parts. When the insects are left to work for a long time the excrescence becomes irritating, and, in an old fowl, sore. It is transmissible from a hen to her chicks. An affected

fowl on the roost will infect others. *Treatment:* Before hens become broody, smear their shanks with carbolic soap, every 2 or 3 days. Treat the perches in the same way.

LEG WEAKNESS.—A disease of young fowls. The symptoms are moping, squatting and staggering. *Treatment:* 1. Remove to a dry, warm place and give cayenne pepper daily in the food. —2. See that that the fowls have lime, and give bone meal in the food.

LICE. — The symptoms are refusal of food, rumpled feathers, comb dark blue at the end. *Treatment:* 1. Grease the fowls under the wings, over the vent and on the head, with ointment made of lard and sulphur. Examine the roosts and wash thoroughly with coal oil.—2. Dissolve 1 oz. carbolic acid in 1 gal. hot water and wash the roosts, and throw the remainder of it over the floor.—3. 2 or 3 lbs. copperas, dissolved in 2 gals. water, will cleanse roosts, and keep poultry in health.—4. Mix a few sprigs of cedar bush with hay or any kind of litter for hen's nests.—5 Syringe the roosts and poultry with pennyroyal tea.

PARALYSIS. — Cause, overstimulating diet. *Treatment:* Incurable. Give plenty of exercise, mixed diet and well ventilated, dry quarters.

PIP.—Cause, want of water or bad water. A dry, horny scale appears upon the tongue. The beak becomes yellow at the base, plumage ruffled, the fowl mopes and finally dies. *Treatment:* Frequently moisten the mouth; if the scale of the hardened membrane is loose, remove it. Do not scrape the tongue, nor use rough modes; apply borax, dissolved in pure water, and tincture myrrh, with a camel-hair brush, 2 or 3 times a day. Give onions or parsley chopped and mixed with potatoes and a little Indian or oatmeal; give pure water; also, a teaspoonful castor oil, according to age.

POX. — A contagious eruption of the comb, face and wattles. The symptoms are yellowish white rash, bleeding profusely when the crests are removed. It takes from 5 to 7 days to run its course. *Treatment:* Remove the crests and bathe in hot water and carbolic acid. When the bleeding ceases, apply citrine ointment; take off the scales after 60 or 72 hours. Take 1 tablespoonful each of common flour, and flour of sulphur; 1 teaspoonful cayenne pepper; 60 gr. hyposulphite of soda; milk enough to mold into 20 pills; dose, 1 pill each morning. Dissolve 4 gr. quinine in $\frac{3}{4}$ pt. of milk, and give in 3 equal doses during the day. Feed boiled onions and rice mixed with oatmeal.

RHEUMATISM.—Cause, exposure to cold and wet. The fowl is unable to move. *Treatment:* Give good food and warm, dry quarters.

ROUP. — Cause, dirt, too hot feeding, and want of exercise. The symptoms are difficulty of breathing, constant gaping, dimness of sight, lividity of the eyelids, a discharge from the nostrils that gradually becomes purulent and fetid, loss of appetite, and thirst. *Treatment:* 1 part powdered gentian and powdered ginger; 1½ parts Epsom salts; ½ part sulphur; make up with butter and give every morning. If the discharge becomes fetid, bathe the mouth, nostrils and eyes with the following: 1 part chloride of lime; 1 part acetate of lead; or with an infusion of chamomile flowers.

SPINAL CURVATURE.—This causes the tail to be carried on one side. It arises from overgrowth when young, caused by high feeding and too much confinement. *Treatment:* Nourishing but not animal food, a good run, and green food, are the best preventives.

STOMACH, Inflammation of. — Cause, overstimulating food. When a fowl mopes and refuses to eat, or selects only soft food, and gradually pines and becomes thin, inflammation of the stomach may be suspected. *Treatment:* Give an occasional gr. of calomel, at intervals of several days, and a wholesome diet.

ULCERS.—*Treatment:* Dress with a little lard, or wash with a weak solution of sugar of lead. If they appear sluggish, touch them with bluestone.

VERTIGO.—(See *Apoplexy.*)

WHITE COMB. — *Treatment:* ¼ oz. turmeric powder; 1 oz. cocoanut oil; apply to the comb.

WINGS, Drooping. — Caused by *Lice,* which see.

WOUNDS.—*Treatment:* Wash with a solution of 1 dr. carbolic acid in 8 oz. water.

DOG VERSUS BABY.

PET STOCK.

ANIMALS.

CATS.

BREEDS.

ANGORA, or PERSIAN.—Remarkable for great size, length and delicacy of hair, especially of the belly and throat. Color usually white, yellowish, or grayish, while the soles and lips are sometimes flesh color. Its temperament lethargic, which is generally due to excessive petting.

BLACK.—These are remarkable for clear, yellow eyes; coat rarely entirely black, having generally white hairs on the throat. When young they show striped markings.

GRAY.— Very rare; a tabby, without black stripes, except 2 large ones over the forelegs.

MALAY.—Found in Pegu, Siam and Burmah. Their tails ¾ the ordinary length, and contorted in a sort of knot.

MALTESE (Blue or Carthusian).—This breed has long, soft hair of a uniform dark, grayish blue tint; black lips and black soles.

ROYAL SIAMESE.—This cat is fawn color of a dark tinge, with a tendency to darker color about the muzzle; remarkable blue eyes, and sometimes 2 bald spots on the forehead.

TABBY.—This may be the result of crossing of the domestic cat by the wild cat. That they do breed together, sometimes, is certain.

TORTOISE-SHELL. — Fawn colored, mottled with black. Cats thus marked are generally females, while sandy colored ones are males. It seems that the sandy tomcat is the male of the breed of which the tortoise-shell is the female—the litters being so divided.

WHITE.—Have blue eyes, or eyes of the ordinary color (an obscure yellow), with a tinge of green. Those with blue eyes are generally deaf. It sometimes happens that the eyes of a white cat are not always alike in color; one may be blue and the other yellow.

CARE AND HABITS.

FOOD.—Cats will eat any kind of fresh meat, fish, birds and insects, and are very fond of cow's milk.

LONGEVITY.—The length of the lives of cats varies; 12 years is probably its limit; but, in some cases, 18 yrs. may be attained.

REPRODUCTION.—The domestic cat begins to be ready to reproduce by the end of the 1st year, and is prolific to her 9th. She carries her young from 55 to 56 days; has generally 5 or 6 young at a birth, and sometimes 8 or 9.

DOGS.

BREEDS.

ALBIAN.—About 27 to 28 in. high, with long pointed muzzle, powerful body, muscular limbs, and a long, bushy tail, like that of the Newfoundland. The hair of a silky texture and fawn color, clouded with brown. Used for hunting wild boars and wolves and for guarding sheepfolds.

BLOODHOUND.—Named from his power of scenting the blood of a wounded animal, so that once on his trail he could hunt him through any number of his fellows, and thus single out a wounded deer from a herd. He has been used to trace human beings. His height is 24 to 26 in.; forehead long and narrow; ears 8 to 10 in. long; lips hanging; throat loose and roomy; deep in the brisket, round in the ribs; loins broad, legs and feet straight; color black and tan, or deep and reddish fawn.

BULL-DOG. — The bull-dog and bull-terrier are fighting dogs. They have short, broad muzzles; head massive and large, and the frontal sinews broad; lips thick and pendulous; ears pendent; neck short; legs short and thick. When properly domesticated they are harmless.

DALMATIAN, or COACH DOG.—Resembles the pointer; has fine muzzle, small ears, dark eyes, sparkling and small; ears spotted, not black, nor any black upon his muzzle, head, or body, except in spots. Black on the head or ears not unfrequent, but it detracts from his beauty. Black

Coach Dog.

and tan on the head is not uncommon and occasionally tan spots, mingled with black, on the legs, feet and hips. The tail is like the pointer's, but inclined to coarseness. The feet small, well split up, close and firm. His chief beauty consists in his marks.

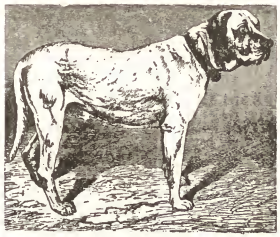
FOX-HOUND.—Prevailing colors: Black and white with tan; mixed or blended colors, known as red pie, blue pie, yellow pie, gray pie, lemon pie, hare pie, and badger pie; the last 3 are handsome. Height of male from 23 to 25 in., female from 21 to 23 in.

GREYHOUND.—The greyhound is used in the chase; and, as he hunts by sight, rather than by smell, his eyes are placed more forward than in other dogs. His head is slender and finely shaped; muzzle long and pointed; ears droop at the points; back is broad and muscular; body lank, and much contracted in its lower parts; legs long and muscular, while the chest is capacious; tail slender and curved upward at the end. The principal varieties are the *English, Rough Scotch, Italian, Persian, Russian,* and *Turkish.*

Italian Greyhound.

HARRIER.—A dwarf southern hound, with a slight infusion of greyhound; is more throaty than the foxhound, and has more ear, with a broader head, more fully developed flews, and a heavier and less active frame. Height 18 in.

MASTIFF. — A large variety; head large, and muzzle broad; ears moderate size and pendent.



Mastiff.

His strength is great, and his vigilance as a house dog unrivalled.

NEWFOUNDLAND.—There are several varieties: A smooth breed, with small head; white spotted with black, which seems to be extinct; a large breed, with broad muzzle, head raised, noble expression, curly hair, thick and bushy

Newfoundland.

tail. He is the water dog *par excellence*. The purer, the better water dog he will be; yet many dogs, possessing Newfoundland blood, make excellent dogs for ordinary sporting. His education comes by nature. In his infancy he may be taught to bring a glove and lay it down; and by practice, his various duties will follow. With judicious exercise of authority, he becomes very docile. They have been known at 4 mos. old to fetch a duck, but they should not be put too early at hard service.

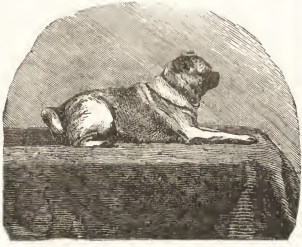
POINTER.—A valuable sporting dog. When it scents game, it stops motionless, until the sportsman comes near, and is prepared to shoot; he then gives the word and the dog springs upon the game. It requires but little training. Its scent and sight are acute.

Pointer.

POODLE.—This dog is covered with long, silky hair. It is considered the least useful of any variety, and is only kept as a pet.

Poodle.

PUG.—A diminutive bull-dog,



Pug.

having a bushy tail. It is cleanly, sensible, and somewhat intelligent and affectionate. It is small, of a fawn color, with black muzzle, and curled tail.

RETRIEVER.—A cross breed. The head is long, ears small, and set close; eyes and mouth large; chest broad and powerful; color, black or black and tabby. They are good tempered, and are used to bring in birds that are shot.

SETTER.—Probably a large species of spaniel. He is intelligent, docile, and courageous. He is taught to set or stand at birds, and is held in great value by sportsmen. He is not a clean house dog, and should be confined to his kennel. There are three kinds: *English*, *Irish* and *Russian*, the latter more like a poodle.

SHEPHERD.—There are 2 varieties: 1 short-haired, black on the back, white on the breast, belly and feet, with tan-colored spots on the cheeks, shoulders and thighs; the 2d, large and rough, with long hair; in color resembling the 1st. Crosses between these breeds have produced numerous races of dogs, doing duty in every sheep country. As soon as his strength allows, he applies himself to the care of sheep with fidelity. With little training he learns the will of his master. Training should commence when the pup is 5 or 6 mos. old; the older, the more difficult. In training, the services of an experienced dog will be indispensable. The

Retriever.

ardent temperament of the young dog must be subdued, and there is no better mode, than by compelling him to accompany a well-trained dog. A long line in the hands of the trainer, attached to a collar or belt, on the neck of the young dog, is generally necessary.

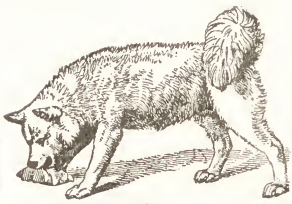
Setter.

SPANIEL.—There are several varieties, more or less elegant: The *Irish Water Spaniel* stands 21 in. at the shoulder, with long ears, round forehead, elegant sharp muzzle, and a comical face; body adorned with long ringlets, and though the face is bare, a few ringlets hang over the forehead; legs well covered with curls; color red, or dark mahogany. The *Clumber Spaniel* is long, heavy looking, short on the legs, strong, white in color, with orange markings; the coat straight and silky; head large and foolish-looking, but the eyes thoughtful. The *Sussex Spaniel* is from 30 to 35 lbs., of a beautiful golden liver color, with long head, dark brown nose, and well developed nostrils; mouth large, and the lips long and hanging; legs rather short and the body strong; coat short. The *Norfolk Spaniel* is liver and white color, at times black and white; legs and nose white, with brown freckles; shaped like the Sussex, but larger. The *Cocker Spaniel*, somewhat similar to the Sussex. The *English Water Spaniel* stands 19 to 20 in. at the

shoulder; color liver and white, with a collar of white; the dog is the only spaniel, except the Irish, on which a curly coat can be tolerated.

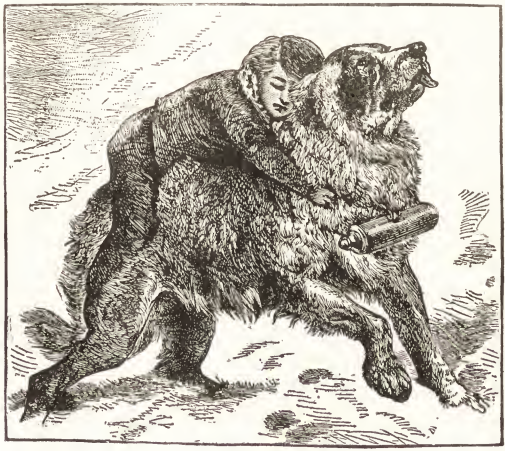
Spaniel.

has a stately carriage; tail heavy and well carried; they vary in intelligence; but a dog of moderate ability will learn to discover the dying and dead beneath the snow.



Spitz.

TERRIER.—A number of varieties, prominent among which are *Fox*, *Bull*, *Skye*, *Scotch*, *Dandy Dinmont*, and the smooth *Black and Tan* terriers. Noted for sagacity and power of scent; they will lie about and dig into a rat



St. Bernard.

SPITZ. — A breed of medium size, covered with long, thickly coated white hair; of hardy stock; active, sagacious, but rather cross; their bite thought to be dangerous; considered subject to rabies; when small, they afford amusement to children, and are often pets.

ST. BERNARD. — A mastiff capable of high training; could be educated as a retriever, but is almost too massive; reaches great weight; hole for days. They are of great assistance in hunting foxes and animals that burrow. The *Bull Terrier* is a cross between the bull and the terrier. Half bloods make good fighting dogs, while less of the bull produces a dog that will learn tricks. They are obedient, affectionate and courageous. Color white, or white patched with black; the under jaw does not project; fore legs straight and hind quarters strong. The

Fox Terrier was once used in fox hunting, but at present his place is taken by faster dogs. They weigh about 16 lbs.; head flat and nar-

Bull Terrier.

Black and Tan Terrier.

Fox Terrier.

row between the eyes; ears small and set back; jaw smooth, strong, and armed with strong teeth; eyes small, black and keen; nose black; shoulders straight; chest full; color white with black, or black and tan markings about the head; coat fine. Of all classes of terriers, perhaps the Fox terrier has greater intelligence; he is small, clean and attractive. The *Skye Terrier* is beautiful; the short haired variety is among the most valuable, being sagacious, hardy, energetic and courageous; color generally dark.

Breeding.

AGE FOR BREEDING.—The best age to breed from, is soon after maturity. When the result is desired to be small, the older both animals are

Scotch Terrier.

Skye Terrier.

the more likely this sequence; except in the last litter, which being often composed of one or two, they are not smaller than the average, but sometimes larger. All should be allowed to breed. The period varies according to size. Small dogs are adult at 1 yr.; large ones take fully twice as long to develop. The mastiff is barely full grown at 2 yrs.; large hounds and greyhounds at 1½ yrs.; pointers and setters from 1½ to 1¾ yrs.; terriers and small pet dogs at 1 yr. and even earlier.

CROSSING. — Crossing has 2 objects: 1. To prevent degeneration by keeping the same blood,

or what is called in-and-in breeding; 2. To improve the breeds when deficient in any desirable quality, by crossing with others which have it.

TIME FOR BREEDING.—The best time of the year for breeding is from April to September; for in the cold of winter the young are apt to become chilled, whereby growth is stopped and disease developed.

WHELPING, Treatment before.—When it is ascertained that the animal is in whelp, exercise should be increased freely till the 6th week, after which it should be given with care, to avoid strains. During the last few weeks the food should be regulated by her condition, which must be raised, if too low, or reversed, if too fat, the medium being such as is compatible with health, and neither tending towards exhaustion or inflammation. Excessive fat interferes with the birth of the young and the secretion of milk. It is better to separate her from other dogs during the last week or 10 days, as she becomes restless, is constantly looking for a place to whelp in, and if prevented from occupying any desirable place, she is uneasy. At this time the food should be of a sloppy kind, chiefly composed of broth, and milk and bread.

WHELPING, Treatment during.—The best way to prepare a place for the animal to whelp in, is to nail a piece of old carpet over a smooth boarded floor, to a regular bench, if in a sporting kennel, or on a flat board, raised a few inches. When a regular wooden box or kennel is used, she may as well continue to occupy it, as she will be more content; but it is not so easy to get at her or the whelps if anything goes wrong. A board, according to the size of the animal, with a raised edge to prevent the young rolling off, and supported by bricks a few inches from the ground, is all that is required; and if a piece of carpet is nailed upon this, and some straw placed upon it, the height of comfort is afforded. During whelping, the only management is in regard to food and quiet. While labor is going on, no food is required, unless it is delayed unnaturally. When completed, some lukewarm gruel, made with ½ milk and ½ water, should be given, and repeated every 2 or 3 hrs. Nothing cold should be given for the first 2 or 3 days, unless in the height of summer. Milk or broth should be given, until the secretion of milk is established, when a generous diet is to be allowed of meat.

TRAINING.

THERE is not space to give a long description of various tricks, but the most common, useful, and amusing ones are here explained.

CARRYING.—This consists of placing the article in the dog's mouth, and when he lets go of it, give him a slight box on the ear, and replace the article in his mouth. Whatever is given him to carry should be of such a form as to be grasped easily. The weight should at first be very light, and never more than he can carry. Dogs take pleasure in carrying articles, and feel the responsibility. When teaching them to carry food, care should be taken to keep them from eating it. Place the article in a covered basket, and when the dog has learned to carry a parcel give him this. If he attempts to get at the food, box his ears. By-and-by reward him with food, and then try him with a basket from which he can abstract the contents; if he tries to do so, punish him slightly, never permitting him to steal.

DANCING.—Taught by attaching a piece of meat to the end of a long switch; with this trace out in the air, in proximity to his nose, the figures you wish him to take, and you may depend upon his instinct leading him to follow the motions of the switch. Reward him with the meat after he has danced enough, and after a few lessons the switch may be used without any bait. He will at first follow its motions in the hope that there is something attached, and if he be rewarded, he will soon comprehend that following the switch means meat.

HUNTING.—As soon as the pups feed apart from the mother they should be called to their meals by firing a gun, commencing for a few days while engaged in eating their food. At first they will be terrified, but will soon associate the sound with enjoyment. Leave off when this object is attained. They must be taught from the first to come to heel at a call or whistle, and as soon as they understand the command, made to obey it by temperate chastisement for neglect. When old enough to walk out into the fields, they should be taught to obey the word "down." The command should be uttered with the whelp at the feet, forcing it down by pressure of the hand; repetition soon teaches the pup obedience, which may be occasionally rewarded by a bit of bread. When obedient at the feet, the pup should be ordered "down" when at some distance, and if a steady pointer can assist, he will soon obey; but, if not, walk quickly up and repeat the command in a stern voice. On the second disobedience a scolding is added; and if a third time the order be neglected, a cut with the whip accompanies the "down," and impresses it. This lesson is of great consequence. Teach the dog to drop at a wave of the hand. The animal must never be allowed to rise till ordered to "hold up," or simply "up." The next step is to teach the pups to drop at the report of the piece by ordering them "down" after discharging it, by degrees omitting the command, meeting any neglect at first by rebuke, and the second time by chastisement. On no account must they be allowed to rise until the piece is reloaded, checking any attempt by an imperious "down." To prevent the other dogs, when a comrade has found game, from rushing in upon the scent, the trainer must wait till the first dog has made a decided point, and then, if another runs in, his name and the word "soho," or other word of caution, must be shouted in a stern voice, at the same time waving the hand. If the game should run and the dog follows, the others will naturally approach, and they may be allowed to follow on the scent. But if any pup attempts to go before the one that found, he must be checked and punished if he disobeys. Young dogs should be allowed to play with the first game they see

chilled; with every successive bird they mouth, their ardor seems to increase, while they rarely injure it much. Dogs may be trained with very little correction, which should never be administered wantonly. If any dog is obstinate, it is best to fasten a light line to his collar, and just when he has gathered full speed, fetch him up sharply, which will send him tumbling over, and a few cuts of the whip will bring him to order. Any hunting dog may be taught to retrieve. Great patience is required, but the result amply compensates for the trouble. In teaching a dog to retrieve, an old glove, or other soft substance, should be used, and after allowing the pup to play with it, toss it from you and he will rush to get it. Call him after he has got it, and take it from him, rewarding him with kind words. Repeat this plan, using the command, "hie fetch," when you wish him to go, and "come in," when you wish him to return. By using the command, "come in," when he is a little distance from you, he will learn to obey. He will regain the glove. After practicing, you may drop the glove unobserved. He will follow your track for a distance to recover a lost article, by receiving the command, "hie fetch." You may now give the glove to another person to hide, first permitting the dog to see it in his possession, and he will be almost certain to find it. In first lessons, be careful to place the glove where the dog will be certain to find it. He should be taught to follow closely at the sportsman's heel when they are out together; this may be done by saying, "back, back," and striking him gently with the whip when he attempts to press forward.

LEAPING.—Extend a line from any support so high that the dog cannot step over; hold a morsel of meat near his nose, but a trifle above it, and induce him to approach to the line. With a sudden movement extend the hand beyond the barrier, saying "hip," or any quick exclamation. This will generally cause him to jump the barrier; when repeated several times he should be given the morsel. After a few repetitions, he will leap over, at a motion of the hand and the word of command. He should be rewarded for obeying, and it is well to have a switch to give a gentle cut, should he attempt to run under. The height of the barrier may be increased daily, taking care never to overtask his powers. When he has learned to leap, a hoop may be held in the hand, and he will jump through it. The hoop may be lessened in size until the dog leaps through one hardly bigger around than his own body, but, to do this, the trainer must display skill in conforming the motions of the hoop to those of the dog as he passes through.

PAW, To Give.—If the same paw is always given, the dog may be taught to offer the other one, when you ask for the "other paw," by taking it a few times when you make the request. It is easy for a dog to learn the difference between "right paw" and "left paw." It is well to lay extra stress upon "right" and "left" while training.

SITTING AND LYING DOWN.—Raise one hand over his head, and make a motion as though about to strike him on the top of his head with your palm; as you do so, use the word "down" distinctly and commandingly with each motion of the hand. While this is done, press firmly with the other hand upon his back, just over the hips. When he has done so, he should be patted. Repeat until he obeys the command readily. Then teach him to lie down, forcing him into a recumbent posture as you command him to "lie" down.

SITTING UP.—When the dog has learned to stand erect, he may be taught to sit up by pressing him down in the desired position. If he attempts to leave it, a gentle tap on the head with the switch will suffice. He may be taught to sit up without learning to stand erect; in this case he may be made to sit down, and, then, pressing his haunches down to prevent rising, tap him under the chin till he takes the right position. Repetition is necessary until he learns what is desired.

WALKING ERECT.—Hold a bone above the nose, but not so high as to lead him to jump up. As he reaches for it, raise it to induce him to rise on his hind feet, saying, "up, up." When he reaches the proper point, let him remain a moment or two, and then let him have the bone. Soon he will stand up by merely holding the hand in proper position, and saying "up, up." He may be taught to walk in this position by slowly moving the bone, or your hand, slightly in advance. These exercises should not be tedious, for the position is fatiguing. After he understands, you may check any attempt he may make to regain his natural position, by a tap under the chin or under the fore paws.

Treatment of Disease.

REMARKS.—The effect of medicines on dogs is much the same as on man; but there are exceptions. The dog can take a dose of aloes 6 or 8 times larger than that given to man; but the administration of ½ as much calomel or oil of turpentine would be of serious injury to the animal. Dogs have a short and strait alimentary canal, and purgative medicines act more quickly. The facility with which dogs can be made to vomit, is another peculiarity. Vomiting may arise by swallowing unpalatable matters. A good plan to prevent the vomiting of medicine, is to keep the head well raised for 1 hr. after administration, by attaching a cord to the collar, and fixing it at the requisite height. The kidneys are acted upon with more difficulty than with the horse, while the skin seems nearly incapable of being affected. The variety in the sizes of dogs should enjoin caution as to quantities in doses.

ASTHMA.—Dogs shut in damp cellars, and deprived of air and exercise, are attacked with asthma; old dogs are more liable than young. *Treatment:* Powdered bloodroot, lobelia, marshmallows, licorice, of each, 1 teaspoonful; mix; divide in 12 parts, and give 1 night and morning. If they produce retching, reduce the quantity of lobelia. The object is not to vomit, but to induce nausea or relaxation. Let the animal take exercise. Feed cooked vegetables; a small

quantity of boiled meat may be allowed; raw meat should not be given.

BOWELS, Inflammation of.—The symptoms are acute pain in the abdominal region; signs of suffering when moved, and the bowels constipated. *Treatment:* Put the animal into a warm bath for about 5 minutes; then take out, rub dry, and give the following injection: 4 oz. linseed oil; 1 gill warm water. To allay irritation give the following: 1 teaspoonful powdered pleurisy root; 1 tablespoonful powdered marshmallows; mix, and divide into 3 parts; give 1 every 4 hours. Should vomiting predominate, give a small quantity of saleratus in spearmint tea. If this does not give relief, make a fomentation of hops and apply to the belly, and give ½ oz. manna. For food, give barley gruel and mush. If the dog betrays heat, thirst, panting and restlessness, a little cream of tartar may be added to the gruel. The bath and clysters may be repeated, if necessary.

BRUISES, or SPRAINS.—*Treatment:* 1. Rub opodeldoe into the part frequently during the day.— 2. Bathe with rum or diluted alcohol.

COLDS AND COUGHS.—*Treatment:* Give a purge of oil, less food, and keep warm.

CONSTIPATION.—*Treatment:* Give a large dog ½ oz. castor oil, and repeat in 10 hours if the bowels have not moved. Give injections of soap and water frequently. If these means do not succeed, give the following: 1 dr. jalap; 1 dr. ginger; 1 dr. gentian; syrup to make a pill; give as 1 dose, and continue the injections. Mixed food and exercise will prevent it.

DISTEMPER.—Commences frequently with white mucus running from the nose. If it begin with a dry, hot nose, it is not so good a sign. The dog is restless, disinclined to move, has loss of appetite, looseness of the bowels, dry cough, debility, and wasting of the flesh. Some have only a part of these symptoms. *Treatment:* Give an emetic; feed beef soup, with rice, and a little meat well cooked. The 2d day give a teaspoonful to a dessertspoonful of castor oil every 2 hours until it operates, if costive. If his bowels be loose give a dessertspoonful of spiced syrup of rhubarb every 2 hrs., until the passages are colored by it. Give rich soup, little and often. If he still grow weak, give a teaspoonful of whisky in each pt. of soup. With patience and care he will be apt to recover.

DROPSY.—Preceded by loss of appetite, cough, diminution of urine, and costiveness. The abdomen shortly after begins to enlarge. *Treatment:* Powdered flagroot and male fern, of each, ¼ oz.; scraped horseradish, 1 teaspoonful; mix; divide into 8 parts, and give 1 night and morning. Give nutritious diet.

EAR, Internal Abscess of.—The affected side is turned downwards, and the dog shakes his head. *Treatment:* In the early stages foment the part twice a day with an infusion of marshmallows. As soon as the abscess breaks, wash with an infusion of raspberry leaves, and if a watery discharge continues, wash with an infusion of white oak bark.

EAR, Ulceration of.—*Treatment:* External ulcers should be washed twice a day with the following: 2 oz. pyroligneous acid; 8 oz. water, mix; as soon as the ulcers assume a healthy appearance, touch them with tincture gum catechu.

EPILEPSY.—*Treatment:* 15 gr. bromide of potassium, 3 times a day, dissolved in water. If the disease is caused by worms give the medicines ordered in such cases. (See *Worms.*)

EYE, Inflammation of.—*Treatment:* Bathe the eyes 3 times a day with green tea. Keep the animal in a dark place on a light diet; and if the eyes are very red and tender, give a pill composed of 29 gr. extract of butternut, and 10 gr. cream tartar. If a purulent discharge sets in, bathe the eye with the following: 5 gr. alum; 1 oz. water. Give the following: Equal parts powdered pleurisy root, bloodroot and sulphur; mix, and give ½ tablespoonful daily in honey. When the eyelids adhere together, wash with warm milk, and grease their edges with lard every evening.

FLEAS.—*Treatment:* 1. Bathe with an infusion of lobelia for 2 successive mornings, and afterwards wash with water and Castile soap.— 2. Rub the skin with powdered resin and bran.—3. Take tobacco stems and put them in the dog's bed.

HYDROPHOBIA.—2 days after madness has seized a dog, he becomes agitated, restless, and turns continually in his kennel. If at liberty, he goes and comes, and seems to be waiting for something; then he starts and bites the air, and dashes himself, howling and barking, against the wall. His voice undergoes a change; he then begins to fight with other dogs. These last symptoms indicate an advanced period of the disease, and the dog may become dangerous at any moment. *Treatment:* When a dog acts suspiciously, chain him up. If it proves to be hydrophobia, shoot him.

LUNGS, Inflammation of.—*Treatment:* Give a purgative; afterwards the following: 12 gr. digitalis; 3 gr. tartar emetic; 1 dr. nitre; mix, and divide into 6, 9 or 12 powders. Also give 5 gr. Dover's powder every evening.

MANGE.—*Treatment:* 1. 7 parts flour of sulphur; 2 parts sulphate ammonia; 1 part sulphate copper; pulverize the 2 latter ingredients to a fine powder, and mix the whole to the consistency of paste; rub well over the parts affected, and repeat on the 3d day.—2. Sulphur, 1 lb.; soft soap, 4 oz.; oil of tar, 1 oz.; whale oil, ½ pt.; mix for use, and rub in with the hand.

PILES.—Generally brought on by confinement, over feeding, etc., and show a red sore and protruded rectum. Dogs subject to constipation are likely to be attacked. *Treatment:* Give ½ teaspoonful sulphur, 2 or 3 mornings, and wash the parts with an infusion of white oak bark. If they are very painful, wash 2 or 3 times a day with an infusion of hops, and keep the animal on a light diet.

SCALDS.—*Treatment:* Apply, with as little delay as possible, a saturated solution of bicarbonate of soda.

ST. VITUS' DANCE.—*Treatment:* 8 gr. nitrate silver; 10 gr. ginger; syrup to form a mass; divide into 64 pills; give 1 or 2 morning and night.

THORNS.—*Treatment:* Extract with pliers, if they can be grasped. If too far in, bind up the

place with a plaster of shoemaker's wax, or a bread poultice, and it will soon come out.

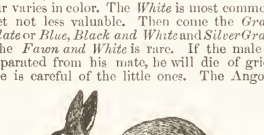
WORMS.—Dogs occasionally suffer with these, and the worms will be seen in the passages. If the animal starts in his sleep, is troubled with itching at the nose, and does not gain flesh on his fair allowance of food, worms may be suspected. *Treatment:* 5 gr. calomel; 40 gr. aloes; give at night, and follow the next morning with castor oil and turpentine, if necessary.

RABBITS.

BREEDS.

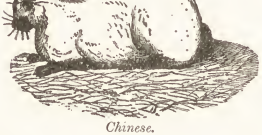
ANDALUSIAN.—With care this will reach 16 to 20 lbs. weight. The most robust variety known. The breeding of this rabbit is deserving of attention. It is a wonderful producer of flesh, rendering it the most profitable for food. At 8 or 10 weeks old it weighs as much as the common tame rabbit at 8 or 9 mos.; besides, the flesh is more tender, juicy and delicate.

ANGORA.—A rabbit of medium size, with erect ears. It differs from the common in fineness of fur, skin, habits and flesh; not so tender as others, and not so often used for the table. Its fur varies in color. The *White* is most common, yet not less valuable. Then come the *Gray, Slate* or *Blue, Black and White* and *Silver Gray*. The *Fawn and White* is rare. If the male is separated from his mate, he will die of grief. He is careful of the little ones. The Angora



Angora.

loves society. The young are never ill-treated, and respect the aged. This variety is bred for its long, silky fur; the old furnish it more abundantly and is more valued. In France their fur is combed every 2d or 3d month, and, as this operation makes them chilly, they should have warm lodgings, with bedding more abundant and clean.



Chinese.

BELGIAN.—Attain large size; not so fruitful as many varieties; ears large; head small; and in color they are similar to a hare.

CHINESE.—Also known as *Polish, Russian Warren* and *Himalayan*. They have red eyes; fur whiter and finer than the common white rabbit; nose, ears, feet and tail black or rich brown; they do not arive at this perfection till 6 mos. old. They are hardy, and are bred for their fur, which is valuable and the best imitation of ermine.

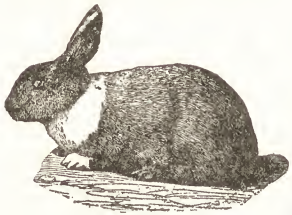
DOUBLE. or FULL LOP.—Lop eared rabbits are pets of the fancier. In breeding, there are 7 points to aim at: Length of ear, measuring from the tip of one ear to the tip of the other across the head; width of ear; position of ears; color; size of eye (the larger the better); carriage of body; and size. Both ears should fall near to the inner corner of the eye. The convex surface of the ear should be outwards, and the concave inside surface nearly concealed; the ear should be of the prevailing color; it

Double or Full Lop Ear.

should be thick and strong, though round and narrow at its root, becoming broad to the tip and not angular. The fashionable colors are *Black and White, Blue and White*, and *Tortoise-shell*. Good *Yellow and Whites* are admired, but are scarce. The nose is marked at each side with some dark color, having a dark mark running up the face; the eyes surrounded with coloring which joins the ears. The chain is a line of spots at each side of the shoulder, running from the ears to the saddle, which is a large patch of color, and should be large and unbroken by any other color. The saddle should be free from any but the prevailing color. The carriage should be low at the shoulder, high at the rump, head resting on the dewlap when sitting. They should not be less than 18 in., but 20 to 21 are good lengths.

DUTCH.—Known in France under the name of *Nicard*; very prolific, hardy, and largely

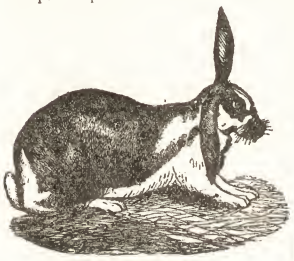
bred; useful as nurses, to bring up young fancy rabbits; of all varieties of color; many of them



Dutch.

have a white collar around the neck, and their chief excellence is diminutive size.

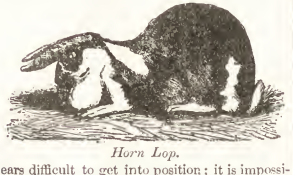
HALF LOP.—Derives its name from the carriage of its ears. It may be divided into 2 classes: One bespeaks impurity of blood; in the others, we find numbers descended from parents of pure blood. It is difficult to breed a litter from perfect specimens without 1 or 2 of them



Half Lop.

being half lop. In the first class the rabbit holds one ear erect, in the other both fall over one side. In the former, the ear will be found deficient in length; in the latter they often turn out longest eared and best lopped.

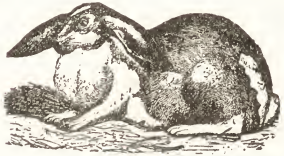
HORN LOP.— The horn lop is not so often met with, is ungainly in appearance, and the



Horn Lop.

ears difficult to get into position; it is impossible to make perfect lops of horn lops either by capping or stitching. Stitching is practiced by fanciers; that is, the ear is placed in position and stitched to the side of the face and allowed to remain for a week, when the stitch is drawn; but the cap is best. In color, form, and size, the Horn Lop resembles the other varieties of the lop-eared rabbit.

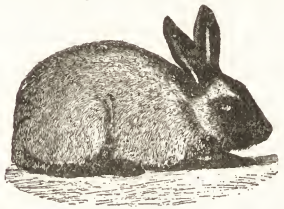
OAR LOP.— So called from the ears in this position resembling the two oars of a boat resting in the rowlocks. This is admired by some fanciers, but condemned by others. It bears a more close resemblance to the perfect lop than any other variety of this breed. Many rabbits carry their ears in this position, but are unfit for



Oar Lop.

exhibition, unless to compete for weight. The ears being thus carried should not be a reason for rejecting stock rabbits fine in every other respect.

SILVER GRAY. — Also known as *Chinchilla Silver Gray*, so called from the skin resembling that animal and being sold as a substitute. It is more developed in form than the wild or domestic rabbit. Its fur is dark, part silvery gray, and part slate color. The head and ears black, with a few white hairs; white hairs numerous on the neck, shoulders and back; on all the lower parts the number of white hairs is greater than those of a blue or black color. The young are quite black, and continue thus from 2 mos. to 9 weeks old, when white hairs show about the neck and loins. These hairs increase until 4 to 6 mos. old, when they assume the silver gray character. It is bred for its flesh and fur, but in cold climates it becomes iron gray instead of remaining silvery. The fur of the males is finest. To obtain a finer fur, castration of the males is in use, which should be performed when the animal is 3 mos. old. It not only improves the fur, but increases size. In climates where temperature alters its qualities, it requires great



Silver Gray.

care to profit by its skin. The temperature of burrows that suit the wild rabbit is suitable for tame rabbits. The darker and warmer the burrows, the finer, longer and more lustrous will be the fur.

Breeding.

AGE OF DOE.—The doe should not be allowed to breed at less than 6 mos. old; it is better, however, to wait till they are 8 or 9 mos. If under 6, they produce weak and delicate young.

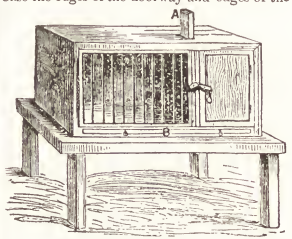
BREEDING-IN.—It has been proved that multiplication by son and mother, or between brothers and sisters, is a powerful cause of degeneracy in fur, fecundity and health. Rabbits of one color, that multiply in their own family, offer from the 3d generation white spots on the fur prejudicial to value. Fecundity diminishes, and weak rabbits are produced, subject to internal derangements, seldom living over the 1st molt, and dying at from 4 to 6 weeks old.

CHOICE FOR BREEDING.—The females must be strong, body long and well developed, hind legs large and well apart, teats apparent, and filled with milk at the approach of birth. The most gentle should be chosen, as the turbulent often destroy the young. The males should be bold and vigorous.

DELIVERY, Treatment before.—Pregnancy continues from 30 to 31 days, and a memorandum should be made to indicate the doe's fecundation, in order to separate her from the young she is suckling. Clean the hutch out, and give litter for her new family. If she is suckling and pregnant at the same time, she must be fed with succulent food, and occasionally a little salt given. Females suckling and breeding at the same time, are often so thirsty that they devour 1 or 2 of their young, to allay thirst. Give them, at least twice a day, a good handful of green food, and water once a day. Four or five days before birth, the litter should be removed and the rabbit left alone in her hutch to prepare her nest.

DELIVERY, Treatment during.—When the rabbit is vigorous, she is delivered without violent pain. The successive births sometimes last 24 hours. During parturition she loves quiet and secrecy, and it is customary to cover the door of the hutch over with a cloth, from the 28th day of gestation. Rabbits frequently die from a laborious birth or from weakness, the result of bad food, or from too watery green food. Delivered, she closes the opening of her nest and watches her new family. She suckles several times a day, but chiefly at night. If she is surprised, she starts away suddenly, and drags with her several little ones out of the nest. The mother does not replace them, unless the feeder does it for her.

HUTCHES.—Place them on stands 3 ft. high, around the sides of the rabbit house. Each hutch for breeding should have 2 apartments, a bedroom and a dining-room. The floor must be smooth, so that the wet will run off. They should be 2 ft. high, 2 ft. 6 in. deep, and 4 ft. long. Separate ⅓ of this length by a panel and arched doorway, dividing the dining-room from the bedroom. Above this there should be a sliding door, to shut the doe into either compartment. Case the edges of the doorway and edges of the



Breeding Hutch.

feeding trough with tin, and any other part that the rabbit can get at with its teeth. The front of the hutch has 2 doors: one, belonging to the inner apartment, made of boards; the other, belonging to the feeding room, is open, having wire-work in front; both doors are fastened by buttons in front, but open in a contrary direction. The bottom of the hutch should have a long, narrow piece of wood in front, below the wires (at B), which should be movable, and this, upon being removed, will permit an iron rod or scraper to be introduced for cleansing the hutch of any loose matter. Place the hutch on the stand a little aslant backward, and drill a few holes at its back partition, to let all liquids pass off as soon as voided. During warm weather, a hutch under the trees does very well; but when cold weather approaches the rabbits must have comfortable quarters. This is especially true of young lop-eared rabbits, warm quarters making material difference in the length of earage.

WEANING.—At the age of 5 or 6 weeks wean, by removing from the mother. The young are finer if left till 7 or 8 weeks old with their mother; but the number of young is diminished by allowing the mother to bear less frequently. The weaned rabbits should be placed with others of the same age, in spacious, warm hutches, with plenty of broken straw for their bed; cleanliness assists their development. Feed with tonic, succulent food, a little barley meal 4 times a day, and what they leave give to the older and less dainty.

Care and Management.

FEEDING AND FATTENING.—The principal thing is always to give more dry than succulent food; weeds and refuse vegetation should be banished, except the roots and leaves of dandelion, sow thistle and hog weed. The most nutritious food is the tops of carrots and parsnips, cabbages, parsley, fine grass, clover, tares, coleworts, and the tops of furze plant, cut up with their dry food. The grain proper for rabbits, are oats, peas, wheat or buckwheat; to

these may be added bran, dry clover, pea and bean straw. Rabbits, full grown, which have as much corn as they will eat, never take harm from an abundant supply of vegetable food; but to young rabbits especially, very little vegetable food should be given. The greater the impossibility to change the green food, the more necessary to season it. Parsley, fennel, coriander, aniseed, peppermint, bitter chicory, wild thyme, pimpernel, etc., should be mixed twice a week with other green food. Salt, as a seasoning, should be mixed with meal once or twice a week. Rabbits should be fed at daybreak, and from 11 in the morning till 1 in the afternoon, and 1 hour before sunset. The best food for fattening is barley meal, oatmeal, soaked gray peas, and boiled linseed, mixed with meal; but they must be varied. Oil cake will fatten to a great size, but the difficulty is to get them to take it, which is only done by starving them into it, and by giving very little at first, pounded and mixed with meal; the cake should be put near the fire, and when warm can be pounded easily. A large quantity of green food is not advisable. Dandelions, thistles, or any plant of the same family, are good, but when not to be had, give a little water once a day, or a little milk sweetened with sugar. Much exercise is not good for them at this time; but if placed for a few hours a day in fine weather, on dry, gravelly ground, and given a little green food, it will promote health. In selecting for fattening, young males should be sacrificed before the females; they become amorous sooner, and their flesh loses flavor.

SHELTERING. — The rabbit house should stand upon a dry foundation, and be well ventilated. A spare loft will be a good place. If rabbits are to be kept in a place already built, fill all crevices with pieces of brick and cement; then mix 1 part cement with 2 parts fine sand and water, till thick like cream; spread it on the floor 1½ in. thick. This should be done quickly, for cement dries rapidly, and becomes hard as stone, through which vermin cannot penetrate. The sides of the building that have been stopped, should be plastered with the same, but thicker than for the floor. Where tiles, stones, or bricks are used for paving, see that joints are well filled with cement to avoid filtration of urine under the pavement. (See *Hutches* in BREEDING.)

TREATMENT OF DISEASE.

CONSTIPATION. — Dry food, deprivation of greens and water, and cold temperature, occasion constipation so obstinate, as to be accompanied by irritation of the genito-urinary organs. *Treatment:* 1. Give a few greens, or a little salt and water. — 2. Dissolve 15 dr. sulphate of soda in 1 qt. water, and give 5 oz. twice a day.

DIARRHEA. — Caused by an excess of green food, and by cabbages and vegetables of too watery a nature. *Treatment:* Change the diet; banish objectionable food; place in a warm hutch, and give a little peameal and oatmeal mixed into a stiff paste; also, sweet hay, crushed oats, and a little carrot.

DROPSY.—Caused by damp, dark hutches, and damp, green food. A soft tumor appears in the neck, disappears, and returns. *Treatment:* Give corn to eat, 1 lb. dry bran, and a mixture of rosin in powder. The powdered leaves of the juniper tree may be given as a preventive.

EAR GUM. — *Treatment:* Loosen the scurf formed upon the ear, by means of a quill; then sprinkle into the ear dry sulphur, which will, after 1 or 2 applications, clear all off. Do not be afraid of a little sulphur, as the rabbit will shake out a great portion of it. Examine the ears every week.

EYE, Inflammation of.—Occurs in young rabbits bred in hutches. The eyes are closed, and lids covered with little red pimples, from which matter is discharged; these pimples often extend over the head, neck, and part of the body. *Treatment:* Give air, clean the hutches, and wash the floors with water in which sorrel has been boiled. If the rabbits are valuable, wash the parts with the following: 2½ dr. alum; 1 qt. water; mix.

LIVER COMPLAINT.—Caused by damp beds, foul hutches, want of exercise, etc. *Treatment:* There is no cure, but it is easily prevented by dry hutches and bedding, and wholesome food.

MANGE.—This attacks the roots of the ears, eyelids, nose and legs. Caused by uncleanliness, want of air, and too much dry food. *Treatment:* Rub sulphur among the hair. Separate the affected rabbits from the rest.

MOLTING.—About the age of 30 or 40 days the fur falls off, and is replaced by permanent fur. This crisis passes if the rabbits are kept warm and clean, and the mother well fed. Convulsions occur when it does not take place naturally, and is often preceded by paralysis. *Treatment:* For paralysis rub the loins with camphorated brandy, or apply a small blister. Keep them warm with 15 gr. camphor a day; as soon as they can eat, give water cress, and boiled barley, with a little salt.

SNUFFLES.—Caused by damp hutches and exposure to cold. There is a discharge at the nose, dullness of the eye, and a stupid appearance. It is fatal if not taken in time. *Treatment:* Give to a full grown rabbit 2 gr. sulphate of copper 3 times a week, or mix it with bran. Give more bran than usual as food; keep the hutch warm, and separate the affected rabbits.

WOMB, Tenderness of. — *Treatment:* Wash the parts affected every alternate day with the following: 15 gr. carbolic acid to 1 oz. water.

WORMS.—Frequent in rabbits kept in damp hutches, fed on much watery green food, and that lie on damp litters. Round worms are found outside the intestines, the loins, bladder and heart. The flesh becomes soft. *Tænia*, or *Tapeworm*, is seldom found. *Treatment:* Change the male or female breeders. Give dry hutches, and tonic food, seasoned with salt; employ condiments mixed with bran and composed of the leaves of heather, juniper, sage, wormwood, thyme, green parsley, etc., dried and powdered.

OTHER FOUR-FOOTED PETS.

FERRETS. — These are useful to poultry keepers. They should never be teased. They cannot bite if held by the neck and shoulders. Wherever rats are, ferrets will go and drive them out. Ferrets need a hutch to prevent them getting out; their quarters should be cleansed twice a week. Pine sawdust is best for litter, but eut straw or dry earth will do. Feed with bread and milk, slightly salted; if they become too fat, mix water with the milk. Feed twice a day, and keep water by them. Feed meat once or twice a week. They will eat rats, birds, or anything fresh. They breed in spring, and have 6 to 9 at a litter. After copulation the male must be kept from the mother, who needs quiet, and after birth her young should not be disturbed until their eyes are open. A few days before delivery fill the nest with soft, clean straw. The period of gestation is 6 weeks. They breed twice a year if well cared for.

GOATS.—The *Angora* goat is a native of Asia Minor, of square build, straight back, large wavy horns, and grayish white color. It has a tuft of hair under the chin, an undercoat of short hair, and an outer one of long, silk hair, termed mohair. The *Cashmere* goat is a native of Central Asia, of medium size, and grayish white color; ears long, and horns small. It has a coat of outer hair, and an undercoat of soft, silky wool, weighing about ½ lb., used for cashmere shawls. The different varieties of the *Common* goat are believed to have originated from wild stock. The milk is superior and plentiful. Goats feed on what cows could not subsist. The female bears 2 or 3 at a birth. Its hair and skin are valuable, especially the skin of the kid, whose flesh is equal to lamb. The male will gender at 1 yr. old, and the female at 8 mos., but good stock must come by parents not so young. The goat is capable of attachment, and may be used in harness and taught to go where desired.

GUINEA PIG.—A native of Brazil; feeds on grain and fruits, and may be kept on sopped bread and vegetables, with an occasional slice of apple. They are less than a rabbit; the upper lip half divided; ears broad and erect; colors, *White*, *Black* and *Fawn*. The *Tortoise-shell* is generally preferred. Some of the white ones have red eyes. Their flesh resembles the rabbit in flavor.

MICE.—The mouse is a lively but timid animal. The *Brown* mouse can rarely be tamed, but *White* mice are domesticated. The female has 6 to 8 broods in a year, but at these times must be separated from the buck, who destroys the young. The cage is like a squirrel's, but smaller. The principal food is bread and milk, oatmeal grits, or any common food, excepting cheese. They should be kept clean, and their beds made up every day, to enjoy health.

MONKEYS.—These are divided into 3 groups: The *Catarrhines* or *Simiadæ* have an oblong head, oblique, flat nostrils, the anterior members longer than the posterior, and provided with thumbs; natives of the old world. The *Platyrhines* or *Cebidæ* have a round head, wide nostrils, the anterior members longer than the posterior, and without distinct thumbs; have long tails, and are natives of the New World. The *Strepsorhines* or *Lemuridæ* have a pointed head, curved nostril openings, the posterior members usually the longest, have long tails, large eyes, soft wool, and are mostly nocturnal; natives of the East Indies and Madagascar. The monkey is easily trained. During instruction he has a small leather belt around his body, to which is attached a cord, which the trainer holds. The first thing taught is to stand on the hind legs; this is done by holding the cord tight and the gentle application of a switch under the chin. Walking the tight rope is easily accomplished, and, when furnished with a balancing pole, he will go back and forth under the guidance of the "leading string." Jumping barriers and leaping through hoops is taught by jerking the string and giving the monkey a slight cut with the whip. Hoops, covered with tissue paper, may be substituted for open ones after a few lessons. Nuts, bread, and an occasional bit of candy, may be given as a reward. To break a monkey to ride a horse, carry a flag, and hold on by the reins, is considered remarkable.

OPOSSUM.—Sometimes a pet with country boys. He uses his tail for climbing, and swinging from branch to branch. He is hardy, and it is almost impossible to kill him. He feeds on insects, birds, eggs, etc. His length is about 22 in., and his height that of an ordinary cat. He should be watched, as he is destructive among the hen roosts, like his neighbor the raccoon.

RACCOON.—About the size of a common dog. If taken young, he can be domesticated. He is very amusing. Feed him with green corn and vegetables.

SQUIRREL.—One of the most engaging of all pets; elegant in form and cheerful in disposition. It breeds generally in May or June, and brings forth 4 or 5. In captivity it will eat nuts and fruit, sip milk and eat bread; it generally sits upon its hind legs, and uses its fore paws in eating. Some squirrels are difficult to tame, and must be taken from the nest at an early age. With care the squirrel may be brought to love and obey its keeper. The *Flying Squirrel* is frequently carried in his young master's pocket. He is fed and treated like others of his kind. He has an expansion of the skin, by which he takes enormous leaps.

AQUARIA.

FRESH WATER.

REMARKS ON MANAGEMENT.—For fresh water, the simplest and least expensive aquarium is the bell glass. It is preferable to the globe, exposing a larger surface to the atmosphere. It is also free from any contaminating influences. Where space is no object, an oblong tank may be selected. The framework may be of wood, zinc, iron or glass pillars, with glass sides; but the best are slate, with glass fronts or slate ends, with a glass front and back. If not made of slate, the bottom should be lined with glass or slate, embedded in a layer of Portland cement. Wood frames are least durable, and soon leak. Sand or pebbles may be used for the bottom, but sand is to be preferred. Wash the sand till the water runs from it clear, and then lay it in the bottom of the tank to the thickness of 2 in., to hold the plants and allow them to root. Or, the plants may be fastened in one of the terra cotta ornaments sold for that purpose, with enough sand or broken rock to cover the bottom. The plants will root readily if the aquarium has light. A few large pebbles improve the appearance, and afford sheltering nooks to which the fish may retire. Shells and corals are out of place. Floating islands may be made of pieces of cork, on which may be grown small ferns. For rock-work or caverns, pile up small blocks of granite, fastening them with Portland cement (other cements are apt to injure the fish); this cement must remain in water for a week, in order that it may part with any soluble matter it may contain. Having laid your sand and gravel, and built your rockery, let the cement get firm, then add water, and empty and refill till the water is clear, when it will be fit to receive plants. These must be put in the aquarium several days before the fish, to enable the plants to commence growing vigorously. Do not put the fish in till this is the case, and then put in only a moderate number. The most important consideration is light. A certain amount of sunlight is necessary. Frequent removal of sediment is required. For this purpose use the lifting tube, which is a simple glass tube, ½ in. in diameter, and 2 or 3 in. longer than the depth of the water, and drawn in a little at one end, so that the finger may cover it more easily. Hold it in the right hand, with the finger over the smaller end; insert it into the water, placing the open end over the object to be removed. Then remove the finger, when the air will escape, allowing the water to rush into the tube, carrying the dirt with it. By placing the finger again over the opening at the top, the tube may be lifted out with its contents and emptied into a vessel held in the other hand, by again removing the finger from the opening. Never take fish in your hand. If the aquarium needs cleansing, make a net of mosquito netting, and take the fish out in it. Keep the aquarium clean and the water clear. Watch the fish, and you will find out when they are all right. Feed them with worms, meat, fish wafer or fish spawn. Dace, roach, and other cyprinidonts are vegetable feeders, and may be kept in good condition on wafer food, sold by dealers. The addition of shreds of lean meat and oysters, or small worms, will be enjoyed. Sun fish may be kept healthy on meat, oysters, or worms; the oysters should first be washed. Where a brook is accessible, a small net, dipped among the plants, dead leaves, or sedimentary deposits, will furnish crustaceous larvæ, on which all classes of fish feed. The sticklebacks require this, and will not thrive on dead food. All food which is not eaten within 2 or 3 hours, should be removed with the lifting tube. The aquarium should have such an even balance, and every occupant so adjusted as to number and variety, as to present a miniature aquatic world harmoniously displayed.

Bell Glass Aquarium.

ANIMALS.

CADDICE WORMS.—These may be put into the tank with safety. To protect their bodies, they inclose themselves in cases formed of straw, sticks, pebbles, and small shells, kept together by threads, which they spin. When about to assume the pupa state, the larvæ fix their cases to some solid substance, and close the extremities with a grating. When nearly arrived at the perfect form, they eat through the grating, swim to the surface, and undergo their final change in the air.

COBITIS, or LOACH.—A small fish, found in running streams. It seldom exceeds 4 in. in length; head, back and sides clouded and spotted with brown on a yellowish white ground; fins spotted with dark brown; belly white; and scales spotted olive. They are restless on the approach of rainy weather and become barometers.

CRAWFISH.—A species resembling the lobster, but smaller; found in fresh water streams.

DACE.—A small fish, found in clear streams; head small, and muzzle pointed; back slightly elevated, and tail forked; color silvery gray.

EELS.—Small eels look well; their sinuous movements give variety. They feed on any sort of food, but prefer animal food.

FROGS.—Young frogs and tadpoles are interesting. They thrive well on meat and oysters.

GOLD FISH.—Live for months without introduced food; are hardy, and stand remarkable changes in temperature.

GUDGEON.—A small fresh water fish, 6 to 8 in. long; back pale brown, spotted with black; belly white, and tail forked. It is easily caught.

MINNOW. — No fish thrives better in the aquarium. The top of the head and back are of a dusky olive color; sides of the body pale and mottled; belly white and silvery. After a short residence in the aquarium, the minnow becomes bold and intelligent.

NEWT, or WATER LIZARD.—Found in ponds and streams. They soon grow tame, and will feed from the finger.

RED SALAMANDER.—Presents a curious appearance, having an elongated body, 4 in. long, and a long tail, which gives it the form of a lizard.

ROACH. — A fresh water fish; color silver white, with greenish back. Suitable only for a large aquarium.

SNAILS.—Introduced into an aquarium, they will reduce the growth of fungus; and where the different elements of the aquarium are balanced, 2 or more snails are sufficient.

Snail.

STICKLEBACK.—A fine fish, 2½ in. long. A pair is necessary, for they will breed in the tank. He builds his nest somewhat like a hanging-bird's, and is a lively, spirited fellow. He is a fine fish for the aquarium.

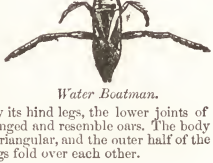
Large Water Beetle.

SUNFISH.—A small fresh water fish, and will answer only while small; but when older he is apt to disturb the others.

TENCH. — Though common in ornamental waters, it is sparingly found in pools and rivers. Its length is 10 in.; color, greenish brown or olive. It is peculiarly adapted to the aquarium, where the quantity of oxygen is never over plentiful.

TURTLE.—The *Chrysemys picta*, or painted water turtle, should be procured when young, as they are destructive when old.

WATER BEETLES.—The large water beetle is useful as a scavenger, and is perfectly harmless. It is better to buy these than to catch them; for if, by mistake, one of the *Dytiscus maginalis* family were put into the aquarium, it would kill the other animals. The *Water Boatman* beetle is very interesting, and may be distinguished by its hind legs, the lower joints of which are fringed and resemble oars. The body is thick and triangular, and the outer half of the superior wings fold over each other.



Water Boatman.

PLANTS.

BROOK LIME.—A plant with sky-blue flowers in loose, lateral spikes; very pretty.

FORGET-ME-NOT.—A well-known blue flower. It may be cultivated on the projecting rock.

FROGBIT.—A plant of the lily kind in appearance. It will thrive well and bloom freely. The body of the plant derives its nourishment from the roots by means of its long spiral stalks; its foliage accommodates itself to the surface of the water. This plant dies away in the winter; but during the autumn a series of eones are formed; these, in due time, are detached and float on the surface; but, on the approach of winter, gradually sink. At the approach of spring they unfold themselves, and assume the shape of the perfect plant.

SOLDIER PLANT.—Admirably adapted, as it affects water of the stillest kind. Its broad, saw-edged leaves form capital lurking places for fish.

Soldier Plant.

TAPE GRASS.—This is found in some rivers; two plants should be obtained, male and female. They may be distinguished by the flowers—the male being borne on short and straight, while the female are on long, spiral foot stalks.

VALLISNERIA.—Well suited on account of its long, bright green leaves. It has perennial roots, and requires but slight depth of soil. The female flowers are borne on long foot stalks, which rise and float on the surface. The male flowers are on short stalks, and at maturity detach and

ascend to the surface, float among the female flowers, and impart to them their pollen.

Small Water Lily.

WATER CROW FOOT. — Known by its white flowers and yellow petals. The plant may be set in the sand, or simply placed in the water. It may be found on the surface of pools in April.

WATER LILY. — Plants of the lily kind are pretty objects. The *Yellow* and *White*, with their handsome leaves floating on the surface, serve as rests for the smaller amphibia. It should have an appropriate situation in every aquarium.

WATER VIOLET.—Fleshy, aquatic, perennial herbs, with pectinate-pinnatifid submersed radical leaves. It is found in swamps and stagnant waters, and may be added with pretty effect to the aquarium.

WATER WEED. — A species of *Anacharsis*, which may be found in ponds and slow-running streams. It is a necessary, as well as a handsome plant; but it multiplies so fast that you will be obliged, occasionally, to remove some.

MARINE.

REMARKS ON MANAGEMENT. — The best form of tank for a marine aquarium is the oblong square tank, with the back sloping inwards towards the bottom, all (except the glass front) being made of slate. The hexagonal shape is ornamental. Artificial sea water may be used, by mixing 100 oz. fresh water with 3 oz. common salt, 1 oz. Epsom salts, 200 gr. chloride of magnesium, and 40 gr. chloride potassium. Sea water may be imitated as follows: Mix with 970,000 gr. rain water, 27,000 chloride of sodium, 3,600 chloride of magnesium, 750 chloride of potassium, 29 bromide of magnesium, 2,300 sulphate of magnesia, 1,400 sulphate of lime, 35 carbonate of lime, 5 iodide of sodium; all, finely powdered and mixed, are to be stirred into the water, through which a stream of air may be caused to pass from the bottom till the whole is dissolved. On no account heat the water. In arranging rockwork avoid hiding places. The stones should be piled to form a shelving background, which will shade the light and prevent the creatures getting out of sight. Immovable objects, such as serpulæ, should be placed so as to be easily seen. Mussels, if deposited against the glass, will cling to it and creep up the side, and afford observation for the magnifying glass. Limpet shells may be embedded in the shingle at the bottom, or placed on rocks. When the hermit grows too large for his shell, he goes in search of another, and an empty shell, larger than the one inhabited, should be placed in the aquarium. If the aquarium has been in preparation for some time, and green growth has commenced, the live stock may be introduced. If not, the water must be aerated, by taking some out with a cup and pouring it back from a distance. All the creatures are accustomed to shallow water, which is aerated by the lashing waves. Imitate this every day for 5 minutes by moving a stick backwards and forwards in the water. A mark should be made on the glass where the water reaches, and when evaporation causes the water level to descend below the mark, fresh rain water should be poured in.

ANIMALS.

BARNACLES. — Found upon the sea shore, drifted upon the wood of a wreck, or other floating body. They live in clusters, each barnacle consisting of a membranaceous branch, fixed to some body, the animal being invested with compressed shells, attached to the pedicel. They are furnished with tentaculæ, with which they gather their food. The shell is clear and brittle, of a white color, tinged with pale blue. The shell is at the end of a long fleshy stalk, generally of a purplish red, but sometimes of a bright orange color.

Barnacles.

CORALLINES, or ZOOPHYTES.—Are compound animals, that live upon one general structure of a plant-like form. Those commonly known are named *Moss Corals*, from their moss-like appearance, and *Polyps*, many of which closely resemble sea weeds. Viewed under the miscroscope they are exceedingly interesting objects.

Corallines.

CRAB.—An animal whose body is covered by a crust-like shell. It has 10 legs, the front pair terminating in claws. *Hermit Crabs* are soft-tailed, and occupy the empty shells of whelks, or other mollusks, as they happen to find them. The crab acts as a scavenger.

Hermit Crab.

FISH LOUSE, or ROCK LOUSE.—Frequently seen running over rocks, where the crevices afford safe retreat. They resemble the common wood louse.

LIMPETS.—Eligible for the salt water aquarium. They are quiet animals. Those should be chosen that are found adhering to the rocks, with the shell raised a little from the body, and with seaweed growing from the shell; the latter being pretty marked sometimes.

Limpets.

MUSSELS.—These live in strong shells, of an oblong triangular form, terminating in a point. The head of the animal is situated toward the point near the hinge. Mussels abound on rocks, to which they attach themselves by strong fibres. When they move, they thrust a tongue-like foot out of the shell, and draw themselves onward. It is hardy, and should always have a place in the aquarium.

Mussel.

PERIWINKLE.—A well-known shell fish. Its eyes are placed at the base of the tentacula. Their tongues are long and armed with teeth. Members of this group inhabit all regions of the sea, but the greater number live near the shore. They are useful as scavengers.

Periwinkle.

SEA ANEMONES.—There are many varieties. The handsomest is the *Carnation-like* sea anemone. There are other kinds, known as *Daisy*, *Wheatsheaf*, and *Crass*. A little below high water mark plenty of specimens of the carnation anemone may be found. The pale pink varieties are sought for nearer to low water mark, where overhanging weeds or stones shelter them. The crass is generally sought for in crevices behind bunches of overhanging weeds. Choose 2 or 3 that have fixed themselves to bits of rock that you can chip off and bring away. The smaller specimens are best, for they live the longest.

Crass.

SEA HEDGEHOG, or SEA URCHIN.—A great treasure for the aquarium. They are of a conical shape, divided into 5 segments, covered with minute holes, from which project tentacles. The surface of the body is covered with shelly spines. The mouth is in the centre; they feed upon marine productions.

SEA MOUSE.—Its appearance is much like an enormous caterpillar. Its upper surface is covered with a double row of broad membranous plates, beneath which are the gills. These plates are covered with hair; and besides these the upper surface is beset with bundles of irridescent bristles, brilliant as the plumage of the humming bird. After a gale of wind, many of them are thrown upon shore.

Sea Mouse.

STAR FISH. — Small specimens are very interesting. They have very peculiar colored rays and extraordinary motions. The brittle star fish is one of the handsomest specimens. It is called brittle from the property of separating into pieces with wonderful quickness. They are affected by the presence of light, and will grow lively when a lighted candle is brought near them.

Star Fish.

PLANTS.

ARTICULATED CHYLOCLADIA.—Found growing upon rocks, or attached to larger plants. Its fronds are tubular, looking like the cells of an orange, united at their extremities; the branches spring from some of these constructions, and the plant grows in tufts, rising from 1 to 6 in.; they are of a tender substance, and purplish or pinky red colored.

BLUNT RUSCOUS-LIKE DELESSARIA. — A red fronded species, growing upon rocks and the

larger marine plants. Remarkable for small leaves from the midrib of the fronds.

BUCK'S HORN FUCUS.—This is destitute of air vessels, but the extremities of the fronds are inflated, forming terminal receptacles. The fronds are from a few inches to 1½ ft. in length; olive green color, with yellow at the extremities.

DICHOTOMOUS DICTYOLA.—Grows upon rocks. The fronds are from 2 to 9 in. in height, green in color, and forming a beautiful specimen when dried.

ESCULENT IRIDÆA.—Consists of a subcartilaginous cuneiform frond, attenuated below into a short stipe; it is found near low water mark. The fronds are 4 to 8 in. long, deep blood red or purple, changing to greenish or yellowish white upon exposure.

FEATHERED PTILOTA.—This is of a red color, characterized, with some 3 or 4 varieties, by the feathered form of the frond. It is frequent on rocky coasts, grows from 3 to 6 in. long, and is attached by a small disc. The younger branches are pale crimson or pink; the older deep purplish red, passing into brown.

Feathered Ptilota.

LACERATED NITOPHYLLUM.—Frequently met with on rocky coasts. The plant is thin and delicate, of a pale pinkish red, varying to reddish brown. The lower part of the frond is marked with dark veins, originating at the base, and disappearing at the length of 2 or 3 in. It flourishes well in the aquarium.

PEACOCK'S TAIL PAVONIA.—A curious species, growing in rocky pools. The frond is membranous, presenting shades of brown, and yellowish or reddish olive, which, with the numerous darker and concentrical lines, and a white, bloom-like powder, spreading over and modifying the hues, renders this a most beautiful plant. Several generally rise from the same base in tufts, seldom more than 2 or 3 in. high.

Peacock's Tail Pavonia.

RED ROCK-LEAVED DELESSARIA.—Beautiful plants of fragile texture, rarely found entire, unless growing in rocky pools; the leaves of a rich red color and satiny texture, from 3 to 12 in. in length.

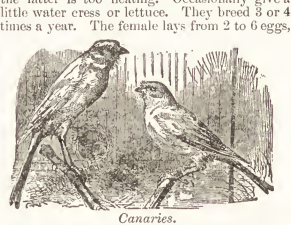
SARGASSUM.—An interesting specimen found on the American shores of the Atlantic. The stems are 1 ft. or more in length, alternately pinnated with simple branches; dark olive color, changing to reddish brown on exposure to air.

SEA WEED.—In making a selection of sea weeds, brown and olive must be avoided; they cannot endure the narrow limits of a tank, and will die; red and green are the sturdiest and the most beautiful varieties. Always choose the smaller and finer kinds; the larger are too strong and will cover the aquarium with slime. The delicate specimens are found under the shelter of the larger kinds. Remove them gently, taking care that a portion of the rock on which they grow is detached with them. Endeavor to obtain specimens of as many various forms and colors as possible.

BIRDS.

BLACKBIRD.—A native of Europe, but being hardy, it is generally able to stand the climate of the United States. Of all birds (excepting the American robin) it is most capable of instruction. His song is rich, and contains deep notes like those of the nightingale. When free, he sings from March until July; but in the cage during the whole year, except when molting. His memory is good; he will learn various airs, and even imitate words. He will eat bread, meat and such food as comes on the table. The young may be raised upon roll steeped in milk. The blackbird must be kept in a large cage and not allowed to associate with other birds, or he will peck them to death, especially the young ones. He will live from 12 to 15 years, if his food is varied, bathing facilities allowed, and his cage kept thoroughly clean.

BULLFINCH.—A pretty bird, about the size of a sparrow; common in many parts of Europe. Its bill is strong and black; the upper part of the head, the ring around the bill, and the margin of the neck are glossy black; the back ash gray; breast and belly red; wings and tail black; legs dark brown. The male has a red tinge upon the breast. The food for those that are allowed to run about, may consist of German paste and a little rape seed. Those kept in a cage must have rape and hemp seed, with a little biscuit occasionally. Rape seed, soaked in water, without hemp seed, increases longevity; the latter is too heating. Occasionally give a little water cress or lettuce. They breed 3 or 4 times a year. The female lays from 2 to 6 eggs,



Canaries.

of a bluish white. The young hatch in a fortnight. The bullfinch may be taught to whistle

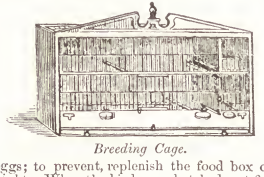
many airs, in a soft, pure tone. The diseases are costiveness, diarrhea, epilepsy and the effects of molting. Change and regulation of food will generally work a cure.

CANARY. — A native of the Canary Islands.

Pets in the Household.

The male has a streak of bright yellow over the eyes and under the throat, his head is wider and longer, his feet are larger, and he is much higher colored than the female; he sometimes begins to warble at the end of a month. Canaries mate in March. Put a cock and hen into the breeding cage, which should be large. Place 2 little wicker nests in the cage. The hen sometimes has a second brood before the first are fit to fly, leaving them to the care of the father bird. When the birds are pairing, feed, besides the usual seeds, with yolks of hard boiled eggs, bread moistened, and pounded almond meat.

The hen lays commonly 4 or 5 eggs, and the time of setting is 13 days. They frequently eat their



Breeding Cage.

eggs; to prevent, replenish the food box over night. When the birds are hatched, cut fine a hard boiled egg, and add some roll soaked in water and squeezed dry. Give fresh every day. If the little birds should be left orphans, keep the nest warm; grate up plain biscuit, and pound some hemp seed; mix together, and moisten with raw yolk of egg and water, and drop morsels into their mouths with the end of a quill. This must be done once every hour. The quantity administered to each at a meal should not exceed ½ teaspoonful. In a fortnight the birds will be able to feed themselves. When they are a month old take them out of the breeding cage, but continue the soft food. Canaries thrive on a mixture of canary seed with rape. A little hemp seed should be occasionally given, but not mixed continually. Groundsel or chickweed, watereress, lettuce and dry sponge cake, may be given occasionally. Food for singing birds may be made as follows: Blanched sweet almonds, pulverized, ½ lb.; pea meal, 1 lb.; saffron, 3 gr.; yolks of 2 hard boiled eggs. Reduce to powder by rubbing through a sieve. Place the mixture in a frying pan over the fire, and add 2 oz., each, butter and honey. Slightly cook for a few minutes, stirring well; set off to cool, and preserve in a closely corked bottle. To keep canaries in health, the cage and perches must be washed often, and fine sand scattered over the sliding bottom; clean water given daily for drinking and bathing; a piece of cuttle fish bone put handy for them to pick at, and a small lump of sugar given occasionally. The cage should not be hung more than 5 feet high, and out of the way of draughts. When hung out doors, have a part of the cage in the shade. Canaries may be trained by stupefying them with oil of bergamot, and made to hop from one finger to the other. Canaries are subject to the following diseases: *Decline* is indicated by roughness of the feathers, inordinate appetite and wasting of the flesh. The bird should be forced to swallow a spider, and a rusty nail should be put into the water. Give green food, especially watereress. *Epilepsy* is caused by excess of food, and deficiency of exercise. Give a few drops of olive oil, but if inefficacious dip the bird once or twice in ice cold water, and cut the claws so close that they let blood. *Giddiness* is the result of looking upwards. Cover the top of the cage with a cloth. *Molting* is an annual recurrence. The food should be varied; all draughts excluded, and cleanliness observed. Put a sprig of saffron or a rusty nail into the water. *Pairing Fever* attacks birds in May. The birds cease to sing, their feathers become rough, and waste away. Hang the cage before a window, so as to cheer the bird. *Pip* is caused by cold. The symptoms are yellowness at the root of the beak, dryness of the tongue, roughness on the feathers of the head, and frequent gasping. A pill of butter, garlic and pepper, with occasional sipping of infusion of speedwell, will cure; and to assist the remedy a fine feather should be drawn gently through the nostrils. *Lice* may be exterminated by using hollow canes for perches; knock out mornings into water. Or, cover the cage with a white cloth at night, and in the morning it will be covered with red spots; these are lice.

CROW.—The crow family comprises birds that have a strong bill, covered at the base with bristly feathers; plumage dark, sometimes gray. They are caught when young and tamed. They have many amusing tricks, and may be taught a few words with patience. They are thievish, and, like the English magpie, hide many things.

GOLDFINCH.—About 5½ in. long; the bill is white, forehead and throat scarlet, head black, back brown, belly white, wings black, edged with white, and crossed with yellow. Kept in a cage or allowed to run about the room. A square, flat cage is best. When allowed to run about the room, a place separated by a grating, or a small tree or bush should be provided for a sleeping place. The female lays once a year 5 or 6 pale green eggs, spotted red. The males have a white ring round the beak. When taken from the nest, rear on poppy seed, and bread soaked in milk and water. The diseases are *Epilepsy*; to this the goldfinch is most liable. *Sore and Swollen Eyes* may be cured by applying unsalted butter. *Stupor and Giddiness*, produced by hempseed, may be cured by substituting soaked lettuce and thistle down. It will conduce to health, if they are allowed now and then to pull the seeds from a thistle head.

LINNET, or REDPOLE.—Found in the northern, temperate and arctic regions. The bill is short, wings long and pointed, and tail forked. Its winter plumage is brown; in the spring the crown of the head is deep crimson. The males have more brown on the back; and if, on stretching out the wings, the white on several feathers extends up to the quills, it is proof that the bird is a male. The food consists of rape and canary seed, groundsel, plantain, seeded chickweed, and hemp seed may be given occasionally. They may be taught to perform many tricks, and require the same care as canaries.

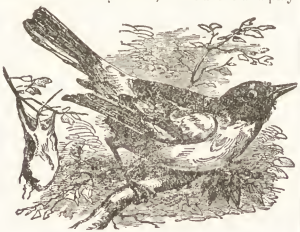
MOCKING BIRD. — It receives its name from being able to imitate the notes of other birds. The female lays from 4 to 5 eggs, of an ash blue color; sets 14 days; is very jealous of her nest, and apt to desert it if disturbed. Their food consists of thickened meal and water, or meal and milk, mixed occasionally with minced fresh meat. Animal food, finely divided, and soaked in milk, is at first the only nutriment for raising nurslings. Young and old require berries from time to time, and any kind of wild fruits, if not given too freely, are useful. A few grasshoppers, or other insects, as well as gravel, are necessary; spiders will often revive the drooping or

sick. The following is a good food: Mix 1 part cornmeal, 1 part pea meal, and ½ part moss meal; add a little melted lard and sweeten with molasses. Fry for 4 hours, stirring constantly; this makes it keep. Put in a covered jar. The moss meal is prepared by drying and grinding

Mocking Bird.

the imported German moss seed. During molting, saffron should be put in the water or a rusty nail. To keep insects out of the cage, tie up a little sulphur in a bag, and suspend it in the cage. This is essential to health.

ORIOLE (Baltimore).—A native of America. It is 7½ in. long. The plumage of the male is brilliant, the under parts being a bright orange yellow. Head, throat, back and tail black; legs and feet lead colored. It can be kept on meal and water, with occasionally a piece of sweet fruit. It is easily tamed, and is docile and play-



Baltimore Oriole.

ful in captivity, and can be taught to imitate the notes of other birds.

PARROT, PAROQUET and COCKATOO.—True parrots have the upper mandible toothed, and longer than it is high, and the tail is short and rounded at the end. The tongue is fleshy, obtuse, and entire; the feet and bill are used in climbing. The *Gray Parrot* is remarkable for its loquacity, docility and distinctness of articulation. It is about the size of a pigeon; its color ash gray, tail bright crimson; bill black, and legs cinerous. It is said to live nearly 100 yrs. The *Green Parrot* is larger than the gray. Plumage fine green; base of the bill bright red; cheeks blue; top of the head yellow; all the quill feathers and wing coverts deep blue; legs and feet dusky. It is affectionate, and may be taught to talk distinctly. The *Paroquet* belongs to the parrot family, but is distinguished by being smaller and having a longer tail. It is graceful in its actions and prettily colored. It is a native of Continental India and some of the islands of the Indian Ocean; it is also found in the woods of Australia. When well cared for, it is easily domesticated. The *Cockatoo* may be distinguished from true parrots by a crest or tuft of elegant feathers on the

Gray Parrot.

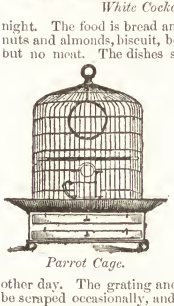
Green Parrot.

head, which it can raise or depress at pleasure. A native of Australia and the Indian Islands. There are several varieties, the *Great White Cockatoo* being the most common. It is about the size of a common fowl; color white. The head has a handsome crest of feathers, which are scarlet underneath; bill bluish black, and strong. It is of a docile disposition, but can rarely be taught any words. Cages for parrots should be large and strong; from the top of the cage there

should hang a wide ring, swinging well clear of the perches, for exercise by day and roost at

White Cockatoo.

night. The food is bread and milk, varied with nuts and almonds, biscuit, boiled corn and fruit, but no meat. The dishes should be porcelain or thick glass. The greatsecret of keeping parrots well is in careful feeding and perfect cleanliness. The feet must be washed, and the plumage occasionally syringed with warm water. The cage should have a grating at the bottom, and a drawer for sifted gravel, which should be put in fresh every other day. The grating and the perches must be scraped occasionally, and the cage cleansed once a month, taking care that it is quite dry before the bird is put into it. The water must be fresh every day, and the food of a moist nature. To train a parrot, take him alone; caress him a little, then utter the word in a distinct tone, and repeat at intervals of a few moments. Soon the parrot will attempt to repeat the word. Caress him and reward him. Repeat this until he has learned the word thoroughly. When he desires anything, make him repeat his lesson before his wishes are gratified. It is essential that the trainer should be on good terms with the parrot in order to insure success. Under favorable circumstances they copy the words and even the voice of their trainer. Parrots are subject to several ailments. *Asthma* is caused by cold, or too much hempseed. The symptoms are shortness of breath and frequent expansion of the beak. Give extra warmth and change of food. In severe attacks, give a paste, made by boiling a piece of white bread, the size of a walnut, in 4 tablespoonfuls of milk, stirring until it becomes



Parrot Cage.

a pulp; mix with it a few grains of cayenne pepper, and keep the bird entirely on it for 2 or 3 days; it must be prepared fresh as wanted; as an aperient, give twice a week lettuce or watercress. *Atrophy* or *Wasting* is caused by improper food. The body becomes emaciated, feathers rough, and the bird disgorges its food. Put a rusty nail into the water, and give same treatment as for asthma. *Consumption* or *Decline* is known by loss of appetite, swelling of the lower parts, and falling away at the breast. Give a bread and milk diet, with seed about twice a week; no water on the seed days; juice of white turnip to drink, and a red or black peppercorn, occasionally, are the best remedies; if taken in time, this disease can be cured. *Convulsions* or *Fits* should be treated as follows: Take the bird up; open the beak, and put into it a few drops of cold water; if this does not restore it, plunge it into a cold bath; this failing, draw out one of the tail feathers, and lay the patient on some cold substance. If recovery takes place, wrap the bird in flannel, and put it in a warm place until dry; afterwards feed it as directed for asthma, and give it a few drops of spirits of nitre occasionally in its water. *Costiveness* may be detected by frequent and useless efforts of the bird to void its excrements. Give bread and milk diet, with a few shreds of saffron boiled in the milk; if this is not effective, give 4 drops castor oil, and introduce into the vent the head of a large pin dipped in linseed oil. *Diarrhea* is caused by sudden change of diet, or improper food. The symptoms are frequent evacuations of fluid chalky matter, which causes irritation in the parts. Keep the bird warm; feed it with soaked bread and corn boiled in a decoction of lettuce seed; anoint the irritated parts with palm oil, and give water impregnated with iron to drink, mixed with a little milk; chillies are good, and the yolk of a hard boiled egg. *Diseased Eyes* proceed from various causes; when inflamed wash with warm green tea. *Diseased Feet* result from want of cleanliness and from cold. Soak the feet in lukewarm water for ½ hour, daily; put the bird in a small dry cage, in a warm situation. If sores are observable, sprinkle with powdered loaf sugar. *Inflammation* is caused by draughts. The bird becomes dull and listless. When this is the case great care must be taken. Give bread and milk and oatmeal grits boiled, yolk of egg boiled hard, and corn boiled in an infusion of rape seed twice a week; remove all food at night, and place a little magnesia mixed with water in a shallow vessel; remove in the morning, after the patient has taken a dose. When *Molting* give extra warmth and nourishment. Give hemp seed, corn and canary seed, separately, twice a week; bread and milk, with chillies cut small, and mixed, once; on seed days put a little saffron in the water; warmth is the grand requisite. *Surfeit* is usually the effect of neglect; it shows itself in head eruptions, which discharge an acrid humor. Apply a solution of salt in spring water, wiping the parts dry after it, and anoint with palm oil. The diet should be scalded bread and ground rice, mixed with milk, in which has been boiled a little licorice, and keep the bird warm.

Tumors may be removed by passing strong silk around them close to their junction with the part to which they are attached; tie the silk so as to gradually tighten it, and the tumor will eventually drop off.

PEACOCK.—A native of the East Indies. It is now domesticated all over Europe and the U. S. The head is adorned with a crest of green and gold; the body variegated; its distinguishing feature is its train, which, when erect, forms a circular fan of resplendent hues. The plumes are shed every year, and, when molting, the bird keeps out of sight. The female lays 5 or 6 eggs, which she hatches in 27 to 30 days. The plumage is in its perfect state the 3d year. It lives 25 years. It feeds chiefly on corn, preferring barley, however; at times it seeks insects, and is very mischievous in gardens.

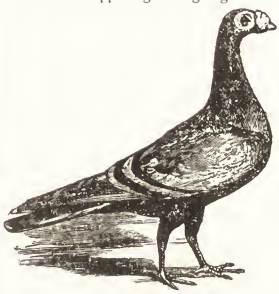
PIGEONS.—The *Archangel* is rich in its coloring; the head, neck, and fore part of the back and body are chestnut, or copper color, with

Common

changeable hues; tail, wings and hinder parts are blue black; but many of the feathers on the back and shoulders are metallic and iridescent; iris orange red; feet clean and bright red. It has a turn of feathers at the back of the head, similar to the trumpeter, and its size is that of the

Archangel.

rock dove. The *Barb* or *Barbary* pigeon was introduced from that part of the African coast. It has a tuft of feathers sprouting from the back of the head; plumage dusky, or black; short, thick beak; insides of the eyes are pearl-colored, and there is a circle of incrusted flesh round the eyes, of a red color. The *Carrier* has been employed as a messenger from the earliest ages; is larger than the common pigeon; measures 15 in. in length, and weighs about 1¼ lbs. The neck is long, and the pectoral muscles large. An appendage of naked skin hangs across its bill. The value of the bird is estimated according to its size and shape. Those are considered best that have the appendage rising high on the



Carrier.

head, and of considerable width across the bill, and a wide circlet round the eyes, destitute of feathers. The *Cropper* has a thick, short body; legs feathered down to the feet. It has also a large pouch or bag under the beak. The crop hangs low, but is large, and it is loose breeched on the thighs. The *Dragoon* is bred between a tumbler and a horseman. It is a serviceable pigeon, and sometimes invaluable as a nurse. A good flyer, but not so strong as the

Fantail.

horseman. The *Fantail* takes its name from spreading its tail in the shape of a fan. There

are 2 sub-varieties, the broad-tailed and the narrow tailed shaker. The former ought to have a tail of at least 24 feathers, a swan-like neck, a full breast, and quivering motion of its tail, which gives it the second name of shaker. The plumage is white, red, blue, or cream color. The narrow-tailed shaker is produced by pairing the broad-tailed shaker with the stock dove. The tail is not so wide as its name imports, while it is also a shorter, thicker and less graceful bird. The *Helmet* is much coveted; it is smaller than the nun, which it resembles, but has no hood; a tuft of white tinted feathers overshadows its head; head and tail black. The *Horseman* resembles the carrier in appearance and qualities, but is smaller, and has a shorter neck. He may be trained like the carrier, and is scarcely inferior. The *Jacobin* or *Jack* has inverted feathers on the back part of the head, like the cowl of a monk. The *Mawmet* is of a cream color,

Jacobin.

with black bars across its wings; the part nearest to the body is black; has black wattle on its beak; and the eyes are circled with black flesh. The *Nun* has a tuft of feathers rising from the head like a hood; bill small; pearl eye; color

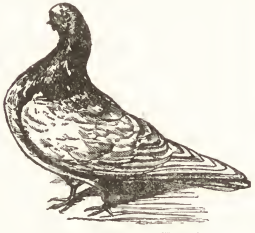
Nun.

of body white; head, tail, and the 6 flight feathers red, yellow or black. The *Owl* is odd-looking; has a purl on its breast; short beak, and a pearly eye; color varies, being red, blue, yellow, black, or silver; the yellow and red, when handsomely formed, are rare and valuable. The *Pouter* is handsome, and distinguished by the size and form of the crop. It is about 18 in. in length; has a hollow back; carries its wings close; legs well covered with feathers; front of the crop white, surrounded with green; head, neck, back and tail uniform in tint. If a pouter

Pouter.

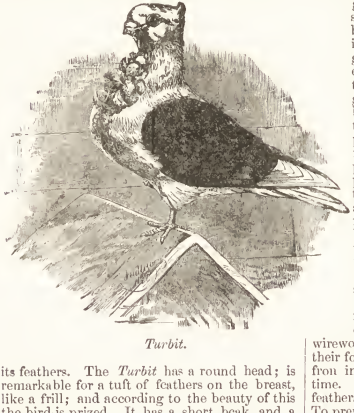
is unable to distend his crop handsomely, it is considered a defective bird. They are difficult to rear, and require great care to prevent overfeeding. Every bird should be kept in a separate coop, lofty and capacious; when the young are hatched, as the old birds pay little attention to them, they should be carefully watched. Some fanciers never suffer pouters to rear their young, but put their eggs under a hen dragoon. The *Ruff* is like the jacobin, but is larger, and a distinct variety. The hood and span are larger. The *Runt* is full breasted, with tail turned up. It has a long, thick neck; beak short; has a small wattle over the nostril; plumage grizzled, and ermine round the neck; those esteemed are black, white, red or mottled. The Leghorn is the most valued, but is a bad nurse; their eggs are often put under the hen horseman. The Friesland runt is larger than the common runt, and its feathers stick out the wrong way. The Spanish runt is short, thick legged, and has a long body. The Smyrna runt has feathers growing from the outside of the feet. The Roman runt is large and unwieldy. The *Swallow* resembles the nun in having a tuft of feathers rising from the back of the head; but has a large bill and feathered legs and feet. It is not a universal favorite. A perfectly feathered bird has the colored portions clean cut and free from white feathers; the colored portion of the head extending back to the base of the crest. The feathers of the feet are the same color as the wings and top of the head, and extend no further than the hock joint; the hock feathers are pure white; and the entire wing the same color as the head. The *Trumpeter* derives its name from the sound it utters after playing. It has a tuft of

feathers sprouting from the root of the beak, and the larger this is, the greater the value of the bird. The legs and feet are feathered; it is pearl eyed; to be valuable, it ought to have a hood at the back of its neck. The *Tumbler* has its name from its habit of turning over in the air. The finest variety is the bald-pated, having



Ermine or Almond Tumbler.

a snow white head and pearl like eyes. Another, called the Ermine or Almond, is a beautiful bird, distinguished by the colors and marking of



Turbit.

its feathers. The *Turbit* has a round head; is remarkable for a tuft of feathers on the breast, like a frill; and according to the beauty of this the bird is prized. It has a short beak, and a tuft behind its head. It varies in color, some being red, some dun, while others are blue and black. The most valued have their body plumage white, or of one color. The blue have black bars across their wings. They are called yellow shouldered or blue shouldered, according to the tints of the shoulders or wings. The original blue turbit has a blue tail, and the black turbit a black tail. In erecting a pigeon house, care should be taken to fix it in some quiet and secure spot. A small one is easily made from a wine cask, which has holes cut in its sides, and the interior apportioned into chambers, and a small platform, made of wood work, before each hole forms a place for the birds to alight upon. The cask should be elevated on a stout scaffolding pole or the trunk of a straight tree, and made secure. The top of the cask may be thatched, and should come well over the holes and sides. In arranging the chambers, they should be large enough for the birds to turn round with ease; and if 2 holes can be allowed for each compartment for egress and ingress, it will be of great advantage. Sometimes there is a little trouble attending the mating of pigeons, and it is of importance that they should be comfortably matched. Coops should have a thin lattice-work partition between them, so that the birds may become acquainted; they should be allowed to feed out of the same vessel, and in a short time the observer will find the birds selecting their choice, when they may be placed in one pen. When mated, they may be left to build their nests. When pigeons are fed, accustom them to one particular call, and the best is that of a common pea whistle. Pigeons will eat any kind of grain; pigeon's beans are the best food, but this may be varied, by mixing with it tares, gray peas, and buckwheat; the tares should be very old and good, and the buckwheat sparingly given. Hemp seed is stimulating, and should be sparingly given, except in very cold weather. Pigeons are fond of lime and salt. Prepare the following for their use: Take sifted gravel, brickmaker's earth, and the rubbish of an old wall, ½ peck each; add to these 1½ lbs. cummin seed; ¼ lb. saltpetre; let these be mixed with as much natural animal brine as will make a stiff paste. Portions of this mixture may be placed in flower pots and stationed where the birds can get at them. Gravel should always be scattered plentifully about the floor of the house, and a little salt allowed. Fresh water, daily, is necessary to keep them in health and feather. They must never be exposed to damp or cold. Cleanliness is necessary, and their houses should be cleansed once in 6 months, care being taken to have them well dried before the birds are readmitted. The dishes must be kept clean, and covered with wirework to prevent the birds from scattering their food. A little hemp seed, and a little saffron in their water, help them about molting time. If annoyed with vermin, fumigate their feathers by puffing tobacco smoke into them. To prevent vermin, attention must be paid to cleanliness, both in the birds themselves and in every part of their houses.

ROBIN. — The common robin of America is about 10 in. long. It is a common and most interesting bird, coming to the temperate districts in spring, and remaining late in autumn; some remain the whole winter, even in New England. Its song is among the sweetest. It builds in hedgerows, or at the foot of old trees, and lays

4 or 5 eggs. It is also very easily domesticated.

Robin.

SPARROW.—There are 2 species—the house sparrow and the tree sparrow. The house sparrow builds in holes, eaves of houses, or in deserted chimneys; the tree sparrow in trees. The nest of the latter is large. It is distinguished from the house species by its chestnut colored head, and having a black patch on the cheek. The sparrow feeds upon grains and seeds, and sometimes upon insects. Some are prized for their song and others for their flesh.

SWAN.—The most graceful of aquatic birds when gliding over the water, with its neck proudly arched, and the wings partly spread. Wild swans are found in nearly all the northern regions of the globe. There are numerous varieties of tame ones, the jet black being rare and the white common. They are seldom seen but in parks and gardens. They feed upon the roots and seeds of aquatic plants, are easy to manage, though often vicious; are hardy, and live long.

THRUSH.—Of this family, the song-thrush is smallest and most attractive. It thrives well in the cage. It may be fed on German paste, or paste made of oatmeal moistened with milk, with now and then a few snails and worms. It needs to be kept clean, and to have plenty of water for drinking and bathing. The young are hatched in spring, and should at first be fed on a little raw meat cut small, and bread steeped in milk and mixed with a little hemp seed. When they can feed themselves, give German paste and an allowance of raw meat.

WREN.—This genus is distinguished by having the bill nearly as long as the head, and the wings about equal to the tail. There are several species; the best known is the house wren. It is nearly 5 in. long; the wings over 2 in.; the color above reddish brown, barred with dusky. It builds in holes in the timbers or walls of dwellings, or in a hollow tree in the garden The nest is formed of twigs and grasses, and lined with soft materials. The wren lays 5 or 6 eggs of a pale reddish color.

FORMS OF BEAUTY.

FISH CULTURE.

REMARKS. — There are few enterprises that promise more profit than the multiplying of food fishes in fresh water ponds. It is believed by those who have investigated the facts, that fresh water fishes can be multiplied indefinitely, and improved in quantity, quality and cheapness. Every one, who has water sufficient to form a pond, can make it yield fish food profitably, with a moderate outlay.

CARP.

CLASSES. — Carp are divided into 3 chief groups: The *Scale Carp*, which has regular, concentrically arranged scales, being the original species improved; the *Mirror Carp*, so named from the rows of large scales along its sides, the rest of the body being bare; the *Leather Carp*, having only a few scales, or none, and a soft skin, velvety to the touch.

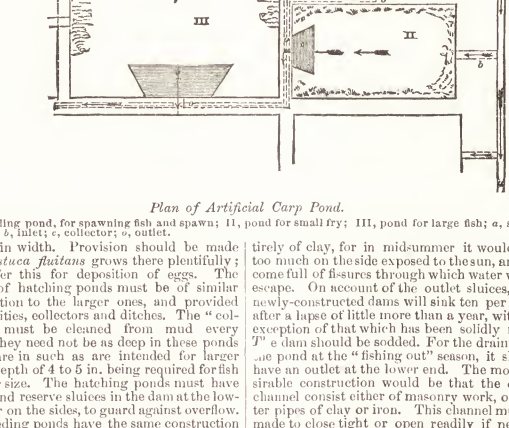
CHARACTERISTICS AND HABITS.—The carp is partial to sluggish waters, with a loamy bottom, and deep places with vegetation. In the temperate zone, at the beginning of cold, they seek deep water. This occurs at the beginning of November if winter sets in early. From 50 to 100 make a cavity in the muddy bottom, called a "kettle;" in this they pass the time until spring, huddled in concentric circles, heads together, the posterior part of the body raised and held immovably, scarcely lifting the gills for breathing, and taking no food from October until the end of March. It will not, however, be safe to depend on this habit when transporting them for propagation, in spring or winter, especially young carp.

CROSSING.—The carp sometimes crosses with related species; and hybrids result, resembling the genuine so much that it is difficult to recognize them. Such are valueless on account of bad and bony flesh. The spawning season of the crucian and the true carp coincide, and if kept together hybrid races may result. The spawning season is from March until August, according to latitude.

FEEDING.—The carp lives on vegetable food, worms and larvæ of aquatic insects, and is fond of cabbage, lettuce, boiled potatoes, corn, turnips, pumpkins, and melons. The refuse of brewer's malt is good. The pisciculturist, who has a pond of only ½ acre, can feed his fish on refuse from the kitchen and stable. Not every pond has the essentials of a good soil at the bottom and is capable of producing fish food. If these are wanting, the fish must be fed. This is a general rule for ponds with a sandy bottom. Never feed in the same place; distribute the food in different places near the banks. If food is always put in one or two places, the carp will stay near those places, and instead of scouring the pond in search of food, will remain at the bottom. It will grow fat, but never have firm flesh nor much length; and, besides, such feeding attracts the turtle, who will lie in wait and destroy the carp. Never give much at one time, or during the day, but in the morning or evening. During the hot season feed late at night, because the carp, if it has eaten sufficient in the morning, remains at the bottom all day, while it is necessary that it should swim and get a change of water. It is, therefore, useful to place in ponds containing large carp a limited number of pike, smaller than the carp. The carp fears the pike and flies from it.

PONDS.—To carry on carp culture in a judicious manner, 3 ponds are required: The hatching pond, breeding pond, and regular carp pond. A gravelly ground is not appropriate. Small ponds with a sandy bottom may be improved by supplying them with loam. An undulating country, with slight elevations, where the valleys are easily closed by dams for forming reservoirs, is favorable, the construction involving only a trifling expense. Ponds must not be too deep, or the water will be cold and harbor fewer insects, larvæ and worms; besides, this fish does not grow quickly in cold water. A depth of 3 ft. in the centre is sufficient; toward the outlet sluice it may be 6 to 8 ft. deep, but only for an area of 200 to 1,000 sq. ft. In the depths of this "collector" the fish seek their resting place for winter, and in summer, when the water is too warm near the edge. The outer part of the pond should not be deeper than 1 ft. for the distance of about 70 or 100 ft., so that the water may be warmed by the sun. Toward the centre of the pond, and in accordance

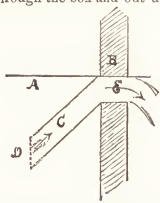
with its size, a cavity of from 20 to 50 ft. in length and 2 feet deeper than the rest of the ground, should be dug. This cavity is sometimes called a "kettle." From the entrance of the pond to the other end, where the "collector" and the outlet sluice are situated, 2 or 3 ditches of 2 ft. in depth and 4 ft. in width, must be dug. These are to carry the fish into the "collector," when the pond is drained. The "collector" is a place of from 20 to 40 ft. in length and breadth, near the outlet sluice, 1 ft. deeper than the remaining bottom of the pond. In ponds of superior construction, it has a wood floor, and is cleaned of the mud every year, so that the fish may not become too much soiled. The hatching pond should not be as large as the breeding pond; its depth 1 or 1½ ft.; the outer portion, or low water margin, 2 to 5 in. in depth, and 30 to 40 ft. in width. Provision should be made that *Festuca fluitans* grows there plentifully; fish prefer this for deposition of eggs. The bottom of hatching ponds must be of similar construction to the larger ones, and provided with cavities, collectors and ditches. The "collectors" must be cleaned from mud every spring; they need not be as deep in these ponds as they are in such as are intended for larger fish; a depth of 4 to 5 in. being required for fish of minor size. The hatching ponds must have outlets and reserve sluices in the dam at the lower end or on the sides, to guard against overflow. The breeding ponds have the same construction as the hatching ponds; they have dams, reserve sluices, outlet channels, collectors and ditches, the only difference being that they are deeper and larger. They have an average depth of 1 ft. 9 in., and the width of their shallow borders is from 70 to 80 ft. The "kettles" have a depth of 4½ ft. from the surface; their borders are from 6 to 8 in. deep. The growth of grass should be advanced in these ponds. Culture ponds should have a shallow border; the depth accords with the size 1 ft., in regular carp ponds, ½ ft. in breeding ponds, and ¾ to ½ ft. in hatching ponds. The borders should be of considerable width, and a great number of shallows be contrived for feeding places. If the size of the principal and supplementary ponds has been decided, the height, depth and width must be measured, and the levels of the ground and dams carefully taken. The leveling of the bottom is required to assist in determining the depth of the ditches, kettles, collector and outlet. In the erection of the required dam, it must be of the best material, to make it secure against the destructive influence of water. It ought to be 3 times as wide at its base as it is high, and at the top the width should be the same as the height. The interior or water side should be less inclined than the exterior. The dam should not be entirely of clay, for in midsummer it would dry too much on the side exposed to the sun, and become full of fissures through which water would escape. On account of the outlet sluices, etc., newly-constructed dams will sink ten per cent. after a lapse of little more than a year, with the exception of that which has been solidly made. *T* e dam should be sodded. For the draining of ..e pond at the "fishing out" season, it should have an outlet at the lower end. The most desirable construction would be that the outlet channel consist either of masonry work, or water pipes of clay or iron. This channel must be made to close tight or open readily if needed, and provided with two or threefold gratings to prevent the escape of the fish upon opening the sluice. There should also be an outlet channel, several feet in breadth at the side of the pond, to allow the water to run off, secured by grating, but kept open, so that in case of storms no overflow may be possible through rising of the water in the pond. The illustration shows a good plan for an outlet in the dam: A, shows the surface of the pond; B, the dam; C, the outlet, which



Plan of Artificial Carp Pond.

I. breeding pond, for spawning fish and spawn; II, pond for small fry; III, pond for large fish; *a*, supply of water; *b*, inlet; *c*, collector; *o*, outlet.

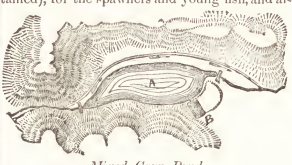
is a wooden box, extending from the surface to a distance under the water, and must be large, so as to allow the surplus water to flow off. The water enters through the perforations (D) and flows up through the box and out at the outlet



Outlet Channel through the Dam.

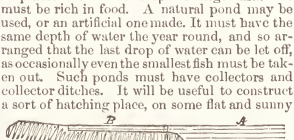
in the dam (E). The advantage is that the water flows out from the bottom of the pond, preventing the grating from becoming clogged by leaves, etc. If it be desirable to use natural ponds, see whether they can be put in proper condition for regular culture. This can only be done if the influx of water can be regulated, and drainage made possible. An intrenchment will be required to make them dry. Trunks of trees should be taken out; if too deep, they should be filled up, or brought into connection with the sewers on the bottom of the pond. If this is not done, many fish will remain embedded in the mud when the pond is drained. Should any brooks fall into such ponds, they must be kept under strict observation on account of possible overflow. If practicable, turn off, and conduct alongside the pond, when the latter can be supplied with water, if required. Spring water direct, is not favorable; it should be conducted a few hundred yards through wide, shallow ditches, to receive nourishing components from the air and earth, and be warmed by the sun. The inflow of water into the pond should not be direct, like a brook falling into it, causing the water to rise, thus carrying into the pond other fish, especially the rapacious pike. The carp has a disposition to swim toward the inflowing water, away from its feeding places. The water should be conducted into the pond sideways from the stream; and if a small brook only, it may be turned off and carried alongside of a pond, from which point the latter can be supplied with water. The inlet sluices from the stream must be of strong construction, so that overflow is impossible, and provided with gratings to prevent other fish from intruding. It is indispensable for fish culture that the ponds allow of being thoroughly drained, so that the fish can be taken out without difficulty. The bottom of the ponds should permit of their being dried up for agricultural purposes when necessary. The fundamental rule in carp culture is that the water be of the same depth in summer and winter. If the supply of water is too plentiful, great quantities of mud are carried into the pond, embedding the grass and causing it to rot and poison the water. The carp deserts such water for depths which are deficient in food.

PONDS FOR MIXED CULTURE.—Sometimes only 1 pond is used instead of 3. When this is the case it must combine the characteristics of the class ponds, and have shallows with grass or aquatic plants (*Festuca fluitans* and *Phellandrium*, when it is possible for them to be obtained), for the spawners and young fish, and al-



Mixed Carp Pond.
A, pond; B, breeding place.

so places 8 to 10 ft. deep for larger fish. It must be rich in food. A natural pond may be used, or an artificial one made. It must have the same depth of water the year round, and so arranged that the last drop of water can be let off, as occasionally even the smallest fish must be taken out. Such ponds must have collectors and collector ditches. It will be useful to construct a sort of hatching place, on some flat and sunny



Cross Section of Carp Pond through Breeding Place.
A, pond; B, breeding place.

spot, near the bank (a cut in the bank), 40 to 100 ft. long, 30 to 50 ft. wide, and 5 in. to 1½ ft. deep, planted with aquatic plants, and it ought to be the only place where carp can ascend to deposit eggs and engage in spawning; as soon as this has taken place, the entrance is closed with a net, so that the eggs cannot be eaten. This net may be removed when the young have hatched; but it is safest to leave it for some days, that they may feed undisturbed.

STOCKING PONDS.—The hatching pond is for propagation, by placing a number of male and female fishes therein. The females drop the eggs upon the aquatic plants, where they are impregnated by the males; 1 female is calculated to 2 males, per acre. When young fish want food for a length of time, the gristle and bone harden, and the fish is crippled for life, even if placed in ponds with an unlimited supply of food. It is better to place fewer young fish in the ponds, then they will grow rapidly, develop, and during the first year reach 5 to 6 in. in length. Strong fish can thus be placed in the growing ponds, and they will grow rapidly. If there are too many young fish for the water area, place them in some lake, brook or river; on no account keep them in the pond. In ponds

of a few acres, it will be found advantageous to surround them with a close board fence sunk 4 to 6 in. into the ground. This will exclude the snapping turtle, the most dangerous enemy. At night it seizes the fish with its fangs and kills them. It is a peculiarity of the carp to keep at the bottom during the night, and in cold and gloomy weather; the snapping turtle would, therefore, have many an opportunity of destroying them. Large iron fish hooks, with meat as bait, at suitable places on the banks, will catch the turtle; this should be done from spring to October. The pieces of meat should be of such a size that large carp cannot bite them. The hooks should be fastened with strong brass wire. In placing spawners in ponds, caution must be had in selection, so that healthy fish may be introduced, and not such as are affected by fungous growths, the gelatinous polyp, or other disease. The newly obtained fry are left in the hatching ponds during winter, to be transferred to the larger ponds in spring. In catching the young fish, it must be done carefully, the water being drained off through the outlets slowly, so that none remain in the mud; for, if a new hatching operation is contemplated in the pond, the newly hatched fish will be retarded in their growth on account of scarcity of food, this being consumed by any remaining larger ones. Young fish must be handled carefully, for the slightest injury proves fatal. The stocking of the breeding ponds takes place in spring, after emptying the hatching ponds; it lasts from the latter part of March until April. An advantage will be gained in northern sections by leaving the young fish 2 summers in the breeding ponds; that is, they are transferred to a larger pond, and from this pass into the real carp pond. This answers well where the bottom of the pond is poor, or if feeding has not the desired effect. In the spring of the 3d year, those fishes which have been 1 year in the breeding pond are transferred to the carp pond. Fish kept in the breeding pond for 1 summer, without being fed, will weigh, at the expiration of that time, 1 to 1½ lbs.; while those which remained 2 summers, will show a proportionally greater increase. To stock a culture pond of 1 acre, 400 to 500 carp, of 1 lb., will be required, and in the autumn of the same year, when taken out for market, they will weigh 2¾ to 3 lbs. each.

SPAWNING.—The fish show signs of spawning about March 1st. Some days before, they increase in vivacity, and rise to the surface more often; 2 or more males keep near the female, which swims more swiftly on a sunny morning. Spawning does not take place at once; days and weeks may pass before the fish leaves her last egg to the care of nature. In rainy, cool weather, it is interrupted, but is resumed when the water grows warmer. Culturists dislike cold weather at this time, as not only the eggs, but the young fry suffer. The great abundance of eggs in the carp explains its extraordinary increase in natural waters. A fish of 4 to 5 lbs. contains about 400,000 to 500,000 eggs. The eggs of the carp adhere in lumps to the object upon which they have fallen. The moment she drops her eggs they are impregnated by the milter. As soon as the egg has left the fish it swells a little, the mucus which surrounds it, serving to fasten it upon some aquatic plant, stone, or brushwood. The eggs which have no such object to cling to, are lost. Eggs develop quickly in warm weather. As early as the 5th or 6th day, the first traces of the eyes will be visible, and toward the 12th or 16th day the little fish break through. This rapid development takes place only in shallow, thoroughly-warmed breeding ponds. If these ponds are deep and the water colder, the hatching process may require 20 days. In 3 to 5 days the young fish has absorbed the yolks, and seeks food. If the breeding pond be productive enough to furnish the food for so many young, they will grow rapidly. The weight which a carp may attain to in 3 years, is from 3 to 3¼ lbs.; that is, a fish which has lived 2 summers, will weigh 2¾ to 3¼ lbs. the year following.

TRANSPORTATION.—The assertion that the scale carp is better for transportation than either the mirror or leather carp, by reason of its scales being a protection against transfer and hurtful attacks in ponds, is not correct. In transportation, scales are not only inefficient, but frequently cause death, especially in the so-called breeding fish, for, if a scale be torn off in part only, ulceration and death will ensue. The leather carp, having no scales, will bear more ill-usage, whether young or old. Its smooth, slippery skin, suffers much less from transportation, and any slight wound will heal more easily. The emptying of ponds demands great caution. The water must flow gradually through the outlets, all of which must be kept open at the time; requiring from 10 to 18 days to draw off the water. The fishes are driven carefully and slowly with boats into the principal ditches. They must not be chased on any account, or they will bury themselves in the mud. To guard against such an emergency, preparations must be made for an immediate supply of water to save the fish. If the fishing out progresses in the regular manner, the fishes will, by degrees, draw off from the ditches into the collector. The collecting takes from 5 to 6 days in large ponds, containing 100 to 400 tons of fish. Avoid crowding them. On the evening previous to the fishing out, when the water has been diminished to the depth of ½ ft., those fish which have been collected are shut off from the pond by a large net, and at dawn they are caught. (See *Transportation* in SALMON.)

SALMON.

CHARACTERISTICS AND HABITS.—Under the head *Salmon*, may be included salmon, trout, lake trout, white fish, grayling, and the fresh water herring. The mode of culture for each is essentially the same. They spawn in autumn and winter, with the exception of the California salmon, which spawns in summer and the first of autumn. The salmon comes in from the sea as soon as the ice breaks up, and seeks fresh water in which to spawn. Trout, also, pass from ponds and lakes into fresh water streams. Salmon and trout form nests. The female digs out

the bottom with her fins and tail; and when the nest is made, she deposits her eggs, which are then impregnated by the male. They are covered with gravel by the female, while the male drives away any intruders of his own sex. When the spawn falls from the fish, it adheres to whatever it touches. As soon as this operation is completed, and the fish are exhausted of milt and spawn, they seek deeper water, leaving the eggs measurably unprotected from numerous enemies; the worst of whom is the eel, which devours the eggs and young voraciously. The eggs remain in the water from 2 to 5 months, according to the temperature of the water, before hatched. Many fail of impregnation, and the nest is often disturbed and the eggs eaten by other fish seeking places for a nest. When the eggs have hatched, the fry are about $\frac{3}{8}$ in. long, and are furnished with a sac of provision 3 times their bulk. For nearly 30 days after birth, the salmon and trout are sustained by the absorption of this sac or stomach. During this period they are beset on all sides by hungry enemies, and being very shy they try to hide in every imaginable place.

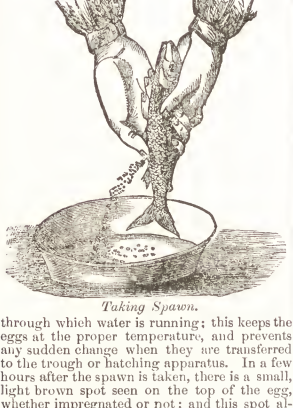
Trout Ponds.

PONDS, Trout.—Those who raise trout as a crop, have a series of ponds connected by raceways, the latter being used for spawning grounds. Three ponds are necessary: The 1st pond is for the young fish, from the time they are hatched until they attain the age of 18 or 20 months. For if left with the older ones they will be devoured. The 2d pond is for the same fish, until they are $3\frac{1}{2}$ years old. The shape of the ponds should be oblong and the width about $\frac{1}{4}$ of the length. The raceways should be 5 to 6 in. deep, and 2 to $3\frac{1}{2}$ ft. wide, according to the size of the ponds and the supply of water; the bottom of the raceways should be covered about 3 in. in depth with fine gravel for nests, and the sides be of boards 1 in. thick, 12 in. wide, and furnished with screens, to prevent the fish going from one pond to the other. These screens may be made of common wire, painted with tar, or copper wire, or of galvanized iron wire; the last being most durable. The screens for keeping the fry, should be 14 threads to the inch, and for 1 yr. old fish, 5 to 6 threads to the inch. Incline them at an angle of 45°, the top farthest down stream. The bottom of the pond may be of mud, clay or moss; gravel must be avoided, as the fish would spawn on it, and the eggs be lost. The ponds must be arranged so that they can be entirely drained.

PONDS, Salmon.—To hatch salmon it is necessary to have ponds where they can be retained till they are ripe; but it is impossible to keep them throughout the year, as they are migratory. The ponds must be larger than for trout, and have larger raceways. They are manipulated as for trout, and the eggs hatched in the same way.

HATCHING, Artificial.—When the fish ascend the raceways and seem to be seeking for a place to make their nest, they may be taken and the spawn pressed out. At the entrance of the raceway there should be grooves to receive a frame, on which is tacked a net of coarse bagging, 8 or 10 feet long. One corner of the bagging should be narrowed, left unsewed, and tied with string. The raceways should be covered in spawning time, so that the fish will not be frightened. As soon as there are fish in the raceway, the net is gathered in one hand, and the frame held in the other, so as to put in the grooves quickly. Go quietly to the spot, and put the net in the groove quickly. The water running down will swell the net to its full length. The covers may be removed and the fish frightened down from the head of the raceway into the net. As soon as they are in, the frame may be lifted out and the fish inclosed in the bag. A tub of water being ready, the end of the net can be lifted into it and untied, when the fish will fall into the tub. The fish should then be immediately taken to the hatching house, lest they die in this small quantity of water. While the fish lie quiet in the tub, there is sufficient air to sustain them, but, if they begin to come to the surface, the air is exhausted and the water must be replenished. Provide a milkpan for the spawn, and a tub of water in which to put the fish after they are deprived of the spawn. Wet the milkpan with water; hold the fish as shown in the illustration; slip the right hand gently down from the head, and press the belly with the forefinger and thumb. If the fish is ripe, a few drops of pearly colored milt, or orange-hued eggs, will be expressed into the pan. If the milt is not of this color, it is not good, and another male must be treated in the same manner. Press the female more slowly and oftener than the male. If, when the hand is pressed lightly over the belly, the eggs are felt to be hard, they are not ripe. When ripe, the belly is soft, and the eggs feel loose and change position at the touch. Stir the eggs at intervals by moving the pan, so that they will

all come in contact with the milt; when the operation is completed, pour about ½ pt. of water on them and set the pan in a hatching trough,



Taking Spawn.

through which water is running; this keeps the eggs at the proper temperature, and prevents any sudden change when they are transferred to the trough or hatching apparatus. In a few hours after the spawn is taken, there is a small, light brown spot seen on the top of the egg, whether impregnated or not; and this spot always rises to the top. When the egg is held before the light in a small vial, this speck looks about the size of the head of a small pin elongated upwards. Looking down on the egg, the speck is seen in the centre, apparently on top. Seven days after the ova is taken, a small circle is seen around the speck, whether the egg is impregnated or not. It is difficult to know which eggs are fecundated; the fecundated egg has a clearer speck in the centre, and the ring around the speck is larger. When 9 days old, the circle in the impregnated egg has enlarged, a slight brown or bluish gray tinge pervading the interior. The unimpregnated do not change after the 9th day, unless to become opaque. On the 11th, the first formation of the fish is seen, a brown line extending from the circumference towards the centre of the circle, and covering ¼ the egg. When 12 days old, the circle covers ⅓ the egg. On the 13th the circle has passed ⅔ around the egg. On the 14th the circle covers entirely the egg, and the trout is formed. On the 25th, the eyes, heart, arteries, red blood, and circulation of blood and motion will be observed. About the 50th day the trout come out of the shell. In a couple of weeks they move about, become more agile as the sac is absorbed, and begin to look for food. They should now be fed twice a day on chopped raw liver, coagulated blood, thick milk, or bonny-clabber, boiled liver or lean meat grated, and the yolks of eggs boiled hard and powdered.

HATCHING APPARATUS.—A great many inventions are in use for hatching. Below are given a few approved methods: 1. A wooden trough, 12 to 15 in. wide and 4 in. deep, is divided into nests or apartments, 16 to 18 in. long, by placing strips across; over these strips, the water slightly ripples, and the force of the current is broken. The bottom of the trough is covered with clean gravel to the depth of 1 in., to receive the eggs, over which the water, 1 in., deep, flows in a gentle current. — 2. A floating box for hatching is also used. It is made of boards, ½ in. thick; the bottom covered with fine, painted wire gauze; on this the eggs are distributed. If the box does not set deep enough to allow the water to cover the eggs 1 to 1½ in., weights should be placed on the cover to sink it that depth. If the bottom of the box is made of boards and gravel strewn over it, 2 or 3 rows of large gimlet holes should be bored in each end below the water line. These boxes are 2 ft. long, 18 in. wide, and 6 in. deep, and are tied to a strip extending across the raceway, and allowed to float in the current. Success in hatching depends on the purity of the water, and even the purest should be filtered. A sq. in. of water divided into 4 jets, and flowing through the same number of troughs, will suffice for 300,000 to 400,000; but about 3 times the supply will be required to sustain the same number of young fish for any great length of time in the nursery. An extra supply must, therefore, be provided for the fry, after they have absorbed the umbilical sac.—3. The Holton hatching box is an excellent incubator, and was constructed especially for white fish. It is about 20 in. sq. and 2 ft. deep, and will hold eighteen wire trays, placed one upon another. The water enters from the bottom, passes up through the box, falls evenly into little troughs, which run around 4 sides, and is thence carried into a reservoir. The trays are lifted for cleaning by arms at 2 sides of the box, fastened into a lower frame. The trays are made of wire cloth of so small a mesh that the eggs will not pass through, but large enough to permit the passage of the white fish fry, which, as soon as they break the shell, are carried up by the current into the reservoir, from which they may be taken as required.—4. Coste constructed an incubating-box, which it is claimed will remedy the defects of the other boxes. This box measures 60 in. in breadth and depth. Its sides and bottom are of solid wood. Its top is formed of a lid in 2 parts, in the centre of which is a grating of metal wire; each end is closed by a door, whose opening is larger than that of the lids, and is also supplied with grating. Both doors and lids move on hinges, open outward and are closed by 2 small bolts fastend with strings, and supplied with padlocks. There are no subdivisions in the inside of this box, but running along the sides are small ledges to support the frames. These frames are of wood and glass sticks. As these frames are intended to be put one over the other, the box must be higher than in the trough apparatus, and at the ends there must be large notches for the free passage of water. To render the process easier, their surface must not (if the box has the length mentioned above) represent more than ¼ its

capacity, so that 4 of them may be on the same floor. This box, which should be used in running water, can be used for free eggs and for eggs adhering to foreign bodies. It can hatch a large quantity, and permits manipulations which in other apparatuses are hurtful. For observing what is going on inside, and to clean the gratings, when obstructed by sediments, the lids and doors can be opened without taking the apparatus out of water or disturbing the frames or eggs. Whether attached to a floating frame by clamps, or by strings attached to pegs driven in the ground, it must present to the current one of its extremities when the current is moderate, and one of its angles when it is very rapid. A bed of pebbles and fine sand, at the bottom, receives the fish, which either fall or descend on it as they are hatched, and offers favorable conditions for their development, till the gates can be opened and they set at liberty in some river or pond. Fish of small size will escape through the meshes of the wire grating and disperse through the water. When the hatching process is finished, the frames are removed from the box, so that it can be cleaned, and also that better care can be bestowed on the young fish.

SMELT.—This fish is a variety of the salmon. The eggs are very adhesive, and must be treated differently from those of trout. The fish spawn in March, and the eggs should be deposited upon trays, previously dipped in water, and then placed in a tin pan without any water in it; then the milt should be added, and just enough water to cover the tray, and the whole shaken till the eggs are evenly distributed. In a few minutes they will adhere firmly, and must remain undisturbed till hatched. With a temperature of 35° to 40°, they will hatch in about a month. The trays are removed to hatching boxes (see *Hatching Box* in SHAD), after the eggs have adhered by the hardening of the mucous matter that surrounds them, and are then treated as trout eggs.

TRANSPORTATION.—Trout, or any other kind of fish, may be transported in a cask, with a cover which has a hole 1 in. in diameter, and the cask filled to within 6 in. of the top with water. Tie some ice in a piece of flannel, and fasten it to the side of the cask near the top, so that it cannot swing about and bruise the fish. If the journey be long, insert a bellows with a tube long enough to reach the bottom of the cask, and by blowing occasionally the fish may be supplied with air and carried a great distance.

SHAD.

CHARACTERISTICS AND HABITS.—Shad are migratory, but spend much of their time in the sea. They spawn from February to August, and ascend into fresh water to deposit their eggs, but do not go as far as salmon. They seek some rocky ledge, where there is a gentle current, and, uniting in pairs, press their vents together and extrude the spawn and milt. They build no nests, and spawn while in rapid motion. The eggs are left to their enemies, the only precaution being that they are deposited at night. A little increase of current will wash 9-10 of the eggs off the rocky ledge into the muddy flats, where they perish for want of air. A heavy rain will rile the water, and on its subsidence there will be deposited upon the eggs a thin covering of sediment, which will destroy them all absolutely and without exception. Eggs of fish, in order to hatch, must be continually surrounded with fresh water; they require the oxygen of changing water just as land animals require the oxygen of changing atmosphere. So great are these risks, that shad could never have held their own, were it not for the compensation of their wonderful fecundity. They produce 10,000 eggs to each lb. of weight, which is 10 times as many as salmon or trout, and it is not unusual to obtain 60,000 eggs from a single mature female. This is their protection, that among the vast number laid some will hatch, and although the percentage is small, the aggregate has been large enough to maintain the supply. When spawning is over, the fish at once return to the ocean to recuperate.

HATCHING, Artificial.—Shad eggs are lighter than those of trout, and will almost float in water. They are less than $\frac{1}{2}$ the size of trout eggs, and require a temperature of from 65° to 75° for hatching. They will hatch at a lower temperature, but in such cases mature slowly, while 80° of heat are as much as they can possibly endure. In artificial manipulation the fish are taken in seines at night from their spawning beds, and stripped at once, as they will die very quickly. The eggs are caught in a pan with a little water in it; after being allowed to stand for a few minutes until impregnation is complete (which is shown by their swelling in size), and reducing the temperature of the water 10°, they are poured into the hatching boxes and allowed to remain. In 24 hours the black eyes of the young fry will be visible through the shell. In from 3 to 10 days the fry will hatch. Instead of trusting to good fortune to get ripe spawners from the nets, these may be obtained in a way similar to the treatment of salmon and trout. A pond may be built by damming up a stream running into the main river; in this the shad may be confined till they are ripe. It has been supposed that shad were so timid a fish that they would hardly ascend fishways, and could not be kept in confinement; but such does not turn out to be the case. There is no difficulty in ponding them and in examining them from time to time till they become in proper condition to strip. They are not more timid than other fish.

HATCHING BOX.—This is a simple box with the bottom knocked out and replaced by a wire gauze netting. It is suspended by floats of wood nailed on the sides so that the bottom is presented at an angle to the current, the degree of inclination being determined by the velocity of the current. The water striking against the screen enters the minute interstices and keeps the eggs in motion. Attach these boxes one behind the other in a long row; fill with impregnated spawn and anchor them in the river.

PART 4.

MECHANICAL ARTS.


ELECTRICITY
WOOD WORKING
PRINTING, ETC.
ENGINEERING AND METAL WORKING.
PAINTING
MINING
Armand Welcher

"STICK TO IT!"

ADHESIVES.

REMARKS.—Quite as much depends upon the manner in which a cement is used as upon the cement itself. The best will prove worthless if improperly applied. Cement should be brought into intimate contact with the surfaces to be united, by heating the pieces to be joined, as in using resin, shellac, marine glue, etc. Glue must never be used upon hot wood, or hot cauls used to veneer with, as the wood will absorb the water in the glue too suddenly, and leave only a little residue, with no adhesiveness. Always glue both surfaces, excepting in the case of veneering. Where solutions are used, the cement must be rubbed into the surfaces with a soft brush (as in the case of porcelain or glass), or by rubbing the surfaces together (as in making a glue joint between two pieces of wood). As little cement as possible should be allowed to remain between the united surfaces. To secure this, the cement should be as liquid as possible, and the surfaces pressed close, until the cement has hardened. Time should be allowed for the cement to harden, particularly oil cements, such as copal varnish, boiled oil, white lead, etc. When two surfaces are joined by a layer of white lead between them, 6 mos. may elapse before the cement in the middle of the joint has become hard. When the article is to be used immediately, the only safe cements are those liquefied by heat, and which become hard when cold. A joint made with marine glue is firm an hour after made. Next to cements that are liquefied by heat, are those dissolved in water or alcohol. A glue joint sets firmly in 24 hrs.; a joint made with shellac varnish becomes dry in 2 or 3 days. Oil cements, which do not dry by evaporation, but harden by oxidation (boiled oil, white lead, etc.) are slowest of all. The hotter the glue, the more force it will exert in keeping the parts together; in long joints the glue should be applied after boiling; glue loses its strength by remelting; newly made is preferable to that reboiled. Glue of good quality should contain no specks, and be transparent. Good glue, when put in cold water, swells without dissolving, and resumes its original condition on being dried. In preparing glue, break it into small pieces; soak in water 10 to 24 hrs.; put over the fire in a glue pot; heat until dissolved, stirring frequently. Never melt glue in a pot subjected to the direct heat of the fire. Glue used by cabinet makers is of an amber color, and of superior quality. Fresh glue dries more readily than that which has been reheated. The quality of glue is determined by the amount of cold water it will absorb. From experiments it has been found that after 24 hrs. immersion in water at 60°, the finest glue absorbs 12 times its weight of water; that from dark bones absorbs 9 times its weight, and ordinary glue absorbs 3 to 5 times its weight of water. Glues that take the longest to dry are preferred to those that dry quickly; the slow drying glues being strongest. Powdered chalk, added to glue in small quantities, makes it hold stronger. Common adhesives are so indiscriminately called cements, lutes, glues, or pastes, that any classification under these heads has little value; the terms are merely those of popular usage, and are too general in their own meaning to be clearly separable. Common usage is, therefore, the uncertain guide in the following analysis and nomenclature.

CEMENTS.

BUILDING.

BRICK DUST. — Brick dust, 1 part; lime, 1 part; sand, 2 parts; mix dry, and temper with water in the usual way.

BRIMSTONE. — Melted brimstone, alone or mixed with resin and brickdust.

CONCRETE, Gravel. — To 8 barrows slaked lime, well deluged with water, add 15 barrows sand; do not use river or beach sand, as this will absorb dampness. Mix to a creamy consistency, and add 60 barrows coarse gravel; work well. You can throw stones into this mixture of any shape, from 9 to 10 in. in diameter. Form moulds for

the walls of the house by fixing boards horizontally against upright standards, which must be braced so as not to yield to the pressure of the material as it settles. Set standards in pairs around the building where the walls are to stand, 6 to 8 ft. apart, and so wide that the inner space shall form the thickness of the wall. Into the molds thus formed, throw the concrete, and the more promiscuously the better. In a short time the material will get hard as solid rock. If the gravel is free of dirt, the sand clean, and the weather dry, the walls can be raised 1 ft. a day. Some make the gravel and sand into mortar, press into bricks, and then lay into walls; but the walls will be stronger, if laid up solid in board frames made to raise up as required.

DRAIN TILE. — 1 bush. Rosendale cement should be evenly mixed with 3 bush. sharp, clean sand, and 4 bush. washed gravel, not very coarse, but not fine. When all is carefully mixed, water should be added to make a soft mortar, and the cement rapidly worked until mingled, and immediately used. It sets quick.

EXTERNAL.—1. (*Pen's.*) Used to cover buildings. Powdered quicklime, 1 part; powdered baked clay, 2 parts; mix; then add 1 part freshly baked and powdered gypsum to 2 parts powdered baked clay; after mixing, add them to the former powder, and incorporate the two. It is mixed with water, and applied like mortar.—2. Sand, 1 part; ashes, 2 parts; clay, 2 parts; mix with linseed oil. Hard and durable, and resists the weather almost like marble.—3. (*Hamelin's.*) Siliceous sand, 60 parts; Portland stone, in fine powder, 40 parts; lime marl, 20 parts; litharge, 8 parts; grind together. For use, mix with linseed oil, and use like mortar. Wash the surface of the building first with linseed oil.

FIRE-PROOF.—Used for walls, and to mend broken pieces of stone, steps, etc. Fine river sand, 20 parts; litharge, 2 parts; quicklime, 1 part; linseed oil sufficient to form a thin paste.—2. (*Beale's.*) Chalk, 60 parts; lime and salt, each 20 parts; Barnsey sand, 10 parts; iron filings or dust, and blue or red clay, each 5 parts; grind together, and calcine.

FLOOR.—1. Used for houses, especially malt houses. Take $\frac{2}{3}$ lime and $\frac{1}{3}$ coal ashes, well sifted, with a small quantity of loamy clay; mix the whole together; temper with water, making it up into a heap; let it lie a week or 10 days, and temper it again. Heap it up for 3 or 4 days; repeat the tempering till it becomes smooth and gluey. The ground being leveled, lay the floor therewith $2\frac{1}{2}$ or 3 in. thick; smooth with a trowel; the hotter the season the better. — 2. To make floors look better, take lime of ragstones, well tempered with whites of eggs; cover the floor $\frac{1}{2}$ in. thick before the underflooring is too dry. If well done and thoroughly dried, it will look, when rubbed with a little oil, as transparent as metal or glass. In elegant houses, floors are made of stucco, or of plaster Paris, beaten and sifted and mixed with other ingredients.

MORTAR, Gloucestershire. — Used for stone and brickwork. Collect road scrapings; slake lime, and mix thoroughly together. Carefully pick out, as the mass is worked over, stones or other foul matter. For stone work, this is quite sufficient; for brick work, pass the materials through a sieve previous to being made into mortar.

MORTAR, To Make.—Reduce quicklime and sand to a paste with water; the lime pure, free from carbonic acid, and in fine powder; the sand free from clay (partly fine sand and partly gravel); the water pure, and if previously saturated with lime, so much the better. The proportions are 3 parts fine and 4 parts coarse sand, 1 part quicklime, recently slaked, and as little water as possible. The addition of burnt bones, rye straw, or hair, improves mortar, by giving tenacity, but should not exceed $\frac{1}{4}$ of the lime employed. Sawdust has been recommended as superior to hair for preventing cracking and peeling off of rough casings by storms and frost. Mortars improve with age, and attain maximum hardness and strength after a long time. A chemical union takes place between the lime and the silica of the sand, requiring years to complete. Black mortar is made by mixing with lamp black.

PORTLAND. — Gray chalk, mixed with $\frac{1}{4}$ its weight of clay in a pug mill supplied with warm water, and run off into a settling pond where the superfluous water is removed. The sediment is dried on a floor provided with flues, then burned in a kiln, and ground between millstones.

ROOFING.—1. Melt together in an iron pot, 2 parts by weight of common pitch, and 1 part gutta percha. This forms a homogeneous fluid more manageable than gutta percha alone. To repair gutters, roofs, etc., clean out of the cracks all earthy matters; warm the edges with a plumber's soldering iron; then pour the cement upon the cracks hot, finishing by going over the cement with a moderately hot iron, so as to make a smooth joint.—2. Mineral coal tar, pulverized coal (charcoal is best), and fine well slaked lime; the coal and lime to be well mixed together; 4-5 coal, and 1-5 lime; the tar to be heated, and, while hot, thickened with the mixture of coal and lime, until it can be spread upon a board and not run. The cement must be applied warm with a trowel.

ROMAN.—Genuine Roman cement consists of *puzzolene* (a ferruginous clay from Puteoli, calcined by the fires of Vesuvius), lime and sand, mixed with soft water. The only preparation which the puzzolene undergoes, is pounding and sifting; but the ingredients are occasionally incorporated with bullock's blood and oil, to give more tenacity.

ROMAN, Artificial.—1. A mixture of clay or loam, broken pottery, flints, or silicious sand, or broken bottle glass and wood ashes, exposed to heat in a furnace, until it becomes partially vitrified; then ground to powder, sifted, and mixed with $\frac{1}{3}$ its weight quicklime in fine powder; then packed in casks to preserve from air and moisture. For use, mix with water, and apply like Roman cement.—2. Drift sand, 94 parts; unslaked lime, 12 lbs.; and 4 lbs. poorest cheese grated; mix well; add hot water to reduce to a consistency for plastering. Work well and quick, with a thin, smooth coat.—3. Slaked lime, 1

bush.; green copperas, 3½ lbs.; fine gravel sand, ½ bush. Dissolve the copperas in hot water, and mix all to a consistency; use the day it is mixed, and keep stirring while in use.

SLATING FLUID. — Dissolve water glass in boiling water to a syrup, and form into a paste with a mixture of equal parts dry plaster Paris and fine calcined clay passed through an 80 in. sieve.

STUCCO.—Used for coating walls and ornamenting ceilings. A compound of powdered gypsum or strong gelatine. It takes a high polish, and colored designs can be painted on it. When employed on walls a coarser kind is first laid on, followed by a coating made of choicer specimens of gypsum, or glue, or isinglass. Fine stucco is the third or last coat of 3-coat plaster, and consists of fine lime and quartz ore sand, which is "twice hand floated" and well trowelled. When the outer coat is dry, it is polished with pumice, tripoli and linen. The color is incorporated with the outer coatings by mixing metallic pigments with it, and applying it to the wall, after which a very thin coating of gypsum and isinglass, or oil is given, and when the whole is partially dry the tint is brought out by polishing. Generally the finest effect is obtained by oil.

WALL FINISH. — 1. (*Sorel's.*) For coating walls of rooms. A coat of oxide of zinc, mixed with size, made up like a wash, is first laid on, and over that a coat of chloride of zinc, prepared as the first wash. The oxide and chloride effect a combination, and form a cement as smooth as glass, and said to be superior to plaster Paris. —2. Slack 1 pk. lime, and while hot and thick like cream, add 1 pt. linseed oil, and ½ lb. dissolved glue. Let it stand ½ day before using. This, for interior walls, is superior to simple lime and water.

WATERPROOF, or HYDRAULIC. — 1. Good gray clay, 4 parts; black oxide of manganese, 6 parts; limestone, reduced to powder by sprinkling it with water, 90 parts; mix, calcine, and powder. — 2. Mix white iron ore, 15 parts, with lime, 85 parts; calcine and powder. Both this and the preceding must be mixed up with a little sand for use. A piece thrown into water rapidly hardens. — 3. Fine clean sand, 1 cwt.; quicklime, in powder, 28 lbs.; bone ashes, 14 lbs. The above are beat up with water for use. — 4. (*Bruyere's.*) Clay, 3 parts; slaked lime, 1 part; mix, and expose to a red heat for 3 hours, then grind to powder. — 5. (*Vicat's.*) Stir into water a mixture 4 parts chalk and 1 part clay; mix with a vertical wheel in a circular trough, letting it run out into a large receiver. A deposit takes place, which is formed into small bricks, which, after being dried in the sun, are moderately calcined; it enlarges about ⅔ when mixed with water.—6. (*Gad's.*) Clay, well dried and powdered, 3 parts; oxide iron, 1 part; mix, and make into a stiff paste with boiled oil. — 7. Slake lime with water, containing about 2 per cent. gypsum, and add a little sand. Gypsum tends to delay the slaking of the lime, and to harden the substance formed after slaking. — 8. Used in constructing edifices constantly exposed to the action of water. When a little manganese is added to the mortar, it acquires the invaluable property of becoming hard under water. Limestone is often combined with manganese, when it becomes brown by calcination. — 9. Used for uniting large stones in cisterns. Equal parts red and white lead, with drying oil, spread on tow or canvas. — 10. Used for making the hard joints of wooden cisterns and casks air and water-tight. Melted glue, 2 parts; linseed oil, 4 parts; boiled into a varnish with litharge; hardens in 48 hours.

MECHANICAL.

ACID PROOF.—1. This cement resists boiling sulphuric acid. Take caoutchouc; melt by gentle heat; add from 6 to 8 per cent. of the weight of tallow; keep the mass stirred; add dry slaked lime, to make the fluid mass the consistency of soft paste; then add 20 per cent. red lead, whereby the mass becomes hard and dry.—2. Used for cementing troughs for holding acids. Resin, 6 lbs.; dried red ochre, 1 lb.; calcined plaster Paris, ½ lb.; linseed oil, ½ lb.; incorporate by stirring together when melted. — 3. For smaller purposes, an alcoholic solution of shellac, or a solution of bitumen in benzol, answers well. To render this latter less brittle, add a few drops solution of india-rubber.—4. (See *Fireproof*, 4, in BUILDING.)

ALABASTER.—Used to join or mend pieces in alabaster, white marble, Derbyshire spar, porphyry, and other like substances, and to fill up cracks, supply chips out of corners, etc. Apply hot, the surfaces having been previously warmed. 1. Yellow resin, 2 parts; melt, and stir in plaster Paris, 1 part. — 2. Yellow resin, beeswax and plaster Paris, equal parts. — 3. Resin, 8 parts; wax, 1 part; melt, and stir in plaster Paris, 4 parts. — 4. Sulphur or shellac, melted with sufficient plaster Paris, or coloring matter to give the desired shade.

AMBER. — Used as a cement for glass and earthenware. Fragments of amber are cautiously heated in an iron pot; as soon as it becomes semi-liquid, an equal weight of hot pale boiled linseed oil is gradually stirred in and the whole thoroughly blended.

AQUARIUM.—Used for the marine as well as the fresh water aquaria, as it resists the action of salt water. 1. 1 gill litharge; 1 gill plaster Paris; 1 gill dry white sand; ½ gill finely powdered resin. Sift, and keep corked tight until required for use, when it is made into a putty by mixing in boiled linseed oil, with a little patent drier added. Never use it after it has been mixed with the oil over 15 hours. The tank can be used immediately, but it is better to give it 3 or 4 hours to dry.—2. Mix equal quantities white and red lead, to a paste, with mastic varnish, and use soon as mixed. — 3. Resin, 1 lb.; tar, 4 oz.; linseed oil, about 2 oz.; melt together over a gentle fire, and pour into the angles of the aquarium in a liquid state, but not when boiling, as this would crack the glass. The cement becomes firm in a few minutes. If too liquid after cooling under water, add more tar to the cement and heat again; if not sufficiently fluid, add

more oil. The cement will not affect the water, and will set the glass water tight. (See *Waterproof* or *Hydraulic.*)

ARCHITECTURAL.—Used for making entire models, busts, ornaments, etc. It is light, and takes a good polish, but is affected by moisture. 1. Reduce paper to a pulp by boiling in water, and work it over. Squeeze this paste dry, and add an equal bulk of whiting; mix the whole into a paste of the required consistency with good size or a solution of glue. — 2. Same as the above, but with plaster Paris instead of whiting. —3 (See *Japanese.*)

ARMENIAN, or DIAMOND. — Used to unite bits of glass, polished steel, and for cementing precious stones on jewelry. 1. Dissolve 5 or 6 bits gum mastic, each the size of a large pea, in as much rectified spirits of wine as will render it liquid; and in another vessel dissolve as much isinglass, previously softened in water (though none of the water must be used), in French brandy or good rum, as will make a 2 oz. vial of strong glue, adding 2 small bits gum galbanum or ammoniacum, which must be rubbed till dissolved; mix the whole with sufficient heat, and keep in a vial closely stopped; when used, set the vial in boiling water. — 2. Isinglass, 6 oz.; gums mastic and olibanum, each, 2 oz.; pure water, 9 oz.; rectified spirits wine, 12 oz.; dissolve the isinglass in the water; then stir in the mastic, previously dissolved in the spirits wine; and, lastly, stir in the olibanum in the state of an impalpable powder. — 3. Isinglass, 1 oz.; distilled vinegar, 5½ oz.; spirits wine, 2 oz.; gum ammoniacum, ½ oz.; gum mastic, ½ oz.; mix well.

BADIGEON.—Used for filling up holes and defects in mechanical work. The most common is putty, colored to suit. Statuaries use a mixture of plaster and freestone; carpenters, a mixture of saw dust and glue; coopers, a mixture of tallow and chalk. The same name is given to a stone colored mixture used for fronts of houses of which the published composition is wood-dust and lime, slaked together, stone-powder, and a little umber or sienna mixed with alum water to the consistency of cement. The composition is probably some good hydraulic cement, colored to suit.

BUCKLAND'S.—Used for all the purposes of mucilage, and as a cement for labels. It does not become brittle and crack. White sugar, 1 oz.; starch, 8 oz.; gum Arabic, 4 oz.; all be separately reduced to fine powder, and rubbed together in a dry mortar; then, little by little, add cold water until of the thickness of melted glue; put in a wide-mouthed bottle and cork close. The dry powder itself, ground and mixed, may be kept for any length of time in a wide-mouthed bottle, and when wanted a little may be mixed with water.

CAP.—Used for chemical and electrical purposes; cementing glass tubes, necks of balloons, etc. 1. Resin, 5 lbs.; beeswax and dried Venetian red, of each, 1 lb., melted together. — 2. Equal weights of red lead and white lead.

CASE-HARDENING.—Used as cement mixture for the manufacture of steel, to convert iron into steel and to utilize the waste bone in the process of the manufacture of cosmoline. A combination of bone carbon and hydrocarbon oils. The bone carbon is impregnated with hydrocarbon oil. The wrought iron is case-hardened by immersion in the bone carbon heated to redness. The surface of the iron is of extreme hardness, and the metal is not blistered.

CHEESE, or CURD.—Used to unite glass, earthenware, etc. It is made into a paste with a little water, and applied immediately. 1. Curdle skim-milk with rennet or vinegar; press out the whey; dry the curd by a gentle heat, as quickly as possible; when quite dry, grind in a pepper or coffee mill, and triturate in a mortar until reduced to fine powder. Mix 10 parts by weight of this powder with 1 part quicklime, in powder; to every oz. of the mixture, add 5 or 6 gr. camphor; triturate the whole together, and keep in vials well corked. — 2. Add ½ pt. vinegar to ½ pt. skimmed milk; mix the curd with the whites of 5 eggs well beaten, and sufficient powdered quicklime to form a paste. It resists water and a moderate degree of heat.

CHEMICAL GLASSES. — Used for mending glasses. 1. Mix equal parts wheat flour, powdered Venice glass, pulverized chalk, and a small quantity of brick dust, finely ground. These ingredients, with a little scraped lint, are to be mixed and ground with the whites of eggs; it must then be spread upon fine linen cloth, applied to the crack, and allowed to get thoroughly dry before the glasses are put to the fire. — 2. Used for sticking things temporarily together. Melt yellow beeswax with its weight of turpentine, and color with powdered Venetian red. When cold, it has the hardness of soap, but is easily softened and molded with the fingers. The consistence of the cement may be varied by changing the proportions of turpentine and wax, and if a firm cement is needed, a little resin may be added. — 3. Used for mending stone ornaments. Finely scraped old cheese, 1½ parts; quicklime, in fine powder, 1 part; mix thoroughly; moisten with milk to a paste, and use at once, as it hardens quickly. Instead of milk, a strong aqueous solution of water glass or borax may be used. White lead (in oil) applied on cotton gauze, may be used advantageously. It is nearly colorless, quick setting, can be applied without heat, and will stand outside weather.

CHINA.—Used for mending all kinds of crockery. 1. Take 10 oz. isinglass, and dissolve in a wineglass gin before the fire. It should be warm when applied, and put on with a camel's hair brush; the pieces joined, and then bound with strips of cloth. — 2. Take a very thick solution of gum Arabic and water; stir in flour of plaster Paris until it becomes a thin paste; apply with a brush to the broken edges, and put them together; let them dry; its whiteness renders it valuable. — 3. Take the white of an egg and a little flour, which make into a light paste; clean the parts to be joined from all dust and dirt; spread the paste on each piece and press together; wipe off exuding portions, and let it dry. — 4. A transparent cement. Take 1 lb. pulverized white shellac; 2 oz. clean gum mastic; put these into a bottle, and then add ½ lb. pure sulphuric ether. Let stand ½ hour, and then add ½ gal. 90 per cent. alcohol; shake occasion-

ally till dissolved. Heat the edges to be mended, and apply the cement with a camel's hair brush; hold the article together until the cement cools. — 5. The expressed juice of garlic is a good cement for glass or china; it is better if mixed with a little of the ash of a burnt oyster shell. — 6. Equal quantities of gutta-percha and shellac are melted together and well stirred. This is best done in an iron capsule placed on a sand bath, and heated. It possesses hardness and toughness. The articles to be mended must be warmed, and kept in position until cool. — 7. 4 lbs. white glue; 1½ lbs. dry white lead; ½ lb. isinglass; 1 gal. soft water; 1 qt. alcohol; ½ pt. white varnish. Dissolve the glue and isinglass in the water by gentle heat; stir in the lead; put the alcohol in the varnish; mix the whole together. — 8. A cement that cannot be dissolved or broken from the part that is repaired. 5 parts gelatine to 1 part acid chromate of lime; put on the edges with a camel's hair brush; press the edges together, and expose to the sun. — 9. This cement will make crockery as good as new. Dissolve 1 oz. common salt in 1 qt. water; bring to a boil, and put in 1¼ lbs. gum shellac. When dissolved, pour into cold water, and work like wax; make into small sticks. Warm the articles to be cemented till they melt the sticks brought into contact with them. — 10. Freshly burnt plaster Paris, 5 parts; freshly burnt lime, 1 part; white of egg, as needed. Reduce the 2 first ingredients to a fine powder, and mix well. Moisten the parts to be united with white of egg; then mix the powder rapidly with white of egg, and apply the mixture; the pieces are then pressed together, and left undisturbed for several days. — 11. This is unbreakable. Pure white lead, or zinc white, ground in oil, and used very thick; but it takes a long time to harden.—12. Put a piece of white flint stone into the midst of a fierce fire; when it is of a white heat, take it out with a pair of tongs, and suddenly drop into a pan of cold water, which should be placed ready for the purpose. This will destroy the powers of adhesion in the flint, and precipitate the stone to a fine powder, from which you must carefully pour off all the water; next melt white resin in an iron or earthen pipkin, and stir the flint stone powder into it till it is of the consistence of thick paste. Warm the edges of the glass, stone, china or earthenware, and rub it thereon; then carefully and neatly place them together; when quite cold, with a knife scrape off as much of the cement as remains outside.

CHINESE. — Used to mend china, glass, and fancy ornaments. 1. Dissolve shellac in enough rectified spirits to make a liquid of the consistency of molasses. This will join wood so strongly that it will resist the flexion of a bow. The fluid is thinly smeared over each face to be united, a thin piece of muslin interposed, the whole pressed tightly together, and left to the next day. — 2. Dissolve 6 oz. shellac in 1½ pts. water, containing 2 oz. borax, and evaporate to the consistency of molasses.

COLLODION.—Ordinary collodion is made by dissolving 8 parts gun cotton in 125 parts ether and 8 parts alcohol. When used as a cement or varnish, it becomes hard, cracks and peels off. It may be rendered elastic by the addition of 4 parts Venetian turpentine, and 2 parts castor oil.

COPPERSMITHS'.—Used to secure the edges and rivets of copper boilers, to mend leaks from joints, etc. 1. Bullock's blood, thickened with finely powdered quicklime. It must be used as soon as mixed, as it rapidly gets hard. It is extremely cheap and very durable. — 2. Boiled linseed oil and red lead, mixed together into a putty. The washers of leather or cloth are smeared with this mixture in a pasty state.

CUTLERS'.—1. Used for handling knives and forks. 1 lb. colophony, and 8 oz. sulphur, melted together, and kept in bars or reduced to powder. 1 part of the powder is to be mixed with ½ part iron filings, fine sand or brick dust, and the cavity of the handle filled with this mixture. The stem of the knife or fork is then to be heated and inserted in the cavity, and when cold it will be found fixed to its place with great tenacity. — 2. Shellac, 2 parts; prepared chalk, 1 part; powder and mix. The opening of the blade is filled with the powder, the lower end of the iron heated and pressed in. — 3. Resin, 4 parts; beeswax, 1 part; brick dust, 1 part. Fill the hole in the handle with the cement; heat the tang of the blade, and press in. — 4. Pitch, 4 parts; resin, 4 parts; tallow, 2 parts; brick dust, 2 parts. Melt the first 3 ingredients, and add the brick dust hot and finely powdered. — 5. Chopped hair, flax, hemp, or tow, mixed with powdered resin, and applied as above.

CRUCIBLE.—Used to join the covers to crucibles, or for similar purposes, so as to keep them air tight when hot. Made of glass, of borax (fused borax), brick dust and clay, finely powdered together and mixed with a little water when used. No very great nicety is required in the proportions, but about 1-10 of borax is quite sufficient to bring the earths to that state of semi-vitrification which is desired. Litharge may be used instead of borax, but the latter is by far the best, as it promotes that thin spreading fusion which is most efficient.

DRUGGISTS'.— Used for cementing stoppers. 1. Composed of finely ground litharge and concentrated glycerine, painted around the cork or stopper; quickly dries, and becomes hard, but easily scraped off when necessary to open the bottle. — 2. Used to close vessels containing the vapor of acids, or highly corrosive substances. Beat and sift finely dry pipe clay; add painter's drying oil, and mix in a mortar to a molding consistency. Use this lute in cylinders, flattened and applied to the joinings. The points to which it is applied must be clean and dry. — 3. For corks and apparatus use. Zinc white rubbed with copal varnish to fill up the indentures; when dry, cover with the same mass thinner, and lastly with copal varnish. — 4. Used as a temporary stopping or lute for the ends or joints of tubes, which are not exposed to much heat. Yellow wax, 4 parts; turpentine, 2 parts; Venetian red, well dried, 1 part; melt together.

EARTHENWARE.—1. A good cement is made by dissolving gum shellac in alcohol; apply the solution, bind the parts together, and let it dry.—

2. White of egg, thickened with powdered quicklime.—3. Fire-proof. Used for metallic or earthen vessels, which should be dried with heat in the open air. Coagulate 2 lbs. fresh milk by means of a little vinegar; remove the whey, and beat this with whites of 4 or 5 eggs, or with fresh bullock's blood; mix with powdered slaked lime. — 4. 2 parts litharge; 1 part, each, unslaked lime and flint glass; pulverize separately and mix. To use it, wet up with old drying oil. — 5. (*Botany Bay.*) Used to cement coarse earthenware. Yellow gum and brick dust, equal parts, melted together. The liquid is spread thin over the parts, a thin gauze interposed, the whole pressed together, and confined so until the next day.

EGG.—(See *China.*)

ELECTRICAL MACHINE. — 1. Black resin, 7 lbs.; red ochre, 1 lb.; plaster Paris, ½ lb.; both dried and warm; melt together until frothing ceases, and the liquid runs smooth; withdraw from the fire, and stir until cooled sufficiently. — 2. Melt together 5 lbs. resin and 1 lb. beeswax; stir in 1 lb. red ochre, dried and warm, and 4 oz. plaster Paris, continuing the heat a little above 212°, and stir till frothing ceases. — 3. (See *Acid Proof*, 2.)

ELASTIC.—Used for cementing leather, cloth, etc. 1. Caoutchouc, in small pieces, 1 part; chloroform, 3 parts; dissolve. — 2. Caoutchouc, 5 parts; chloroform, 3 parts; dissolve, and add powdered gum mastic, 1 part. Elastic and transparent. — 3. Gutta-percha, 3 parts; caoutchouc, 1 part; both cut small; bisulphide of carbon, 8 parts; mix in a close vessel, and dissolve by the heat of a water bath. Gently warm before applied. — 4. Gutta-percha, 1 lb.; caoutchouc, 4 oz.; pitch, 2 oz.; shellac, 1 oz.; linseed oil, 2 oz.; melt together. Melt before being applied. — 5. Used for cementing leather and india-rubber. Bisulphide of carbon, 4 oz.; fine india-rubber, in shreds, 1 oz.; isinglass, 2 dr.; gutta-percha, ½ oz.; dissolve. The parts must be coated thinly, and allowed a few minutes to dry; then heat to melting; place the parts together, and hammer the air bubbles out.

EMERY, To Wood. — Melt together equal parts shellac, white resin, and carbolic acid in crystals; add the last after the others are melted. The effect of the carbolic acid is surprising.

ENGINEERS'. — Used by engineers to make metallic joints; also, for joining broken stones. A washer of hemp, yarn or canvas, smeared with cement, is placed in the joint, which is then screwed up tight. It dries hard as stone. 1. Ground white lead, mixed with as much red lead as will make it the consistence of putty. — 2. Equal weights red and white leads, mixed with boiled linseed oil to a proper consistence.

ENTOMOLOGISTS'.— Used by entomologists in rejoining the dislocated parts of insects. To a solution gum ammoniac in proof spirit, add best isinglass, and unite with gentle heat. The value of this consists in the readiness with which it melts, and the little tendency it has to be affected by moisture.

FIRE-PROOF.—1. To 4 or 5 parts clay, dried and pulverized, add 2 parts fine iron filings free from oxide, 1 part peroxide manganese, 1 part common salt, and ½ part borax. Mix thoroughly; render as fine as possible; then reduce to a thick paste with the necessary quantity of water, mixing well; use immediately, and apply heat, gradually increasing almost to a white heat. — 3. Pulverized litharge, 5 lbs.; fine Paris white, 2 lbs.; yellow ochre, 4 oz.; hemp, cut into shreds, ½ oz. Mix to the density of thick putty with boiled linseed oil, and it is ready for use. — 4. Used for making joints, fitting tups, connecting pipes, and filling cracks in retorts. Is said to be of great service in the manufacture of nitric and sulphuric acids, and other products, because it can be easily made and applied, hardening rapidly, and preventing the escape of acid vapors. It consists of asbestos powder made into a thick paste with the liquid silicate of soda.

FRENCH. — Used by naturalists in mounting specimens; by artificial-flower makers, and by confectioners to stick ornaments, wafers, etc., on cakes. Mix thick mucilage of gum Arabic with powdered starch; a little lemon juice is sometimes added.

GASFITTERS'.—Mix together, resin, 4½ parts; wax, 1 part; Venetian red, 3 parts.

GAS RETORT. — Finely powdered barytes and a soluble water glass; or the barytes and a solution of borax. The joints are to be coated several times with this cement, by means of a brush. The addition of ⅔ part clay improves the cement, and the retorts will then stand a red heat very well. Instead of the water glass, a solution of borax may be used, or even finely powdered white glass.

GLASS.—1. Pulverized glass, 10 parts; powdered fluor spar, 20 parts; soluble silicate of soda, 60 parts. Both glass and fluor spar must be in the finest possible condition, which is best done by shaking each in fine powder with water, allowing the coarse particles to deposit, and then pour off the remainder, which holds the fine particles in suspension. The mixture must be made by quick stirring, and when thoroughly mixed, must be at once applied. — 2. Dissolve 1 part india-rubber in chloroform, and add 16 parts by measure of gum mastic in powder; digest for 2 days, shaking the bottle frequently; apply with a fine camel's hair brush. — 3. Used for mending broken china. Red lead, 3 parts; fine white sand, 2 parts; crystallized boracic acid, 3 parts; mixed and fused; it is levigated and applied with thin mucilage of tragacanth. The repaired article must be gently heated, so as partially to fuse the cement. — 4. Take a thick mucilage of gum Arabic, and stir into it plaster Paris (the broken images are best) made very fine, to form a paste, and apply to the edges with a brush; press firmly together, and confine there 2 or 3 days. — 5. Used for repairing valuable objects in glass. A strong solution of gelatine, to which has been added for every 5 parts gelatine, 1 of a solution acid chromate of lime. The mixture becomes insoluble in water under the action of light, in consequence of the partial reduction of the chromic acid. With a fresh preparation of the solution, cover the surfaces to be united as evenly as possible; press them together, and tie them. Expose the glass to the sun for a few hours. Boiling water has no effect

on the oxidized cement, and the fracture can scarcely be recognized. — 6. Used to stop cracks in glass vessels to resist moisture and heat. Dissolve cascine in cold saturated solution borax; with this solution paste strips hog's or bullock's bladder (softened in water) on the cracks of glass; dry at gentle heat; if the vessel is to be heated, coat the bladder on the outside, before quite dry, with a paste of a concentrated solution of silicate of soda and quicklime, or plaster Paris.

GLYCERINE.—Used to mend coarse earthenware, stop leaks in tin, tighten joints of wood and iron, etc. Mix together litharge and glycerine to the consistency of fresh putty. The articles should not be used until the cement is hardened, requiring from 1 day to a week. This resists the action of water, hot or cold, and acids.

GRINDERS'.—Used to fix pieces of glass while grinding and for lenses. 1. Pitch, 5 parts; wood ashes and hard tallow, of each 1 part; melt together. — 2. Black resin, 4 lbs.; beeswax, 1 lb.; melt, and add of whiting (previously heated red hot and still warm), 1 lb. — 3. Shellac, melted and applied to the pieces slightly heated.

GUTTA-PERCHA.—Used for cementing metal, glass, porcelain, ivory, etc., and as putty in glazing. Melt together, in an iron pan, 2 parts common pitch and 1 part gutta-percha; stir well together until incorporated; then pour into cold water. When cold it is black, solid, and elastic; but it softens with heat, and may be used as a soft paste, or in the liquid state. It does not crack.

HENSLER'S.—Used for china, glass, etc. Litharge, 3 parts; quicklime, 2 parts; white bole, 1 part (all in fine powder); linseed-oil varnish, q. s. to make a paste. It is very tenacious, but long in drying.

INDIANITE.—Used for uniting pieces of india-rubber. 1. 100 parts finely chopped rubber, 15 parts resin, 10 parts shellac, dissolved in sufficient bisulphide carbon. — 2. India-rubber, 15 grs.; chloroform, 2 oz.; mastic, ½ oz. The 2 first-named to be mixed, and, after the rubber is dissolved, add the mastic in powder; macerate for a week.

IRON.—1. Used for cast-iron ware. 5 parts fire clay and 1 part fine iron filings, mixed into a paste with linseed oil. When hard, it resists heat, but does not close cracks in a stove unless these are held by means of a plate and rivets, as the expansion caused by red heat causes the cement to crack. — 2. Clean borings or turnings of cast iron, 16 parts; sal ammoniac, 2 parts; flour of sulphur, 1 part; mix together in a mortar, and keep dry. When required for use, take of the mixture 1 part; clean borings, 20 parts; mix thoroughly, and add sufficient water. A little grindstone dust added, improves the cement. — 3. Common salt and sifted wood ashes, equal parts; make into a paste with water; this may be applied hot or cold. — 4. Used for repairing damaged places in cast-iron tanks, cisterns, etc. 5 parts brimstone; 2 parts black lead; and 2 parts cast-iron filings (previously sifted), are melted together, taking care that the brimstone does not catch fire. The damaged place is well heated by placing a piece of red hot iron upon it, and it is then stopped with the cement, previously heated in a ladle. — 5. Used for luting. Take 16 parts steel filings; 3 parts sal ammoniac, and 2 parts flowers of sulphur. This mixture can be preserved any length of time in dry packages. In order to lute with it, add to 1 part of the mixture 12 parts iron filings, and enough water, previously acidulated with sulphuric acid, to form a paste. This is now ready to be applied to the surfaces of the metal. For fine castings and small holes, the pulverized iron can be substituted for iron filings. — 6. Used for iron joints. 4 parts fine borings or filings of iron; 2 parts potter's clay; 1 part pounded potsherds; make into a paste with salt and water. When this cement is allowed to concrete, it becomes very hard. — 7. (See *Fire-proof.*)

IVORY.—Dissolve 1 part of isinglass and 2 of white glue in 30 of water; strain and evaporate to 6 parts; add 1-30 part of gum mastic, dissolved in ½ part alcohol and 1 part white zinc. When required for use, warm and shake it. Used also for mother of pearl.

JAPANESE.—This elegant cement is made by mixing rice flour intimately with cold water, and then gently boiling it. It is white and transparent. Papers pasted by this cement will not separate at the joining, which makes it useful in the preparation of curious paper articles, as tea-trays, ladies' dressing boxes, etc., which require layers of papers to be cemented. It is preferable to common paste. It answers well for pasting into books the copies of writings taken by copying machines on unsized silver paper. With this composition, made with a small quantity of water, that it may have a consistency similar to plastic clay, models, busts, statues, bas-reliefs, etc., may be formed. When dry, the articles made of it are susceptible of a high polish, and are durable.

JET.—Shellac is the only cement used by jewellers for jet articles. The edges should be warm before applying the cement. Should the joint be in sight, by smoking the shellac before applying, it will be rendered the same color as the jet.

JEWELLERS'.—1. Dissolve 5 or 6 pieces gum mastic, the size of a large pea, in just as much methylated spirit as will render it liquid. Soften isinglass, by steeping in water; having dried it, dissolve as much in good brandy as will make a 2 oz. vial of strong glue, to which add 2 small bits of gum ammoniacum, rubbing until dissolved. Mix the two solutions; keep in a close vial; and when used, set the vial in boiling water. — 2. Put in a bottle 2 oz. isinglass and 1 oz. best gum Arabic; cover with proof spirits; cork loosely, and place the bottle in a vessel of water, and boil it till a thorough solution is effected; then strain it for use.

LAMP. — The cement, commonly used for fastening the tops on kerosene lamps, is plaster Paris, mixed with alum water to the consistency of paste; this is porous and quickly penetrated by the kerosene. A cement which has not this defect is made with 3 parts resin, 1 part caustic soda, and 5 parts water. This is mixed with ½ its weight plaster Paris. It sets firmly in about ¾ hour, and is said to have great adhesive pow-

er, not to be permeable to kerosene, a low conductor of heat, and but superficially attacked by water. Zinc white, white lead, or precipitated chalk, may be used instead of the plaster, but when they are used the cement will be longer in hardening.

LEATHER. — 1. Common glue and isinglass, equal parts; soak 10 hours in enough water to cover. Bring gradually to boiling heat, and add pure tannin until the whole appears like white of an egg. Buff the surfaces to be joined. Apply this cement warm, and clamp firmly. — 2. Used by shoemakers for invisible patching. To 10 parts bisulphide carbon and 1 part spirits turpentine, add enough gutta-percha to make a tough, thickly flowing liquid. The surfaces to be joined must be freed from grease, by laying a cloth upon them, and applying a hot iron for a time. The coat is applied to both surfaces, and pressure made till the joints are dry. — 3. Used for earthenware, china, glass, or leather; for harness, belts for machinery, and cloth belts for cracker machines for bakers. Ale, 1 pt.; best Russia isinglass, 2 oz.; put into a glue kettle, and boil until the isinglass is dissolved; then add 4 oz. best common glue and dissolve it with the other; slowly add $1\frac{1}{2}$ oz. boiled linseed oil, stirring while adding, till mixed. When cold, it appears like india-rubber. To use, dissolve what you need in a suitable quantity of ale to the consistence of thick glue. If for leather, shave off as if for sewing, apply with a brush while hot, laying a weight to keep the joint firmly pressed for 6 to 10 hours, or over night. — 4. A mixture of india-rubber and shellac varnish; or a strong solution of common isinglass, with a little diluted alcohol added to it, makes a very adhesive cement. — 5. Gutta-percha, 1 lb.; india-rubber, 4 oz.; pitch, 2 oz.; shellac, 1 oz.; oil, 2 oz.; melt, and use hot. — 6. Used for invisible patching on shoes. Put 2 oz. sulphuret carbon and $\frac{1}{2}$ oz. gutta-percha into a wide-mouthed bottle. Shake occasionally till the latter is dissolved. Dust the shoes with finely powdered rosin; shave the edges of the patch thin and roughen them; apply the cement, and press with a warm iron.

LEATHER, To Gutta-Percha.—Used for uniting sheet gutta-percha to leather, such as soles of shoes, etc. Gutta-percha, 50 lbs.; Venice turpentine, 40 lbs.; shellac, 4 lbs.; caoutchouc, 1 lb.; liquid storax, 5 lbs. The Venice turpentine should be first heated; then the gutta-percha and shellac added; the order in which the other materials is added is not important; incorporate thoroughly and do not burn the mixture.

LEATHER, To Metal.—1. Steep the leather in an infusion of hot nut-galls; wash the metal with hot gelatine, and press the leather firmly on the surface. — 2. Take 56 lbs. good common glue; melt, and add $3\frac{1}{2}$ lbs. gum ammoniac; stir well, till reduced to an even mass; remove from the fire, and pour in gradually $3\frac{1}{2}$ lbs. nitric acid, and incorporate with the rest. This has been proved to be the best among metal binders, because not susceptible to the action of oil. Gelatine dissolved in acetic acid, forms a cement that will fasten leather to metal, and that will not be affected by bisulphide of carbon.

LUTES. — Used to make tight joints without really effecting a tenacious union between the parts. — 1. Linseed meal, either alone or mixed with an equal weight of whiting, and made into a stiff paste with water. It soon becomes hard and tough. — 2. Ground almond cake, from which the oil has been pressed, mixed as the preceding. It is capable of resisting the action of the fumes of volatile oils, spirits, weak acids, etc., for some time. This, and the preceding, are much used for stills, retorts, and other vessels, that are not exposed to a heat higher than 320° F. — 3. Used as a coating for glass vessels, to preserve them from injury from exposure to the fire. Pipe clay and horse dung, made into paste with water. This composition is used by the pipe makers, and will stand unharmed the extremest heat of the kiln for 24 hours. Applied by spreading on paper. — 4. Dissolve 1 part india-rubber in 2 parts linseed oil, by heat, and work into a stiff paste with 3 parts, or as much as is sufficient, of stiff clay. — 5. Powdered clay or whiting, made into putty with water and boiled linseed oil. Commonly known as "fat lute." — 6. Used for joining crucibles which are to be exposed to a strong heat. A mixture of powdered clay and ground bricks, made up with water, or a solution of borax.

MAHOGANY.—1. Used to fill cracks and holes in furniture. Melt 4 oz. beeswax, and add 1 oz. red lead, and enough yellow ochre to produce tint required. — 2. Shellac, melted and colored as above. Red putty is also used.

MAISSIAT'S.—Used as a waterproof and air-tight covering for corks, bungs, etc. India-rubber, melted with about 15 per cent. of either beeswax or tallow; quicklime, in powder, is gradually added; and the heat continued until change of odor shows that combination has taken place, and until a proper consistence is obtained.

MARBLE. — 1. (*Keene's*). Admirable for internal decorations, and from its extreme hardness is durable. Baked gypsum, or plaster Paris, steeped in a saturated solution of alum, and then recalcined, and reduced to powder. For use it is mixed up with water, as plaster Paris. It may be colored or tinted of any shade, by diffusing mineral colors (levigated, if in powder) through the water which is used to mix the cement. A pleasing tint is given to this cement by adding a little solution of green copperas to the alum liquor. — 2. Water, 1 gal.; glue, 3 lbs.; white lead, 4 oz.; alcohol, 1 qt.; mix. If cold weather, warm the bottle until the cement is dissolved; then rub on the broken parts; put together, and retain in place until dry. — 3. Gum Arabic, 1 lb.; make into thick mucilage; add to it powdered plaster Paris, $1\frac{1}{2}$ lbs.; sifted quicklime, 5 oz.; mix; heat the marble and apply the mixture. — 4. Melt together 8 parts resin, and 1 part wax; when melted, stir in 4 or 5 parts plaster Paris. The pieces to be joined should be made hot. — 5. Procure a small piece quicklime fresh from a newly burnt kiln; slake with white of an egg; wash the fractured parts clean, and apply. — 6. Used for mending marble or stone. Mix 20 parts litharge and 1 part freshly burned lime in dry powder. This is made into a putty

with linseed oil. It sets in a few hours, and appears like light stone.

METAL, To Fibrous Material.—An amalgam composed of good glue dissolved in hot vinegar, with $\frac{1}{3}$ its volume of white pine pitch, also hot. This composition, it is said, will give a sure and certain result with any metal. — 2. Used for brass and wood. Best gelatine, 1 part; glacial acetic acid, 1 part; soak the gelatine in cold water, until it has swollen up and become soft; throw away the water, and dissolve the gelatine in the acetic acid, applying gentle heat if necessary. — 3. Melt rosin, and stir in calcined plaster until reduced to a paste, to which add boiled oil until of the consistency of honey; apply warm. — 4. Melt rosin, 180 parts; stir in burnt umber, 30 parts; calcined plaster, 15 parts; and boiled oil, 8 parts. — 5. Mix thoroughly together 4 parts carpenter's glue and 1 part Venice turpentine.

METAL, To Glass.—1. Take 1 lb. shellac, dissolved in 1 pt. strong methylated spirit, to which is to be added .05 part of solution of india-rubber in carbon bisulphide. — 2. A mixture of 2 parts finely ground litharge and 1 part white lead; work to a paste with 3 parts boiled oil and 1 part copal varnish; add more litharge and white lead as required. — 3. 4 oz. thick solution glue; 2 oz. linseed oil varnish; 1 oz. turpentine; mix, and boil together in a close vessel. The metal and glass to be joined should be clamped for 48 hours, after being cemented. — 4. Copal varnish, 15 parts; drying oil, 5 parts; turpentine, 3 parts; melt in a water bath, and add 10 parts slaked lime.

METALLIC.—An alloy of copper, prepared as follows, is capable of attaching itself firmly to the surfaces of metal, glass and porcelain. From 20 to 30 parts finely divided copper (obtained by the reduction of oxide of copper with hydrogen, or by precipitation from solution of its sulphate with zinc) are made into a paste with oil vitriol; 70 parts mercury are then added, and the whole well triturated; when the amalgamation is complete, the acid is removed by washing with boiling water, and the compound is allowed to cool. In 10 or 12 hours it becomes sufficiently hard to receive a polish, and scratch tin or gold.

MICA.—Used for joining sheets of mica. Clear gelatine, softened by soaking it in a little cold water, and the excess of water pressed out by gently squeezing it in a cloth; then heated over a water bath until it begins to melt, and just enough hot proof spirit stirred in to make it fluid. To each pt. of this solution gradually add, while stirring, $\frac{1}{2}$ oz. sal ammoniac and $1\frac{1}{2}$ oz. gum mastic, previously dissolved in 4 oz. rectified spirit. It must be warmed to liquefy it for use, and kept in stoppered bottles when not required. This cement, when properly prepared, resists cold water and is colorless.

MICROSCOPIC.—Used for mounting opaque objects for the microscope. Put into a bottle 2 parts isinglass and 1 part gum Arabic; cover with proof spirit; cork the bottle loosely; place in water, and boil it till a solution is effected; strain for use.

MILK. — 1. Snugly tie together the different parts to be united, and lay in the pail while milking. After thoroughly drying, the pieces will be firmly united, and will remain together a long time if not soaked. — 2. Take fresh, warm milk, and turn it into a basin over the fire; into this lay the article to be mended, firmly tied together. Heat until scalding hot; then remove, and dry.

MILLSTONE.—1. Emery of the proper grain mixed with melted borax in slight excess. — 2. For a French burr millstone, a good cement can be made of alum and powdered burrstone; plaster Paris is generally used to cover the stone after making the joints with the cement.

OIL STONE.—Dissolve isinglass in the smallest quantity of proof spirit by the aid of gentle heat (over a water bath). In 2 oz. of this dissolve 10 gr. gum ammoniacum; triturate to effect solution; then add $\frac{1}{2}$ dr. gum mastic dissolved in 3 dr. rectified spirit. Stir well and keep stoppered. Liquefy by gentle heat when required for use. Clean the stone with hot lye, rinse thoroughly, and dry before cementing.

OPTICIAN'S.—1. Shellac softened with rectified spirit or wood naphtha. For fine work. — 2. Beeswax, 1 oz.; resin, 15 oz.; melt and add whiting (previously made red hot and still warm), 4 oz. — 3. Resin, 1 lb.; melt, and add plaster Paris, dry, 4 oz. — 4. Pitch, 5 parts; wood ashes, 1 part; tallow, 1 part, less or more, according to the temperature of the season. — 5. A useful cement for many purposes. It is employed by opticians for uniting the lenses of achromatic objectives. For this purpose it must be pure and colorless. It is bleached by exposure to sunlight. If too thick, it may be thinned by benzole. In cementing the 2 parts of an achromatic lens together, the surfaces should be well cleaned, and the glasses, previously warmed, laid on some surface that will not scratch them. By means of a rod of glass or metal, place a drop of balsam on the centre of one lens, and gently lower the other down upon it. Now apply a slight pressure, and the dark disc in the centre, indicative of optical contact, will rapidly increase in size, until the balsam reaches the margin and begins to ooze out. By means of a piece of soft string, if the lenses are large, or a spring clip, if they are small, the lenses should be held firmly together, and exposed to a gentle heat in an oven that is cooling, or before a fire, until the balsam at the edges has become hard and dry. The string or clip may then be removed, and all traces of balsam, first by scraping, and afterwards with a little benzole or ether. The above directions, modified to suit circumstances, apply to the cementing of glasses for transparencies or opal pictures; also to the varnishing of magic lantern slides, and the protection of any transparent surfaces from the air.

PARIS, or SEA SHELL.—Used for mending shells and other specimens of natural history. 1. It is composed of gum Arabic, 5 parts; sugar candy, 2 parts; and white lead enough to color. — 2. A bit of isinglass boiled in spirits of wine.

PEASLEY.—Prepare a solution of 200 parts white glue in water; another, of 50 parts isinglass, 3 parts gum Arabic, and 3 parts tragacanth; and

finally, another of 1 part shellac in alcohol. Then pour these 3 solutions together; mix them with 24 parts white lead, and add 12 parts best glycerine, and 200 parts alcohol. The mastic obtained should be immediately put up in bottles, and well corked.

PLUMBERS'.—Used to fix the pieces of metal while cutting, and also to secure seals and tools in their handles. Black resin melted with about an equal weight of brick dust. Sometimes a little pitch or tallow is added. It grows harder and improves every time it is melted.

PORCELAIN.—1. 2 parts isinglass are soaked in water until swollen; the water is then poured off, and the isinglass is dissolved in alcohol by heat. 1 part mastic is then dissolved in 3 parts alcohol, and added to the above solution; then 1 part gum ammoniacum. The solution is well shaken, and evaporated to the consistency of strong glue, when it solidifies on cooling. For use, the cement and the articles themselves must be warmed. — 2. Used to unite glass, metal, porcelain, etc., quite firmly. Add plaster Paris to a strong solution alum, till of the consistency of cream. It is probably suited for large rather than small surfaces.

RUBBER.—1. Pieces of india-rubber may be united by means of the pasty mass obtained by acting upon pure rubber by its appropriate solvents. These are sulphuric ether, coal-tar, naphtha, bisulphide of carbon, caoutchoucin, and oil of turpentine. As it is difficult to dissolve rubber on the small scale, and, as the cement may be bought ready made, it is hardly worth while to enlarge upon its preparation. Those who wish to try it, will probably succeed best by cutting pure rubber (not that which has been vulcanized) into thin slices, boiling it in water so as to soften and expand it, and then digesting it in hot coal tar, naphtha, or oil of turpentine. Several days are required to effect the solution. When used for uniting rubber, the surfaces to be joined must be fresh; the surfaces should be either pared with a knife or rasped with a file. They may then be coated with the cement, pressed firmly together, and exposed to a gentle heat for a few days. — 2. For mending india-rubber shoes, boots, and apparatus, when the regular rubber cement cannot be obtained, the following directions are given: Cut 2 lbs. caoutchouc into thin, small slices; put them in a vessel of tinned sheet iron, and pour over 12 to 14 lbs. sulphide carbon. For the promotion of solution, place the vessel in another containing water, previously heated to about 86° Fahr. The solution will take place, but the fluid will thicken soon, and thus render the application difficult. To prevent this thickening, a solution of caoutchouc and resin in spirits of turpentine must be added to the solution of caoutchouc in sulphide of carbon, and in such quantity that the mixture obtains the consistency of a thin paste. The solution of caoutchouc and resin in spirit of turpentine should be prepared as follows: Cut 1 lb. caoutchouc into thin, small slices; heat over a moderate coal fire until the caoutchouc becomes fluid; then add ½ lb. powdered resin, and melt both materials at a moderate heat; when these materials are fluid, gradually add 3 or 4 lbs. spirit turpentine in small portions, and stir well; by the addition of the last solution rapid hardening will be prevented, and a mixture obtained which fully answers the purpose of gluing rubber surfaces, etc. — 3. Used for uniting leather or rubber that has not been vulcanized. 16 parts gutta-percha; 4 parts india-rubber; 2 parts common caulker's pitch; 1 part linseed oil; melt together, and use hot.

RUBBER, To Wood, Metal or Glass.—Used to fasten gum covering on iron rollers. Melt together over a gentle fire equal parts black pitch and gutta-percha. If this is required to set very hard, 1 part powdered shellac may be added. The addition of 1-10 part caoutchoue clippings makes it more adhesive, but prevents, in a measure, its final hardening. This cement should be used hot.

SAFETY ENVELOPE. — To be used in 2 portions, neither being of any value till moistened and joined to the other. One portion is composed of a preparation of chromium, and is made by dissolving crystallized chromic acid in water, in the proportion of 2.5 grams of acid to 15 grams of water; 15 grams of ammonia are added to this, and then about 10 drops sulphuric acid are added, with finally 30 grains sulphate of ammonia and 4 grams white paper. The 2d preparation is made by dissolving isinglass in dilute acetic acid (1 part acid to 7 parts water). This cement is designed chiefly for envelopes, and in using it the chromium preparation is applied to the back of the envelope, and the isinglass to the flap. On wetting the flap and pressing it down, the two preparations meet and form a firm and insoluble cement, binding the paper against every effort to open it. The materials may be applied in the same manner to other uses.

SAND SLAG.—A good hydraulic cement from blast furnace slag is made by selecting such portions of it as are readily dissolved in dilute hydrochloric acid. On subjecting it to the action of the acid, silica is thrown down, which is afterward to be washed, dried, and pulverized; 1 part of this is to be mixed with 9 parts powdered slag and the necessary quantity slacked lime. This matter soon hardens, and rivals Portland cement in its durability.

SEAL ENGRAVERS'.—Common brick dust and resin melted together in an earthen pipkin; with this the handles of loose knives and forks may also be fastened.

SECTIONS OF CAST-IRON WHEELS.—Used for fastening stone to stone, or iron to iron. Make a paste of pure oxide lead, litharge, and concentrated glycerine.

STEAM BOILER.—Used to stop cracks and leaks in iron boilers, stoves, etc. 1. Dried clay, in powder, 6 lbs.; iron filings, 1 lb. Make into a paste with boiled linseed oil. — 2. Powdered litharge, 2 parts; very fine sand, 2 parts; slaked quicklime, 1 part. Mix all together. To use, mix the proper quantity with boiled linseed oil, and apply quick. It gets hard very soon. — 3. This cement offers great impermeability and strength. It is prepared by an intimate mixture of 6 parts graphite finely ground; 3 parts slaked lime; 8 parts sulphate baryta, and 7 parts linseed oil varnish.

STEAM-PIPE JOINTS.—1. Sal ammoniac, 2 oz.; sublimed sulphur, 1 oz.; fine cast-iron turnings, 1 lb.; mix in a mortar, and keep dry; when to be used, mix with 20 times its quantity of clean iron filings, and triturate the whole in a mortar; then wet with water until of proper consistence. — 2. Used for iron steam pipes. 2 parts litharge; 1 part dry slaked lime, and 1 part fine dry sand. Combine thoroughly, and add sufficient hot linseed oil varnish to form a paste. It sets hard quickly, and must be freshly prepared every time it is required. Apply only when the cement is hot. — 3. Good linseed oil varnish ground with equal weights white lead, oxide of manganese and pipe clay. — 4. White lead, ground in oil, 10 parts; black oxide of manganese, 3 parts; litharge, 1 part. Reduce to the proper consistency with boiled linseed oil, and apply. — 5. Mix finely ground soapstone with a little plumbago and mica in it, into a paste, with an equal weight plaster Paris, and the proper quantity of water, and cast in flat bricks or in semi-cylindrical, well-oiled molds, to fit the pipes, etc.

SULPHUR.—Roll sulphur is frequently used alone as a cement for fastening iron bars in holes drilled in stone. The addition of brick dust, sand or resin, lessens its liability to crack. When the yellow color of brimstone is an objection, a little plumbago may be mixed with it.

TURNERS'.—1. Melt 1 lb. resin in a pan over the fire; when melted add ½ lb. pitch; when these are boiling add brick dust until, by dropping a little on a cold stone, it is hard enough. In winter it may be necessary to add a little tallow. By means of this cement a piece of wood may be fastened to the chuck, which will hold when cool, and when the work is finished it may be removed by a smart stroke with the tool. Any traces of the cement may be removed from the work by means of benzine. — 2. 16 parts whiting are finely powdered and heated to redness; when cold, this is mixed with 16 parts black resin and 1 part beeswax, the latter having been previously melted together, and the whole stirred till of uniform consistence.

UNIVERSAL. — 1. Used for cementing wood, iron, leather, glass, paper, and almost all kinds of household materials. Best isinglass, ½ oz.; rub it between the hands until it breaks into a powder; put in a bottle, and put as much common acetic acid to it as will wet the mass through; stand the bottle in some boiling water, and the paste will dissolve and be fit to use at once; it will be solid when cold, but is easily warmed up the same as before. Leave the cork out when warming, or there is danger of bursting the bottle. — 2. Used for repairing fractured bodies of all kinds. White lead ground upon a slab with linseed oil varnish, and kept from contact with air. It requires a few weeks to harden. — 3. When stone or iron are to be cemented together, a compound of equal parts sulphur with pitch answers very well.

VARLEY'S.—Black resin, 16 parts; beeswax, 1 part; melt; add whiting (sifted, dried by a a dull red heat, and allowed to cool), 16 parts; and stir until cold.

WATERGLASS. or SILICATE OF SODA. —Also called "soluble glass," and when mixed with the following forms a good cement for mending ornaments and vessels of zinc, sticking alike well to metals, stone and wood. — 1. Finely pulverized or levigated stibnite (gray antimony, or black sulphide of antimony) will produce a dark cement, which, after burnishing with an agate, will present a metallic appearance. — 2. Pulverized cast iron; a gray cement.—3. Zinc dust (so-called zinc gray). An exceedingly hard, gray cement, which, after burnishing, will exhibit the white and brilliant appearance of metallic zinc. —4. Used for glass, earthenware, and porcelain. Rub together 1 part fine pulverized glass, and 2 parts pulverized fluorspar, and add enough waterglass solution to give it consistency. — 5. Used for edges and joints of stone and marble slabs. Waterglass mixed with hydraulic cement to a thick dough. It is well to mix but a little at a time, as it hardens very quickly.

WATERPROOF, or HYDRAULIC. — 1. Shellac, 4 oz.; borax, 1 oz.; boil in a little water until dissolved, and heat to a paste. — 2. 10 parts carbon disulphide and 1 part oil turpentine are mixed, and as much gutta-percha added as will readily dissolve. — 3. Melt together equal parts pitch and gutta percha; apply warm, and press the parts firmly together until cold. — 4. Used for glass, porcelain, etc. Simple shellac, made up into sticks, is commonly sold for such cement. The articles to be cemented are warmed sufficiently to melt the shellac brought into contact with them. It is not adapted for flexible objects, as it cracks, and will not withstand heat or alcohol. — 5. Take alcohol, 1 pt.; sandarac, 1 oz.; mastic, 1 oz.; common white turpentine, 1 oz.; glue, isinglass, and water sufficient. Dissolve the sandarac and mastic in the spirit, then add the turpentine to the solution. Make some strong glue, and add to it a good pinch of isinglass. Heat the alcoholic varnish until the liquid begins to boil; then stir in the warm glue; the amount of liquid glue to be added is determined by noting the point at which, after thorough mixture, a magma or thin paste is formed capable of being strained through a cloth. When required for use, the strained mixture is to be warmed and applied like glue. A junction is effected which is not destroyed by cold water, and only after a time by hot water or ordinary saline solutions. — 6. 2 gills litharge; 2 gills plaster Paris; 2 gills fine, dry white sand; ⅔ gill finely powdered rosin; sift, and keep them for use, when they should be made into putty by mixing them with boiled linseed oil, to which a little dryer has been added. Use within 12 hours after being mixed.

WHITE.—Beeswax, 1 oz.; resin 4 oz.; powdered plaster Paris, 5 oz.; melt together; to use, warm the edges, and use the cement warm.

WOOD, To Metal, Glass, etc. — Dissolve isinglass in acetic acid, in such quantites that it becomes solid when cold. When applied let it be heated. It resists moisture well.

ZEIODELITE. — Used for uniting stones or bricks and for cementing iron rods into holes cut in stone. 19 parts sulphur and 42 parts powdered glass or earthenware, mixed together by heating the sulphur.

ZINC.—(*Sorel's.*) The following composition

forms an excellent material for molding or for uniting stone, etc. Mix commercial zinc white with ½ its bulk fine sand, adding a solution chloride of zinc of 1.26 specific gravity, and rub the whole together in a mortar. The mixture must be applied at once, as it hardens quickly.

GLUES.

REMARKS.—Common glue is generally prepared from waste pieces of hides and skins, the refuse of tanneries and offal of slaughter houses. They should be kept dry to prevent decomposition. Before conversion into glue they are steeped in weak milk of lime, well worked in water, and exposed to air for 24 hours; then placed in a copper boiler, ⅔ filled with water, and furnished with a perforated false bottom to prevent burning, and as much is piled on as will fill the vessel. Heat is applied, and gentle boiling continued until the liquor, on cooling, becomes a gelatinous mass. The clear portion is then run off into another vessel, kept hot by a water bath, and allowed to repose some hours to deposit, when it is run into the congealing boxes and placed in a cool situation. The next morning the gelatinous mass is turned out upon boards wetted with water, and cut horizontally into thin cakes with a stretched piece of brass wire, and into smaller cakes with a moistened flat knife. These cakes are placed upon nettings to dry, after which they are dipped one by one in hot water, and slightly rubbed with a brush wetted with boiling water, to give them a gloss; they are lastly stove dried for sale. The undissolved skins left in the copper are treated with water, and the operation repeated again and again. The first runnings produce the best glue. Refuse matter from the tanners and leather dressers yields, on an average, when dried, 50 per cent. of its weight in glue. To bleach common glue, soak in moderately strong acetic acid for 2 days; drain, place on a sieve, and wash well with cold water; dry on a warm plate.

BANK-NOTE.—(See *East Indian, or Portable.*)

BOTANICAL.—1. Used for mounting ferns, and made as follows: 5 parts gum Arabic; 3 parts white sugar; 2 parts starch; add very little water, and boil, stirring until thick and white. — 2. For moss work: Clarified glue, dissolved in water to the thickness of molasses; add a thickening of flour and water while the glue is boiling, until about as thick as clear starch; use hot. Put on the moss and the surface to which it is to be applied. The moss and lichen on old board fences or old shingled roofs is better, because it has a more even surface than that from walls and rocks. Peel it from the wood and remove all the bark, dirt and dust. The thinner it is, the better it will adhere. It works better damp, and if gathered before being used, should be kept in a cellar, and sprinkled occasionally.

DRAIPER'S.—3 parts glue in small pieces; cover with 8 parts water; let stand for several hours; then add ⅔ part hydrochloric acid and 1 part sulphate zinc, and expose the whole to a temperature of 178° to 192° Fahr., during 10 or 12 hours. The compound does not gelatinize; it only needs to be allowed to settle. A most useful agent for joining purposes.

EAST INDIAN, or PORTABLE. — Useful for many purposes, such as repairing book-binding, leather goods, bank bills, parchments, etc. For use, hold it over steam a moment, or wet it with the tongue and rub on the surfaces to be cemented. It is strong, and is prepared as follows: 2 lbs. white shell glue; boil and strain until clear; then boil 8 oz. Cooper's isinglass to a creamy consistency; mix the 2 substances while hot in a clean double glue pot; add 1 lb. good brown sugar to the mass, and boil, stirring until thick; pour off into shallow pans; when nearly cold, cut in pieces for the desk or pocket.

FIRE-PROOF.—Take the best glue; pour on an equal quantity of water; soak over night; melt it over a gentle heat, and add fine Paris white, or white lead; mix well, and add a little acetic acid, carbolic acid, or any ethereal oil, to prevent putrefaction. This cement is adapted for flexible objects, like leather. It will not withstand boiling water.

HAT MAKERS'.— This is prepared from the tendons of cattle. It is brown and soft; grows moist in damp weather, but it does not render felt brittle like other varieties.

LABELING ON METAL.—1. Take good yellow glue, break it into small pieces, and soak a few hours in cold water; pour off the supernatant water; place the glue in a wide-mouthed bottle; add sufficient glacial acetic acid to cover the glue, and facilitate solution by standing the bottle in warm water. This glue will stick anything. — 2. Add a little chloride of calcium to glue; this will prevent cracking and make it adhere to metal, glass, etc.

LIQUID.—1. The addition of a little nitric acid will prevent the glue from becoming solid. It is supposed that this is substantially the formula for making the well-known Spalding's glue, but this is doubtful. The addition of this substance injures the glue, however, as it is eventually decomposed.—2. 1 part refined glue broken, to 4 or 5 parts saccharate of lime; on warming the glue dissolves, and remains liquid when cold. It can be varied to make any thickness desired. The saccharate of lime is prepared by taking 1 part crushed sugar and dissolving in 3 parts water; adding to the sugar ¼ its weight slacked lime, and heating to 145° or 165°, and allowing it to macerate several days, with frequent shaking; then let it settle, and pour off the clear liquid for use. This is equal to the prepared glue sold for scrap book use. — 3. Best white glue, 16 oz.; white lead, dry, 4 oz.; rain-water, 2 pts.; alcohol, 4 oz. With constant stirring, dissolve the glue and lead in the water by means of a water bath. Add the alcohol, and continue the heat for a few minutes. Lastly, pour into bottles while hot. — 4. A bottle ⅔ full common glue; fill up with common whisky; cork, and set by for 3 or 4 days. — 5. Dissolve 1

lb. best glue in 1½ pts. water, and add 1 pt. vinegar. It is ready for use any time without warming.

MARINE.—This is probably the strongest cement known; when well made and properly applied, it will unite wood, metal, glass, leather, etc., with a strength that is astonishing. 1. Dissolve 3 parts shellac and 1 part india-rubber, in separate vessels, in ether free from alcohol, applying a gentle heat; when dissolved, mix the two solutions. Use rectified sulphuric ether and unvulcanized india-rubber. When the india-rubber has become softened, break into small pieces, and stir until a soft mass is obtained. It is well to cut the rubber into small pieces before pouring the ether on, but the mass must be frequently stirred. Pour the solution of shellac into the rubber, and incorporate by stirring. This is a modification of the famous marine glue, and resists water, both hot and cold, and most acids and alkalies. If thinned by admixture of ether, and applied as a varnish to leather, along the seams, it renders them water-tight and almost impossible to separate. — 2. India-rubber, 15 to 20 gr.; chloroform, 2 fl. oz.; dissolve, and add powdered mastic, ½ oz.; keep corked, and in a cool place. — 3. Finely divided india-rubber, 1 part, dissolved in crude naphtha, 40 parts. The solution is complete in 10 or 12 days, if repeatedly agitated. To it is then added gum lac, 2 parts by weight to 1 of solution. The compound is then placed in an iron vessel over the fire, and constantly thinned till homogeneous. It is then poured on a slab to cool, when it is broken up, and put by for use. India-rubber is sometimes omitted, in which case the proportions will be 1 part naphtha and 2 parts lac. For use, the cement is heated to 212° Fahr., in a vessel of copper or cast iron, and is brushed in thin layers on the surfaces to be joined; these are then brought into contact, and strongly pressed. If the surfaces are so wide that the cement becomes cool before the operation is finished, it is well to pass a hot iron, at about 140° Fahr., overit. It is valuable for repairing broken wood, cementing molds used in foundries, caulking ships, joining blocks of marble or granite, and for uniting wood and iron. It can be made as hard as desired by increasing the lac. — 3. Caoutchouc, 1 oz.; genuine asphaltum, 2 oz.; benzole or naphtha, q. s. The caoutchouc is first dissolved by digestion and occasional agitation, and the asphalt gradually added. The solution should have the consistence of molasses.

METAL.—Melt the glue as usual, and to every pt. add 2 spoonfuls, each, of powdered resin and powdered brickdust; incorporate together, and it will hold the metal much faster than plain glue.

MINERAL.—Starch, 2 dr.; white sugar, 1 oz.; gum arabic, 2 dr.; water to dissolve. Dissolve the gum, add the sugar, and boil until the starch is cooked. It is very adhesive, never becomes brittle or scales off from stones or other hard substances. In a geological cabinet it is simply invaluable.

MOUTH, or LIP.—(See *East Indian or Portable.*) 1. Soak 4 oz. best glue and 1 oz. isinglass in water until soft; pour off superfluous water, and add 1 oz. brown sugar; melt together with a gentle heat, until thick; pour into a flat-bottomed dish; if placed on ice, so much the better, as it will prevent the glue sticking to it. When solid cut into cakes.—2. Glue, 5 oz.; sugar, 1 oz.; dissolved in water, boiled down, poured into molds, and dried. — 3. Isinglass and parchment glue, each, 1 oz.; sugar candy and gum tragacanth, each, 2 dr.; add to them 1 oz. water; boil the whole to the consistence of glue; form into small rolls. This glue, wetted with the tongue and rubbed on the edges of paper, silk, etc., will, on their being laid together and suffered to dry, unite them as firmly as any other part of the surface.

PARCHMENT. — Parchment shavings, 1 lb.; water, 6 qts.; boil until dissolved; then strain and evaporate to proper consistence; use a water-bath if wanted light colored.

POTATO STARCH. — Pour upon 11 lbs. best potato starch a mixture of 7 oz. pure nitric acid and 4 lbs., 6 oz., soft water; stir together, and let stand 24 hours at the temperature of about 80° Fahr., stirring from time to time; then heat to 212° Fahr.; add gradually from 4 lbs., 6 oz., to 6½ lbs. more water, and boil till the mass begins to grow thick and transparent. Further add 1¾ oz. pure nitric acid, diluted with 2 lbs., 3 oz., water; boil till the liquid is clear, dilute with water if too thick, and strain through a woolen cloth; next, dissolve 11 lbs. gum Arabic and 2 lbs., 3 oz., sugar in 8¾ to 11 lbs. of soft water, warming slowly and adding a little more water if the whole is not dissolved; strain through a woolen cloth, and add to the filtered solution 1¾ oz. nitric acid, mixed with a little water; heat to 212° Fahr. for an hour, adding gradually the first-mentioned solution of starch, and allow the whole to stand at this temperature till perfectly clear. If it is at all turbid, dissolve at a boil 8¾ oz. isinglass in 6½ lbs. water and 2 lbs., 3 oz., alcohol, keeping up the heat till all the spirit has escaped; strain through a woolen cloth; add ¾ oz. pure nitric acid; heat once more, and add the solution gradually to the adhesive mixture. If any turbidity appears, filter again. The consistence can be regulated at pleasure by the addition of water.

RUBBER.—A most valuable glue for photographers, and extensively used by book-binders, is made from bottle india-rubber. This must be dissolved in highly rectified spirits turpentine.

SPALDING'S.—(See *Liquid.*)

TUNGSTIC. — This has been suggested as a substitute for hard india-rubber, as it can be used for all the purposes to which this latter is applied. Mixing together a thick solution of glue with tungstate of soda and hydrochloric acid, a compound of tungstic acid and glue is precipitated, which, at a temperature of 86° to 104° Fahr., is sufficiently elastic to be drawn out into thin sheets.

WATERPROOF.—1. Soak glue in water until it is soft, but still retains its form; then put it into raw linseed oil, and apply a gentle heat until it is dissolved by the oil. It is then used like ordinary glue. It dries soon, and water has no effect on it. — 2. A glue which will resist water to a considerable degree, is made by dissolving

common glue in skimmed milk. Fine levigated chalk added to the solution strengthens it, and renders it suitable for sign boards. — 3. A glue that will hold against fire and water, may be prepared by mixing a handful of quicklime with 4 oz. linseed oil. Thoroughly levigate the mixture; boil thick, and then spread it on thin plates in the shade; it will become hard, but may be dissolved like glue. — 4. Where glue is exposed to the weather, common glue, protected by a good coat of oil color, is superior to the one above. If both are combined (that is, the waterproof glue and the paint), a much greater advantage may be obtained. — 5. 1 oz., each, gum sandarach and mastic are to be dissolved in 1 pt. alcohol, to which 1 oz. white turpentine is to be added; at the same time a very thick glue is to be kept ready, mixed with a little isinglass. The solution of the resins is to be heated to boiling in a glue pot, and the glue added gradually with constant stirring. After the mixture is strained through a cloth it is ready, and is to be applied hot. It dries quickly, becomes hard, and surfaces of wood united by it do not separate when immersed in water. — 6. Glue, 12 parts; water, sufficient to dissolve; then add yellow resin, 3 parts; and, when melted, add turpentine, 4 parts. Mix together in a water bath. — 7. Ordinary glue can be rendered insoluble by adding to the water, with which it is mixed when required for use, a small quantity of bichromate of potash, or tannic acid, and exposing to light the articles to which it is applied.

MUCILAGES.

REMARKS. — The use of salicylic acid, corrosive sublimate, carbolic acid, boracic acid, cloves, or any essential oil, are recommended for preventing the decomposition of mucilage and paste, which, as generally prepared, become sour, ropy, and unfit for use.

CASEINE.—Take the curd of skim milk, carefully freed from cream or oil; wash thoroughly, and dissolve to saturation in a cold concentrated solution of borax. This mucilage keeps, and surpasses gum Arabic in adhesiveness.

DEXTRINE. — 1. Dissolve sufficient yellow dextrine in hot water to bring it to the consistency of honey. This forms a strong paste that will keep long unchanged if the water is not allowed to evaporate. Sheets of paper may be prepared for extempore labels by coating with the paste and allowing it to dry; to use slightly wet the gummed side. This paste is very useful in the office or laboratory, and is cheap. — 2. The following is said to be the formula for the mucilage used on United States postage stamps: Dextrine, 2 oz.; acetic acid, 1 oz.; water, 5 oz.; alcohol, 1 oz.; add the alcohol to the other ingredients when the dextrine is dissolved.

GUM ARABIC.—This is the principal material from which true mucilage is made. Put 3 oz. gum Arabic into ½ pt. cold water, and stir frequently till dissolved.

GUM TRAGACANTH.—1. Powdered tragacanth, 1 dr.; glycerine, 6 dr.; water, enough to make in all 10 oz. Rub the tragacanth in a mortar with the glycerine and then add the water. This will produce a mucilage of excellent quality. — 2. Dissolve equal parts gum Arabic and gum tragacanth in sufficient water. This will produce a stronger mucilage than either gum Arabic or gum tragacanth alone.

LABELING. — Ordinary mucilage from gum Arabic, does not fix paper to wood or pasteboard, or to metallic surfaces. These disadvantages are overcome by adding a solution of sulphate of aluminum, made up in 10 times its quantity of water. 10 grains aluminum sulphate are sufficient for 250 grains of mucilage. Prepared in this way it will not become moldy. Again, a few drops of strong sulphuric acid are added to the gum solution, and the precipitated sulphate of lime allowed to settle.

PEACH TREE.—Take the gum that exudes from the peach tree, put in a vial and add equal parts of water and alcohol, till of the right consistence. This is good and easily obtained by any one having peach trees.

PASTES.

REMARKS.—Except where paste is to be kept a long time, no additions are necessary. Carbolic acid may be used on the large scale. For small quantities, cloves are a good preservative, but a few drops of oil of cloves or any essential oil is more convenient. To prevent the attacks of insects, the addition of corrosive sublimate is a sure preservative; but this is a powerful poison and requires great care.

BOOKBINDERS'.—Place ½ gill flour in a saucepan, and as much cold water as will cover it. Break all the lumps while in state of dough; then pour on 2 qts. cold water and 1 oz. powdered alum. Set on the fire, and stir constantly while boiling, till thick.

CORN STARCH.—Corn starch makes a good paste for scrap-books. Dissolve a small quantity in cold water; then cook thoroughly; do not get it too thick. When cold it should be thin enough to apply with a brush. It is not so liable to mold and stain the paper as paste made from other kinds of starch.

FLOUR. — Mix good flour with cold water to a paste, then add boiling water, stirring up well until of a consistence capable of being spread with a brush. Add a little brown sugar, a little corrosive sublimate, and 6 drops oil lavender, and keep 2 days before using.

PERPETUAL. — Used for leather, paper, or cardboard. Let 4 parts by weight of glue soft-

en in 15 parts cold water, for 15 hours, then heat the mixture until clear. To this mixture 65 parts boiling water are added without stirring. In another vessel 30 parts starch paste are stirred with 20 parts cold water, so that a thin milky fluid is obtained without lumps. Into this the boiling solution is poured, with constant stirring, and the whole kept at boiling temperature. When cooled, 10 drops carbolic acid are to be added. It must be preserved in closed bottles, and will keep good for years.

PHOTOGRAPHIC.—Used for mounting photographs. 1. Mix thoroughly 630 grains finest Bermuda arrowroot with 375 gr. cold water in a capsule with a spoon or brush; then add 10½ oz. water and 60 gr. gelatine in shreds. Boil with stirring for 5 minutes, or until clear; when cold, stir in 375 gr. alcohol, and 5 or 6 drops pure carbolic acid. Keep in well-closed vessels, and before using it, work up a portion with a brush in a dish. — 2. 4 parts, by weight, of glue are allowed to soften in 15 parts cold water for some hours, and then moderately heated till the solution becomes clear; 65 parts boiling water are now added with stirring. In another vessel, 30 parts starch paste are stirred up with 20 parts cold water, so that a thin fluid is obtained without lumps; into this the boiling glue solution is poured, with stirring, and the whole kept at a boiling temperature. After cooling, 10 drops carbolic acid are added. This paste is of great adhesive power, and may be used for leather, paper, or cardboard with success. Preserve in closed bottles, and it will keep good for years.

SCRAP-BOOK.—1. Rice starch, 1 oz.; gelatine, 3 dr.; water, ½ pt.; heat with stirring, until the milky liquid becomes glassy. Keep in a tight bottle, with a few drops clove oil added. — 2. Dissolve in hot water a teaspoonful alum; when cold, stir in flour to make it like cream, stirring out all lumps. Stir in this as much powdered resin as will lay on a dime, and add 6 cloves. Put into another vessel a teacupful boiling water; set over the fire and pour the flour mixture into it, stirring well. It will soon be like mush. When cool, put into fruit jars, cover and keep in a cool place. For use, soften with warm water. It will keep a year, and does not blister the paper or stain through.

STARCH. — Prepared by triturating starch with cold water in a mortar until no lumps remain, and not too thick a mass is formed; pour into this boiling water slowly, with rapid stirring, until the paste begins to form, as indicated by increase of transparency, and then rapidly add the rest of the boiling water necessary. Boiling renders it less adhesive and liable to peel. Rye flour affords a more adhesive paste than starch, but of a gray color. A little alum, added to the water renders it more permanent, and the boiling lime water instead of pure water adds to its adhesiveness. An aqueous extract of decomposed gluten, affords the best paste with starch. By incorporating with the paste turpentine, equal in weight to the starch, and stirring well while hot, it will be rendered more impervious to moisture, and more adhesive.

Sealing Wax.

REMARKS.—All kinds of sealing wax, except that formed in round sticks, are molded in heavy iron molds. They are made in 2 pieces, each representing half the matrix. The wax is poured in from the top. The iron chills the stick and prevents it adhering. The sticks then go through an ironing process, which imparts the gloss. If the wax is not properly compounded and strained, the casts are likely to be imperfect. In forming round sticks, a portion of the mass should be weighed while ductile, divided into pieces, and then rolled out upon a warm slab by means of a wooden block like that used by apothecaries for pills. The variegated kinds are scented with essence of musk or ambergris, or any fragrant essential oil. The addition of a little camphor, or spirit of wine, makes sealing wax burn easier.

BLACK.—1. Shellac, 3 lbs.; Venice turpentine, 10 oz.; finest cinnabar, 2 lbs.; mix. —2. Resin, 4 lbs.; shellac, 2 lbs.; Venice turpentine and red lead, of each 1½ lbs. — 3. The following 3 receipts are for bottle corks, cask bungs, etc. Black resin, 6½ lbs.; beeswax, ½ lb.; finely powdered ivory black, 1½ lbs.; melt together. — 4. Black pitch, 6 lbs.; ivory black and whiting, each, 1 lb.; melted together.—5. Common resin, 20 lbs.; tallow, 5 lbs.; lampblack, 4 lbs.; mix, with heat.

BROWN. — 7½ oz. shellac; 4 oz. Venice turpentine; color with 1 oz. brown ochre and ½ oz. cinnabar. Mix thoroughly by a gentle heat, and mould as required.

GOLD.—Bleached shellac, 3 lbs.; Venice turpentine, 1 lb.; Dutch leaf, ground fine, 1 lb.; mix with a gentle heat, and pour into molds.

GREEN. — Shellac, 2 parts; yellow resin, 1 part; verdigris, 1 part; powder and mix by heating slowly.

MARBLED. — Mix 2 or 3 different colored kinds just as they begin to grow solid.

RED. — 1. Melt cautiously 4 oz. pale shellac in a copper vessel, at the lowest temperature; add 1½ oz. Venice turpentine, warmed, and stir in 3 oz. vermilion; pour into metallic molds to cool. — 2. Used for cans. Melt together yellow wax, 1 oz.; American vermilion, 3 oz.; gum shellac, 5 oz.; rosin, 16 oz.; run into molds.

WHITE. — Mix 3 parts resin, 1 part caustic soda, and 5 parts water; this is then to be mixed with ½ its weight of plaster Paris. The compound sets in ¾ hour, adheres strongly, is not permeable like plaster alone, and is affected but slightly by warm water. — 2. Soften glue in cold water; melt to a thick paste; add glycerine in quantity equal to the dry glue taken, and heat to expel the water. Cast on a marble slab to cool, and melt for use as required.

YELLOW. — Mix together 4 oz. pale shellac; 1½ oz. resin; 2 oz. Venice turpentine; ¾ oz. King's yellow (sulphuret of arsenic, or orpiment).

ARCHITECTURE IN THE EARLY AGES.

BUILDING.

ARCHITECTURE AND STYLES.—This department has been prepared under the supervision of Mr. Jerome B. Legg, of St. Louis, whose efforts have not been confined to that city and vicinity, but the monuments of whose architectural taste and mechanical skill loom up in widely scattered cities and dot the hillsides over a dozen states. His recent signal triumph in carrying off the honors in the hotly waged contest for the premium design for the great St. Louis Exposition Building, over competitors from the ranks of the most renowned architects of several of our largest cities, has placed him in the very front position, and stamps our selection of Mr. Legg with approval. His advice will be found fully abreast with all the latest modern requirements pertaining to home building.

To a close observer, the unwritten history of past nations may be followed, step by step, by the development or decay of their architectural cultural. No art allies itself so closely to the social condition of peoples; none follows with more fidelity their successes or reverses. Nowhere is found more information concerning bygone ages, than in the remains of their buildings; nations that have left none are the most unfathomable. Egypt, who built her pyramids and magnificent temples, which have withstood the elements, and stand as landmarks to explorers in ancient history, leads in the ranks of nations whom we are able to trace back for centuries where all authentic traces of their neighbors have disappeared. That they had such neighbors, is indisputable from references to them in Egyptian chronicles. With them architectural forms reached a higher standard than the earliest traces of contemporary nations, showing that they enjoyed superior knowledge and power and were rich and cultured. Babylonia, Syria, Persia, India and China, contain remains of the same nature, and their history is an open book so far as these ruins carry us, but sinks into oblivion as soon as their architectural traces are lost. In the following classification of architectural styles, it will be seen that it stops with the Renaissance. While the unlearned talk of "modern styles," there are no such styles. Since the Renaissance no architectural style has been developed with sufficient originality to claim classification. The 19th century sees an indiscriminate application of almost every preceding style. The so-called Elizabethan and Queen Anne styles are but mongrel varieties of Gothic and Renaissance, and, as applied in this country, seldom come up to the characteristics of their use in England. The results of the last 10 or 20 years' work here, show a gradual improvement in style, proportion and execution, the natural consequence of increasing wealth and cultivation. Where this movement may eventually lead, the future must decide; possibly to a new style, which will be national. The Colonial style arose from the necessities of our forefathers; and though sometimes attempts are made to harmonize it with the demands and conveniences of the present, it taxes the ingenuity of the architect, as the requirements are such as not to harmonize with the opportunities which that style of design offers. An attempt to describe these sub-types would end in a labyrinth. A passing notice only is taken of them in standard works on architecture. The difference in the many ways of applying old principles, heretofore explained, which often led to most curious combinations, is no greater than may be seen any day in a trip from the East to the West, in our own country, where each section is seen to have its peculiar style, regulated by the wants of the inhabitants and the materials which are at hand for satisfying them.

ARRANGEMENT.

REMARKS.—The first step, when intending to build, is to secure a good lot. Many important points are often overlooked in the desire to secure a bargain, or get into a particular neighborhood. For a dwelling house, the lot should be of natural ground, free from fill; for, unless the material used to grade up the lot is pure clay, or earth free from all vegetable or animal mat-

ter, serious consequences may follow, caused by the inevitable decomposition which follows any disturbance of such earth. Another point is, that a low piece of ground, which has served as drainage for the neighborhood, is certain to be impregnated with filth of all kinds, which is apt to form gases that will force their way to the surface. The purifying effect of the ground placed over them will reduce this result to an extent; but unless this fill is pure, it will fail even in this respect. Many cases of sickness could be traced back to some such source. Having selected a lot, the house should be placed at an elevation above the street from which it is to be viewed. Placing too low, will spoil the appearance of the best design. The height will vary with the style of the building and its surroundings, and no guide but good taste can be given. Another reason for placing the house on an elevation is to ventilate the cellar; or, in case there is none, more important still, the space under the house, so as to carry away all vapors and gases, which are constantly rising. The house should be so laid out as to get all the sun and air practicable in the living and sleeping rooms; for sunlight is as indispensable to healthy apartments as pure air is to breathe. No apartment is desirable where the sunlight has not the freest access. In the country, trouble about good building sites is seldom encountered, and the point to be looked after is that the ground slopes in all directions from the house sufficiently to drain the surface-water from it, and that natural drainage is handy for the discharge of the waste matter from the house. The next step is to consider the style. To do this, the number of and size of the rooms must be determined. The location of the house, as to the points of the compass, must be noticed. The location of the building, whether in city, village, or on a farm, must not be forgotten. The halls and stairways should be placed so that the distance between the rooms in connection be as short as possible; a few steps spared her housewife amount to considerable in the course of a year, and make a great difference in the convenience of a house.

Houses.

CITY DWELLINGS.—In erecting a city residence, the hints elsewhere, especially as to filled ground and arrangement of different rooms, must be carefully considered. The small space usually allotted demands the closest attention to its arrangements. A good, dry cellar, with as much light as possible; suitable location for a furnace; convenient coal and fresh air supply, and a good laundry, are conditions most commonly required. The cellar should not be less than 7 ft. to the underside of the first floor joist. The monotony of living apartments, where narrow lots will allow of no great projection, is sometimes nicely accomplished by the manner in which the closets are placed. Small projections in front relieve the stiffness of the elevation, and improve the parlor and front chamber. The height of stories should be 10½ ft. to 12 ft., in the first, and 10 ft. to 11½ ft., for the second story. The size of the rooms should be taken as a guide in determining the height of stories, as a small room, with too high a ceiling, is never pleasant and cosy. Within the above limits, there will always be sufficient height to thoroughly ventilate the apartments, and, unless very large, prevent any squatty appearance. Regarding the exterior of city houses, not much can be given as a guide; the three most common modes of handling being the stock-brick, brick and stone trimmings, and stone-fronts. Such matters depend on the owner's taste, and amount of money to be expended. As to brick fronts with stone or terra cotta trimmings, or stone fronts, it may be said, that in large cities, where the atmosphere is loaded with soot and dust particles, projections should be avoided, except in such places where provision can be made for a water drip to throw the wash from rains away from the walls; otherwise, the dirt and dust will be washed down the front, and produce a very bad effect. All stone, except granite (which is seldom used), disintegrates under the effects of the weather; it is, therefore, a good precaution, when used in combination with brick, to give the stone one coat of paint of the original stone color; it will effectually prevent the wearing of the stone, and stop the streaks, which appear soon after such work is completed, on the brick work below the stone. The space between the ceilings of the upper stories and the roof should always be ventilated, which will prevent the super-heating of the confined air, and keep the rooms cooler in summer.

COUNTRY TOWN DWELLINGS. — Houses built in country towns and in the suburbs of cities may be classed under one head, as the requirements are the same. More ground being available, the house assumes a broader shape, usually with a centre hall, making a double house. The hall should be made wide, with an easy stairway. The parlor, family room, and dining room should enter the hall with sliding doors. The family room, being used more frequently, should be roomy and have a pleasant exposure. The parlors, dining room and kitchen need the same conveniences as a city house. The bed rooms and general arrangement of the second story, should be according to directions elsewhere. The only point differing is the bath room, which requires some extra arrangments. City water not being usually available, parties desiring a bath room are compelled to provide a substitute. A tank is placed in the attic, or elevated in some room, so as to allow the water from the eave-gutters to flow in to it, and provided with a cut off, by which the supply can be thrown into the conductors leading to the cistern. This tank should be in connection with a force pump in the kitchen or laundry, which can draw the water from the cistern and throw it into the tank, so that in a dry season, when the water in the tank is low, a supply can be had from the cistern. The soil pipe (in case a closet is used), must empty into a cesspool, at least 40 ft. from any well or cistern, and inclosed with hard burnt brick laid in cement, to prevent seepage of the matter through the ground, which would follow any strata in the earth and

taint the contents of neighboring wells. Where a natural drainage can be had for cesspools, attention, in properly locating wells and cisterns, is especially necessary. Porches greatly increase comfort and should never be omitted. The front porch should shelter the entrance; and, if the exposure is south or west, could extend across the entire front and protect the parlor also. The kitchen porch ought to be large. The south and west fronts should have protection. If properly treated, porches will be a comfort to the inmates, and ornamental to the house. Good taste must be exercised, or, in trying to provide ample porch room, it may result in burying the house.

FARM HOUSES.—Their requirements differ from those of city and country towns. The parlors and library are omitted, and the kitchen, dining room and sitting room, are enlarged. In some cases the kitchen is made of a size sufficient to serve as kitchen and dining room. One or two bed rooms are usually provided on the ground floor. The general arrangement and disposition of the rooms have been thoroughly discussed elsewhere. This class of buildings is put up with small expenditure, and depends more on the skill of the architect than even the more elaborate ones. It is easy to procure fine effects when ample means are at hand; but, to produce a pleasing appearance, and convenient interior with small outlay, taxes the designer's skill to the utmost.

Rooms.

BATH ROOM.—This modern convenience, in order to be enjoyed, must be easy of access from all sleeping apartments; not located, when avoidable, on the north side of the building, and of sufficient size to be comfortable. It should never be connected directly with any bed room; for, although much improvement in sanitary devices has been made, we are still far from the point when we can guarantee safety from sewer gases.

BED ROOMS.—These should be placed where exposed to the sun sometime during the day. The furniture of the rooms must not be forgotten in the disposition of the doors and windows. It is not unusual to find houses in which no thought has been given to this point; where beds are placed across windows and before doors in the the most awkward position, simply because the designer of the room neglected to make it appropriate to the use intended. Bed, bureau and washstand, each demand a place. The bed should be located so as to avoid draughts, and still be where the air in summer can reach it; never between two openings, nor in such a manner as to project too far into the room, thus cutting it in two parts; neither must it come too close to fire places. The bureau requires good light, and is best provided for between the windows. The washstand is less important, and can be located in a corner of the room away from the door leading into the hall and the side where the principal windows are. Good ventilation is indispensable, and is gained by placing a transom over the door to the hall, and, where possible, the location of windows on two sides of the room.

CELLAR.—Complete drainage is an absolute requirement of all cellars; and, where this cannot be obtained, it is better to do without them, and merely ventilate the space beneath the first floor. The necessity for drainage will vary with the varieties of soil and the location of the house. With good clay and sufficient fall of grade in all directions, a cellar is not liable to be damp. If moisture should show itself, the cause may be sought in a careless ramming of the back filling around the walls. When there is a sandy soil, with a layer of clay underneath, cellars may be kept dry by sinking a trench around the walls at the level of the top of the clay bed, and filling with coarse gravel, rock, or, better still, laying ordinary clay drain tile. These trenches must have an outlet to some point low enough to drain the water from them. By catching all surface and subsoil water before it reaches the house, they keep the walls dry.

CLOSETS.—The convenience of closets is realized when one is unfortunate enough to occupy a house in which they have been omitted. A skilful designer can locate them so as to use corners and spaces which could not be utilized. Kitchen closets and pantries require considerable shelf room, and the lower shelf must not come nearer the floor than about 2 ft., 6 in., so as to allow a barrel to be placed underneath. In large pantries it is best to inclose the shelves with narrow, tight fitting doors. China closets need many shelves, placed with decreasing spaces as they go up. Clothes closets are fitted up with two shelves and a strip for clothes hooks.

DINING ROOM.—This room, in which the family gathers every day, and often used as a sitting room, should be pleasantly located; an eastern exposure is best, as the room is always cheerful in the morning. Its shape should have reference to the furniture. The table will be greatest in length; hence the room ought to correspond. If the fireplace is on the long side, width must be gained to prevent persons sitting on that side from being rendered uncomfortable. When the fireplace is at the small end, the sideboard should be placed at the opposite side of the room. The doors must be located to obviate passing close to parties seated at the table. The method of reaching this room, from main and rear portions of the house, should be as direct as the disposition of the rooms will admit.

HALLS AND STAIRWAYS.—The main hall of city houses is gradually assuming a more important place; the long, narrow passway, with its straight run of steps, will soon pass out of use. This is one of the most important steps of modern house building. The hall takes a prominent position among the several apartments; it is in constant use, and is seen by all guests. A pleasing effect here carries the feeling through the house. The vestibule and steps leading to it must not be cramped; the last step to the storm doors should be double width, so as to afford a good platform to rest on when the storm doors are closed. The stairs must not start too close to the front door, and must be constructed so as to show the newel, rail and balusters to the

best advantage. The doors of the rooms adjoining the hall, when well grouped, assist the general effect. Stained windows soften the light and are appropriate, and at a small cost add much to the general finish. Though any departure from the old fashioned hall is an improvement, the mistake of making the hall out of proportion is serious and must be avoided. In some cases, on narrow lots, no other style than a long hall can be applied; but where space will admit, a more pleasing arrangement can be obtained. The stairway, well proportioned, should measure 10½ in. to 12 in. on the treads and 6 in. to 7½ in. rise; a wider tread not being comfortable, and a higher tread making too great a step up. Where the story is high, platforms or landings make the ascent easier and beautify the stairs. Skylights of stained glass at the height of the ceilings produce pleasing effects. Open fire places are sometimes used with good results. Rear halls require good light, and stairs free from "winders;" or steps, which come in the turns, can be made with 8 in. rise and 10 in. treads. There are cases where "winders" have to be employed; but they should be used sparingly. More space than absolutely needed is a bad feature in rear halls, as they are cold passages in winter.

KITCHEN.—This should be conveniently isolated from the house, so as to prevent the odors of cooking from penetrating to the rooms. Nothing is more annoying to the housewife than this. A convenient connection of the kitchen with the front door is a good point, if attainable, and should not require passing through another room. The inside cellar stairs, to and from the kitchen, must be handy. Communication between kitchen and dining room must naturally be close, and where possible protected by double doors. A double pantry, with a slide, forms the best method of passing the eatables, though it should be used in connection with double doors. Sometimes the pantries can be made large enough to enable one to get necessary shelf room and a passage through the closets also. The exit to the yard must be protected by a porch or shed roof, so as to shelter the entrance from storms and sun. Sinks and flues should be carefully located with reference to light.

LAUNDRY.—This is not usually "finished," but the ceilings should be plastered in two coat work, which will prevent steam from penetrating to rooms above, and dirt from falling down on the clothes. The best form of floor is that finished in the best Portland cement. In some localities sand used for buildings contains iron, rendering it unfit for cement work below the ground; where this is the case, a top dressing of pure cement will obviate the difficulty. Concreting the cellar is excellent for excluding moisture and vermin, and, where the funds will allow it, should never be omitted. Cheaper floors are made by laying cedar sleepers and filling the space between with broken brick and stone, rammed solid, then covering with ordinary flooring. This filling should stop ½ in. below the sleepers, so as to leave an air chamber between the filling and bottom of the floor, which will prevent decay. Stationary tubs are not in general use for laundries. Though convenient, they become foul and afford a harbor for vermin; but if adopted, there should be as little wood work as possible surrounding them. Laundry sinks are set low, and should be placed on an open frame with turned legs.

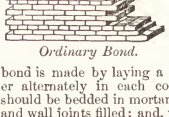
PARLOR.—This indispensable feature requires more symmetrical designs than any other part of the house. The fireplace and door to the hall should be on a line, in the centre of the room; the door between the parlors (or if there be but one, that leading to the library or dining room, as the case may be) also in the centre. The latter door is commonly a sliding door, and should not be less than 5 ft., 6 in. wide. Parlor furniture calls for some attention in the location of openings; and places for piano, sofa and corner stands are to be provided. The piano needs good light and a location where doors do not open against it. When the hall is wide, sliding doors connecting the parlor or parlors with it, and also between the parlors and dining room, make a fine suite of rooms, and, in giving entertainments, are fully appreciated.

SERVANTS' ROOM.—This, in a well-arranged building, is cut off from the rest of the house; where there are two stairways, this can be easily accomplished, and should never be overlooked.

CONSTRUCTION.

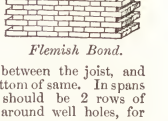
BRICK WORK.—This is of several grades. If the outer facings of the walls are of red brick, and the balance of salmon or soft, light, burnt brick, it is called a "merchantable job." If the facings are of dark red brick, and the balance of the walls of light red brick, it is called an "ordinary hard and red job;" and if the inner portions are of hard or red brick, it is a "strictly hard and red job." Extra fine, smooth brick, of even size and color, with square, full edges and corners, are called "stock brick," and are made larger than ordinary brick, to admit of neat joints in the outer facings and being laid in courses and bonded in with the common brick back of same. Stock brick are laid in fine, thin mortar, composed of white sand and Cape lime, but often made of a compound to produce a black or red mortar joint. If red or black joints are required, the brick is generally laid in white mortar; and, after the walls are up, the outer portions of the joints are scraped out, and the joints tuck-pointed. If the joints are cut back, and straightened with a steel, it is called "steel joints;" if worked with an oval convex face, with a concave rod, it is called a "rod joint." Stock brick work is laid with all stretchers on the face of the walls, that is, with the long edge of every brick showing outside; except on corners and angles the ends are alternately bonded in. The stock brick facings

are bonded to the common brick portion of the wall, by having the inner corners of the stock-brick clipped off, and extending the common brick clipped off, and extending the common brick work into this space. Walls are 2, 3, 4, 5, or more bricks thick, according to the height and strength required, and every course should be bonded together, every 5 or 7 brick in height, with heading courses; that is, with bricks laid lengthwise across the walls. The Flemish



Ordinary Bond.

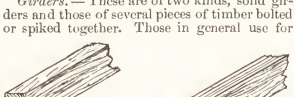

Stock Brick Bond.


Flemish Bond.

bond is made by laying a stretcher and header alternately in each course. Every brick should be bedded in mortar, and all head joints and wall joints filled; and, where a good job is required, every course of headers should be slushed up with thin mortar, poured in to fill up every crevice in the walls. Brick, surrounding smoke flues, should be shoved up in mortar and the joints inside struck and pointed same as wall facings, where not of stock brick.

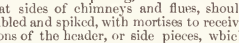
CARPENTER'S AND JOINER'S WORK.—There are two divisions of work under this head which are intrusted to the carpenter: 1. The carpenter's work proper, such as framing the joist, roofs and stud partitions; putting on roof sheathiny, and laying floors; he is required to furnish and cut all the wood blocks required, and, as the walls go up, for later use in securing stud partitions, finish wainscot, etc. 2. The joiner's work, is such as cornicing, doors, windows architraves and base finish, panel backs, shutters, etc., which are delivered to the building ready to go up, but fitted and put in place by the carpenter. (See *Joiner's Work.*) The carpenter has to fit and secure locks, bolts, hinges and other hardware. In rough framing the most important point is the quality of the wood, which should be dry and free from knots, which would be likely to impair the strength.

Girders.—These are of two kinds, solid girders and those of several pieces of timber bolted or spiked together. Those in general use for


Girders.

dwellings are usually made of 4 pieces of 2x10 or 12 in. joist, each spiked to the next, with the joints in long girders broken over the supports in such a manner as to let each piece lap over the joints in the next one. Where timber is strongly grained, have the grain lines reversed in adjoining pieces.

Joist.—The depth of a layer of joist varies with the length of the span, that is, the distance between supports, and the weight which they may be required to sustain. Joists should be sized to one depth at the ends, and rest on accurately leveled bearings, with the tops dressed in such a way as to leave them high in the in such a way as to leave them high in the centre, which is called crowning. Those coming above the first story in brick buildings should rest on a 3 in. x 4 in. piece of timber, laid even with the inner edge of the wall, with each joist spiked to same. Each tier of joists should be braced with small pieces (commonly 1 in. x 3 in.), so as to form a cross between the joist, and nailed to the top and bottom of same. In spans of over 14 ft. there should be 2 rows of bridging. In framing around well holes, for skylight, for stair openings and fireplaces, and from brick work of flues, the timbers should be doubled; the trimmers or long joists, which are placed at either end of the opening, or at sides of chimneys and flues, should be doubled and spiked, with mortises to receive the tenons of the header, or side pieces, which are also doubled and spiked together, and have mortises cut to receive in turn the tenons of such joist as come in the space and are supported by the header. When the studding for partitions come on the joist, they should be doubled for ordinary partitions; and, if more strength is necessary to sustain the weight, the number may be increased, thus forming a sort of girder in the floor. Under sliding door partitions there should be 3 joists, either blocked 2 in. apart by small pieces, spiked between, or trussed by cutting 2 in. x 4 in. or 2 in. x 6 in. pieces between them, so as to form an inverted V


Double Tenon.

Plan.

truss meeting in the centre at top line of the joist, and extended to lower edge at sides. It is of importance that spikes be not spared. The latter form of sliding door partitions is preferable.

Roof.—The rafters or timbers which support the inclined portions of a roof should rest at the base on a wall plate, a piece of timber commonly 2 in. thick, laid level on top of the wall; and where there are look-outs, or skeleton frames built in the wall to secure the cornice to, the plate should be spiked to them. Deck rafters or joist are those supporting the flat portions of a roof. The decks are supported, where there are no rooms underneath, by suitable posts placed under the deck plates, or plates on which the deck rafters rest; these posts should stand on sleepers, short pieces of

timber long enough to cover 4 or 5 of the joist below (ceiling joist). Valley rafters are those forming the line in the inner angle of a hipped roof. Hip rafters are those forming the line on the outer angle of a hipped roof. These latter (hip and valley rafters) should be heavier than the plain rafters, as they support the cripples or short pieces cut in to fill out the angles in the framing. The dimensions of roof timbers depend on the use to which they are put and the construction and size of the roof.

Partitions for separating the compartments of a building, are commonly made of timber, called "studding." For ordinary partitions, 2 in. x 4 in. stud are used, and for such as are required to carry a tier of joist, 2 in. x 6 in. They are placed 16 in. apart from the centre of one stud to the centre of the adjoining one. The correct construction of these partitions plays an important part in the stability of the plastering, and no point to secure that end should be slighted. In all cases where there is a partition or girder under a line of stud, the stud should continue on through the floor joist and rest on the girder or plate (a horizontal piece of timber placed over the top of a line of stud) of the partition underneath. The benefit to be gained by this, is the reduction of the amount of shrinkable timber in the height of the partitions, as wood in drying only contracts across the grain; and by not resting the studding on the joist, the shrinkage in them does not affect the plastering.

Sills.—It is not always practicable to have the upper partitions come over the lower ones; and, in such cases, the stud should be placed on a 2 in. piece of the same width as the stud, resting across the joist; this, of course, applies to partitions running in an opposite direction to the joist; when the direction is the same, the stud rests directly on the joists. (See *Joist.*)

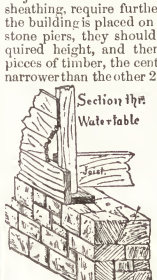
Plate. — Partitions should be capped with a plate 2 in. thick, of same width as the stud, with a couple of spikes through plates into the head of each stud. Where a partition supports a partition above, this plate should be doubled, with the joints of the upper half, so as to lap over those in the lower one, and securely spiked together.

Bridging. —All partitions should be bridged. There are two methods, the "block" and the "*zigzag*" bridging. The block bridging by cutting 2 in. stuff so as to fit in exactly between the stud, and then toe-nailing the pieces securely to the sides of stud. The zigzag bridging is formed by cutting the pieces about ½ larger than the distance between the stud, with the ends cut at such an angle as to fit exactly against the side of stud, and then toe-nailing ends to the studding, reversing the direction of slant of each piece, so that, when completed, the bridging will have a zigzag outline. This is to be preferred to the previous method, for unless the pieces in the block bridging are accurately fitted, they do not hold the stud in position and are of no practical service. This accuracy is difficult to obtain, as the spaces vary on account of difference in the width of studding; while in zigzag bridging, the pieces are wedged firmly between the stud in the process of nailing. Unless in very high partitions, one row of bridging will suffice. Sliding door partitions are formed by placing 2 lines of stud, 2 in. x 4 in., so far apart as to allow the door to slide back in the space between (called pocket). These partitions should be trussed over the opening for the doors, to prevent the weight of upper floor from sagging them down, which would impair the working of the doors. When the space at the sides of the opening is more than 4 or 5 ft., there should be a diagonal brace cut in on each side to prevent the ends of the truss over the door from moving sideways.

Door Jambs.—At all door jambs the stud of partitions should be double; and, if the finish is of such width as to require it, they should be blocked far enough apart to allow the nailing of the finish directly to the outer stud. Wall stud, or those coming against brick walls, should be spiked every 24 in. to wood blocks 3 in. x 4 in. x 8 in., which must be built in, as the walls go up, in the correct position. Care should be taken that the bricklayer does not neglect to build in the blocks; otherwise the partitions will invariably shrink from the brick wall, leaving an ugly crack in the plaster. Corner stud, or those forming the angles in partitions, must be well spiked, in such a manner as to leave good spaces for nailing the lath work. For these places, straight dry stud of even size, should be selected.

Floors.—These are generally made of ⅞ in. matched stuff, and from 3 in. to 5½ in. wide; the narrower widths preferable. In laying floors, the stuff should be selected to match in width, and nailed to every joist with a 10d nail.* Flooring should be absolutely dry, and never put in a building until the roof is on.

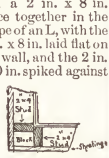
Balloon Frames.—The descriptions of girders, joist, studding, etc., is applicable to brick or frame structures, but in the latter, the bearing of joist on the outer walls, erecting of frame and sheathing, require further description. When the building is placed on wood posts, or brick or stone piers, they should be leveled at the required height, and then sills, composed of 3 pieces of timber, the centre one of which is 2 in. narrower than the other 2 (commonly two 2 in. x 10 in., and one 2 in. x 8 in.), all spiked together, with the joints broken, as described for girders, and the corners then carefully joined and spiked. The ends of the frame stud are then cut with a 2 in. mortise to fit in the channel between the 2 larger pieces of the sill, and carefully spiked to



Sections Through Water Table.

the same. If there is a brick or stone foundation, the sill is formed by spiking a 2 in. x 10 in. and a 2 in. x 8 in. piece together in the shape of an L, with the 2 in. x 8 in. laid flat on the wall, and the 2 in. x 10 in. spiked against the end of it. The frame stud are then notched out 1 in. for 8 in. of their height, so as to fit over the outer piece of the sill, and then spiked to each piece of the sill. The corner posts, if not solid, are made by spiking 2 pieces of stud together to fit the angle, with blocks inserted on those for outer angles, to stiffen them, about every 3 ft. Corner braces and pieces running from the bottom of the 2d tier of joist to the sills, as far from the corners as the window arrangements allow at the sills, and should always, be put in. For houses where studding used is 2 in. x 6 in., these braces should be 2 in. x 6 in. pieces; and where studding is 2 in. x 4 in. a 1 in. x 6 in. piece is preferable, as they (the braces) must be let in flush with the outer edge of the stud; if 2 in. braces were used in 4 in. studding, they would weaken it. The first tier of joist where there is a sill, should be sized by notching down on the sill, and then be spiked to the sill and also to the sides of the studding. Where the sill is of the second variety, the joist should be sized on the lower piece of sill and spiked to both pieces of the sill and to the stud. The second tier of joist, when the house is frame, rests on a 1 in. x 4 in. piece, let in flush with the inner edge of the stud, and the joist spiked to the sides of the stud. It is obvious how important a part spikes have in this construction, and a liberal use of them is necessary. Wherever possible, the stud should continue up the height of the walls, and must be doubled at the sides of all openings.

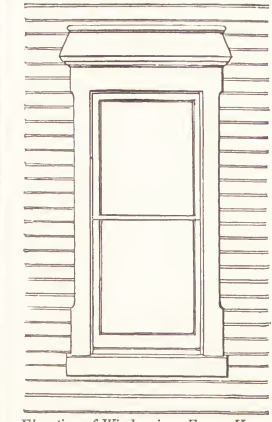
Gird Supporting 2d Floor Joist.



Construction of Corner.

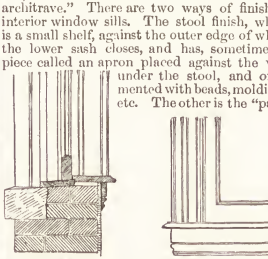
Sheathing.—In houses of good size, sheathing, or the covering of the frame with 1 in. boards, should never be omitted. In many cases these are, in turn, covered with felt paper, and the dressed siding or weather-boarding put over the felt. In houses of a cheaper class, in countries not exposed to severe climatic changes, the sheathing may be omitted; but this is not advisable, as it weakens the structure.

Joiner's Work.—The first portion of this work, is the door and window frames. Door frames are all plank except when paneled, and may be ornamented in various ways, with beads, flutes, etc.; those for outer doors should not be less than 1¾ in. thick; for inner frames, 1¼ in. They may be plain, single or double rabbetted (that is, reduced at the edges ½, to allow the door to fit in between the frame), giving the centre of the frame the appearance of a raised panel. The tops of sliding door frames should be made in one piece. Window frames are of 2 kinds, the box and plank. In plank frames, the sash are held up by catches, a great variety



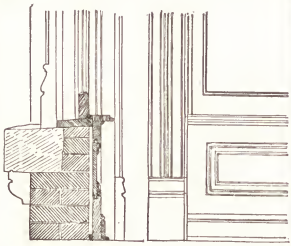
Elevation of Window in a Frame House.

of which are in the market. In box frames the sash are counter-balanced on cast iron weights, and hung by cords. Sash, in the better class of rooms, should be 1¾ in.; for those less important, 1⅜ in. Window sills, if wood, should be of cedar. The sub-sill placed on the sill. proper forms the bottom of the window frame. In frame buildings, exterior openings are ornamented by trimmings, called "outer architraves;" interior finish is called the "inner architrave." There are two ways of finishing interior window sills. The stool finish, which is a small shelf, against the outer edge of which the lower sash closes, and has, sometimes, a piece called an apron placed against the wall under the stool, and ornamented with beads, moldings, etc. The other is the "panel back," in which the entire space, from floor to sill, is covered with a wood panel; the inside architrave continuing to the base; while, with a stool



Section and Elevation of Window, with Stool and Apron Finish.

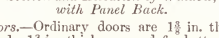
and apron finish, the architrave stops on the stool.



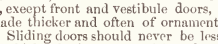
Section and Elevation of Window, with Panel Back.

Doors.—Ordinary doors are $1\frac{3}{8}$ in. thiek, 4 paneled; $1\frac{3}{4}$ in. thick are used for better elass interior doors, and should be used for exterior doors, except front and vestibule doors, which are made thicker and often of ornamental design. Sliding doors should never be less than $1\frac{3}{4}$ in. thick; the best elass $2\frac{1}{4}$ in.; doors of 2 thicknesses of $1\frac{1}{4}$ in. stuff glued. This prevents

Solid Molded.



Flush Molded.

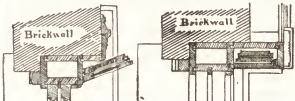


Lip Molded.

warping. Ordinary sliding doors are 6 paneled. Doors may be divided into the following styles: Those "molded on the solid" (such as have the panel molding worked on the stiles); "flush molded," or such as have a panel mold, which does not project beyond the face of the stile; "lip-molded," or with a projecting mold, which lips over the stile; or they may have raised panels in the main panel, or be plain. Doors are made with paneling of various kinds and styles.

Finish.—The interior trimmings of the openings of a building, the door and window finish, and the base boards. Plain finish consists of a simple casing, usually $\frac{7}{8}$ in. thick, of various widths; the top piece made $\frac{1}{4}$ in. thicker than the sides, and sometimes raised in the centre, called "pediment head." The base has the top edge beveled. Molded finish is of one or more members, which mitre around an opening with the outer mold in door casings, and when there are panel backs, made similar to the cap mold on the base, so as to mitre, making one continuous mold around the apartment. Plain pilaster finish has a molded or beaded easing in one piece, with a base, plain or molded, called "plinth," against which the base is stopped, and eorner blocks, in the upper angles, against which the side and top casing stop. Sometimes an ornamental top piece is added to the eorner block. Molded pilaster finish is designed to any degree of richness. The height of the base should be about 1-12 the height of an apartment, but varies with the style of the finish.

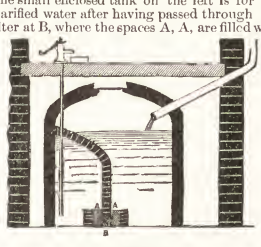
Blinds, omitting several patent varieties, are of 2 kinds, inside and outside. Inside are of $1\frac{1}{8}$ in. stuff, and, unless the width of opening is more than usual, in 4 folds. They are cut 2 sections in height, the division eoming at the meeting rail of the sash. The inner folds are



Sections Through Window Jamb, with Pocket for Inside Blinds.

made with movable slats, and the outer folds paneled and molded to match the finish in the apartment. There are 2 ways of disposing of the inside blinds when open, either to let them close against the window jamb and project in the room, or to prepare pockets in the jambs, into which they are pushed when open. The former is preferable. Outside blinds are made $1\frac{3}{8}$ in. thiek for ordinary dwellings. They are also sometimes made with a solid panel, when security is desired.

CISTERN. — The great importanee of pure drinking water is nowhere more appreeiated than in eountries where there are no wells; the illustration shows a form of filter eistern whieh will clear the most eloudy water. On the right is the receiving tank, where the diseharge from the down spouts from the house is received. The small enclosed tank on the left is for the clarified water after having passed through the filter at B, where the spaces A, A, are filled with



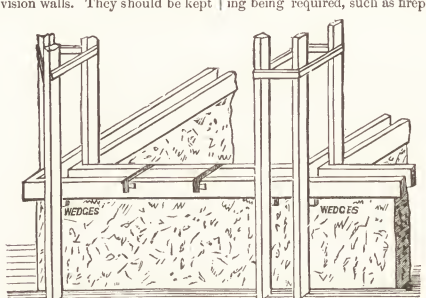
Filter Cistern.

gravel and fine charcoal. The supply is drawn from the second apartment, which fills as the

water is withdrawn. A more simple, and equally effective form of filter is made from an ordinary cistern, by building a partition wall in it, after the cementing of the outer surface has been completed; the pressure of water in the receiving side forces the water through the pores of the bricks and effectually clarifies it.

CONCRETE.—Made of broken stones, about 2½ in. in diameter, with the interstices filled with mortar, composed of 1 part cement and 2 parts sand; mixed together, dumped in position, leveled and rammed down solid with a maul, until the cement floats on top. This, 3 to 4 in. thick, makes a fine flooring for cellars; if used 10 in. to 15 in. thick, and 20 in. to 40 in. wide, it makes a fine footing or foundation for heavy walls, as good as stone, and cheaper.

CONCRETE HOUSES.—The method of building with concrete is shown in the illustration. Firmly fix stout wooden uprights, 3 x 9 in., at each angle of the building, and at the junction of cross or division walls. They should be kept



Manner of Constructing Concrete Houses.

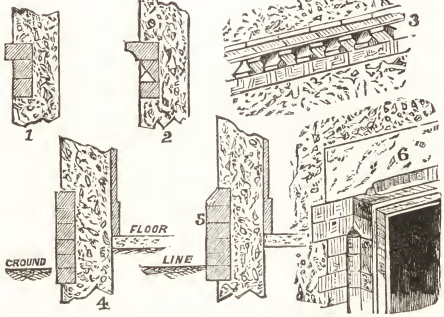
at a uniform width apart, with bolts or cross-pieces of wood; and stiffened with stays from the ground to keep them upright. Two 3 x 11 in. planks, one for each face of the wall (or four 3 x 7 in. deals, 2 for each face, each pair firmly secured with wedges), are required to form a trench the length and width of the intended wall. A piece of iron suited to the thickness of the wall, dropped over the plank at intermediate distances between the uprights and wedged up, will prevent the planks from bulging out by the pressure of the concrete; a few such pieces, to suit 6 or 9 in. walls, could be made by any blacksmith, of light bar iron. When the trench is filled with concrete up to the ground line, and above that to the top of the planks, they should be moved higher up, and secured with counter wedges. The lower edges of the planks should be allowed to cover the concrete about 1½ in., to securely confine the next layer of concrete and prevent oozing out. The trench being shallow, it may be filled in a day, allowing the concrete to set during the night, so that the trench may be ready for moving higher the next morning. The sides, being only a single plank, will be lighter to move up and down than if made up of 2 or 3 in depth; the shallowness of the trench will enable an unskilled laborer to fill it in better with concrete. It will also be open to supervision, although the progress will not be so fast as if the trench had been 18 in. deep; but where unskilled workmen are employed, the slower progress will be more sure. No scaffold poles will be required, as strong wood brackets can be secured to the wood uprights to carry the scaffold planks. Special provision will have to be made for fireplaces and for gables. Door and window frames should be built in, partially driving a few nails in at the backs of the frames, to take firm hold of the concrete. Joist should be fixed in place, and either wood fillet, hoops, iron, or nails driven in at the ends, so as to secure them to the concrete, and form a perfect tie from wall to wall. In the case of any opening being required, such as fireplaces or arches, wood cores or molds, made tapering, should be used so as to be easily withdrawn when the concrete has set; wood cores will be required for chimney flues, either round, square or oval, and by the same means air flues or other openings for ventilation can be formed as the work proceeds. The face of concrete being smooth, no parqueting will be required for flues; and one coat of plastering to walls will be saved. The floors of the kitchen, if formed with concrete, will be drier and warmer than either tiles or stone. Concrete (if made of Portland cement and fine broken material) is impervious to moisture, and will make a drier and warmer house than one built of brickwork. In the illustration, 1 2, 3, are details of a string to ½ in. scale; 4 and 5 are details of plinths; and 6 shows a window with stone head and chamfered red brick jambs.—*Making Concrete.* The position of the intended building being staked out, the trenches for the foundations dug, and the several materials required to make the concrete being arranged, 2 mixing boards are required, a useful size be-

ing 12 ft. x 7 ft.; but this will depend upon the nature and extent of the building. They should be made of 3 in. planks, firmly secured to cross sleepers, without sides, so as to form a good, firm and solid floor upon which to mix the concrete. The larger materials must be broken the size of a hen's egg and deposited in heaps around the mixing boards, within reach; a plank is laid from each heap to the board, and towards the building, to facilitate wheeling. The men should proceed to wheel on to the mixing board as much of the materials as can be conveniently turned by 4 men; 2 of the men wheel the stuff on, while the other 2 spread it evenly, depositing the whole in layers. The lime should be thoroughly slaked, the proportions being 1 part lime to 6 or 7 of broken material, large and small. These should be mixed in a dry state by turning the mass over twice. Commencing at the centre and throwing over towards the right and left, the mass will be divided into 2 heaps, which should be again thrown together, and form 1 heap. Water should now be sparingly added, and the whole thrown back in 2 heaps, and again back to 1, so that the various materials may be thoroughly incorporated. The mixture is now ready for use, and should be at once wheeled to the building and thrown into the trench or mold, as the case may be.—*Concrete Cement.* This is made in the same manner as for lime concrete. The only difference is that cement is used in the place of lime; as the building materials and the rough materials are reduced in size, the smaller the rough materials are broken up, the stronger will be the concrete. Concrete cement is used chiefly for walls above ground.

EXCAVATIONS.—Foundation walls for buildings must extend below frost line, and deep enough to reach solid ground. The earth should be removed from 4 in. to 6 in. from wall lines, to admit of the foundation walls being built and pointed; when the walls are up, this space should be filled with clay, puddled and rammed solid, to keep the water from the walls.

GAS.—The arrangement of gas fixtures depends on the use to which an apartment is to be put and must be governed thereby. Parlors, dining rooms and bed rooms should have centre lights; also front halls, where the gas is not on the newel posts. Bed rooms should have a bracket on each side of where the bureau would be placed. In first-class work there is a branch pipe leading from the supply of a story to where the centre drops come; and in no case should the joist be cut more than 24 in. from the points of support. Municipal gas companies have regulations governing the size of the pipe. There are various gas machines, each requiring their own sizes. All gas pipe should be tested after lathing is completed.

HARDWARE.—Consists of the hinges, locks, bolts, window locks and lifts, sash weights and cord, and the ornamental facings of the parts, called the "furniture. The most inexpensive is the Japanned finished, and the most expensive real bronze, more or less ornamental. The principal varieties are: Japanned, plated, Tucker and Berlin bronze, and real bronze. Knobs are mineral, porcelain, jet and bronze, Care should be taken to use none but the best brands and makes. Mortise locks should be used, as the old style rim lock is liable to become out of order and troublesome. Chamber doors and outer rear doors ought to have thumb-bolt attachments on the locks. No furniture should be put on any of the work before the varnish is thoroughly dry.



Details in Constructing Concrete Houses.

PAINTING AND GLAZING.—Painting should have special attention. The foundation of all durable work is good material. Pure lead and oil must be used, or all will be in vain. The wood-work must be smoothed before paint is applied, and knots covered with shellac; then the first coat can be applied. This coat ought to be composed principally of oil, with

just enough body added to fill pores. Using plenty of oil makes it penetrate the wood, and prepares it to receive following coats without drawing on them for oil, which would deaden and make the finish look spotty. The work must be sand papered before each coat is applied, dust or dirt removed, and each coat thoroughly dry before succeeding ones are applied. For common work 2 coats may suffice; but on all interior work, not less than 3 ought to be used. A good coat does not mean a heavy one, for, when heavy coats are applied, they are liable to blister. The coats should be medium, with sufficient body to cover well; and when well rubbed down, this will be found to produce satisfactory results. Graining, when put over good ground work, will have a proper foundation; but for fine panels, it is necessary to cover the panels with ground pumice stone and oil, and then rub down smooth with pumice stone and water. Good graining is a pleasing decoration; but poor work is a detriment, and plain painting in parti-colors is preferable. One of the most common mistakes in graining is to make the work too "loud," which here, as in every thing else, looks common. Oil color graining is more durable than when done in water colors. Varnish must be of good material and carefully applied, otherwise all defects present in the work will be magnified. It should never be applied when the temperature prevents it flowing freely, as then every hair in the brush will leave a ridge. As regards color, good taste must be the judge, and a selection of harmonious colors adds much to appearance. Glass may be classified into single strength, double strength and plate-glass. Single is used in less important sash, except in places where the size of the light prevents. Double is used for front sash. Good glass must be true, flat, and free from waves. To properly set glass, brads should be used without stint, as otherwise the movement of the glass will push back the putty before it hardens, leaving a space larger than the thickness of the glass; a rattling window will be the result. Even bedding of the glass against the sash is indispensable.

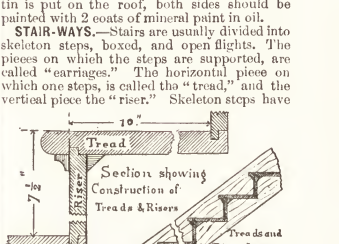
PLASTERING. — The foundation for plasterer's work must be looked after in that of the carpenter's, who must space his joist and studding accurately, 16 in. from the centres, so that the spaces will fit the length of the lath. Lath should be dry, carefully selected, and free from knots. Rafted lath are preferred to saw-mill lath. The spaces between the lath must be $\frac{3}{8}$ in. to $\frac{1}{2}$ in., for the plastering to be pushed between and run over on the back of the lath, forming the "key" of the plastering. The first or "scratch" coat, applied to the stud walls and ceilings only, must have plenty of long hair, mixed in when ready for use. This should be keyed to the lath work, and well cross-scratched to afford a good key to the second coat. When scratch coat is hardened, the second coat is applied, composed of clean, sharp sand and fresh strong lime, well tempered. In this coat all inequalities of surface should be overcome and the corners and angles be left sharp. This, like the first coat, must be dry before the white coat is applied. The white coat is composed of pure white lime and fine, sharp sand, washed to remove foreign matter, with sufficient plaster of Paris added to give it a smooth surface. This coat must be thoroughly "troweled" down, and washed with clean water and a brush. Troweling is important, otherwise the plaster will show cracks in all directions, which are hard to remove. While each coat of plaster must be dry before the next one is applied, too rapid drying must not take place; for that reason the blinds must be hung, and when there are no outside blinds, the sash put in place, so as to stop draughts. Cracks are annoying, as they do not show themselves, in some cases, until after the white coat is finished. Plaster cornices are measured by the length of the face measured around all the moldings. This can be ascertained by using a string and passing it over all and then taking the length of string used. The cornices and centres should be well keyed. Centres ought to follow the form of the room in shape. If there be any imperfect joints they should be discovered and fixed before plastering.

PLUMBING AND SEWERAGE. — This is a subject on which there is great diversity of opinion. Although much has been discovered, and many improvements made in the last 10 years, our advances have only taught us how much more there is about which our knowledge is insufficient. Too much attention cannot be paid to sewer pipes for the whole system of plumbing, which represent the main arteries; and any defect soon spreads through the whole structure. Where possible, the rain water from the roof ought to be taken through them, which will give them a wash out not to be attained in any other way. The pipe must be laid with a good fall to the outlet, not less than $\frac{1}{4}$ to 1 ft., and the more obtained within a limited extent, the better; more fall than 1 in. to 1 ft. being superfluous. They must rest on solid ground; and where such cannot be obtained, a prepared planking must be laid under them in the trenches. All joints should be thoroughly cemented. Between the house and the point of discharge, whether a sewer or vault, there must be a trap, with the neck ventilated by a stand pipe extended to the level of the yard. If the discharge is into a vault, connected with the sewer, a second trap ought to be placed between the vault and sewer (not ventilated), which will prevent gas from the main from penetrating to the vault. All sewer pipe inside of buildings, in good work, are made of socket joint iron soil pipe; those outside may be of glazed clay. Take the sewer out of the building or cellar as soon as practicable. No sewer pipe ought to be laid in the vicinity of cisterns or wells, as the effect of one imperfect joint would be disastrous to the health of those using the water. A few words are needful on the subject of traps and ventilation. A trap is the bent portion of a pipe, or a receptacle so formed as to retain a body of liquid large enough to completely fill the section of the pipe, thus shutting off the air from such portions of the works as lie beyond the trap, i. e., the branches leading to the plumbing.

To overcome the pressure of such air, which frequently becomes charged with sewer gas, ventilating pipes are provided which connect with the trap on the side of the discharge, thus affording a free outlet for such air. By supplying all branches with a constant volume of air all siphonage of traps is avoided. Some professional men advocate the use of a ventilation system only, and use no traps; but as our knowledge is limited, it would seem best to employ both safeguards. Water has great affinity for gases. This can be seen by the short time necessary to taint water placed in a bucket in a freshly painted apartment. If we did not use a system of ventilation, the great pressure exerted by accumulated sewer gas would charge the contents of the traps, and by evaporation it would be discharged into the apartments. By providing an outlet this danger is reduced. The more simple and condensed the plumbing of a structure, the better. Washstands in living apartments should be avoided, and a door connecting bed rooms with bath rooms is often a cause of disease. This is a matter where convenience should not be regarded, for severe and dangerous sickness may follow such indulgence. Laundry sinks are set low, so as to facilitate the emptying of large tubs, etc. Kitchen sinks are of many varieties, plain iron, enameled, soapstone, etc., and should have good drain boards. It is preferable to place sinks on open frames, to inclosing them, as such cupboards are likely to harbor vermin. Butler's sinks are made of copper, of a shape to suit space. All sinks should have a screw plug in the bottom of the trap, to facilitate cleansing. Strainers are needed in the sink to catch large particles and prevent choking the trap. Washstands should have plug chains and rubber plugs. Bath tubs are made of tinned copper, 12 to 14 oz. per sq. ft., and need plugs and chains the same as washstands. By using rubber plugs, they never batter the receptacles. The waste pipe and overflow of baths and washstands should be separately trapped. Water closets are made in endless styles, of which the "pan closet" is the worst; a side outlet hopper closet with flushing tank, is the most perfect. All plumbing above the first floor should be lined underneath with sheet lead, turned up not less than 3 in. on the edges, and connected with the soil pipe by a separate waste pipe and trap. Boilers ought not to be tested to less than 150 lbs. pressure. The supply pipes are of extra strong lead, usually $\frac{3}{4}$ to $\frac{5}{8}$ inch from the street main to the kitchen sink. The waste can be of medium lead pipe. Joinings must be carefully made, and air chambers provided over all cocks, to prevent hammering in the pipe. The supply pipe must be laid so as to enable one to drain them completely at some point in the cellar. Compression faucets are best. Keep all soil and waste pipe as short as possible, as every inch adds to the surface, gathering foul matter and discharging sewer gas into the house. Never try to economize in this part of the dwelling. The many new improvements made in this branch, render it difficult to select the best; a good adviser in this work is the most effectual safeguard.

ROOFING.—*Shingles.* These are made of different kinds of wood, cedar, cypress, and white pine, sawed or shaved. The best shingle is of shaved cedar. As a rule the shaved shingle is better than the sawed; $4\frac{1}{2}$ in. lap to the weather is usual to a 16 in. shingle; but $5\frac{1}{2}$ in. is sometimes allowed on buildings of minor importance. They should be carefully blind-nailed to the sheathing of roofs. For shingle roofs, less than $\frac{1}{4}$ pitch is not advisable.—*Slate.* The best quality of slate comes from Maine and Pennsylvania quarries. A simple test for the quality, is to take a dry piece, and, after weighing, immerse it in a bucket of water; then, after a soaking of 24 hours, re-weigh; the less water absorbed the better the slate. Slate roofs should be put on over felt paper, carefully lapped; none but galvanized iron nails are trustworthy.—*Tin.* Ordinary roofing is designated by I. C. Bright tin. The best quality used for the purpose is the I. X. Bright. For portions not liable to be walked over, the tin should be put on with standing grooves, with the seams carefully locked and soldered. For ordinary work, every other sheet of tin should have a tag soldered to the underside, to fasten it to the sheathing. In good work every sheet should be back-tacked. Before the tin is put on the roof, both sides should be painted with 2 coats of mineral paint in oil.

STAIR-WAYS.—Stairs are usually divided into skeleton steps, boxed, and open flights. The pieces on which the steps are supported, are called "carriages." The horizontal piece on which one steps, is called the "tread," and the vertical piece the "riser." Skeleton steps have no risers, and are only used for cellar stairs. Boxed stairs have walls, or partition on both sides, against which the outside carriages are placed, and are enclosed stairs; although, in some cases, there may be a rail on one side, with the space between that and the floor boarded with partition stuff. In such stairs the treads and risers are grooved and glued together with small blocks glued and screwed in the inner angle of joint, and then placed on the carriages. To prevent a squeaking the bearings of the treads on the carriages should be kept level so as to bring the weight on all the supports. Open flights are of 2 kinds: those of which the face string, or outer carriage is cut out for the treads and risers, and then the nosing with scotia and fillet returned on the string, or extended around



on the string. The other variety has a close or curb string which hides the treads and risers

Stair with Open Face String.

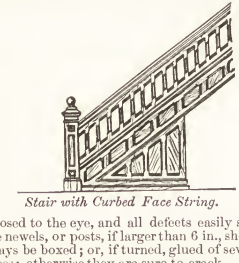
and continues in one width up with the slant of the stairs. Sometimes this string is ornamented. Rails are double-molded, and show the same shape on both sides. Balusters need no

Range Work.

Broken Ashler.

Tooled Margin.

description as they are of numberless forms, to suit taste and means. Great care should be taken in stair work, to secure accurate workmanship and dry material, as the entire work is



Stair with Curbed Face String.

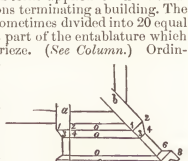
exposed to the eye, and all defects easily seen. The newels, or posts, if larger than 6 in., should always be boxed; or, if turned, glued of several pieces; otherwise they are sure to crack.

STONE WORK, Cut.—Is either drove, bush-hammered or tooled, and made to any degree of fineness. If the work required has to be fine, it is first cut to an even surface; then rubbed with a stone and fine sand and water. Stone fronts are generally built with thin stones, 4 in. or 5 in. thick, set on edges, and backed up with a brick wall, to which the stone is anchored with flat iron hooks with the outer end turned down and gained into the top edges of the stone; the other end turned up and built into the brick wall.

STONE WORK, Range.—A class of rough stone work facing the outer walls when exposed above grade, and consists of stones in even courses and regular height, and in rectangular blocks with the face left stone rough or with broken surface; the top, bottom and ends hammered off to admit of close, straight joints, which should be raise-pointed in best cement colored with lamp-black or bone-black, with straight oval joints. If the stories are of uneven height, and laid up without being kept in courses, the work is called "broken ashler;" if the face of the stones is worked off to an even surface with a pointed tool, it is called "pitch-faced work;" and, if dressed only on the margins, it is then "ashler" or "range work," with tool or drove margins.

STONE WORK, Rubble.—This means rough stone walls, built of promiscuous stones neatly fitted and bonded together, with the spaces filled with mortar. The stones should have flat bottoms and tops, and be selected and laid in the wall so as to break joints every time over each other on the space of the walls, and lap past each other, extending through the walls, and should be bonded every few feet with stones extending through the thickness of walls. All stones should be bedded in mortar, and spaces filled with mortar; where the spaces are large and stories irregular, such should be filled with spauls, or small stones, well bedded in mortar, so as to level up the walls to receive the stories above. These walls should be built 18 in. to 24 in. wide, to strength required; true and plumb to a line on both sides, with all joints and cracks neatly pointed.

CORNICE. — A term applied to horizontal molded projections terminating a building. The eaves cornice is sometimes divided into 20 equal parts, and is that part of the entablature which surmounts the frieze. (*See Column.*) Ordinarily it is composed of the fillet, cymatium, corona, ovolo and cavetto moldings and divided into 2 principal parts, the upper one of which projects beyond the lower, and is supported by modillions. The proportions of the cornice in rooms should be less than in halls, salons, etc. In rooms finished with a single cornice, it should not exceed 1-15 nor be less than 1-20 of the height of the room. The form of angle bracket for a cornice may be found as follows: Let *a* in the engraving be the common bracket; draw the parallel lines, *o o o*, to meet the mitre line, *c*; square up on each line at *c*, and set the distances, 1, 2, 3, 4, etc., on the



Angle Bracket.

common bracket, from the line, *d*, on the small lines from *c*; through these points, 2, 4, 6, etc., trace the form of the bracket.

DOME.—The concave covering of a building, and may be either a segment of a sphere, of a spheroid, or of any similar figure. When made of wood its strength depends on its construction. The usual form is that of the sphere. When the interior does not rise too high, a horizontal tie may be thrown across, by which any degree of strength may be obtained, and by means of which trusses may be formed on each side of the opening in the top. Upon these the whole frame-work is to depend for support, and their strength must be calculated accordingly. When the interior dome rises too high to admit of a level tie beam, the framing may be composed of a succession of ribs standing upon a continuous circular curb of timber. This must be well secured, as it serves to resist the lateral thrust of the ribs. In small domes the ribs may be cut from wide planks, but for large structures they must be built in 2 thicknesses, and placed 2 ft. apart at the base. The strength of the scantling varies with the size. For domes 24 ft. in diameter, 1x8 in. will be required, which will increase to 3x13 in. for one 108 ft. in diameter. The curve of equilibrium should pass through the middle of the depth of the framing. For an arched roof the curve of equilibrium is that of a parabola; for a dome having no tower or cupola above it, a cubic parabola; for one having a tower above it, an approach to a hyperbola, as great strength is required at its upper parts. The pressure of a circular dome is greatest at $\frac{1}{3}$ of its height; therefore an iron band should be placed around it at that height; also around or across the base. The boards may be applied either in the form of gores, or in portions of conic surfaces.—*To Find the Form of a Base or Covering for a Cone or Circular Dome.* Let *a*, *Fig. 1*, be the width of the base to the cone. Draw the line *b* through the centre of

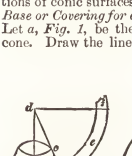


Fig. 1.

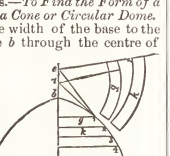


Fig. 2.

the cone; extend the line of the side *c*, till it meets the line *b* at *d*; on *d* for a centre, with 1 and 2 for a radius, describe *e*, which will be the shape of the base required; *f* will be the joint required for the same.—*To Find the Shape of Horizontal Covering for Circular Dome.* The principle which is employed is shown at *Fig. 2*, supposing the surface of the dome to be composed of many plane surfaces. The narrower the pieces the more accurately they will fit. Draw the line *a* through the centre of the dome, *Fig. 2*; divide the height from *b* to *c* into as many parts as there are to be courses of boards or tin. Through 1 and 2 draw a line meeting the centre line at *d*; that point will be the centre for sweeping the edges of the board *g*. Through 2 and 3 draw the line meeting the centre line at *e*; that will be the centre for sweeping the edges of the board *k*, and so on for the other courses.

DOORS.—Their construction should accord with the size and style of the building or apartment. The principal door of a public building should be 6 to 12 ft. wide, and proportionately high. The doors for a dwelling 2½ to 3½ ft. wide and a little more than twice their width in height. Closet doors 2 ft. wide, of even height with the other doors in the apartment. Folding doors should be used where greater width is required than 3½ ft.; the height about 1-10 greater than the adjacent single doors, and the width equal to 4-5 of the height, if the width of room allows. A 4 panel door is strongest. (See *Paneling.*) In doors having 2 panels, the stiles should be 1-7 of the width. Whatever the number of panels, the united widths of the stiles should equal 3-7 the width of the door. The bottom and lock rails should each be equal to 1-10 of the height of the door, and the top rail and all others of the same width as the stiles. The molding on the panel should be equal in width to ¼ the width of the stile. The lock rail is essential for strength and durability. Doors should be hung so as to open into rooms, and not into halls or passages. If it opens away to the right, it is a right-hand door; if to the left, it is a left hand-door. Doors are affected by an unequal temperature of adjoining rooms, causing the stiles to spring; this may be remedied by using three hanging butts. There is no rule as to the proper edge to which to affix the hinges.

DOVETAILING.—The dovetail joint shown in *Fig 1* consists of the pin, A, and the dove-tail B, the pins usually made first, and should be on the end or short side of the box. The marks, *e e e e*, show the size of the interior of the box when complete. Take the mitre bevel and set it about 60° or 70°, the angle is not important, and set off on the edge of each end of A the 2 outside pins, and any convenient number of pins between them, the bevel being reversed to mark the 2 sides of each pin. Produce the bevel round both faces of the board, with the square, as far as gauge lines *e e*. Now fix the board firmly on the bench, end up, and with the dovetail saw cut the gashes *c c c*. Lay the board flat on the bench, face down, and take a sharp chisel and a mallet, and give a cut exactly on the square line, *e*, between each pin. Turn the piece over, and cut from the other side gauge-line until the pieces between the pins are removed, taking care that the pins are not injured. Carefully square the spaces with the chisel, without using the mallet, and trim off the roughness left by the saw on the pins. Next take the front or back (2) of the box and lay on the bench inside uppermost, and place on it the end A on edge, with its inside edge touching the square mark *e*, and with its top and bottom edges flush with those of 2. Now, with the point of the striking-knife, mark off the bevels on the edges of each pin, and produce the lines with the square across the end of B and to the square mark on the other side, with the mitre bevel. Saw

lines *h h*, with the dovetail-saw, and remove spaces *i i* by chiseling out across the square

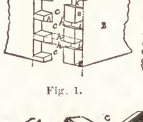


Fig. 1. Fig. 2.

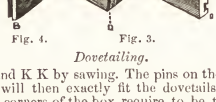
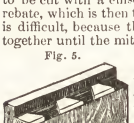


Fig. 4. Fig. 3.

Dovetailing.

line, and K K by sawing. The pins on the ends of A will then exactly fit the dovetails in B. The 4 corners of the box require to be treated in the same way, the pins being worked on each end of the shortest side or end, and the dovetails on each end of the longest or side of the box. Glue in firmly, and after the work is dry plane off projecting ends. The appearance of the joint will then be as seen in *Fig. 2*, in which the end grain of the wood is shaded. *Fig. 3* represents the corner of a drawer as commonly made, on which, although the dovetails are seen on the side when the drawer is open, they are invisible in front. The latter having been planed up true, a line, C D, is made with the gauge on both ends of the same to mark the portion which is to be left uncut. Let the pieces be first rebated out, as A B, *Fig. 4*. The pins and dovetails are then to be cut with a chisel in both parts, below the rebate, which is then to be cut to a mitre. This is difficult, because the pieces cannot be fitted together until the mitreing is done. An easier method is the lap or secret dovetail, in which only one piece is rebated; but the dovetails in the other are not cut through. See *Fig. 5*. In this case no such difficulty occurs in marking and cutting the pins made in the rebated piece, and the pieces can be tried in their places with ease, as in common dovetailed work.

Fig. 5.

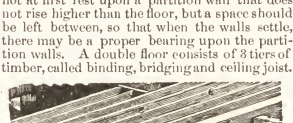


Secret Dovetail.

DURABILITY. — Certain timbers of great durability, when framed together produce mutual destruction. Experiments with cypress and walnut, and cypress and cedar, prove that they rot each other while joined together, but on separation the rot ceases, and the timbers remain sound for a long period.

ELASTICITY.—The quality of springing back, or toughness. The following is a comparison of the different woods: Ash is 1, fir .4, elm .54, pitch pine .57, teak .59, oak .63, spruce .64, yellow pine .64, cedar .66, chestnut .73, larch .84, beech .86.

FLOORS.— May be comprised in 3 following kinds: Single joisted floors, double floors, and framed floors. A single joisted floor consists of only one series of joist; sometimes every third or fourth joist is made deeper, with ceiling joist nailed across at right angles. This kind is used in ordinary buildings, where the span from wall to wall does not exceed 24 to 25 ft. Boards are laid transversely on the joist, and secured by long floor brads after having been pressed together by a screw attached to the joist like a vice during the process of laying and nailing. When a close floor is required, the planks must be jointed by a groove and tongue. After the planks have been nailed to the joist, the brads are countersunk, and the edges of the boards planed level. It is economy to have floors of narrow boards and good wood. Broad and poor boards shrink and leave cracks as vermin nests, and warp at the sides and ends and wear out carpets. Hemlock is probably the worst wood, and spruce or yellow pine the best. Oak is preferable. The combinations of walnut with chestnut, oak, and other lighter-colored woods, are durable, and save matting if carpets are removed in hot weather. The high temperature of the house, fire, hot-water pipes, etc., are severe; it is, therefore, necessary that the wood be well seasoned. What is called naked flooring are the joist which support the flooring boards and ceiling of a room. The wall plates or timbers which receive the ends of the girders or joist, should be sufficiently long and strong to throw the weight upon the piers. When the ends of girders lie over doors or windows, the strength of wall plates must be increased. Wall plates must be larger as their length and the weight of the floor increases; the scantlings will vary from 4½ by 3 in., to 7½ by 5 in. When the ends of joist are supported by outside walls whose height is great, the middle of such timbers should not at first rest upon a partition wall that does not rise higher than the floor, but a space should be left between, so that when the walls settle, there may be a proper bearing upon the partition walls. A double floor consists of 3 tiers of timber, called binding, bridging and ceiling joist.



Timbers Used in Flooring.

a a, girder; *b b*, binding-joist; *c c*, ceiling-joist; *d d*, wall-plates; *e e*, bridging-joist.

The binding joist is the principal support of the floor and run from wall to wall. The bridging joist lie transversely on the binders, and are attached to them by notching, or framed between with chased mortises. Ceiling joist are attached to the binders by notching, or pulley mortising. Framed floors differ from double floors in having the binding joist framed into

large pieces of timber, called girders. When the breadth of girders is considerable, it is an excellent method to saw them down the middle and bolt them together with the sawed sides outward. This gives an opportunity of examining the centre of the log, and reduces the timber to a smaller scantling and less liable to rot. The slips put between the halves or flitches should be thick enough to allow air to circulate freely. Single joisted floors, when the bearing exceeds 10 ft., should be cross-bridged between the joist, to prevent turning or twisting, and to stiffen the floor; when the bearing exceeds 15 ft., 2 rows will be necessary, and so on, adding another row for each increase of 5 ft. bearing. Single joisting may be used to any extent for which timber can be got deep enough; where it is desirable to have a perfect ceiling, the bearing should not exceed 18 ft., nor the distance from centre to centre be more than 16 in.; otherwise the bearing for the lath becomes too long to produce good work. Fire-proof floors may be made by filling a frame-work with concrete or cement, on which tiles may be laid to form the flooring, or joist of timber on which planks may be laid down and nailed in the ordinary way.

FRAMING. — The process of joining and fitting the timbers which comprise the skeleton of a building. A knowledge of the laws of pressure and strength of timber is imperative in determining the position and dimensions for the timbers which compose a roof, floor, partition, or bridge. Materials should be of good quality and in proper quantity, any superfluity being an injury. A heavy body exerts a pressure equal to its own weight in a vertical direction. When 2 supports are inclined at different angles, the pressure is proportionately unequal. The united pressures which are exerted by a weight upon 2 inclined supports will always exceed the weight. When the supports are not inclined equally, the strain will be greatest upon the support that has the greatest inclination to the horizon. The smaller the angle of horizontal inclination, the greater the pressure upon the supports. Correct ideas of comparative pressures can be formed by drawing designs of framing and estimating the strains according to the parallelogram of forces, always drawing the triangle so that the 3 lines shall be parallel with the 3 forces or pressures, respectively. If a scale cannot be had of equal proportions with the forces, the calculation is effected by making the line of the triangle that represents the known weight equal to the unity of a decimally divided scale, and measuring the other line in tenths and hundredths.

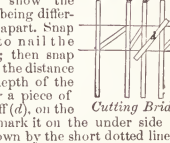
GLUING. — Carpenters use various forms of clamps to hold work until the glue is dry; but for those having no such convenience, the best plan is to bind the parts together with twine, and then set them aside for 12 hours. It is seldom that articles once united by glue and separated, will unite firmly a second time. (See GLUES in ADHESIVES.)

JOIST. — Narrow beams of timber about $2\frac{1}{2}$ in. thick, and varying in depth according to the extent of the span from wall to wall. As walls of successive stories are raised, the joist is laid across, 15 or 18 in. apart, and the ends imbedded in masonry. In building a row of houses, care should be taken to keep 7 in., at least, of masonry between the ends of the joist bridging the space from party wall to party wall, so as to prevent communication of the flames in case of fire. To steady the joist, cross struts are often nailed transversely to the joist and across each other like the letter *X*, at intervals of 2 or 3 ft. —*To Find the Depth of a Joist, the Length of Bearing and Thickness Being Given.* Divide the sq. of the length in ft. by the thickness in in., and the cube root of the quotient multiplied by 2.2 for pine, or 2.3 for oak, will be the depth in in.

TABLE OF SCANTLINGS OR JOIST FOR DIFFERENT BEARINGS, FROM 5 TO 20 FT.

Length of Bearing in Feet.	Thickness 2 in.	Thickness $2\frac{1}{2}$ in.	Thickness 3 in.	Thickness $3\frac{1}{2}$ in.	Thickness 4 in.
	Depth in In.	Depth in In.	Depth in In.	Depth in In.	Depth in In.
5	$5\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{3}{8}$	$4\frac{1}{2}$	4
6	$5\frac{3}{4}$	$5\frac{3}{8}$	5	$4\frac{3}{8}$	$4\frac{1}{2}$
7	$6\frac{1}{2}$	6	$5\frac{1}{2}$	$5\frac{1}{4}$	5
8	7	$6\frac{1}{2}$	$6\frac{1}{2}$	$5\frac{7}{8}$	$5\frac{3}{4}$
9	$7\frac{1}{2}$	$6\frac{7}{8}$	$6\frac{1}{2}$	6	$5\frac{7}{8}$
10	8	$7\frac{1}{2}$	7	$6\frac{3}{4}$	$6\frac{1}{2}$
11	$8\frac{3}{4}$	8	$7\frac{1}{2}$	7	$6\frac{3}{4}$
12	$9\frac{1}{2}$	$8\frac{1}{2}$	8	$7\frac{1}{2}$	7
13	$9\frac{3}{4}$	9	$8\frac{1}{2}$	8	$7\frac{3}{4}$
14	10	$9\frac{1}{2}$	9	$8\frac{1}{2}$	8
15	$10\frac{1}{2}$	$9\frac{3}{4}$	$9\frac{1}{2}$	$8\frac{3}{4}$	$8\frac{1}{2}$
16	11	$10\frac{1}{2}$	$9\frac{3}{4}$	$9\frac{1}{2}$	$8\frac{3}{4}$
17	$11\frac{1}{2}$	$10\frac{3}{4}$	$10\frac{1}{2}$	$9\frac{3}{4}$	$9\frac{1}{2}$
18	12	$11\frac{1}{2}$	$10\frac{1}{2}$	10	$9\frac{3}{4}$
19	$12\frac{1}{2}$	$11\frac{1}{2}$	$10\frac{3}{4}$	$10\frac{1}{2}$	10
20	13	12	$11\frac{1}{4}$	$10\frac{3}{4}$	$10\frac{1}{2}$

—*To Find the Depth of a Girder when the Length of Bearing and Thickness of the Girder are Given.* Divide the sq. of the length in ft. by the thickness in in., and the cube root of the quotient multiplied by 4.2. for pine, by 4.34 for oak, will give the depth required in in.—*To Find the Thickness when the Length of Bearing and Depth are Given.* Divide the square of the length in ft. by the cube of the depth in in., and the quotient multiplied by 74 for pine, or by 82 for oak, will give the thickness in in. In these rules the girders are supposed to be 10 ft. apart, and this distance should never be exceeded; but should the distance apart be more or less than 10 ft., the thickness should be proportionate.—*To Cut Bridging to Fit Exactly the First Time.* Let *a*, etc., show the floor beams, being different distances apart. Snap a line at *c* to nail the bridging by; then snap another at *d*, the distance from *c*, the depth of the timber. Lay a piece of bridging stuff (*d*), on the timber, and mark it on the under side by the timber as shown by the short dotted lines; saw correctly, and it will fit exactly when in place,



Cutting Bridging.

no matter what distance apart the timber is.

LADDERS. — The most desirable timber for the sides of ladders, is straight-grained white pine or basswood; these are light and tough. For a ladder 20 to 25 ft., have a plank sawed 2 in. thick, 8 in. wide, and length desired. It should be carefully laid away to season. When sawing, mark out so that the bottom of the side will be 5 in. wide and the top 3 in. In a 20 ft. ladder the sides at the top should be 13 in. apart, and 20 in. at the bottom. The rungs should not be less than 1 in. in diameter, of seasoned tough wood, pinned in position; the whole then painted and hung up under shelter. A ladder should be of length sufficient to reach the roof of the highest building in case of fire, or for repairs. A straight, second growth white pine, 6 in. in diameter at the butt, if peeled and split in 2, will make durable sides. Chestnut and other light woods may be used for the same purpose.

LATHING. — The process of nailing lath to the studding of a partition or joist of a ceiling. Lath is made in 3 and 4 ft. lengths, and is called single, lath and a half, and double, according to thickness. The first is the thinnest; the second about $\frac{1}{8}$ thicker, and the double twice as thick as single. Single lath is used for partitions, and the double for ceilings. Both lengths should be used for ceilings to enable the plasterer to break the joints, thereby improving the general key, and strengthening the ceiling. The ends of lath should never be lapped when they terminate upon a quarter or batten. Lath come in bundles of 100 each; 10 bundles, or 1,000 lath, will cover about 60 sq. yds., and will require about 7 lbs. of 3-penny nails.

LUMBER. — The best is that sawed from timber which has attained full maturity before being felled. The logs are cut from November to March; then hauled to the nearest stream and deposited to be rafted. When not rafted, or joined together, the logs are marked separately and floated. When ice breaks up and streams begin to swell, the process of guiding the lumber down the stream commences. When at its destination, it is taken to the saw-mill and cut into beams, posts, planks, seantlings, etc. — *Piling.* Lumber should not depreciate for lack of care in piling. Piles should be built so that the front cross-piece shall be higher than the back, and each in succession overlapped beyond the previous one. A pile 20 ft. high should incline outward from base to top 18 or 24 in., which will prevent storms from eating in, or snow from resting to melt and form ice. The sides should be carried up plumb, each cross-piece on top of another, so that the weight shall rest solidly on the foundation timber. If the courser be placed a little forward or back of the previous one, the weight above will warp and perhaps break the lumber. Piles should never be placed less than 3 ft. apart, and boards in the pile should be laid with 2 to 4 in. space between them. — *Rules for Measurement.* The unit of board measure is 1 sq. ft., 1 in. thick, when speaking of the contents of timber. The contents of a board, seantling or plank, can be ascertained by multiplying the length of the board in ft. by the width in in. and that by thickness, and dividing the product by 12; the result is the sq. ft. of the board. If the board or joist is broader at one end than another, multiply the length in ft. by the breadth of the middle in in. and divide by 12; or add together the width of the ends in in., and multiply the length by $\frac{1}{2}$ this sum, and divide by 12; the result is the number of sq. ft. in the board. Pine and spruce spars, 10 to 4½ in. in diameter are estimated by taking the diameter, minus the bark, at $\frac{1}{3}$ their length at the large end; they are bought and sold by the in. diameter, all under 4 in. called poles. Round timber is sold by the cu. ft., and when squared by hewing or sawing is estimated to lose 1-5; hence 1 ton of round timber is estimated to contain 40 cu. ft. The rule for measuring the contents of round logs, is to multiply the length by the sq. of $\frac{1}{4}$ the girt in in., taken about $\frac{1}{3}$ the distance from the larger end, and then divide the product by 144; the quotient is regarded as the contents in cu. ft. Square timber, hewn or sawn, is sold by the cu. ft., and rated at 60 cu. ft. to the ton, but, as usually surveyed, 1 ton of timber contains 50 and 92-100 cu. ft.

MITREING.—Joining 2 pieces of wood by gluing, the ends of which have previously been planed to an angle of 45°, and matching together, so as to form a right angle. Joints can be cut at once, without gauging and measuring to find the proper angle, with the aid of the mitre box; it has cuts in the sides at angles of 45°.

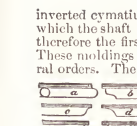
Mitre Box.

MORTISING AND TENONING. — Joining two pieces of wood at right angles, and generally adopted in heavy work, such as tables, doors and window sashes. A cavity, called a mortise, is cut into one piece of wood to receive the end of another piece shaped to fit, called a tenon. The mortise is marked on both sides of the wood by means of square and gauge, and cut equally from both sides by means of a chisel, care being taken to keep within the guide lines. The tenon is measured in the same manner as the mortise, and the cheeks cut away with a fine saw. If, instead of the outer cheeks, the piece between them is to be removed to make a double tenon, this must be done with a mallet and chisel, after sawing down the lines; the chisel used first on one side and then on the other, by which means the shoulder will be cut true to the guide lines. After joining, a small wedge is brushed with glue and driven in on each side of the tenon.

Mortising and Tenoning.

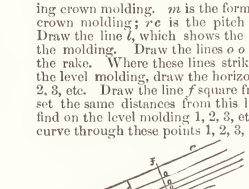
MOLDINGS. — The ornamental curved and plane projections used in cornices, arches, panels, wainscoting, etc. The regular moldings are 9 in number, as follows: Band or fillet, a low, flat, broad, but not deep circle; astragal, or bead, a narrow, curved ring; torus is large, semi-circular, and resembles a rope; scotia, sunken, or concave; ovolo, quarter round and egg-shaped; cavetto, cave, or hollow; cymatium, waved, upper part hollow, lower part swelling; ogee,

inverted cymatium; apophyge, the curve with which the shaft escapes into its base or capital, therefore the first molding in the entablature. These moldings are common to all architectural orders. The fillet, astragal and torus bind the parts; the ovolo and ogee support the projecting parts above them; the cymatium and cavetto core placed uppermost to cover and shelter the other parts; the scotia is introduced in the base of a column to separate the upper and lower torus, to give variety and relief. For beading and molding, the iron of the plane is filled into the shape of the molding it is meant to produce. That for a simple bead is made with a plane. The piece is first planed accurately to the width and substance required, and the plane is then applied, not perpendicularly, but on a slope, the edge and sole of the plane parallel to the surface to be cut, so that the strip may be planed to such inclination. The illustration shows how to find the form of raking crown molding. *m* is the form of the level crown molding; *r c* is the pitch of the roof. Draw the line *l*, which shows the thickness of the molding. Draw the lines *o o o* parallel to the rake. Where these lines strike the face of the level molding, draw the horizontal lines, 1, 2, 3, etc. Draw the line *f* square from the rake; set the same distances from this line that you find on the level molding 1, 2, 3, etc. Trace the curve through these points 1, 2, 3, etc., and you have the form of the raking molding. Hold the raking molding in the miter box, on the same pitch that it is on the roof, the box being level, and then cut the miter in that particular position.



Moldings.

a, astragal; *b*, ogee; *c*, cymatium; *d*, cavetto; *e*, scotia, or cassement; *f*, apophyges; *g*, ovolo, or quarter round; *h*, torus; *i*, reeding; *j*, band.



Finding Form of Crown Molding.

NAILS, Kinds and Sizes.—The following table gives the kinds of nails required:

3	penny, fine	1¼	in.	long,	720	in 1 lb.
3	" common	1¼	"	"	400	" " lb.
4	" "	1½	"	"	300	" " lb.
5	" "	1¾	"	"	200	" " lb.
6	" "	2	"	"	150	" " lb.
7	" "	2¼	"	"	110	" " lb.
8	" "	2½	"	"	85	" " lb.
9	" "	2¾	"	"	75	" " lb.
10	" "	3	"	"	60	" " lb.
12	" "	3¼	"	"	50	" " lb.
16	" "	3½	"	"	40	" " lb.
20	" "	4	"	"	22	" " lb.
30	" "	4½	"	"	16	" " lb.
40	" "	5	"	"	12	" " lb.
50	" "	5½	"	"	10	" " lb.
60	" "	6	"	"	8	" " lb.

CASING NAILS.

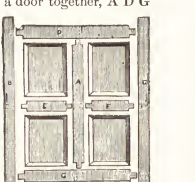
6	penny	2	in.	long,	220 in 1 lb.
8	"	2½	"	"	125 " " lb.
10	"	3	"	"	85 " " lb.
12	"	3¼	"	"	63 " " lb.

FENCE NAILS.

6	penny,	2	in.	long,	80 " " lb.
8	"	2½	"	"	50 " " lb.
10	"	3	"	"	30 " " lb.

From 4½ to 5 lbs. 4 penny nails, or 3 to 3½ lbs. 3 penny nails will lay 1,000 shingles. 5¾ lbs. 3 penny fine lath nails will put on 1,000 lath, joist being 16 in. to centres; 2½ lbs. 8 penny common nails will lay a square of flooring of 5½ in. matched boards, joist being 16 in. to centres; 2½ lbs. 7 penny nails will put on a square of lap siding, showing 4 in. to the weather.

PANELING.—The process of fitting thinner pieces of wood into frames, into the edges of which grooves have been cut to receive the panel. A B C in the illustration are the styles; D E F G the rails. The mortises and tenons are cut as usual. The inside edges of C B D G are then grooved with the plow, and both edges of the other pieces. The panels are squared up, and then beveled off at the edges to fit the grooves. To put such a door together, A D G E and F would be first arranged, then the panels slid in from the outside, and afterwards the stiles B and C put in place. The part beyond the outer mortises in the latter pieces, which are left for safety in cutting these mortises, and to prevent splitting when D and G are driven home, are not cut off until the glue is dry. The process is simple, but it requires care, both in setting out the measurements, and in squaring up the pieces. After the whole is dry, strips of molding, cut to miter-joints at the corners, are nailed on with brads round the panels to give a finished appearance.



Paneling.

PARTITIONS.—The settling of floors and cracking of ceilings and walls may be attributed to carelessness in constructing this part of the framework of a house. A partition should, if possible, be supported by the walls with which it is connected, in order that it may settle with the walls. The stud in a partition should be placed to throw the weight upon the points of support. All oblique pieces that do not tend to this, are better omitted. In partitions constructed for doors at the ends, the truss is formed above the door heads, and the lower parts suspended from it. The posts are halved and nailed to the tie and the sill. The braces in a trussed partition should be placed so as to form an angle of 45° with the horizon. The filling in pieces should be stiffened by short struts placed 3 ft. apart. The principal timbers should have the edge chamfered off, to allow the mortar to pass between and clinch the lath, thereby strengthening the plaster. When the

timbers require to be large for the purpose of greater strengtb, omit upright filling in pieces, and instead place a few horizontal pieces to sustain batten for lathing. Wbere practicable, the stud of a partition should extend down between the floor beams to the plate of tbe partition beneath.

PLANING.—The difficulty which amateurs experience in using the plane arises from its being badly set. If either corner projects beyond the level of the sole of the plane, this will score channels. Hence the extreme angle should be rounded off in sharpening tbe tool. The same effect will be produced if the plane iron is not ground square. The smaller, or break iron, whose office is to bend up the shaving somewhat sharply, should be placed to come within ⅛ in. of the extreme edge of the cutter for rough work, and within 1-20 for finer or finisbing work. The two should then be placed in position, so that the edge projects tbe smallest possible degree below the sole. The position can only be determined by looking along the bottom of the plane, with the point of the same next to the eye. The edge will, if correctly formed and placed, appear parallel with the sole. The same rule applies to small and large planes, except that in the jack plane the iron projects rather more, as it is used for roughing down. The longer the plane, the more accurately true will be the work. The jointer plane is longer than the trying plane. That used by the cooper for jointing staves of casks is longer still, so that it is leaned against a support, and the work taken in hand and moved to and fro along its sole. To plane long, thin slips, which would bend and break if set against the planing stop, tack them to the bench at the end next the right hand by running a brad-awl through and pinning them down; the action of the plane tends to stretch instead of doubling up tbe strip. Mitred edges or bevels are planed similar to those which are rectangular. For those which run lengthwise of the board, a long planing guide is needed, on which the plane sole, and its side, rest in positions according to the angle required. The drawback to such planing boards is the liability to cut the guide, and when it is of iron the tool is of course liable to injury. It will often be found best to place the plank edgewise in the bench vice, and with a gauge set the exact thickness; after it has been planed square, run a fine line on the flat side. (See *Plane* in *Carpenter's Tools.*)

POSTS.—Red cedar, cypress (see *Cypress* in Forestry) and yellow locust are the most durable for fence posts, the latter having been known to do good service for 20 years; the former is even more durable. White oak cut at the right time and well seasoned, is good; but chestnut is better; walnut is good for posts, and will stand for years free from rot. Experiments have proved that posts put in the ground in the same position as that in which they grew, rotted in 12 years, while their neighbors cut from the same tree, and placed top down, showed no signs of decay for years after. The theory is that the capillary tubes are so adjusted as to oppose the rising moisture when the wood is inverted.

PRESERVATION. — Wood is preserved by any agent which destroys the tendency to putrefaction, enables it to resist the attacks of insects and renders it unsuited to the growtb of fungi which produce dry rot. 1. The artificial preservation of timber is attained by injecting into the wood by hydrostatic pressure of a heavy liquid column, a solution of the acid tannate of iron. The principle is that the action of tannin upon the tissues is analogous to that which it exercises upon the animal tissues, effecting upon the former a kind of tanning, having for its result the formation of hard and imputrescible tannates, corresponding to the gelatinous tannates produced in the tanning of skins. The application fixes the putrescible matter in unalterable combinations, thus preventing decomposition.—2. The construction of air-drains around wood-work to be preserved is, where applicable, a great aid to the preservation of wood. — 3. Burnetizing lumber protects it from decay, and renders it almost as indestructible as stone from the ravages of fire. Experiments have demonstrated that wood thus treated will not burn with a blaze even in the most intense fire, but smoulders and wastes away. Burnetized shingles would not only endure the waste and wear of time, but they are as much a protection against fire as is slate. — 4. Wood carbonized by charring the surface prevents decay from exposure to air and moisture. Stakes and piles are thus treated before they are driven into the ground. Casks are charred on the inside when intended to hold water. In both cases the fire is commonly applied directly to the wood. — 5. Shingles are rendered more durable and less combustible by the following process: Water, 1 gal.; chloride of zinc, ½ lb.; digest the wood in this 48 hours; drain, and put into a solution of crude tungstate of soda, 1 lb., water, 1 gal. (hot) for 3 hours; then dry. — 6. Wood steeped in a solution of copperas becomes harder and more indestructible. — 7. Impregnation with creosote water or the "heavy oil" from coal tar distillation is an effectual preventive against the attacks of the teredo, an animal that destroys wood exposed to sea water. In using it care should be taken that the oil is of good quality, the impregnation thorough, and that woods be used that will absorb the oil readily, as fir and other resinous woods. — 8. Kyanizing is another method of preserving wood and cordage from decay. It consists in immersing the materials in a solution of corrosive sublimate, 1 part, and water, 50 or 60 parts, either under strong pressure or the contrary, as the urgency of the case or the dimensions of the articles may require. — 9. Preserving wood by the application of lime is found to work well. The plan is to pile the planks in a tank, and to put over all a layer of quicklime, which is gradually slaked with water. Timber for mines requires about 1 week to be impregnated, and other wood more or less time, according to its thickness. The material it is said acquires consistence and hardness and will never rot. Beech wood prepared in this way for bammers is found to acquire the hardness of oak, without parting with any of its elasticity or toughness, and lasts longer. — 10. Posts treated to 2 or 3 coats of boiled linseed oil and finely-powdered charcoal mixed to a paint will last as

long as iron in the ground and can be prepared for less than 2 cents a piece. They should be well seasoned before applying the mixture. — 11. A mixture of skim milk and brine is recommended as a wash for outbuildings, roofs, etc., being durable, cheap, impervious to water and rendering the wood uninflammable. — 12. Logs and planks split at the ends because the exposed surface dries faster than the inside. Saturate muriatic acid with lime, and apply like whitewash to the ends. The chloride of calcium formed attracts moisture from the air and prevents splitting. Tobacconists' signs have usually a hole bored through their centre from top to bottom; this prevents the outer surface from cracking, by allowing the wood to dry uniformly. — 13. A new method of carbonizing wood has been employed with apparent success. This consists in washing the wood with the strongest oil of vitriol. In this way the outer surface gets carbonized. It succeeds admirably with musty casks and vats. — 14. Wood impregnated with paraffine oil is preserved for years from rot, even under circumstances favorable to decay. Wooden taps, etc., are liable to crack. To prevent this, lay them in a bath of fused paraffine heated to 212° Fahr., and leave them as long as bubbles of air are given off. Then allow the paraffine to cool down to its point of congelation, remove the wood, and wipe off adhering wax; it may be used for inlaid woods and furniture. — 15. To prevent wood from shrinking or swelling, use the following: Paraffine, 1 lb.; benzole, 2 gals.; dissolve; digest the wood (dry) in this solution several days; dry in the air; then heat to about 250° Fahr., in an oven. — 16. Wood exposed to the weather is rendered durable by the application of crude petroleum. — 17. Pitch is a good preservative. — 18. Pillars of wood impregnated with salt last unimpaired for ages. Wooden piles driven into the mud of salt flats and marshes last an unlimited time, and are used for the foundation of brick and stone edifices; and the practice of docking timber by immersing it some time in sea-water, after it has been seasoned, is admitted to be promotive of durability. Experiments appear to show that even after dry rot has commenced, immersion in salt water checks its progress and preserves the remainder of the timber. Posts treated as follows, have been found sound at the end of 14 years: Bore a hole lengthwise into the post from the lower end, and somewhat deeper than the post is to set in the ground; 1½ in. is large enough for the diameter of the hole. Fill nearly full of dry salt, and plug tightly with a dry plug, being careful not to split the post. — 19. A process valuable for railway sleepers: Steam the timber and inject a solution of silicate of soda 8 hours; then soak the wood for the same period in lime water. — 20. Dry rot is prevented in new buildings and cured in old ones by filling up the spaces between the floor-joist with tank-waste from alkali works; it can also be applied to the ends of beams resting in walls. — 21. The following is a preventive against decay: Mix 40 parts chalk, 50 parts resin, and 4 parts linseed oil; melt together in an iron pot; add 1 part native oxide of copper, then 1 part sulphuric acid. Apply with a brush. When dry it is as hard as stone. — 22. Wood may be rendered indestructible as follows: The apparatus consists of a retort, in which resin, coal-tar, or other oleaginous substances, together with water, are placed to subject them to heat. Fire is applied beneath the retort, oleaginous vapor commences to rise, and passes out through a pipe into an iron tank containing the timber to be operated on. The heat acts on the wood, causing the sap to flow from every pore, which, rising in the form of steam, condenses on the body of the chamber and discharges through an escape pipe in the lower part. In this process a temperature of 212° to 250° Fahr. is sufficient to remove the moisture from the wood; but, after this, the temperature should be raised to 300° or more, in order to completely saturate the body of the wood with the antiseptic vapors and heavier products of the distillation. The hot vapor coagulates the albumen of the wood and opens the pores, so that a large portion of the oily product or creosote is admitted; the contraction resulting from the cooling process hermetically seals them, and decay seems impossible. There is a man-hole in the retort, used to change or clean out the contents; and the wood chamber is furnished with doors perfectly tight. The whole operation is completed in less than 1 hour, rendering the wood proof against rot, parasites, and the attacks of the naval worm.

RAFTERS. — The timbers that support the covering of a roof. The principal rafters are placed at intervals of 10 ft., or less, to which are attached the purlins or cross-pieces, forming the truss which supports the common rafters and the weight of the roof. The upper ends abut against the king-post, and the lower ends against the tie beam. The common rafters are usually notched down upon the purlins, their feet resting upon a piece of timber running longitudinally along the sides of the building, called the pole plate, and their summit abutting against the ridge-piece extending from one king-post to the other. When desirable that the common rafters should not stand above the principals, the purlins are framed by mortises and tenons into the principals. The longest rafters in a hip roof are those at the angles, called hip rafters, and the shorter ones jack rafters. — *To Find the Lengths and Bevels of Hip and Common Rafters.* Let *p p p* in *Fig. 1*, represent the face of the plates of the building; *d* the deck-frame; *a* is the seat of the hip-rafter; *b*, of the jack; and *c*, of the common rafter. Set the rise of the roof from the ends of the hip and common rafter towards *e e*, square from *a* and *c*; connect *f* and *e*, then the line from *f* to *e* will be the length of the hip and common rafter, and the angles at *e e* will be the down bevels of the same. — *To Find the Length and Bevel of the Jack Rafters.* *b* in *Fig. 1*, is the seat of a jack-rafter. Set the length of the hip from the corner, *g*, to the line on the face of the deck-frame, and join it to the point at *g*. Extend the jack, *b*, to meet this line at *h*; then from *i* to *h* will be the length of the jack-rafter, and the angle at *h* will be the top bevel of the same. The length of all the jacks is found in the same way, by extending them to

meet the line *h*. The down bevel of the jacks is the same as that of the common rafter at *e*. — *To Find the Backing of the Hip Rafter.* At any

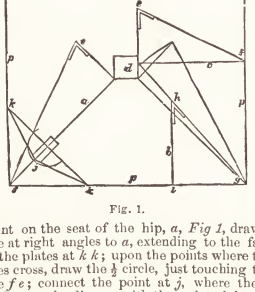


Fig. 1.

point on the seat of the hip, *a*, *Fig 1*, draw a line at right angles to *a*, extending to the face of the plates at *k k*; upon the points where the lines cross, draw the ½ circle, just touching the line *f e*; connect the point at *j*, where the ½ circle cuts the line *a* with the points *k k*; the angle formed at *j* will be the proper backing of the hip-rafter. It is not worth while to back the hip-rafter unless the roof is ½ pitch or more.

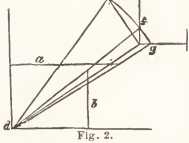


Fig. 2.

It is desirable to have the hip-rafters on a mitre line, so that the roof will all be the same pitch; but when this cannot be done the same rule is employed, but the jacks on each side of the hip are different lengths and bevels. The heavy line from *d*, *Fig. 2*, shows the seat of hip rafter; *a* and *b* the jacks. Set the rise of the roof at *e*; set the length of the hip, *d e*, from *d* to *f* on one side of the deck, and from *d* to *g* on the other side; extend the jack, *b*, and all the jacks on that side, to the line *d f* for the length and top bevels; extend jack, *a*, and all on that side, to the line *d g*, for the length and bevels on that side of the hip. The down bevels of the jacks will be the same as that of the common rafters on the same side of the roof. The lengths of hips, jacks, and valley rafters should be taken on the centre line, and the thickness or ½ thickness allowed for. (See *Fig. 3.*) Let *a b*, *Fig 4.* represent the valley-rafter; *j j* are corresponding jack-rafters. Set the rise of the roof from *a* to *c*; connect *b* and *c*; from *b* to *c* is the length of the valley-rafter, and the angle at *c* the bevel of the same; set the length, *b c*, on the line from *a*; extend the jack, *j*, to meet the line *b d* at *e*; then from *e* to *f* is the length of the jack, and the angle at *e* the top bevel of

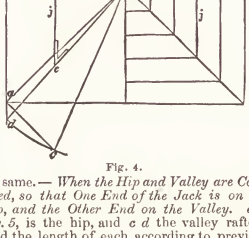


Fig. 4.

the same.— *When the Hip and Valley are Combined, so that One End of the Jack is on the Hip, and the Other End on the Valley. a b, Fig. 5,* is the hip, and *c d* the valley rafters. Find the length of each according to previous directions; find the lines *e* and *f*, as before. Extend the jacks, *j j*, to the line *e*, for the top bevel on the hip; extend the same on the other end to the line *f* for the top bevel on the valley; the whole length of the jacks is from the line *f* to the line *e*. If the hip and valley rafters lie parallel, the bevel will be the same on each end of the jack. In framing a hip-roof without a decking or observatory, a ridge-pole is used of such a length as to bring the hip on a mitre line; but this ridge-pole must be cut ½ its thickness longer at each end, or the hip will be thrown out of place. This is illustrated by the figure.

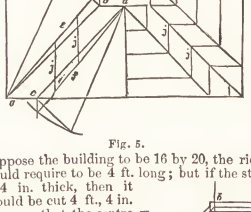


Fig. 5.

Suppose the building to be 16 by 20, the ridge would require to be 4 ft. long; but if the stick is 4 in. thick, then it should be cut 4 ft., 4 in. long, so that the centre line on the hip *a* will point to the centre of the end of the ridge pole *b* at 4 ft. long. — *To Find the Curve of the Hip.* Let *a*, *Fig. 7*, be the common

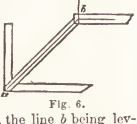


Fig. 6.

rafter in its true position, the line *b* being level. Draw the line *c c* on the angle the hip-rafter is to lie, generally a mitre line; draw the small lines *o o o* parallel to the plate *p*. The more of these lines the easier to trace the curve; continue the lines *o o o* where they strike the line *c c*, square from that line; set the distances

1, 2, 3, 4, etc. (on *a* from the line *b*), on the line *c c* towards *e*, at right angles from *c c*; through these points, **2**, **4**, 6, 8, etc., trace the curve,

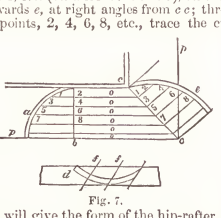


Fig. 7.

which will give the form of the hip-rafter. To get the joints of the jack-rafters, take a piece of plank, *d*, *Fig. 7*, the thickness required, wide enough to cut a common rafter; mark out the common rafter the full size; then get the lengths and bevels the same as a straight raftered roof, which this will be, looking down upon it from above; then lay out the joints from the top edge of the plank, as *f f*; cut joints first; saw out curves afterwards, and the jacks are ready to put up. Cut one jack of each length by this method, then use this for a pattern for the others. It will be seen that the down bevel is different on each jack, from the curve, but the same from a straight line, from point to point of a whole rafter. — *An Easy Way to Find the Lengths and Bevels of Common Rafters.* Suppose a building is 40 ft. wide, and the roof is to rise 7 ft., place the steel square on a board (*Fig. 8*),

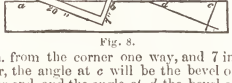
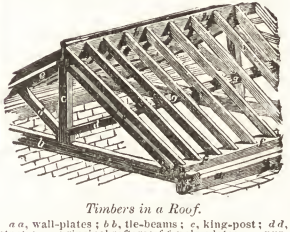


Fig. 8.

20 in. from the corner one way, and 7 in. the other, the angle at *c* will be the bevel of the upper end, and the angle at *d* the bevel of the lower end of the rafter. The length of the rafter will be from *a* to *b*, on the edge of the board. Always buy a square with the inches on one side divided into 12ths. The 20 in. shows the 20 ft., $\frac{1}{2}$ the width of the building; the 7 in. the 7 ft. rise. Now the distance from *a* to *b*, on the edge of the board, is 21 in., 2-12 and $\frac{1}{2}$-12; therefore this rafter will be 21 ft., $2\frac{1}{2}$ in. long.

RESONANCE. — The tone of musical instruments may be improved, and the wood rendered impermeable to temperature and moisture, by subjecting it to the action of pure oxygen ozonized by the passage of the electric current, and heated. The tone of the instrument is said to then improve with age rather than to deteriorate.

ROOFS. — In the construction of roofs, the climate is an important consideration, and they should be strengthened with reference to the weight of snow and force of wind. The weight of sliting per ft. on the inclined surface of a roof is about 7 lbs.; of roof plank, $1\frac{1}{4}$ in. thick, about 2.7 lbs.; of beams and jack-rafters, 2.3 lbs. The pressure per ft. on a horizontal roof is twice as great as that upon an inclined roof. The weight of trusses is nearly in proportion to their length and distance apart. The weight per ft. which the truss is to sustain, is found by dividing its weight by the span, and by the distance apart from centres at which trusses are placed. The weights of the ceiling beams and plaster upon the tie beams is 9 lbs. per ft. The force of wind may be reckoned as high as 50 lbs. per ft., and the weight of snow in proportion to the depth it acquires in a particular climate. Multiply the weight of the snow, 8 lbs. per cubic ft., by its depth. Next, allow for the strain by storage, dormitories, etc. Having found the weight per ft. of different pressure, the total weight is found by multiplying the weight by the area, which gives the weight supported by braces, suspension rods, rafters and tie-beams. To prevent walls from being pushed out of perpendicular by the weight of the roof and thrust of rafters, the latter are framed into a timber called a tie-beam, which is partially supported and prevented from sagging or bending in the middle, by securing it to the king-post by means of scantling, which combination is called a truss.



Timbers in a Roof.

a a, wall-plates; *b b*, tie-beams; *c*, king-post; *d d*, struts; *e e*, principal rafters; *f f*, pole-plate; *g g*, purlin; *h h*, ridge-piece; *i i*, common rafters.

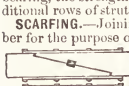
When the width of the span exceeds 30 ft., 2 upright posts called queen-posts are introduced, and a piece of timber called a collar inserted between, to prevent the posts from being drawn towards each other, and all trussed by scantling. When economy is desired, the king-post is omitted, and the rafters held by cross-pieces; this should never be done when the span exceeds 25 ft., nor where particular strains are to be provided against. When the span exceeds 45 ft. struts should be placed between the queen-posts, in addition to straining piece between them. For a span of 20 ft., tie-beams should be 9 by 4 in.; for 30 ft., 11 by 6 in.; for 40 ft., 12 by 5 in.; for 50 ft., 13 by 8 in.; for 60 ft., 15 by 10 in.; all other timbers proportionately increased in strength. When a span exceeds 35 ft., both king and queen-posts are used, and the distance between such supports should not exceed 13 ft. Tie-beams should never be omitted to accommodate an arch in the ceiling, as the powerful lateral strains exerted by the oblique position of

Queen-Post Roof.

a a, queen-posts; *b*, tie-beam; *c c*, struts or braces; *d d*, purlins; *e*, straining beam; *f f*, common rafters; *g g*, wall-plates; *h*, ridge-piece.

the supports tend to separate the walls. When the ends of joist cannot have a bearing upon the wall, a piece of timber, called a trimmer, is framed into 2 of the nearest joist. When the bearing of a joist exceeds 8 ft., a row of strutting pieces should be introduced to prevent horizontal twisting. For every increase of 4 ft. in the bearing, the strength should be increased by additional rows of strutting well fitted.

SCARFING.—Joining 2 or more pieces of timber for the purpose of lengthening, so that they may be equal in strength to a single piece of timber of the same length and strength. It is performed by indenting the joints, and passing bolts through the pieces within the lengths of the indents, and confining the bolts above and below by means of nuts and screws. Scarfing requires great accuracy, for if the indents do not bear equally, the greater part of the strength will be lost.



Various Modes of Scarfing.

SEASONING. — Green wood is seasoned by immersion in water a few weeks; this withdraws the sap rapidly, and subsequent exposure to the air thoroughly seasons it; in small pieces, the sap can be extracted in a few hours by boiling. Boards and all small timber liable to warp, are dried slowly in a kiln. Large timber is piled so as to allow ventilation; it is covered and allowed to dry 3 or 4 years. Its position should frequently be changed by repiling.

SHINGLING. —It is poor economy to use inferior shingles; it costs more to lay them, and they make a leaky roof. Spruce is used, but warps, twists and splits. Soft pine and cedar are cheapest in the end. Imperfect ones should be thrown out. A bundle of shingles has 25 courses on each end, and is 20 in. wide; or 22 courses on one end and 23 on the other, and 22 in. wide; 4 bundles contain 1,000. 1,000 shingles, laid 4 in. to the weather will cover 111 sq. ft.; laid $4\frac{1}{2}$ in., 125 ft.; laid 5 in., 139 ft.; 1,000 shingles require 5 lbs. 4-penny nails, or 3 to 4 lbs. 3-penny nails to lay them.

SHUTTERS, Inside. — Inside shutters, folding into boxes, require to have the box shutter 1 in. wider than the flap. The usual margin shown between the face of the shutter when folded into the box and the quirk of the stop-bead, or edge of the casing, is $\frac{1}{2}$ in.; and, in letting the whole of the thickness of the butt hinge into the edge of the box shutter, allowance must be made for the throw of the hinge; this may be estimated at $\frac{1}{4}$ in. at each hinging; which, being added to the margin, the entire width of the shutter will be $1\frac{1}{2}$ in. more than the width of the frame in the clear. To ascertain the width of the box shutter, add $1\frac{1}{2}$ in. to the width of the frame in the clear, between the pulley stiles; divide this product by 4 and add $\frac{1}{2}$ in. to the quotient, and the product will be the width.

STAIR BUILDING. — It is desirable to have stairs near the centre of the building. This position cannot always be accorded, because of insufficient light, unless a skylight is provided, which is desirable for ventilation. Landings should be introduced at intervals. The width of stair-case should accord with the importance of the building. From 3 to 5 ft. is sufficient for private dwellings and 8 to 12 for public halls, and should not occupy more than $\frac{1}{3}$ the width of the hall. The first step in the process of construction is to measure the height of the story from the top of one floor to the top of the next; also the run or distance horizontally from the landing to where the first riser is placed. The riser (see *Stairways* in BUILDING) varies in height. In first-class dwellings it is about 6 in. Upon the height of the rise depends the ease of ascent. The height of the rise will depend upon the number of steps. The greater the number of steps, the lower should be the rise. The number of risers is determined by dividing the number of in. in the height of the room, by the desired number of in. in the rise of the step. If there is plenty of room for the run, the step, or tread, should be made 10 in. wide, besides the nosing or projection; but if the run is limited, divide the number of in. in the run, by the number of steps, which is one less than the number of risers, because the upper floor forms a step for the last riser. The next step is the pitch-board. The hypothenuse of the pitch-board is the length from the top of one step to the top of another, and should be in proportion to the angle of ascent. If gradual, it should be longer; if steep, shorter. It is made as follows: Take a piece of thin, clear stuff and lay the square on the face edge, as shown in *Fig.* 1, and mark out the pitch board *p*. The string of a stair forms its ceiling or soffit. The space required for timber and plastering is 5 to 6 in. The stringer is laid out by taking the width of the step on the blade of the square, and the rise on the tongue of the square, or as follows: Nail a piece across the long edge of the pitch-board, as at *b*, so as to hold it up to the string. Then begin at the bottom, sliding the pitch-board along the upper edge of the string, and marking it out, as shown at *Fig.* 2. Winding stairs have the steps narrower at one end. In some stairs there are steps of parallel width, called flyers, combined with tapering steps called winders. Flights of stairs, broken at intervals by landings, are called platform stairs; they are preferable to those with winders, being simple in construction and convenient. *Fig.* 3 represents a flight of stairs with a wind at the top, and *Fig.* 4

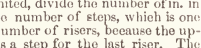


Fig. 1.
Pitch Board.

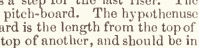


Fig. 2.
String of Stair.

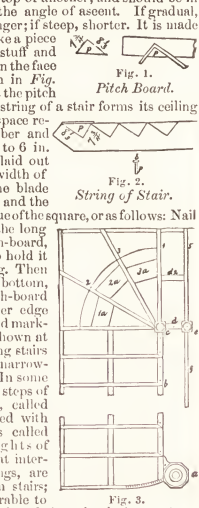


Fig. 3.

shows a more detailed plan of the wind. *Fig. 5* is an elevation of the winding posts showing the position of the mortises and risers. The lettering on these different cuts is the same for each part of the work: *b* is the face stringer, or carriage; *a* is the newel post; *c* is the winding post; *e* is the post at the upper landing, and is cut away so as to hook on to the upper post as seen in *Fig. 4*; *d* is a short piece of stringer, connecting the 2 posts *c* and *e*; *f* is the skirting board which is fastened to the trimmer, and makes a finish of the well-room. The risers 1 and 4 are tenoned into the post *c*, as shown in *Fig. 3*. Suppose that the rise is 7 in., then the top of riser 1 is 7 in. above the mortise, for the face-stringer *b*. (See *Fig. 5*.) The top of riser 4 is 21 in. above riser 1. The top of riser 4 and the piece of stringer *d* are even. The top of riser 5 is 7 in. above *d*, or riser 4. The width of the winding steps is alike, when measured on a circle struck from the winding post *c*, as shown in *Fig. 3*, at 1, 2, 3, 4. The face and centre stringers are usually made of 2 in. plank; the wall stringer of a stout in. board. The winding risers are 4 or 5 in. wider than the others; the extra width projecting below the preceding riser to afford a good nailing for the pieces of plank 1 *a*, 2 *a*, 3 *a*, called chocks, and the piece of stringer *d* 2. The steps are joined by mitering the risers into the face stringer (which should be allowed for in laying out the stringer), and are grooved to receive the tongue of the steps, as seen in *Fig. 6*. The ends of the steps are returned on the face stringer, and a scotia molding mitered beneath. The steps and risers are grooved to receive the base, which is tongued to fit. *Fig. 7* shows how to find the length of opening in the floor, to give sufficient head-room for the stairs. If the story is 9 ft. in the clear, and the upper flooring, lathing, and plastering, etc., 13 in., then the stairs must be 9 ft. + 13 in. = 10 ft., 1 in. from top to bottom, that is, 121 in. If we assume 7 in. for the rise, we have 17 2-7 risers. Since we must have a whole number of risers, we will adopt 17 as the number of risers; then the exact width of riser is 121 ÷ 17 = 7 2-17 in., practically, 7⅛ in. We will make the steps 9 in. on the stringer; but they will finish nearly 1 in. wider, owing to their projecting beyond the riser. Now the rise being 7⅛ in., we find when we have ascended 3 risers (that is, 21⅜ in.) we have 7 ft., 2⅜ in. head-room. Counting out from the top of the stairs, this point is width of 14 steps from the top, which is 14 × 9 in. = 126 in. = 10 ft., 6 in. So with an opening of 10 ft., 6 in., we have 7 ft., 2⅜ in. head-room. If we can do with less head-room, we ascend another riser, which takes us up 28½ in., leaving us still a head-room of 6 ft., 7½ in.; this is at a point the width of 13 steps from the top, which is 13 × 9 in. = 117 in. = 9 ft., 9 in.; so that, with an opening 9 ft., 9 in. in length, we still have 6 ft., 7½ in. head-room. The opening might be still further reduced by narrowing the steps 1 in. or so.

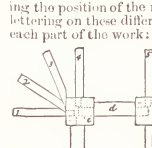


Fig. 4.

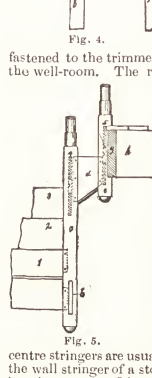


Fig. 5.

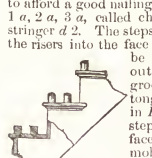


Fig. 6.

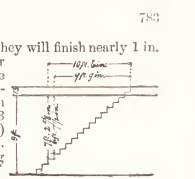
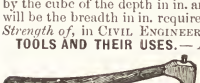


Fig. 7.

STRENGTH. — *Compression.* 1. To find the area of a post that will safely bear a given weight when the height of the post is less than 10 times its least thickness, divide the weight in lbs. by 1,000 for pine, or 1,400 for oak, and the quotient will be the least area of the post in in. This rule requires that the area of the abutting surface be equal to the result; should there be a tenon on the end of the post, this quotient will be too small. —2. To find the area of a rectangular post that will safely bear a given load, when its height is 10 times its least thickness or more, multiply the given weight or pressure in lbs. by the sq. of the length in ft.; and multiply this product by the decimal, .0015 for oak, .0021 for pitch pine, and .0016 for white pine; then divide this product by the breadth in in., and the cube root of the quotient will be the thickness in in. —3. To find the area of a round or cylindrical post, that will safely bear a given weight, when its height is 10 times its least diameter, or more, multiply the given weight or pressure in lbs. by 1.7, and the product by .0015 for oak, .0021 for pitch pine, and .0016 for white pine; then multiply the square root of this product by the height in ft., and the square root of the last product will be the required diameter in in. — *Tension.* To find the area of a piece of timber to resist a given strain in the direction of its length, divide the given weight to be sustained, by the weight that will tear asunder a bar 1 in. square of the same kind of wood as above, and the quotient will be the area in in. that will sustain the given weight; but, as a beam or post should never be strained or loaded to more than ⅓ its breaking weight, multiply the last area by 4. — *Cross Strain.* To find the scantling of a piece of timber to safely sustain a given weight, when such piece is supported at the ends in a horizontal position: 1. When the breadth is given, multiply the square of the length in ft., by the weight in lbs., and this product by the decimal, .009 for oak, .011 for white pine, and .016 for pitch pine; divide the product by the breadth in in. and the cube root of the quotient will be the depth required in in. — 2. When the depth

is given, multiply the square of the length in ft. by the weight in lbs., and multiply this product by the decimal, .009 for oak, .011 for white pine, and .016 for pitch pine; divide the last product by the cube of the depth in in. and the quotient will be the breadth in in. required. (See *Wood, Strength of*, in Civil Engineering.)

TOOLS AND THEIR USES. — *Adze.* This tool is the twin brother of the ax, and among ships' carpenters, wheelwrights and coopers, it is a tool of primary importance. When necessary to produce a flat surface with an ax, as when squaring logs of timber, the adze gives the work greater accuracy.



Adze.

Brace and Bits.—Fig 1. Represents a carpenter's brace, made of wood with brass mountings. It is in principle a simple crank handle. The top, A, which swivels loose, is rested against the chest; and in the bottom, B, there is a square hole into which the bit is inserted, and held by a spring catch, or a screw. There are varieties of this instrument, but the principle is the same. The brace is turned by the right hand, which grasps the part C; the handle, A, being kept in position on the chest by the left hand. *Fig. 2* is a centre bit, consisting of a central triangular point, A, which enters the wood first and guides the tool; an arm or knife, B, which regulates the diameter of the hole, cutting the edge clean, and a cutter or chisel, C, set obliquely, which follows and pares up the wood into shavings. Centre-bits are of various fixed sizes, but may be obtained with movable blades, so that by shifting this blade, holes of different diameters may be made with the same cutter. For small holes a gimlet-bit, pin and nose-bits are used. The pin-bit, *Fig. 3*, is a fluted wire, sharpened at the end like a gouge; the nose-bit is like a pin-bit with a small blade turned under, which cuts out the wood; *Fig. 4* is a countersink bit, used for enlarging holes, or to sink a depression to allow the heads of screws to be buried level.

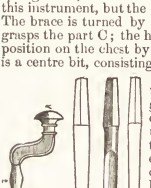


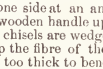
Fig. 1. 2. 3. 4.

Brace and Bits.

Brad-Awls. — These are pieces of steel wire ground with 2 faces at the point. In use, this tool wedges the fibres of wood on either side. The upper end is sharpened and driven into a wooden handle which has a ring or ferrule to prevent splitting. Some awls are square wires sharpened to a point. Cooper's awls have curved blades. Sets of brad-awls which all fit into one socket, and store away in the handle, may be met with, but they are seldom satisfactory.

Carpenter's Rule.—Sometimes there is a brass slide to add to its length, and sometimes it is hinged to fold up. It is 2 ft. long, 1 ft. on each side of the central joint. Each in. is divided by short lines into 8 equal parts, called 8ths; at the second, the line is rather longer, this being $\frac{1}{4}$ in.; at the 4th, there is a longer line, the $\frac{1}{2}$ in.; then comes another $\frac{1}{8}$, then $\frac{3}{4}$, another $\frac{1}{8}$, and the in. is complete. One edge of the rule, or sometimes only 1 in. is divided into 16ths; sometimes divisions still smaller are used, which are $\frac{1}{2}$-16ths or 32ds, because 32 make the complete inch. Carpenters always reckon by the ft. and in., and by 8ths and 16ths of an in. The values of the numbers on those lines are governed by the value set upon the first figure, and, being reckoned decimally, advance 10-fold.

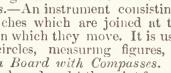
Chisels.—A common chisel is a flat blade of steel sharpened from one side at an angle of about 30°, driven into a wooden handle up to the shoulder. In principle chisels are wedges, and tend to split and tear up the fibre of the wood when the shaving cut is too thick to bend to the pressure of the edge of the tool. Paring chisels are thinner and wider, and are used for clearing out deep holes, such as mortises. — *Mortise Chisels* are much stronger and are sharpened in the same way, but with an angle less acute. Chisels are used either by the pressure of the hand or by blows, the flat side being kept in the intended path of the blade. A carpenter will need 3 or 4 of different sizes. The diagrams show the chisel blades seen on the edge and from the back.



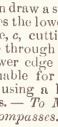
Chisel.

Mortise Chisel.

Compasses.—An instrument consisting of 2 pointed branches which are joined at the top by a rivet on which they move. It is used for describing circles, measuring figures, etc. — *To Square a Board with Compasses.* Let *a*, *Fig. 1*, be the board, and *b* the point from which to square. Set the compasses from the point *b* any distance less than the middle of the board, in the direction of *c*. Upon *c* for a centre sweep the circle, as shown. Then draw a straight line from where the circle touches the lower edge of the board, through the centre, *c*, cutting the circle at *d*. Then a line from *b* through *d*, will be perfectly square from the lower edge of the board. This will be found valuable for laying out walks and foundations, by using a line or long rod in place of compasses. — *To Make a Perfect Square with a Pair of Compasses.* Let *a b*, *Fig. 2*, be length of a side of the proposed square; upon *a* and *b*, with the whole length for the radius, sweep the parts of circles *a d* and *b e*. Find $\frac{1}{4}$ the distance from *a* to *e* at *f*; then upon *e* for a centre sweep the circle cutting *f*. Draw the lines from *a* and *b*, through where the circles intersect at *c* and *d*; connect them at the top and it will form a perfect square.



Squaring Board with Compass.



Perfect Square.

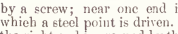
Gauges.—The common marking gauge con-

sists of a rod which slides back and forth through a block, but can be fixed at any required place

Mortise Gauge.

by a screw; near one end is a hole through which a steel point is driven. In using this tool the right end is grasped by the right hand, the thumb and forefinger of which take hold round the block. In gauging, one edge, previously planed, is used as a guide, the left of the block being kept close up to it, the point marking a line parallel to the edge of the wood at any required distance. In cutting thin parallel laths, a knife is used instead of the point.

Gimlets and Augers.—The ordinary form of gimlet is a piece of steel wire fastened into a handle at right angles to it, the cutting part fluted so as to leave sharp edges. At the extreme end is a small screw, by which the tool forces its way into the wood, the edges of the flute cutting out the shavings. Twisted gimlets are best, the effect being the same, for as the flute is twisted round the barrel the wire is not much weakened, and the groove being in the form of a screw, the shavings are lifted out. Augers have two grooves wound round the rod; the bottom edges of the metal left by the 2 grooves are sharpened into a cutting edge, and their action is easy, smooth, and rapid. The largest augers are not fixed into handles, but have their tops expanded into rings, into which a movable handle is thrust.



Gimlet.

Gouges are semi-circular chisels, used to cut grooves, channels and holes, both in carpentry and turning, the difference being in the curved edge of the turner's tool.

Gouge.

Pincers and Pliers.—*Fig. 1.* represents the ordinary pincers, for obtaining a grasp on small objects, such as nails, pieces of wire, etc. Common pliers, *Fig. 2*, are used for the same purpose, but do not grasp so firmly; and *Fig. 3*, cutting-pliers, for small wire. The cutting edges are sometimes on the side, and sometimes on the top edges of the tool, serving the twofold purpose of cutting and holding.

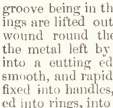


Fig. 1 Fig. 2. Fig. 3.

Planes.—The principle in a plane is the same as with a chisel, with greater steadiness on account of the increased power of guiding given by the sole. *Fig. 1* is a section showing the construction and arrangement of an ordinary plane. The body is of beech wood, the bottom of which is called the sole. The line B, on which the iron rests, is the bed, and is mostly inclined at an angle of 45°. The iron is fastened down to the bed by the wedge C, which fits into grooves on each side of the mouth D. The angle of the wedge is about 10°, cut away in the middle to leave room for the screw which holds the 2 irons together. The plane is pushed forward by the handle E, which is let into the top. *Fig. 2* shows the double iron found in most planes. A is the bottom iron, which is the cutting part, and B is the top iron or break to throw off the shavings. It is set with its edge about 1-20 in. from the cutting edge of the iron, to which it is held by the screw C. The adjustment is allowed by the long slot in the bottom iron in which the screw slides. The top iron is curved in the direction of its length, to keep its edge in contact with the lower iron so as to allow no shavings to pass. In setting a plane the 2 irons are screwed together, and placed on the bed with the wedge lightly pressed in its place; the edge will then be felt underneath by the hand, and can be adjusted. Should it be too far out, a tap with the hammer on the fore part of the plane will bring it up, or should it not project enough, a slight blow on the top of the iron will be necessary; when in its place a sharp blow on the wedge will fix it. *Fig. 1* shows the proportions of a jack plane, the length of which is 14 to 16 in. The smoothing plane is smaller, about 7 or 8 in. The trying plane is about 20 in., the length giving accuracy in the surface to be operated on. The following are kinds of planes used in wood working: 1. Compass planes have round soles according to the curve, they are required to cut, and are of great variety.—2. Jack plane for smoothing rough boards before marking and cutting.—3. Long planes, for long straight edges.—4. Match planes are in pairs. Their use is to cut, one a groove, *Fig. A*, the other a tenon, as in *Fig. B*, down the long sides of boards that are to be joined lengthwise.—5. Plow, with which grooves are cut in the sides of book-shelves, and for door panels, where boards are joined lengthwise, etc. —6. *Rebate.* A very narrow plane, fixed at

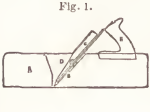


Fig. 1.

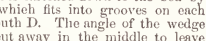
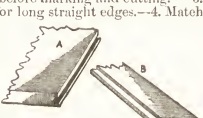
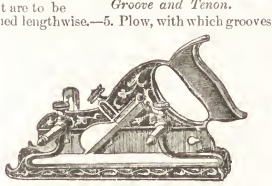


Fig. 2.



Groove and Tenon.



Plow and Match Plane.

an angle, and constructed so as to reach into recesses or to cut across the grain of the wood.

Rebates.

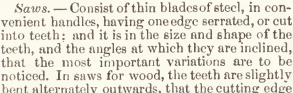
—7. Side or sash fillister, for cutting rebates. Has a wooden guide on 2 arms to regulate the width, and another of metal, moved by a screw, to regulate depth of cut. A rebate is a rectangular groove to receive glass in windows or glass in picture frames. — 8. Smoothing plane, used for finishing. It dips into hollows and rises over hills while seeming to plane true.

Sash Fillisters.

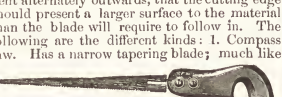
Rasps. — (See *Files*, in METAL WORKING.) The same in action as files, but being used for wood, the teeth are larger, being produced by the blows of a chisel, and always in lines ranged diagonally, or in curved rows across the blade.

Short or Smoothing Plane.

Saws. — Consist of thin blades of steel, in convenient handles, having one edge serrated, or cut into teeth: and it is in the size and shape of the teeth, and the angles at which they are inclined, that the most important variations are to be noticed. In saws for wood, the teeth are slightly bent alternately outwards, that the cutting edge should present a larger surface to the material than the blade will require to follow in. The following are the different kinds: 1. Compass saw. Has a narrow tapering blade; much like

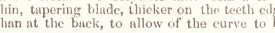


Compass Saw.



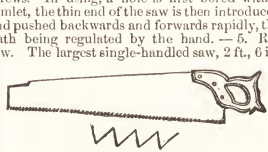
Cross Cut Saw.

the key hole saw, but is used for larger curves and coarser work. — 2. Cross cut saw. Used for cutting lumber across its grain. Worked singly, being of same general shape as rip saw, or by two men, backwards and forwards, cutting both ways; and for this reason the front and back angles of the teeth are equal, or about 60°. — 3. Dovetail saw. Resembles the tenon-saw, but is smaller and thinner in the blade and finer in the teeth. — 4. Keyhole saw. Has a long, thin, tapering blade, thicker on the teeth edge than at the back, to allow of the curve to be



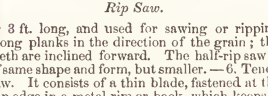
Keyhole Saw.

made. In order that the extreme end of the thin part may be used for small circles, the blade sometimes slides into a long hole right through the handle, and is fixed at any required place by screws. In using, a hole is first bored with a gimlet, the thin end of the saw is then introduced and pushed backwards and forwards rapidly, the path being regulated by the hand. — 5. Rip saw. The largest single-handled saw, 2 ft., 6 in.



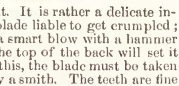
Rip Saw.

or 3 ft. long, and used for sawing or ripping along planks in the direction of the grain; the teeth are inclined forward. The half-rip saw is of same shape and form, but smaller. — 6. Tenon saw. It consists of a thin blade, fastened at the top edge in a metal rim or back, which keeps it



Tenon Saw.

firmly stretched out. It is rather a delicate instrument and the blade liable to get crumpled; if it is only slight, a smart blow with a hammer on the middle of the top of the back will set it right; but failing this, the blade must be taken out and re-fitted by a smith. The teeth are fine and the pitch is not very forward. — 7. Bracket scroll, or turning. It has a narrow blade, thinner on the back than in front. The blade is fixed by a rivet at each end to the handles, which are thrust through holes in the sides of the frame. A centre bar, D, keeps this frame distended,



Turning Saw.

and acts as a fulcrum, whereby the force generated by the twisting of the cord, is transmitted to the blade. The cord is twisted by the lever, F, and should consist of 5 or 6 turns of whipcord. The parts of the handles which go through the frame being cylindrical, they can be turned so as to

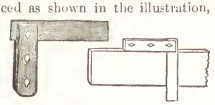
put the blade in any required position to keep the frame out of the way of the work. The handle behind the pitch of the teeth, which is the one taken hold of, is usually larger than the one at the other end. It may be used to cut out spaces, by first boring a hole, into which the blade, released from one of the handles by taking out the rivet, is inserted. The limit of distance from the edge of the work at which these saws can act, is equal to the space between the blade and the centre bar. (See *Saw Mills* in MECHANICAL ENGINEERING.)

Framing Square.—The *board rule* across one side of the blade is explained as follows: At 12 in. is laid down figures, commencing at the bottom: 8, 9, 10, 11, 12, 13, 14 and 15; these numbers represent the length in ft. of the board to be measured, and also the number of ft. in a board 12 in. wide. For any other width, as 8 in. and the length 15 ft. opposite 8 in. the space marked 15 is 10, the number of ft. in the board. If the board is shorter, or longer than is given on the square, take $\frac{1}{2}$ or double the numbers. On the tongue of the square, and on the same side that contains the board rule, is the *brace rule*. The figures are laid down as follows:

$$\begin{array}{cc} 24 & 27 \\ 24\ 33.9, & 27\ 38.19, \text{ etc.} \end{array}$$

The double numbers represent the 2 sides of a square, and the decimal numbers are lengths of diagonals. Thus, if the 2 sides of a square are 24 each, the length for a brace will be 33 and 9-10ths; if the sides are 27, the brace will be 38.19, and so on. The *diagonal scale* is laid down at the end of the brace rule near the corner of the square, which consists of 11 equidistant parallel lines, crossed by vertical ones, drawn obliquely, as follows: 1 in. is divided into 10 equal parts above and below, and a line drawn from the top of the first perpendicular to the first division below, and continued parallel, by which method the first division on the second line from the top becomes 100ths of an in., and each of the others on the parallel lines 1-10. The scale of hundredths reads downwards from the second parallel line where it intersects the first diagonal at the right-hand corner, this being 100ths of an in. The next space is 200ths, the next 300ths, and so on, the last being 10-100 or 1-10 in. On the *octagon rule*, on the other side of the square along the tongue, are a series of numbers: 10, 20, 30, 40, 50, and 60, which are 5-12ths of $\frac{1}{2}$ as many in., being the tangent of $22\frac{1}{2}°$ for circles whose diameters are 10, 20, 30, etc., in. These numbers are used as follows: We have a stick of timber 10 in. sq., and wish to make it 8 sq.; draw a centre line on each side of the stick; set the dividers from the beginning of the scale to 10, and set off this distance on each side of the line; this shows how much of the corner to take off. The octagon scale is on most of the pocket rules, given on 2 lines, marked M and E. The divisions on the line M will be found to correspond with those on the square, and are used in the same way. The line E gives the distance from the corner of the stick to the angle of the octagon. Suppose you have a stick 6 in. sq.; set a guage to 6, on the line E, and guage this quantity each way from all the corners. The lines M and E can also be used for a brace rule; the line E being a table of equal sides of a square, and M a table of diagonals, or braces.

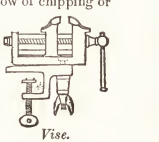
Try Square.—It is a handle and a blade, like a knife half-open, the one fixed exactly square, or at a right angles with the other. The blade is thinner than the handle, and when the latter is placed as shown in the illustration, a line



Try Square.

marked across the board against the edge of the blade will be square to the side, so that when cut off the piece will be like the end shown in the cut.

Vise. — A vise must supply the following qualifications: Strength to allow of chipping or filing the work without a possibility of the vise breaking; the inertia of the anvil should be sufficient to absorb the effect of the blows; the jaws should move parallel and freely, and should be arranged in such a manner as to get the whole power of the screw; all the parts should be durable, and lastly the tool furnished cheaply.



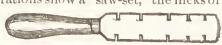
Vise.

TIMBER.—The best timber grows on high, dry, stony or sandy land, with the exception of the kinds indigenous to a low, swampy soil. Timber should be cut in midwinter or midsummer, when it contains the least amount of sap, and sawed as early as possible to prevent decomposition of the vegetable juices and fermentation of the albumen of the wood, which causes dry rot, and is indicated by yellow stains. Healthy timber is indicated by the dark green color of the leaves, which should be left on the tree felled in summer, as they rapidly exhaust the sap. In order to determine whether the heart of a tree is defective, without cutting, bore into the butt, 1 ft. from the surface of the ground, with a 2 in. auger, drawing out the chips for examination. In case the tree is of so large dimensions that the heart cannot be reached with an auger, an iron rod may be attached by welding, or by means of a socket made in the rod to fit the shank of the auger. An auger-hole near the ground will not injure a tree for timber, except it is to be employed for sleigh-runners or for ship building. After the timber is sawed into logs, the soundness may be tested by applying the ear to the middle of one of the ends, while another party strikes the other end. If the wood is sound, the ring of the blow will be distinct; but if decay has set in, it will be muffled. The best part of the tree is nearest to the ground, and the toughest on the north side of the tree.

TOOLS, Grinding and Setting. — Chisels, knives, axes, planes, and all tools with flat edges, are to be ground with the stone revolving towards you, by which means the filament of metal is driven back into the substance of the tool, instead of

drawn away from it. Gouges may be ground in the same way, but should be held across the stone in the same direction as their axis, and by rolling them over backwards and forwards you can give a very good shape to the edge, which should run slightly to a point. Turner's gouges should never be ground square across. The bevel of tools must be kept flat and even. Turner's chisels intended to cut soft wood, like deal, are ground to an angle of 20° to 30°, like C and D in the illustration. A tool for hard wood is given at E. The angle is now at least 40°, and ranges up to 80°, giving a stronger, thicker edge, but not so keen. I is the chisel (held edge-wise as before) ground as it ought to be for soft wood. In grinding plane irons, chisels, etc., they should be held firmly and squarely upon the stone at a point sufficiently near its upper part to allow the tool to be in a nearly horizontal position while its bevel lies flat upon it. If it is held too low, so that its handle points down, the tool cannot be firmly held, nor the work easily seen.

Cutting Edges of Tools. To sharpen and set a saw, first run a file along the edge of the teeth till they range in a line; then lay the blade on a smooth piece of lead, or on the end of a trying plane, and with a square punch give a gentle tap on it with a hammer; after placing it on one of the teeth, do the same with every alternate tooth. Reverse the saw and punch the teeth, on the other side, and look down the saw that the teeth are all equally set. Then begin with the file at that part of the saw nearest the handle. To sharpen or file the teeth to a good point, hold the file so that it makes an angle with the saw-blade of about 30°, or ⅔ that of a mitre angle, observing to shift the file for every alternate tooth in an opposite inclination, bringing each tooth to a sharp point, and keeping the upper edge of file nearly horizontal. Every tooth will then represent a sharp chisel, and cut as it goes without tearing. The illustrations show a "saw-set," the nicks of which



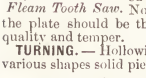
Saw Set.

are of different sizes, to suit the various thicknesses of blades; also the manner of filing the fleam, or lancet toothed saw; *a* the teeth, full size; and *b* the position of holding the saw. The saw is held flat on the bench, and one side is finished before it is turned over.

Fleam Tooth Saw.

No setting is needed, and the plate should be thin and of the very best quality and temper.

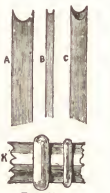
TURNING. — Hollowing out and forming into various shapes solid pieces of wood or metal by means of the lathe and suitable tools. The following are the principal tools:



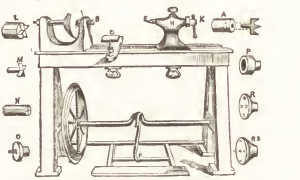
Broad.

Broad. Used for levelling the flat surface of lathe work, such as platters, etc., which are not easy to finish with the chisel and gouge. These are something like an arm-rest, being a broad bar of steel turned up at the extremity for a short distance and sharpened.

Beading. — A to C, in the figure, represent beading-tools. The bevel is on the under side, and it is better to interfere with it as little as possible, by always sharpening the flat face only. If necessary to touch the bevel, rub with a slip of oilstone, rounded on the edge. Conical grinders, revolving in the lathe, are used for small beading-tools, to be fixed in the slide-rest. K shows what are meant by beadings. If these are semicircular in section, they are finer in appearance than if of such curves as can be roughly cut by a chisel.



Beading Tools.



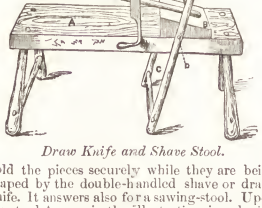
Turning Tools.

Chucks. — These hold in a firm position the work to be bored or turned, and which is fixed upon the screw of the mandrel, B, and held in a chuck suited to its particular form, but sometimes it is screwed directly upon the mandrel. The rest, C, is then fixed near it, and the tool is supported thereon and held firmly while the work revolves against it, remembering always to work down from right and left, into the various hollows; the fibres cannot be neatly cut by working up. The chucks are of wood and metal, according to the hardness of the wood to be operated on. First the prong-chuck, A, for soft wood. This is made to screw upon the mandrel. Its use is to hold one end of any piece of wood while the other is supported by the point, E, of the poppit, H, which poppit can be moved at pleasure along the lathe-bed, and fixed at any place by a hand-nut below. The point itself can be advanced or drawn back by turning the handle, K. A piece of wood thus mounted revolves with the mandrel, because, although it can turn round upon the point of the back poppit, it cannot do so upon the fork or prong, which enters and holds it securely. This chuck, or one of the same nature, is used for cylinders of soft wood, which can be supported at both ends, such as tool-handles, chair-legs, and other work not requiring to be hollowed out. The cross chuck, shown at L M, is preferable when the work is rough or turns upon the fork or prong. The centre of the little cross (which is of steel, and

fits into the same square or round hole in the socket which carries the prong, and which is also used to hold drills, pieces of iron rod to be turned, and other articles) is made to revolve in the precise axial line of the mandrel, or to run true with it, as it is called. The arms of the cross are to be imbedded in the work; which is effected by making in the latter 2 saw-cuts at right angles with each other. N, represents a piece ready for mounting. If you use the cross-chuck, take out the work to put on the ferrule, and replace exactly as before, and it will continue to run true. The next chuck O, is a taper screw of steel, fixed in a socket which can be attached to the mandrel. Two sizes of this would be useful for a large lathe. It is to hold pieces which only require to be supported at one end, so that a tool can be used to work upon the other, either to mold it into the required form, or to hollow it out. The cup-chuck is the last required. It is seen at P, and is sometimes of iron, but generally of brass. The flat plates, R R², can scarcely be called chucks, but they come in the list of such. The latter has 5 projecting points, which, sticking into a flat-board, hold it firm when the back centre is brought up against the other side of the piece, to allow of its being turned. The other is a flat plate with holes in it, through which screws can be passed from behind into any odd bit of wood of 2 or 3 in. in thickness, whereby a chuck can be quickly made to suit any required purpose; 2 or 3 of these would be convenient, 1 of which should be nearly as large as the lathe will carry; and in this one a great many holes and slots should be made. This is called a face-plate, and is fitted with clamps and bolts for the purpose of holding securely upon its face all kinds of flat work in wood or metal.

Chisels and Gouges. — With these alone you can do all the plain work in soft wood which does not require to be hollowed out.

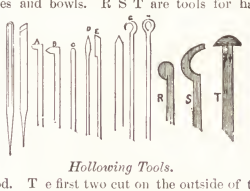
Draw-Knife and Shave Stool. — A useful apparatus for the preparation of long pieces is the shave-stool, used by coopers and chairmakers to



Draw Knife and Shave Stool.

hold the pieces securely while they are being shaped by the double-handled shave or draw-knife. It answers also for a sawing-stool. Upon the stool A, seen in the illustration, is a sloping block, B. A swinging frame C, is pivoted at D, so that if the lower part is pushed back from left to right, the upper cross-bar, E, will come forward and almost touch block, B, so that any piece of wood, such as F, will thereby be pinched and held tightly between the rail E, and the block. The workman sits astride of the stool at A, facing the block, and his feet are placed on the bar C. When he wishes to hold the wood to be shaved by the draw-knife C, he presses from the lower part of the frame, and he can instantly loosen the wood by drawing his feet towards him. The movement is made in a moment, and the wood shifted round as required, and alternately turned about and held tight, while the drawknife is used. A few minutes suffice to pare down a rough piece for the lathe. The cross-bar, E, should be strong, and is better if not rounded very nicely.

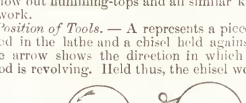
Hollowing Tools. — A to F, shown in the illustration, are for hollowing out hard woods. G and H are hook-tools for hollowing out soft wood boxes and bowls. R S T are tools for hard



Hollowing Tools.

wood. T e first two cut on the outside of the curved part all round. These would be used to hollow out humming-tops and all similar kinds of work.

Position of Tools. — A represents a piece of wood in the lathe and a chisel held against it. The arrow shows the direction in which the wood is revolving. Held thus, the chisel would

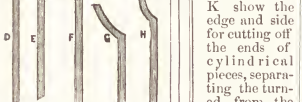


Position of Tools.

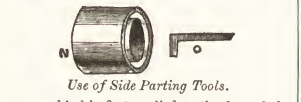
scrape; it could not possibly cut. But, held as at B, it would cut off a clean and continuous shaving, and this shaving would slide off along the upper face *b* of the tool. The tool acts like a thin, sharp wedge, which divides the material by pressure, which has to be great or slight according as the edge is sharp and thin, or the contrary. Between the two positions shown there are others at a greater or less angle; but the smallest possible angle it can make is the best, so long as the thickness of shaving removed will suffice. This rule holds good with all tools made with sharp cutting edges. Care must be taken that the lower face of the tool does not rub against the work. The chisel never lies flat on the rest or on the work, but always slightly raised to clear the upper point.

Side Parting Tools. — D, E and F represent side parting tools; it is usual to have several of these, the hooks increasing in length. The edge is on the extreme end. They are used to cut solid blocks of ivory and hard wood from the

inside of boxes, instead of cutting the material into a heap of useless shavings. Similar tools, G H, curved, serve to cut out a solid piece from the inside of a bowl. I and K show the edge and side for cutting off the ends of cylindrical pieces, separating the turned from the unturned, and for similar descriptions of work. A tenon-saw held still against a piece revolving in the lathe will often serve to cut it in two, but parting tools must also be had; a thick one should be kept for common woods, and a thin one for ivory and precious materials; sometimes one with a notched edge is used for cutting off soft wood. The use of the side parting tool is seen at L in the following illustration. A common straight parting-tool or

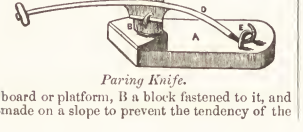


Side Parting Tools.



Use of Side Parting Tools.

narrow chisel is first applied to the face of the work to cut a deep circular groove or channel, as shown by the white space at N, and in section at L. This allows the narrowest of the hooked tools to be applied to under-cut the solid core *x*. This being withdrawn, a rather longer hook is applied, the hook being held downwards as at O, until it reaches the spot where it is to work, when it is gradually turned up (bevel below). Eventually, the solid core or centre block *x* will fall out entire, which may be used for other purposes. M shows how a similar but curved block can be removed from the inside of a cup or bowl. The paring-knife for short thick pieces is made like D. It consists of a long and curved handle, turned up at one end to fit under a staple E, with a cross-piece of wood for the hand at the other end, and a broad strong blade with one bevel in the middle. C is the piece of wood to be pared, A the bottom



Paring Knife.

board or platform, B a block fastened to it, and made on a slope to prevent the tendency of the wood to slip away from the knife. The whole of this may be screwed down to the bench. The hook and ferrule should not be made so large and loose as in the drawing, and a better joint is that of an ordinary hinge.

Ring Tools. — The illustrations P and Q show these tools. A recess is turned in the face of a piece of wood as if it was intended to hollow out a box. The ring-tool is applied bevel down and with the left cutting edge a bead is cut ½ through from the inside. The right edge is then applied to the outside, and when the cuts meet, the ring, neatly finished, will fall off; they require only a rub of sandpaper to finish them.

Ring Tools.

UTENSILS.—Wooden vessels for containing articles of food, wine and for culinary purposes, are hollowed out of various kinds of wood by the lathe. It is necessary that the wood be thoroughly seasoned to prevent its warping or splitting. To remove unpleasant extractive matters and fit the vessels for use, fill them with a solution of washing soda, and let stand 12 to 14 hours; then draw off the discolored liquid, rinse, and fill with pure water, and let remain a few hours more. Wooden vessels, especially in chemical works, should be well dried in hot air, then painted 2 or 3 times with a solution of paraffine in 6 parts petroleum benzine. Vessels in which boiling is affected with steam, should further be coated with linseed oil varnish, or with water glass; after drying, the water glass coating should be set by means of dilute muriatic acid. Paraffine is well adapted for packing stuffing boxes, especially in stirring apparatus exposed to vapors of fuming and English sulphuric acid.

VENEERING. — The art of covering a cheap and solid material with a layer of a more costly ornamental material, so as to convey the impression that the whole is formed of that which meets the eye. The veneer is sent to the cabinet-maker, rough upon both sides; nor does it assume the beautiful polish so ornamental to good furniture, until laying on the veneer is completed, which requires great skill, time, and care. The principal requisite to insure success is to select well seasoned wood for the ground, and to use the best and strongest glue. Be careful to exclude air in gluing, or a blister will arise and spoil the work. Keep thin-shaved veneers, such as ash and walnut burls, in rather a damp place until wanted; as they will curl and split if kept in a dry room. Select that piece of deal which is freest from knots; slit it down the middle, or take a piece out of the heart, and place the boards, when cut the required length, in a warm place for 2 or 3 days; then joint them up, placing a heart edge and an outside edge together; when dry, cut the top again between each joint, and joint afresh; you will then have a top glued up of pieces about 2 in. wide, and if you have been careful in making the joints good, the top will not be so liable to cast. Wainscot or other wood may be used instead of deal, but make the

joints in the same manner. It is also a good plan, after having veneered the top, to lay it on the ground with some shavings, with the veneer downwards; it then dries gradually and is much less likely to cast. In repairing furniture, workmen are sometimes at a loss to know how to get rid of those blisters which appear on the surface, in consequence of the glue under the veneer failing, or causing the veneer to separate from the ground. First, wash the surface with boiling water, and with a coarse cloth remove dirt or grease; then place it before the fire; oil its surface with common linseed oil; place it again to the fire, and the heat will make the oil penetrate through the veneer, and soften the glue underneath; then, while hot, raise the edge gently with a chisel, and it will separate completely from the ground; be careful not to use too great force. Again, if it should get cold during the operation, apply more oil, and heat it again. Repeat till you have separated the veneer, then wash off the old glue, and proceed to lay it again as a new veneer. Ordinary wood may be made to resemble expensive veneers by the following process: Soak the wood 24 hours, and boil ½ hour in a 10 per cent. solution of caustic soda. Then wash out the alkali; the wood will be elastic, leather-like, and ready to absorb the desired color. After immersion in the color bath, dry between paper under sufficient pressure.

WEIGHTS OF WOODS. —

	Lbs. in 1 cu. ft.		Lbs. in 1 cu. ft.
Beech	40	Lignum-vitæ	83
Ash	45	Pine, yellow	38
Birch	45	Cork	15
Cedar	28	Pine, white	25
Hickory	52	Birch charcoal	34
Ebony	83	Pine "	18

WHEELS. — If the felloes of a wagon-wheel are soaked in boiling linseed oil before the tire is put on, the tire will never become loose and the timbers will last longer. The oil is brought to a boiling heat, and the wheel placed on a stick, so as to hang in the oil, each felloe an hour. The timber should be dry. Care should be taken that the oil be not made hotter than a boiling heat, in order that the timber be not burnt. Timber filled with oil is not susceptible to water and is more durable. Wood-centred carwheels, which are used for passenger cars of railways, because of the decreased wear of axle and tire, are improved by making the bars with a number of arms extending to within a short distance of the tire, which do not prevent a close-fitting of the wooden segments. Another improvement consists in having the tire formed with a groove for the retaining ring.

WINDOWS. — An approximation of the necessary size may be obtained by multiplying together the length and breadth in ft. of the apartment to be lighted, and the product by the height in ft. The sq. root of this product will show the number of sq. ft. of glass. The dimensions of frames may be ascertained by adding 4½ in. to the width of the glass for their width, and 6½ in. to the height of the glass for their height, the measure being taken at the inside edge of the sill. In a brick wall, the width of the opening is 8 in. more than the width of the glass (4½ in. for the stiles of the sash, and 3½ for hanging stiles), and the height between the stone sill and lintel, or cross piece over the top, is about 10½ in. more than the height of the glass, it being buried according to the thickness of the sill of the frame. Windows should be placed as far as possible from the quoins of a building; they should be of different heights in different stories, but of the same width, and range perpendicularly over those of the first. The space above the head of a window should allow space between the window trimming and cornice of the room.

WOODS, Working Qualities of. — *Acacia.* An excellent, yellowish brown wood, tolerably hard, and takes a good polish. It is much used for turning. — *Apple Wood* is fine grained, hard and compact. Used when hardness and variegated color are objects. — *Ash.* Suited to all purposes requiring toughness and elasticity, as agricultural tools, wooden springs, frames of railway carriages, wheels, etc. Some specimens are beautifully marked, and are much prized for cabinet work. The wood takes a high polish, and may be cut to present a satin lustre. For the treads of stairs, floors of offices, mills and other buildings, it is regarded as superior to most woods thus employed. Its warm color makes it an effective finish when used with both lighter and darker woods. — *Beech.* A close, tough wood, used for framework of chairs, tables and bedsteads, handles for tools, etc. It is nearly of the color of birch, and may be known by the presence of peculiar little specks of a dark brown, seen in a carpenter's plane.—*Birch* is close grained, strong and easily worked, of a pale yellowish brown. If polished or varnished, it resembles satinwood, but is darker, and by staining is made to resemble Honduras mahogany. It is easy to work, and suitable for the purposes to which walnut is applied, and when properly stained it is almost impossible to distinguish the difference. It is susceptible of a beautiful polish, and its light weight, close grain and rich finish, make it suited for certain applications where fine finish and bright effects are desired. There is a species of bird's-eye birch, but it is very scarce. Most perforated chair-bottoms in use are manufactured from birch. — *Camwood.* A beautiful material when first cut; its rich red tint is diversified with brilliant yellow streaks, but these are not lasting; exposed to the air they become red. The wood has a fine, close grain, is hard, and much used for turning ornamental articles. — *Catalpa.* Being imperishable under or lying on the ground, it can be used for railroad ties, telegraph poles, fence posts, grape-vine posts, gate-posts, hop poles, timber for canoes, skiffs, shingles, weather-boarding, cooperage, water-tanks, framing timber for bridges, piles, the manufacture of railroad cars, lumber for sidewalks, pump-stocks, undertaker's stock, etc. — *Cedar.* Resembles mahogany, though more purplish. It has no curl, and is free from tendency to warp or cast. It is light, fine grained, compact, and is used for posts and shingles; it has been known to outlast a century. The

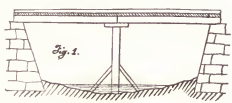
heart has a rich red color, and a pleasant odor, which renders it obnoxious to moths; hence it is highly valued for making drawers and chests for clothing.—*Cherry* is a very excellent wood; takes a fine polish; for light, elegant furniture it is scarcely equaled; dipped in lime water, it darkens,and by doing this here and there a mottled appearance is given; pipes and stems for pipes are made from it. This wood is not abundant, except in certain localities. It is pale and liable to sap-streaks, but answers very well for ebonizing.—*Chestnut.* (See *Chestnut* in FORESTRY.) Some of the best of the cheap furniture is made from it. It is of reddish-brown color, and looks so much like white oak as to be used in combination with it.—*Coral Wood* is bright red, hard and close in grain, well suited for chessmen, where that color is preferred. —*Ebony.* Highly prized for inlaying. It is exceedingly hard, heavy and durable, but expensive. Pear and other woods, dyed black, are substituted for it, but are not so permanent in color. The best comes from Africa, and is of a deep black color. Its colors are red, green and variegated brown in the East Indies, Mauritius and Ceylon.—*Larch.* The grain is large and coarse, and owing to the immense quantity of turpentine contained in it, it is well suited for out-door work, etc. (See *Larch* in FORESTRY.) —*Mahogany.* The most prized of the furniture woods; its size, soundness, almost perfect immunity from dry rot and shrinkage, and its beautiful appearance, render it most valuable for domestic purposes. It is of 2 kinds, Honduras and Spanish. The former has a coarse, loose, and straight grain, without much curl or wave; lighter in color and weight than Spanish and better for solid work. The latter is darker, with curl, by which in a great measure its price is regulated, and with a very fine, close texture. Spanish mahogany will bear great violence; it is also free from tendency to warp. When it is very much curled it is not nearly so strong or so free from twist; but this is of little consequence, as its value is so great that it is generally veneered on some less valuable wood. The heaviest is best. It is good for turning, and admits of a fine polish.—*Oak.* Takes long to season, and is worse than most woods if used green. It is from the numerous varieties of oak that timber for heavy building purposes and ship building is selected, being of immense strength, size, and peculiarly unsusceptible to the weather. It is hard, firm and of great tenacity; the best is of a light-brown color; darker kinds are softer and less durable, but being in most cases beautifully marked, are prized for church architecture and carving. Oak is difficult to work, owing to its hardness, but takes splendid polish. It improves with age. On account of its tendency to warp, a great deal of so-called oak is paneled with chestnut. The peculiar appearance of old oak is given to new wood by exposing it while very slightly damp to the fumes of ammonia.—*Partridge* is a hard, pretty wood, rather dark or gray; the fibres seem to run both ways, giving a mottled appearance when turned.—*Pear.* Is of a light brown or yellow color, but darkens by exposure; it has a fine, even grain, and is used for making the curved templates or patterns of curves for architects and engineers; a favorite for carving. It is often stained to imitate ebony.—*Pine.* There are 2 varieties used, white and yellow. When dry it is free from all tendency to warp; but in a half-seasoned state articles made of them fall to pieces. They are distinguished from each other by difference of color, and from deals by the absence of turpentine veins. When oiled and varnished it looks very well. This wood supplies the largest part of the timber for building purposes.—*Plum.* Veined like elm. It is the wild variety, and is excellent for small boxes. It looks well when turned and polished.—*Osage Orange.* Valuable for its durability; does not shrink and warp like other woods, and can, for some purposes, be used green.—*Osier.* A species of willow used in the construction of wicker work. The most highly cultivated yields the toughest and finest wood.—*Rattan.* A small sort of cane brought from China, Japan and Sumatra. Very pretty and durable summer chairs, lounges, tables, baskets, etc., are made wholly of rattan.—*Rosewood* is hard and dark, with some little curl, intermediate in this respect between Spanish and Honduras mahogany, and of a very open grain. Commonly used for furniture and turned work. Most articles of rosewood furniture are veneered, but the best are of solid wood. The color, which consists of large, elongated dark zones on a reddish brown ground, is permanent, unless exposed to the sun; it takes a fine polish, which is improved by waxing, or better by French polish, which brings out the color of the wood. The best comes from Brazil, and the grain is beautifully variegated.—*Bois de Rose.* An African wood, red, with yellow streaks; it seldom grows over 8 in. in diameter, and is cut into veneers and used bias for borders in inlaid or marquetry work.—*Satinwood.* Used for inlaying lining and veneers. It is of a full yellowish color, with a fine grain, little curl, and silky lustre. Its toughness fits it for furniture, but it is by no means hard; there is also a red satinwood.—*Sycamore* is white, and very soft until old, when it becomes harder. This is used for wooden bowls, backs of brushes, boxes, etc.

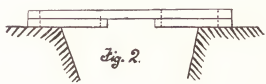
STONE, Improved Artificial.—By a new process artificial stone is manufactured free, it is claimed, from the usual liability to crack or fracture. The process is simple—that is, silicic acid, after being ground to powder, is cleansed from all impurities by ordinary means, and 5 to 10 per cent of it mixed up in warm river or rain water, which is either applied to slacked or well-burnt lime, or is added to hydraulic lime; the resulting product from this process, which is silicate of lime, is mixed with sand and small portions of fluor-spar. This mixture may be cast into molds, so as to give various shapes, as desired, and on being removed the castings are allowed to dry for from 12 to 24 hours, after which time they will be as dry as atmospheric air; they are then brought into a steam boiler and steam blown through so as to drive out all the air, after which the boiler is hermetically

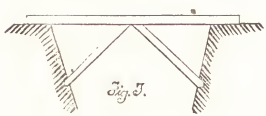
closed up and steam let in under a pressure of 10 atmospheres. In this high-pressure steam bath the stones remain for from 48 to 72 hours, afterward being submitted to a bath of boiling and saturated chloride of calcium during 6 to 12 hours, also under a pressure of about 10 atmospheres in the same boiler, and the condensed water may be used for the bath. These stones are allowed to dry in the open air, or, when desired to dry quickly, steam may be circulated inside of the boiler after the chloride of calcium has been withdrawn and before the stones are taken out of the drying boiler.

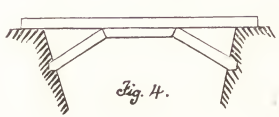
BRICKS.—These are formed by molding prepared clay into the required form and then burning the same in a kiln. The quality varies greatly according to the nature of the earth used, the care in their manufacture, and being more or less burnt. The weight required to crush 1 sq. in. of brick varies from 1,200 lbs. to 4,500 lbs.; but ½ the crushing weight will produce fracture in the brick. The weight of 1 cu. ft. of brickwork, set in mortar, is about 120 lbs. The tensile strength of bricks is somewhere about 275 lbs. for every sq. in.; but, in construction, they are seldom, if ever, exposed to a tensile strain. Great care should be taken in the selection of bricks for structures exposed to weather or the action of water; only the hardest burnt and best made bricks should be employed.

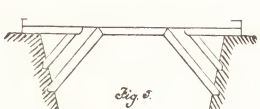
BRIDGES.—The most simple and natural form of a bridge consists of 2 timbers, laid across the stream, or opening, to be passed over, and covered with plank to form the roadway. Walls should be built to support each end of the timbers, and are named abutments; the width of the opening they cross is the span; the timbers themselves are the string-pieces; their number and size increase with the stretch. For a stretch of about 16 ft., they should be about 15 in. deep by 8 in. broad, and be placed at intervals of about 2 ft. This construction is only applicable to short stretches. For spaces of greater width, supports from the bottom of the opening may be placed at proper intervals, as in *Fig. 1.* They may be in the form of piers of masonry, or upright props or shores of timber, properly braced, and supported on piles,

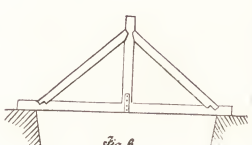


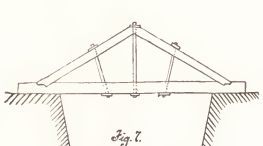


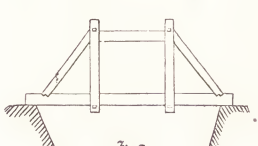












Forms of Bridges.

if the foundation be insecure. They will divide the long stretch into a number of shorter ones, and support the ends of the timbers by which each is spanned. But if the opening be deep, or occupied by a rapid stream, it is desirable to avoid the use of such obstructions. Means must be devised for strengthening the beams, to enable them to span larger openings. This may be effected by supports from below, or from above. Of supports from below, the simplest are shorter timbers (bolsters, or corbels), placed under the main ones, to which they are firmly bolted, and projecting about $\frac{1}{4}$ of the stretch as in *Fig. 2*. This will increase the stiffness. Still more effective are oblique braces or "struts," supporting the middle of the beam, and resting at their lower ends, in "shoulders" cut into the abutments as shown in *Figs. 3* and *4*. Similar braces may be applied to the bolsters of *Fig. 5*. The principle may be extended to very wide openings. But in many cases supports from below may be objectionable, as exerting too much thrust against the abutments, and being liable to be carried away by freshets, etc. The beams must in such cases be strengthened by supports from above. The simplest form of such is shown in *Fig. 6*, in which the horizontal beam is supported by an upright "king-post," being formed of 2 pieces, bolted together, and inclosing the beam between them. The king-post itself is supported by the oblique braces, or struts, which rest against notches in the horizontal beam. Since the king-post acts as a suspending tie, an iron rod may be advantageously substituted for it. The oblique braces may be also stiffened by iron ties, binding them to the main timbers, as in *Fig. 7*. For longer stretches, a straining beam may be introduced between the struts, as in *Fig. 8*, in which the posts are represented as enclosing the beam. For bridges of greater span, and more complicated structure, the assistance of a civil engineer should be secured. The subject is therefore not carried any further in this volume. For the same reason, bridges of stone and iron are omitted.

MASONRY, Strength of.—The strength of masonry is the strength of the cement or mortar used in construction. The adhesive strength of cement is directly as its age, and inversely as the magnitude of the joint. The relative strength of cement, cement and sand in equal portions, and pure lime mortar, are 1,092, 225 and 155. The resistance of the hydrates of the limes to a breaking or crushing weight, is inferior to that of the mortar of the limes. The following experiments show the method of determining the tensile strength of cements and mortars and their results. An arch of bricks, placed horizontally in the direction of their lengths, was built 15 ft., 4 in. in span and 9 in. rise. It bore a uniform load of 6,400 lbs., only deflecting $\frac{1}{4}$ in. It broke with 4 tons. A similar arch with mortar could not support itself. Two stones, each 39 in. x 29 in. x 26 in., weighing 2,662 lbs., were cemented together; they broke apart with a weight of 36,544 lbs.; they were cemented on the largest surfaces, having an area of 1,131 sq. in. The following table shows the strength or force which is required to tear asunder 1 square inch of the materials named therein:

Slate	12,000
Well-burned Brick	750
Inferior "	100 to 200
Portland Stone	857 to 1,000
Crown Glass	42,946
Limestone	670 to 2,800
Hydraulic Lime	140
" Cement	234
Portland "	6 mos. 414
Plaster of Paris	" 72

METALS.—Iron and steel are the only metals of importance for construction. Zinc is used somewhat for galvanizing iron. Cast-iron may be divided into white and gray. White iron has a white color, a crystalline structure, and is hard and brittle. Gray iron has a gray color, a more granular structure, and is softer and tougher than white. Cast-iron is peculiarly adapted for resisting compression, and is almost exclusively employed for this purpose, as pillars, columns, etc. Wrought iron is principally used for bolts, nuts, screws and nails, by which iron and timber are united, and for rods and stays exposed to a tensile or pulling strain. It rusts more easily than cast-iron. Of late years steel has successfully replaced, and in most cases been much superior to iron for many purposes.

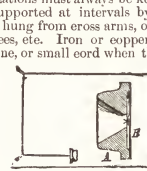
METALS, Strength of. — The mean tensile strength of malleable iron is 25 tons per sq. in., but elasticity is destroyed by 10 tons, and iron ought not to be strained beyond its elastic power. In the following table the tensile strength of other metals besides iron are given for comparison. The figures show the force required to tear asunder 1 sq. in. by direct tension:

	Lbs.
Iron Wire, wrought	103,000
Swedish bar Iron	72,000
Russian " "	59,500
Mean of English Iron	63,000
Iron Metal, mean of Iron	51,232
Clyde, No. 1, " "	16,125
" 2, " "	23,468
Stirling, mean of "	25,764
American, mean of "	45,970
Low Moor, No. 2, cast "	14,078
Crank Shaft "	44,750
American boiler plates, Iron	48,000
	62,000
English plates, mean	51,000
" " lengthwise	53,800
" " crosswise	48,800
German plano steel Wire	284,800
Cast Steel, maximum	142,000
" " mean	88,000
Steel	100,000 to 130,000
Chrome Steel, mean	170,980
Shear "	179,250
American Tool Co	179,980
Blistered Steel, soft	133,000
	194,000
Razor "	15,000
Steel plates, lengthwise	96,300
" " crosswise	93,700
Yellow metal	40,707
Cast Copper	19,000
American Copper	34,250
Brass Wire	50,000
Copper Bolts	38,000
Wire	60,000
Brass	42,000
Gold	20,440
Gold, 5 pts., copper, 1 pt.	50,000
Silver cast	46,997
Bronze	17,698 to 56,788
Tin cast, block	5,000
" Banca	2,122
Platinum Wire	5,300
Zinc	7,000
Sheet Lead	3,000
Antimony	1,060
Bismuth, cast	3,120

To find the tensile strength, multiply the area of the transverse section in inches by the weight given in the table, and the product will be the strength in lbs. A weight of 36,000 lbs. at-

tached to a bar of iron 1 in. sq. and 1,000 long, will draw it out 1 in.; 45,000 will stretch it 2 in.; 54,000, 4 in.; 63,000 8 in.; 72,000 16 in., where it breaks. Beams of maximum strength of cast iron, should be proportioned as follows: Sectional area of upper flange ¼ of lower, their thickness being as 1 to 2. Thickness of the web should equal that of the lower flange.

TELEPHONE.—The acoustic telephone, in its simpler forms, is easy to construct and operate. To make one, take a small sized box (an empty cigar box, for instance), and remove the lid and bottom. In place of the latter, tightly stretch and attach firmly a piece of parchment or dressed skin, in the manner that wire gauze is put in a sieve frame; that is, have a small frame that fits tightly on the open bottom of the box. A small hole is now made in the stretched skin through which the end of the line wire is passed from the outside. A small button is fixed to the end of the wire, which is then drawn tight, holding the button close against the stretched skin. At the other end of the line is an instrument similarly constructed. The wire between the stations must always be kept taut, and must be supported at intervals by a small cord or wire, hung from cross arms, on posts, the limbs of trees, etc. Iron or copper wire will do for the line, or small cord when the lines are short.



Acoustic Telephone.

To make the instrument work well, everything must be kept tight and snug. The wire, if possible, should be so placed that it will not be swayed by the wind. Another form of the acoustic telephone may be made by turning from wood a mouthpiece *A*, and attaching to it a disc *B* of ferrotype plate. The mouthpiece should be 2¼ in. in its largest diameter, and should have an annular surface ¾ in. wide for receiving the disc *B*, which is attached by means of sealing wax. The wax is first applied to the wood, and the disc is warmed and pressed against the mouth-piece. The disc is 2½ in. diameter. The portion left free to vibrate is 1⅜ in. diameter. The larger internal diameter of the mouth-piece is 1⅜ in., the smaller ½ in. There is a small hole in the center of the diaphragm for receiving the thread, which passes through a small piece of soft rubber and is knotted. The telephone thread must be supported on small elastic bands which must be put under tension. The string must also be taut. By means of this sound may be conducted at any desired angle, the elastic rubber supports being arranged as shown in the engraving. Whispers and even breathing may be heard over a long distance. When talking loud, the receiving instrument should be removed 2 in. from the ear.

VELOCITY OF SOUNDS IN DIFFERENT MEDIUMS. — Sound travels through solids faster than through the air. This may be illustrated by placing the ear close to the horizontal bar at one end of an iron fence, and having a person at the other end strike the fence a smart blow. Two successive sounds will reach the ear; one through the metal, and afterwards another through the air.

Air	1,093	feet	per second.
Water	4,900	"	"
Wet Sand	825	"	"
Solid Granite	1,664	"	"
Lead	4,030	"	"
Copper	11,666	"	"
Steel Wire	15,470	"	"
Iron	16,822	"	"
Pine	10,900	"	"
Oak	12,622	"	"
Ash	13,314	"	"
Elm	13,516	"	"

WEIGHT AND CAPACITY OF DIFFERENT STANDARD GALLONS.—

	Cubic Inches in a Gallon.	Wgt. of a Gal. in Pounds.	Gallons in a Cubic Foot.	Weight of a cubic foot of water, English standard, 62.321 lbs. Avoirdupois.
Imperial or English	277.274	10.00	6.232102	
United States	231.	8.33111	7.480519	
New York	221.819	8.00	7.901285	

Weight of crude petroleum, 6½ lbs. per U. S. gal., 42 gals. to the barrel.
Weight of refined petroleum, 6½ lbs. per U. S. gal., 42 gals. to the barrel.

AREAS OF CIRCLES.—

Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.
¼	.012	4 in.	12.56	13 in.	132.73	22 in.	380.13	31 in.	754.7	40 in.	1256.6	49 in.	1885.7
½	.049	½	15.90	½	143.13	½	397.60	½	779.3	½	1288.2	½	1924.4
⅜	.110	5 in.	19.63	14 in.	153.94	23 in.	415.47	32 in.	804.2	41 in.	1320.2	50 in.	1963.5
½	.196	½	23.75	½	165.13	½	433.73	½	829.5	½	1352.6	½	2002.9
⅝	.441	6 in.	28.27	15 in.	176.71	24 in.	452.39	33 in.	855.3	42 in.	1385.4	51 in.	2042.8
1 in.	.785	½	33.18	½	188.69	½	471.43	½	881.4	½	1418.6	½	2083.0
⅛	.994	7 in.	38.48	16 in.	201.06	25 in.	490.8	34 in.	907.9	43 in.	1452.2	52 in.	2123.7
¼	1.227	½	44.17	½	213.82	½	510.7	½	934.8	½	1486.2	½	2164.7
½	1.767	8 in.	50.26	17 in.	226.98	26 in.	530.9	35 in.	962.1	44 in.	1520.5	53 in.	2206.1
⅝	2.405	½	56.74	½	240.52	½	551.5	½	989.8	½	1555.2	½	2248.0
2 in.	3.141	9 in.	63.61	18 in.	254.46	27 in.	572.5	36 in.	1017.8	45 in.	1590.4	54 in.	2290.2
⅛	3.976	½	70.88	½	268.80	½	593.9	½	1046.3	½	1625.9	½	2332.8
¼	4.908	10 in.	78.54	19 in.	283.53	28 in.	615.7	37 in.	1075.2	46 in.	1661.9	55 in.	2375.8
½	5.939	½	86.59	½	298.64	½	637.9	½	1104.4	½	1698.2	½	2419.2
3 in.	7.06	11 in.	95.03	20 in.	314.16	29 in.	660.5	38 in.	1134.1	47 in.	1734.9	56 in.	2463.0
⅛	8.29	½	103.87	½	330.06	½	683.4	½	1164.2	½	1772.0	½	2507.1
¼	9.62	12 in.	113.10	21 in.	346.36	30 in.	706.8	39 in.	1194.6	48 in.	1808.5	57 in.	2551.7
⅜	11.04	½	122.71	½	363.05	½	730.6	½	1225.4	½	1847.4	½	2596.7

MARBLE, Artificial.—Marble is now so closely imitated by chemical means that there is often great difficulty in telling the imitation from the natural stone.—1. By a new process limestones or chalk may be converted into the nature of marble of any tint or combination of shades, while the specific gravity is increased. On the surface of the water-bath used for the veining there is sprinkled a varnish composed of sesquioxide of iron, gum and turpentine, and water being unstable, a freedom of design is obtained, especially when the turpentine is broken up by the addition of soap. After the stone is dipped in turpentine, it is immersed in solutions of sulphate of iron, copper or zinc, separate or in combination. The difference in shades is obtained by varying the period of immersion, and the order of tanks used. Copper and iron sulphate give dark colors; zinc and iron alternately give light yellow, while the use of the 3 consecutively gives dark yellow and brown in variegated tints. After being treated in the sulphate baths, the stone is immersed in a warm water bath to fix the colors, all air being meanwhile expelled. The color is said to permeate the full thickness of the stone, which is afterwards dried in an oven. The next step is immersion in an indurating bath of solution of sulphate of zinc, which so closes up the pores and hardens the stone that it acquires nearly the density of natural marble, and is then ready for polishing in the ordinary way.—2. Very finely powdered marble or white limestone is mixed with milk of lime until a smooth paste is formed. Some powdered limestone may now be added, and the mixture used at once.—3. Reduce marble dust or white limestone to a very fine powder by grinding and sifting, mix with it intimately about $\frac{1}{4}$ its weight of zinc oxide (zinc white) and $\frac{1}{8}$ of its weight of Portland cement, and mix thoroughly into a thick paste with a sufficient quantity of a hot aqueous solution of waterglass, containing about 40 per cent of the glass. Mold the paste under pressure while warm, and expose the molded form for a week or 10 days to warm dry air before finishing.—4. A solution of alum is made by dissolving the alum in sufficient water, and then plaster of Paris is put right into the vessel containing the liquid. It is then so mixed that the solution reaches all portions of the plaster; next it is baked.—5. Good Portland cement and colors that take on that material are mixed dry and made into a paste with the least quantity of water added. One paste has to be made for each color. The different pastes are placed on top of one another in layers of different thickness. The mass is pressed from all sides and beaten so that the colors of the different parts impress themselves on each other without uniformity. The result is that more or less deep veins penetrate the mass; this is then sawed into plates, which are pressed in a mold for 12 days, during which time it is necessary to keep them moist as long as they are not entirely hardened. The plates are polished in the same way as marble.—6. This composition (marmorit) contains 2 parts of magnesia; 2 parts of lime and quicklime; 1 part of carbonic acid; $\frac{1}{4}$ part of silicic acid; $\frac{1}{4}$ part of argillaceous earth; and 1 part of magnesium chloride.

STONE SIDEWALKS, Artificial Cement for.—English Portland cement is generally preferred. Procure a sharp, light-colored sand, and wash it free from all particles of soft earth or soil; also some stone chips, gravel and large stone. Excavate the sidewalk about 18 in. deep, and fill in the large stone to within 6 in. of the surface; prepare a concrete made of the cement, 1 part; stone chips and gravel, about 6 parts; and bed it in upon the stone bottom to within 2 in. of the surface; then prepare a concrete of the cement, 1 part, and fine sand 2 parts, and lay it in up to the surface, floating the surface with cement at pleasure. Finish by lining off into very regular blocks. A more economical sidewalk can be made by omitting the stone bed, but it will require a good hard soil to lay it on, and then will not be so sure of being permanent.

MORTAR, Brick-Dust.—The use of brick-dust mortar, as a substitute for hydraulic cement where the latter cannot be obtained, is recommended on the best engineering authority. It is considered that the addition of even as small a proportion as 1-10 as much brick-dust as sand to ordinary mortars is preventive of the disintegration so often characterizing mortars used in the masonry of public works. The proportions used are 1 of brick-dust, 1 of lime, and 2 of sand, mixed together dry and tempered with water in the usual way. This mortar is superior in the construction of drains, culverts, etc.

ROADS.—Rapidity, safety and economy of carriage are the objects of roads. They should be so located and constructed as to enable goods and passengers to be transported in the least possible time, and with the least labor and expense. Every road (other things being equal) should be perfectly straight. Any unnecessary excess of length causes a three-fold waste. First, of the interest on capital; secondly, by continual expense of repairing; and, thirdly, of time and labor in traveling. A road should be slightly inclined in the direction of its length, that drainage water may be readily carried off by side ditches; for this a slope of at least 1 ft. in 125 should be employed. If the slope be too great, a large portion of the strength of horses will be expended in raising the load up ascents. If a road rises 1 ft. in every 20 of its length, a horse drawing 1 ton, is compelled to actually lift up 1-20 of the weight (100 lbs.) through the whole height of the ascent, besides overcoming the friction of the entire load. Calling the load which a horse can draw on a level, 100 lbs., then on a rise of 1 ft. in 100 he can draw only 90 lbs.; 1 ft. in 50, 81 lbs.; 1 ft. in 40, 72 lbs.; 1 ft. in 30, 64 lbs.; 1 ft. in 20, 40 lbs.; 1 ft. in 10, 25 lbs.; no slope on any road should be of a steeper grade than 1 in 30. In a flat country a road should be raised slightly above the surrounding country, and in cross sections it should not be flat, but must "crown," or be higher in the middle than at the sides, to allow water to run off readily. On each side of the road there should be inclined ditches to carry off the water which falls upon it. As the surfaces of newly

made roads are usually deficient in hardness and smoothness to make a good road, it is necessary to cover the earth, which forms the surface of the road, with some material such as stone, wood, etc. The benefits of this consist in substituting a hard and smooth surface for the soft and uneven earth and in protecting the ground beneath it from the action of rain water, which, by penetrating to it and remaining upon it, would impede the progress of vehicles and render the road too weak to bear weight. Gravel for road beds should be sharp and moderately clean, not contain too much earthy matter, nor yet be too clean, but should have sufficient earthy matter to bind the pebbles together somewhat. In making gravel road beds, about 3 layers of gravel, each 3 or 4 in. thick, are put down and each well rolled. Broken stone roads (which were largely introduced in England by Mr. McAdam, from whom they have taken their name) are much used in the United States. The harder and tougher the rock employed, the more suitable. On this account the basaltic and trap rocks are most suitable, but, not being as universally distributed as limestones, are not so largely employed. The stones should be broken by hand into angular fragments of about 2 in. These are then spread upon the road bed and in time become consolidated. The principal objection to limestone is that it is too soft, ruts soon wearing in the road bed and the rock being ground to powder. Telford roads (so called, from having been introduced in England by Mr. Telford) are made of broken stone and gravel resting on a prepared pavement. The pavement is made of cubical blocks of stone, about six in. deep, set close together on a proper road bed so as to form a close, firm pavement. On this about 4 in. of broken stones are put and rolled until compact. About 2 in. more of broken rock is then put on in the same way; and the whole covered with good clean gravel to a depth of about 2 in. Paved roads are best made of square blocks of stone resting on a stable foundation, made of small broken stones or gravel well rolled down. The cubes should be about 8 in. in every direction, slightly tapered towards their lower ends. These blocks are set so that the joints between them shall not exceed $\frac{1}{4}$ in. and the interstices are filled with clean, sharp sand, enough being put on to slightly cover the whole pavement.

ROPES, CABLES AND CHAINS. Strength of.—The strength of cords depends upon the fineness of the strands, and other conditions. Damp cordage is stronger than dry, and untarred ropes than tarred. Tarring ropes renders them impervious to water and less elastic. Silk cords are 3 times stronger than those of flax of equal circumference, and manilla is $\frac{1}{2}$ as strong as hemp. Ropes of iron wire are a little more than 3 times stronger than ropes of hemp, of equal circumference. White ropes are more durable than others. The qualities of hemp are to be determined in a measure by the color. The best hempen ropes are pearl gray; next greenish, then yellow; brown colored ropes have less strength. The breaking weight of a good hemp rope is 6,400 lbs. per sq. in., but no cordage may be counted on as capable of sustaining a weight or strain above $\frac{1}{3}$ that required to break it, and the weight of the rope should be included in the estimate. The reliable strength of a good hemp cable in lbs. is estimated as equal to the square of its circumference in inches $\times$ 120; that of rope $\times$ 200; thus, a cable of 9 in. in circumference may be relied on as having a sustaining power $= 9 \times 9 \times 120 = 9{,}720$ lbs. The weight, in lbs., of a cable laid rope, per linear ft. = the square of its circumference in inches $\times$ .036, very nearly. The weight, in lbs., of a linear ft. of manilla rope = the square of its circumference in inches $\times$ .03, very nearly. Thus, a manilla rope of 3 in. circumference weighs per linear ft. $3 \times 3 \times .03 = 27$-100 lbs., $= 3$ 7-10 ft. per lb. A good hemp rope stretches about $\frac{1}{5}$, and its diameter is diminished 1-5 before breaking. To find what weight a rope will lift when rove as a tackle, multiply the weight that the rope is capable of suspending by the number of parts at the movable block, and from this subtract $\frac{1}{4}$ for resistance. Thus: 8.9 tons, the strength of the rope, multiplied by 6, the number of parts at the movable block, minus the $\frac{1}{4}$, or 13.3, gives 40.1 tons as the weight required. To find what size rope is needed, when roven as a tackle, to lift a certain weight, divide the weight to be raised by the number of parts at the movable block, to obtain the strain on a single part. To this add $\frac{1}{3}$ for the increased strain brought by friction, and reeve the rope of corresponding strength; $\frac{1}{3}$ of 40 tons is $6\frac{2}{3}$ tons, which, with $\frac{1}{3}$ added, is 9 tons, nearly, for which reeve a 6 or $6\frac{1}{2}$ in. rope.

TABLE SHOWING WHAT WEIGHT A HEMP ROPE WILL BEAR WITH SAFETY.

Circumference.	Lbs.	Circumference.	Lbs	Circumference.	Lbs.
1	200.	$3\frac{1}{4}$	2450.	6	7200.
$1\frac{1}{4}$	312.5	$3\frac{3}{4}$	2812.5	$6\frac{1}{4}$	7812.5
$1\frac{1}{2}$	450.	4	3200.	$6\frac{1}{2}$	8450.
$1\frac{3}{4}$	612.5	$4\frac{1}{4}$	3612.5	$6\frac{3}{4}$	9112.5
2	800.	$4\frac{1}{2}$	4050.	7	9800.
$2\frac{1}{4}$	1012.5	$4\frac{3}{4}$	4512.5	$7\frac{1}{4}$	10512.5
$2\frac{1}{2}$	1250.	5	5000.	$7\frac{1}{2}$	11250.
$2\frac{3}{4}$	1512.5	$5\frac{1}{4}$	5512.5	$7\frac{3}{4}$	12012.5
3	1800.	$5\frac{1}{2}$	6050.	8	12800.
$3\frac{1}{4}$	2112.5	$5\frac{3}{4}$	6612.5		

STONES.—The essential properties of rocks as building material are: Strength, or the resistance which is offered to rupture, caused either by compression, extension or a cross strain; hardness, or the capability of resisting shocks and attrition; and durability, or its unchangeable character when exposed to the extremes of temperature, to the atmosphere and to chemical agents. *Granite* consists of quartz, feldspar and mica, firmly united, forming one solid mass. The quality of the stone depends on the aggregation of the particles, their size, and the proportion of each; the best is usually that in which the particles are fine and uniformly distributed. —*Limestones.* These may be classed as granular and compact. The granular presents the appearance of an aggregation of grains of vari-

able size, from fine to coarse, apparently from irregular crystallization. The compact has a fine, uniform texture, without any appearance of grains, some of the varieties being loose and earthy in their texture. As a rule the compact and smooth varieties are much more durable and better suited for construction.—*Sandstone.* This consists of particles of quartz united by an argillaceous, calcareous or silicious cement. The objection to its use is that it absorbs a large quantity of moisture, which, when acted upon by frost, causes the surface of the stone to scale.

WOOD.—This may be classed as the most important material used for ordinary constructional purposes. The tree is felled after having matured, and before it begins to decline. The trunk and larger branches are cut into suitable dimensions, seasoned thoroughly, and are then known as timber. The best age to fell trees for timber, is from 50 to 100 years old, and when the sap is not in circulation. The best time of year is during December, January and February. The importance of this will be seen when it is stated that there are two kinds of decay, both caused by the fermentation and consequent putrefaction of the sap. Wet rot is caused by the wood being allowed to become alternately wet and dry; while dry rot is due to the want of a free circulation of air around the timber. If timber be not thoroughly seasoned, its durability will be affected, and, on account of shrinkage, will be apt to cause material injury to a structure. The common method of seasoning is to expose it, under cover, to the air for about 2 years. The most durable timber is procured from trees of a close texture; those which grow in moist and shady localities furnish weaker and less durable timber than that from trees grown in a dry and exposed place. Straight grained timber, free from knots, is superior in strength and quality to that which is reverse. The best methods of preserving timber is to procure a free circulation of air around it, to prevent moisture or the action of a warm, damp, stagnant atmosphere. Seasoned timber, when used for posts, can be preserved by slightly charring the end that is to be imbedded in the earth. White oak is well adapted for heavy timbers, but oak boards are subject to warping and cracking. Pine is considered second only to oak for durability, straightness of fibre and ease with which it can be worked. The other varieties occasionally used, are chestnut, cedar, ash, elm, walnut, etc.

WOOD, Strength of. — The following table shows the weight in lbs. required to separate 1 sq. in. of different woods:

Ash	16,000 lbs.	Mahogany	21,000 lbs.
Beach	11,500 "	Maple	10,500 "
Birch	15,000 "	Oak, American White	11,500 "
Box	20,000 "	Oak, seasoned	13,600 "
Cedar	11,400 "	Pine, Pitch	12,000 "
Chestnut	10,500 "	Poplar	7,000 "
Cypress	6,000 "	Sycamore	13,000 "
Elm	13,400 "	Walnut	7,000 "
Fir, strongest	12,000 "	Willow	13,000 "
" American	8,800 "		
Lig. Vitæ	11,800 "		
Locust	20,500 "		

To find the tensile strength of timber in lbs., multiply the area of the transverse section in inches by the weight given in the preceding table. Transverse strength is power to resist force in a perpendicular direction. The weight required to break a solid uniform bar of different materials, is given in the following table, the bar being 1 ft. long and 1 in. sq., fixed at one end, and the weight suspended from the other:

MATERIALS.	Breaking Weight. Lbs.	Greatest Deflection. In.	Weight Borne with Safety. Lbs.	Value for General Use. Lbs.
White Oak, seasoned,	240	9	196	40
Chestnut, "	170	1.8	115	65
Yellow Pine, seasoned,	150	1.7	100	62
White " "	135	1.4	95	64
Ash, "	175	2.4	105	77
Hickory,	270	8	200	50

The strength of a projecting beam is $\frac{1}{4}$ of what it would be if supported at both ends, and $\frac{1}{6}$ of what it would be if fixed at both ends. To find the transverse strength when the bar or beam is fixed at one end and the load applied at the other, multiply the value in the preceding table by the breadth and sq. of the depth in inches, and divide the product by the length in feet. The quotient will be the weight in lbs. When the beam is loaded uniformly throughout its length, the result must be doubled. When the bar or beam is fixed at both ends and the weight applied in the middle, multiply the value in the preceding table by 6 times the breadth and the sq. of the depth in inches, and divide the product by the length in feet. When the weight is equally distributed along its entire length, the above results must be doubled. When the bar is supported at both ends and the weight in the middle, multiply the value in the preceding table by the sq. of the depth and 4 times the breadth in inches, and divide by the length in feet.

TABLE SHOWING THE RESISTANCE OF WOOD TO CRUSHING WEIGHT PER SQ. INCH.

WOODS.	In Lbs.	In Tons of 2,000 Lbs.
Ash	8,083	4.3
Beech, well seasoned	19,363	9.6
Birch	11,663	5.8
Cedar	5,863	2.9
Elder	9,973	4.9
Elm, well seasoned	10,331	5.1
Fir (Spruce)	6,819	3.4
Mahogany	8,198	4.09
Oak	5,982	2.9
Pine, pitch	6,790	3.3
Pine, yellow	5,445	2.7
Poplar	5,124	2.5
Sycamore, highly seasoned	12,101	6.
Walnut	7,227	3.6
Willow	6,128	3.06

BOAT-MAKING. — *Scow.* Perhaps the cheapest and most easily made boat is the scow. Procure 8 or 9 boards of ¾ in. pine, 8 or 10 in. wide; 1 pine board 1 in. thick and medium width; 1 lb. 5-penny nails, and ½ lb. same sized wrought nails. Plane the boards on both the sides and edges. Select 2 of the clearest and best boards, 10 in. wide; saw them 10 ft. long, making square ends; then taper the ends down to 4 in. wide, making the shape shown by *A A*, *Fig. 1*. Round off the

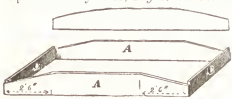


Fig. 1.

edges at the beginning of the tapering section. The curves should be gradual, and exactly the same on both boards. Saw out 2 other pieces, each 4½ in. wide, 1 in. thick, and 2 ft., 10½ in. long. These are the end pieces. Place the boards, *A A*, *Fig. 1*, parallel on their straight edges, and between their ends place the end pieces, *C C*. The ends of the side boards, *A A*, are to lap over the ends of the end pieces, *C C*, and the upper edges of the end pieces should project a little above the level of the side boards, as *Fig. 1* shows. Nail the side boards securely to the end pieces, making square corners. All the nails must be countersunk. Nail bottom boards, 3 ft. long, crosswise upon the edges of *A A*, *Fig. 2*. The edges of the bot-

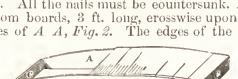


Fig. 2.

tom boards should fit closely; about 6 nails may be used in every board. After planing the edges of the end pieces, *C C*, *Fig. 2*, sufficiently to make a good joint, lap the bottom boards over them. After covering the whole bottom in this manner, cut 2 strips, each 10 ft. long, 1½ in. wide, and 1 in. thick; 4 ft., 5 in. from one end of each strip, cut a notch on the side ½ in. deep and 1½ in. long, and 3 in. from this notch, or 4 ft., 8 in., measuring from the same end, cut another same size. Turn the boat over and nail these strips on the upper edges of the side boards, *A A*, *Fig. 3*, on the outside of the same, with the notches inside. Use clinched wrought

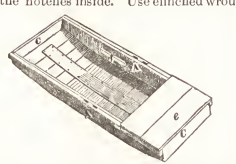
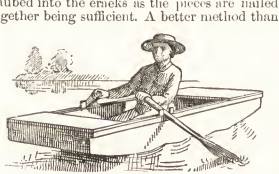


Fig. 3.

nails, 1 ft. apart. The mortices so formed are the rowlocks, hence those on one side must be opposite those on the other. Near the rowlocks the strips must be more securely fastened than elsewhere. The end of the scow nearer the rowlocks is the stern. Place a ¾ in. board in the middle of the bottom inside *Fig. 3*; bend it down against the bottom, and nail through the bottom boards into it, where the dots in the diagram indicate. 2 wrought nails in each bottom board, clinched in the side; this board to be known as the long bottom board. Place 2 boards crosswise, 3 ft., 2 in. long, at *e*, *Fig. 3*, and nail them to the edges of the side boards, *A A*. The opposite end of the boat is covered in the same manner. Nail a cleat about 1 ft. long on each side of the boat inside, at *f*, *Fig. 3*, with its aft end 5 ft., 4 in. from the stern, and its upper edge 6½ in. below the edge of the side board. These cleats should be fastened with clinched wrought nails; they are to support the seat board, which is 2 ft., 10½ in. long. Make 4 oak tholepins, *Fig. 5*, ½ in. thick, 4 in. long, 1½ in. wide, with a shoulder projecting over about 1 in.; fit them in the mortises, and thus complete the rowlocks. Pine or cedar will do for the oars, which should be 5 ft. long, 1¼ in. diameter at handle, and 2 in. diameter immediately below; blade, 18 in. long, 5 in. wide, and ¼ in. thick. Every part of the oar that will fall outside the rowlock when rowing should be as light as due regard for strength will permit. Bore a ¾ in. hole in the bow seat, through it run the end of a small rope and knot it inside *Fig. 4*. This rope is called the "painter," and should be about 9 ft. long. Wedge cotton evenly into all seams and cracks on the outside of the boat, except the end seats, leaving space above the cotton at least ½ in. deep; then fill the seams and cover the nail heads with putty. A good carpenter can fit the joints so that no caulking will be necessary; thick paint daubed into the cracks as the pieces are nailed together being sufficient. A better method than

Fig. 4. Fig. 5.



Scow.

caulking for this kind of boat, is to lay a strip of thick flannel, ¾ in. wide, saturated with paint, between the pieces as they are put together. This strip must be placed in every seam outside. 2 coats of paint will suffice. A neat color is a mixture of white lead and lampblack, forming a lead color. Use a lighter shade for inside. The seams leak at first, but a week's soaking closes them. Cost of all materials about $3.

Skiff. — The illustration represents a skiff costing about $5. 10 or 11 cedar boards ¾ in. thick, and not less than 7 in. wide, are required; also, 2 cedar boards ¼ in. thick, 14 in. wide, and

13 ft. long, free from knots. The latter will be called the side boards. They should both be of same quality, so that one will bend as easily as the other. Cedar is the wood used throughout, except where the name of the wood is given. A piece is cut, shaped like *Fig. 1*, with the entire length 4 ft., the width 12 in., and the distance *d* from the end to the dotted line 4 in. We will name this the cross-board. A piece of oak is cut of similar shape, but making the entire length 20 in., width 13 in., and distance *d* 6 in. This is the stern-piece. Both ends of each side-board are sawed off bevel, like the ends of the cross-board, and with same slant at both ends. The bevel at one end of the side-board should be the reverse of that at the other, making one edge 12 ft., 8 in. long, and the other 12 ft. The side-board has the appearance of *Fig. 1* elongated.

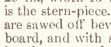


Fig. 1.

The tapering of the side-boards at the ends, which is necessary in the construction of the scow, is not required. The upward curve of the bottom is obtained by bending the side-boards. Set the side-boards, *B B*, *Fig. 2*, on edge parallel, with the longer edges uppermost, and at about the middle place

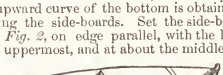


Fig. 2.

the cross-board, *t*, between, also with its longer edge uppermost. Nail the side-boards, *B B*, lightly to the cross-board, *t*. With the aid of ropes, draw two ends of the side-boards together; the other ends draw against the stern-piece, *R*, *Fig. 2*. In a piece of oak, about 16 in. long, cut grooves throughout its length, and make its cross section like *Fig. 3*. This "stem-piece," as it is called, is placed between the ends of the

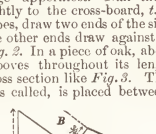


Fig. 3.

Fig. 6.

side-boards that were drawn together. After altering the shape of the stem-piece, if necessary, so that the ends of the side-boards, *B B*, *Fig. 3*, shall fit closely into the grooves, the side-boards are securely nailed to both stem-piece and stern-piece. The projecting upper end of the stem-piece is sawed off, and the boat inverted carefully. The convex edges of the side-boards are

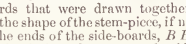


Fig. 4.

planed down 1 in. or more at the middle, *c*, *Fig. 4*, so that the bottom (the boat is now bottom up) may be flat from *a* to *b*, making easy curves at *a* and *b*. This flattening of the bottom is not useless, the draft being thereby diminished, and the speed probably increased. Bottom boards $\frac{3}{4}$ in. thick are nailed on crosswise, *Fig. 5*, and the

Fig. 5.

projecting ends sawed off. A long bottom board is put in, as described for the scow, and the cross-board, which was only temporary, is knocked out. *Fig. 6* is the seat at the bow. The cross-piece *n* is secured by nails driven through the side-boards into its ends, as at *P*. In *Fig. 7*, which represents the seat at the stern, the cross-piece, *L*, is fastened in the same manner. There is a cleat at *K*. The seats in both bow and stern are about 3 in. below the edges of the side-boards, and the seat-boards are lengthwise. We are now ready for the "upper streaks," as they are called. Two strips are cut 12 ft., 8 in. long, 2 in. wide, and 1 in. thick; two notches, each $1\frac{1}{2}$ in. long, and nearly 2 in. deep, are cut in the upper edge of each side-board, *Fig. 8*. They are 3 in. apart, and the point midway between them is 5 ft., 1 in. from the stern, measuring on a straight line in the middle of the boat. All the longi-

Fig. 7.


Fig. 8.

Fig. 9.

tudinal measurements hereafter given are upon this line. The upper streaks are now nailed on the outside of the side-boards even with the upper edges of the latter, like the strips upon *A A*, *Fig. 3*, in scow. The joint made by the upper streaks at the bow is shown by *Fig. 9*, in which *A* is the stem-piece, *B B* are the side-boards, and *C C* are the upper streaks. The row-locks are now completed by a short strip, *y*, *Fig. 10*, strongly screwed on the inside, over the notches. Make thole-pins, of the shape shown by *Fig. 5* in scow, and fit them into these mortises. It is often quite convenient to have another pair of row-locks about 2 ft. nearer the bow, that when a person sits in the stern, the rower may shift forward to better distribute the weight, for a boat rows hard when the stern is weighted down. Make two cleats for the rower's seat, with their aft ends 6 ft. from the stern, and their upper edges $7\frac{1}{2}$ in. below the edges of the side-boards. Saw off a seat-board 3 ft. 10 in. long. Invert the boat and fit a piece of inch-board, *N*, *Fig. 11*, upon its edge, at the stern, upon and perpendicular to the bottom. It is fastened at *g* by a screw, between *g* and *M*, by nails driven into it through the bottom from the inside of the boat, and by the strip *M*, of the same thickness, nailed

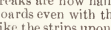


Fig. 10.

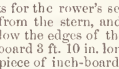


Fig. 11.

Fig. 12.

on the end of *N*, and crossing the stern-piece vertically, to which it is screwed. A $\frac{3}{4}$ in. hole is bored through the stem-piece at *l*. *Fig. 12*, through which the painter, 10 ft. long, is tied. An iron strap, shaped like the double line in the same figure, is screwed to the cutwater. The proper length for oars is about 7 ft. The boat is now to be caulked, unless rendered water-

Skiff.

tight by the methods described for the scow. Nail-heads are covered with putty, and 2 coats of paint applied.

Canoe Sail Boat.—The length is shown in the illustration is 13 ft., and is capable of carrying 2 persons, including guns, ammunition, etc.; designed for cruising on lakes, rivers and creeks, and on the sea-coast, in the latter ease carrying ballast. It is decked, quite stiff, rows easily, and carries 2 small sails made as safe and handy as possible. The masts are easily removed, and spars and sails stowed under deck. Dimensions are given for full sail, or for half sail, as desired. A centre-board is inadmissible, and a deep keel impossible, light draught being an object; good sailing qualities are obtained by using full-sized sails and a "lee-board." Without a deck, and fitted with thwarts, this craft would be an excellent row-boat for shallow waters. Estimated cost, $15. Draught, not over 3 in. with one person and baggage. The ribs are marked in *Fig. 1* as *A B C*, etc., ⊕ *1, 2, 3*, etc., which is a combination of cross sections, 1 at every rib. The canoe is a double-ender, that is, having bow and stern alike. The figure shows the series of ribs on only one side, and extending from ⊕ to only one end, those in the other section being precisely the same. The bottom is flat and coincides with line *0*, and the keel is a board 5 in. wide

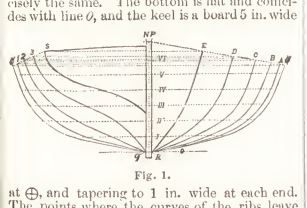


Fig. 1.

at ⊕, and tapering to 1 in. wide at each end. The points where the curves of the ribs leave line *0* are determined by the distances in column *0*, *Table 1*, measured from the dotted centre line *a a*, from which all horizontal measurements must be made. Lines *0*, *I*, *II*, *III*, are 1 in. apart; lines *III*, *IV*, *V*, 2 in. apart. The heights in *Table 2* are measured from line *0*. The ribs between ⊕ and the bow are designated by letters, and those between ⊕ and stern by figures. The bottom being flat, frames ⊕, *1, 2, A, B*, may each be of one piece, the mold-board being cut to represent the curves on both sides of the boat. In the table, the lengths of the ribs mentioned are doubled, and the "width at lower end" means the width of that section of each frame which crosses the flat portion of the bottom.

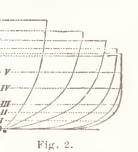


Fig. 2.

TABLE 1.

	0.	I.	II.	III.	IV.	V.
	In.	In.	In.	In.	In.	In.
Rib ⊕	8.5	13.3	14.58	15.22	15.5	15.5
Ribs *A* and *1*	15.62	12.24	13.74	14.5	15.22	15.34
" *B* " *2*	5.22	9.70	11.54	12.66	13.9	14.5
" *C* " *3*	1.7	5.92	8.34	9.98	11.66	12.56
" *D* " *4*	1.2	3.44	5.23	6.58	8.5	9.4
" *E* " *5*	.65	1.64	2.8	3.30	4.46	5.22

TABLE 2.

	Inches.
Rib ⊕	9.
Ribs *A* and *1*	9.32
" *B* " *2*	9.96
" *C* " *3*	10.92
" *D* " *4*	12.12
" *E* " *5*	13.40
Stem and stern	14.56

TABLE 3.

	Inches.
Rib ⊕	15.5
Ribs *A* and *1*	15.38
" *B* " *2*	14.86
" *C* " *3*	13.5
" *D* " *4*	10.66
" *E* " *5*	6.26

DIMENSIONS (FIG. 3).

f	14.57	in.	*Diagram 7.*
g	8.	"	
l	4.8	"	*F* 1.6 in.
k	14.	"	*G* 1.6 "
m	14.	"	*u* .5 "
n	1.8	"	*v* .5 "
Length of keel on lower edge 12 ft.,	8.6	"	*w* 2.24 "
p	1.	"	Width of *G* at junction with *F* .5 "

The stern-post has no curve on either edge. An apron is placed above the stern deadwood as in the bow.

Frame *E* is 11 in. from stem.
" *D* " 12 " " frame *E*.
" *C* " 13 " " " *D*.
" *B* " 14 " " " *C*.
" *A* " 14 " " " *B*.
" ⊕ " 14 " " " *A*.

And the same distances for the other half of the boat.

CROSS-SECTION OF KEEL AT

	Rib ⊕ Diag. B	Ribs A and 1, Diag. B	Ribs B and 2, Diag. B	Ribs C and 3, Diag. B	Ribs D and 4, Diag. B	Ribs E and 5, Diag. E
	In.	In.	In.	In.	In.	In.
a	.....	.....	.....	.1	.22	.35
b	5	4.8	4.2	3.6	2.8	2.
c	5	4.8	4.2	3.4	2.4	1.3

DIMENSIONS OF RIBS.

	Length.	Width of Lower End.	Width of Upper End.	Thickness Throughout.
	In.	In.	In.	In.
⊕.....	52	.8	.5	.5
A and *I*	52	.8	.5	.5
B " *2*	50	.8	.53	.5
C " *3*	23	.7	.6	.5
D " *4*	22	.7	.65	.5
E " *5*	18	.6	.73	.5

BEVELS OF UPPER ENDS.

⊕.....	0. in.
A and *I*	0. "
B " *2*	.03 "
C " *3*	.1 "
D " *4*	.15 "
E " *5*	.23 "

Fig. 4 is the deck plan. The outriggers carry the row-locks. *X* is a simple movable bench, *E E* are seations of ceiling, made movable to

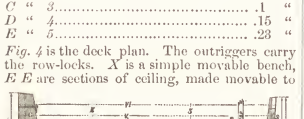


Fig. 3.

F, 3, position of bow; 1, 11, etc., intersection of ribs; *G* bow; *S*, stern piece; *H*, *K*, bow and stern deadwood; *L*, stem; *L*, stern post; *d d*, groove to receive ends of planks; *J J*, keel; *q*, commencement of curves. The bevel *c* is 2 in. at top; dotted lines *a a*, 8 in.

permit bailing. The deck is canvas, stretched on the framework shown in *Fig. 5*. *W* the gunwale, 1.8 in. deep and 1.3 in. thick. The ends of the deck-beams are let into it about .8 in., making beam-ends and gunwale flush with the up-

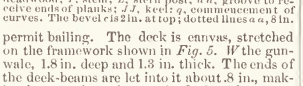


Fig. 4

per streak *N*. The slope of beams *4* and *5* is 4.5 in.; that on the others decreases toward bow and stern, so that if a board is set edgewise resting on the stem and the peak of beam *4*, it will also touch beams *1*, *2*, and *3*. The beams are cedar, .5 in. thick, 1.2 in. deep at ends, and 2.5 in. deep at peak.

Beam 1 is	6	in. abaft bow.	
" 2 "	.....1.5	" "	frame *D*.
" 3 "	2	" " "	*C*.
" 4 "	1	" forward frame	*B*.
" 5 "	1	" abaft "	*2*.
" 6 "	2	" forward "	*3*.
" 7 "	2	" abaft "	*4*.
" 8 "	6	" forward stern.	

D D, *Fig. 5*, are two ½ in. cedar boards, each 4 in. wide, running from beam *4* to the bow, and from beam *5* to the stern. They are nailed upon the tops of the aprons, and made flush with both gunwales and the stem and stern pieces. Beams *4* and *5* are made deeper than the others, and the ends of boards *D D* let into them. Boards *D D* need not be let into the others. The masts should be "stepped," before completing the deck. If full sail is spread, the foremast should be about 1 ft., 10 in. from bow, the mizzen mast 3 ft. abaft ⊕; if one sail is used, the mast should be 5 in. forward of frame *B*. The mast-holes are cut in boards *D D*, *Fig. 4*, ½ circle in each board. Sew breadths of duck together, making two roughly shaped pieces to cover the boat from bow to beam *4*, and from stern to beam *5*. Less material is consumed by placing the breadths across the boat. After securing the cloth by a few tacks on boards *D D*, stretch it tightly, fold the edges under, and tack it upon the outside of the upper streaks, the outer sides (not the edges) of beams *4* and *5*, and crossing boards *D D* near their ends. Copper tacks should be used. Next, boards *B B* (one is shown in *Fig. 5*), .6 in. thick, 4 in. wide, with a slope of 1 in 5, are laid with their ends on frames *4* and *5*, and their outer edges cover both gunwale and upper streak. They are nailed to the beams, and at intervals to the gunwales, and supported at frame ⊕ by a small iron brace (*Fig. 5*). Cut the mast holes through the canvas, and tack round them. Then, to bind together boards *D D*, screw a flat iron ring, bent to fit the slopes, round the aperture. (See *Fig. 4*). *Figs. 6* and *7* represent one of the outriggers. The iron rod *A* (*Fig. 7*) lies in a plane at right angles to the boat. It is screwed to the inner side of the gunwale, before the board *B* (*Fig. 5*) is put on, 2 in. forward of frame *1*; its lower end is bent toward the stern and screwed to frame *L*. The upper or outer end is bent back and made wide enough to drill a hole downward to admit the shank of the rowlock. The rowlock is secured at *d* by a peg or nut. To the extreme end *c* the rod *B* is welded, and screwed at its other extremity to the outside of the upper streak, near the top. Rod *A* should be quite stiff, as it bears the whole weight of the oar; rod *B* should be light. The section of rod *A* below the gunwale may be about 5 in. long; the length of rod *B* should be about 13 in. Sculls, 8 ft. long. In this boat, only one can row; but if designed for two, the rowlocks should be put further forward, about at frame ⊕. The rudder 14 in. wide for full sail, and fitted with a yoke. Dimensions for full sail: Foresail, height on mast, 9 ft.; length on boom, 6 ft. 8 in.; rise, 16 in. Mizzen sail: height on mast, 7 ft., 4 in.; length on boom, 5 ft., 4 in.; rise 14 in. Both are leg-o'-mutton sails, raised by halyards and attached to hoops

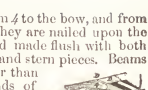


Fig. 5.

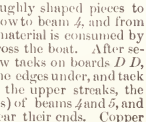


Fig. 6 Fig. 7.

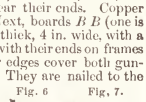
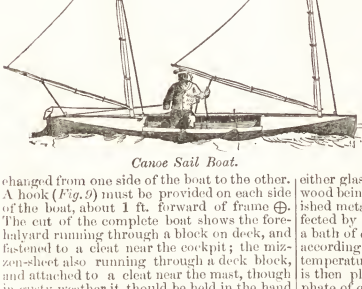


Fig. 8. Fig. 9.

on the mast. Booms with jaws are best, and the sails bent upon them. Foremast, 10 ft. 7 in. long, 2 in. diameter at butt, 1 in. at top. Mizzenmast, 9 ft. long; diameter, 1.7 in. at butt, .9 in. at top. Dimensions for half sail: One foresail, size of either of the foregoing; must 5 in. forward of frame *B*. Beating to windward is impossible with this sail, and no leeboard is needed. Width of rudder, 12 in. To sail well the boat must be furnished with both sails and a leeboard. *Fig. 8* shows the leeboard in proper position, as it should float when partially submerged; but if the buoyancy of the wood causes it to rise, a lead or iron weight let into the board at its aft end will obviate the difficulty. The proper direction of the grain is indicated, and an iron strap on the forward edge. *Fig. 9* indicates the only manner of fastening. *I* is the board already described in *Fig. 5*. A bolt is run through the upper corner of the board, and furnished with rings at each end. This bolt should turn easily. Every time the boat "comes about" this leeboard must be



Canoe Sail Boat.

changed from one side of the boat to the other. A hook (*Fig. 9*) must be provided on each side of the boat, about 1 ft. forward of frame ⊕. The cut of the complete boat shows the forehalyard running through a block on deck, and fastened to a cleat near the cockpit; the mizzen-sheet also running through a deck block, and attached to a cleat near the mast, though in gusty weather it should be held in the hand with the other sheet. Diameter of cordage, $\frac{1}{4}$ in. The weight of anchor about 12 lbs. The cable of hemp, about 5 in. diameter, and length governed by waters in which used. The seam under board *B* (*Fig. 5*) should be caulked. If the canvas is stretched sufficiently, and painted, and the tacks placed $\frac{2}{4}$ in. apart, the deck will be tighter than if of wood. This boat, if submerged, will easily float with one person sitting in it. It is very desirable to galvanize all iron work used.

BOXES.—When made of wood, the pieces are accurately measured by the square; marked on both sides, and sawed through the line. The pieces are planed truly to the angle of the box to be made. Draw a pencil line across the 2 side pieces $\frac{1}{2}$ in. from the ends, by the help of the square, and with a brad-awl make holes along those lines. Do not make the first and last too near the edges, or they will split the wood. Now set up one of the short pieces, and place upon it the piece which you have bored holes in. Run the brad-awl a little way into the lower piece, through the holes made into the upper. Drive a brad through the middle hole first, then through the other holes. This corner should be square and neat. Do the same with the other short piece; then nail on the long side that is left. The frame of the box will now be complete. The following table gives the contents of boxes of different sizes:

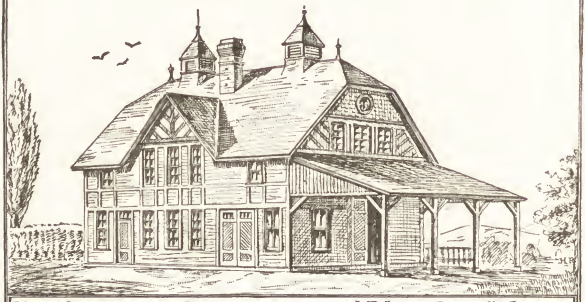
Square		Depth.		Contents.
4 x 4	in.....	2½	in.....	1 pt.
4 x 4	"	4½	"	1 qt.
4 x 8	"	4½	"	2 "
8 x 8	"	4½	"	1 gal.
8 x 8	"	8	"	1 pk.
10 x12	"	9	"	½ bush.
15½x15½	"	9½	"	1 "
18 x18	" 27½		"	1 bbl.
			or 8,467.20 cu. in.	

WOOD, To Make Look Like Metal.—The recently invented process, by which wood is made to take on some of the special characteristics of metal, has been turned to practical account. By this process the surface becomes so hard and smooth as to be susceptible of a high polish, and may be treated with a burnisher of either glass or porcelain, the appearance of the wood being then in every respect that of polished metal, with the difference that it is unaffected by moisture. The wood is steeped in a bath of caustic alkali for 2 or 3 days together, according to its degree of permeability, at a temperature of between 165° and 197° Fahr. It is then placed in a second bath of hydrosulphate of calcium, to which a concentrated solution of sulphur is added after 24 or 36 hours. The third bath is one of acetate of lead, at a temperature of from 95° to 120° Fahr.; and in this latter the wood is allowed to remain from 30 to 50 hours. After being thoroughly dried, it is in condition for being polished with lead, tin or zinc, as may be desired, finishing the process with a burnisher.

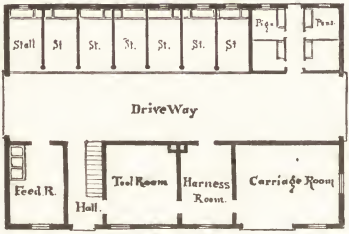
Examples of Buildings.

The cost of materials and labor varies so much in different parts of the U. S., that the estimates given for the cost of each building must be regarded as only approximate.

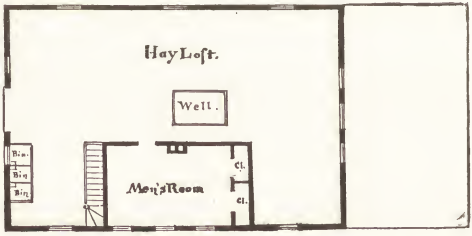
BARNS. — *Small.* In the country and suburbs a small barn, such as shown in the illustration, is sometimes desirable. The first floor has a carriage-house for 2 carriages; a covered open shed for a wagon; a large tool-room, with 3 stalls and a harness closet. The second floor has the grain bins and hay-loft. The loft is lighted by dormer windows, and the ventilating shaft



View of a mediumsize Barn. J.B.Legg Arch! St. Louis.

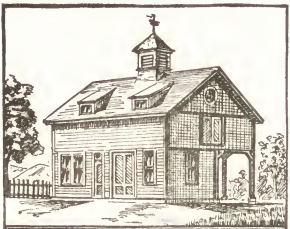


Ground Plan.

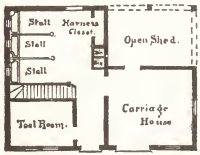


Loft Plan

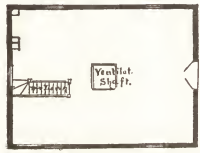
breaks the roof-line very effectively. Cost about $650.



A small Barn. J.B. Legg Arch't St. Louis.



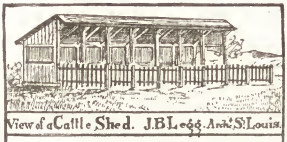
Ground Plan



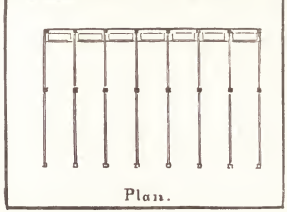
Plan of Hay Loft

Medium-Sized.—The importance of careful handling of farm stock is always kept in view by good farmers, and the accompanying plan may please many. The first floor has 7 large stalls and 4 pig-pens on one side of the drive-way; and the feed, tool, harness and carriage-rooms on the other; also the stairs leading to the second floor. The wagon-shed will accommodate about 4 wagons without encumbering the driveway to the stable. The second floor has a hay-loft with a well-hole to pass hay from the wagons up and also to haul grain through. Bins for oats, corn, and bran are provided. The men's room is large and has 2 closets. The hay-loft, owing to the high pitch of the roof, will hold a large supply of hay. Externally, the sides are weather-boarded with ornamental false framing to break the large surfaces of the sides. All the rooms are well lighted and ventilated. The cost is about $2,750.

CATTLE SHED.—To prevent the cattle from becoming reduced in condition during winter, some protection from the weather is necessary. When arranged in stalls, as shown in the



View of a Cattle Shed. J.B. Legg. Arch't St. Louis.

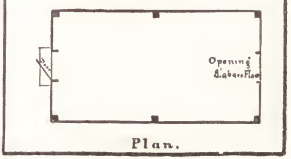


Plan.

illustration, they shelter when fattening for market or for milking. The closed side should be placed to the north. The small fences enable a separation of the stock. The cost per stall is about $350.

CORN-CRIB.—The corn-crib, shown in the il-

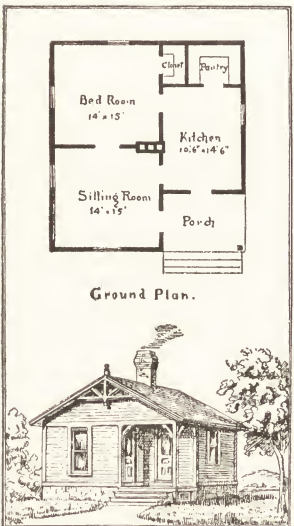
View of a Corn-crib. J.B. Legg Arch't St. Louis.



Plan.

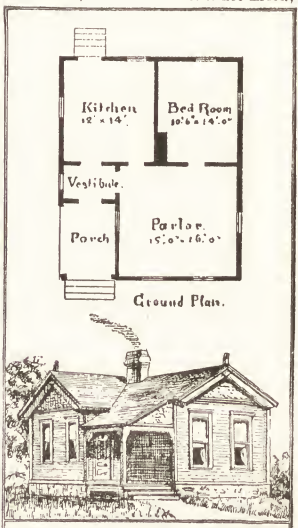
lustration, is elevated on 6 posts, and allows free circulation of air underneath, preventing dampness and keeping the grain dry. This also preserves the grain from attacks of vermin.

DWELLINGS.—*Plate 91, Design 111.* A building, no matter how small or unimportant, costs no more to erect if symmetrically arranged and designed in good proportions. The illustration shows how the most simple form of a house is improved by such treatment. This 3 room cottage, designed for a farm or small village, is compactly and economically arranged. The entrance is sheltered by the porch being drawn under the roof of the building; from it you can enter either the kitchen (intended to be used as a dining-room also), or the sitting-room. The kitchen has a good-sized pantry with ample shelf-room for all necessary utensils, and may serve as a store-room. The size of the kitchen is 10 ft., 6 in. by 14 ft., 6 in., large enough to serve the double purpose intended, for a small family.



The sitting-room, to the left of the porch, is 14 by 15 ft., having windows on 2 sides, and a door, with transom, entering the bedroom in the rear; it is well lighted and ventilated. The bedroom, the same size as the sitting-room and lighted in the same manner (windows on 2 sides), will make a pleasant sleeping room. A closet with shelves is attached to this room, and a door leads from it into the kitchen. This door should have no transom. One feature, and a very economical one, is the location of the chimney, so placed that it contains a flue for each room. Any one who has built in the country knows how expensive it is to build chimneys, and will appreciate this. Regarding the exterior, the perspective view shows plainly what the design is. The roof will take shingles about 33°, and has a hanging gutter on each side. The gables have small finials and simple frame work. The outer architraves are plain, and a belt rail extends on the level of their top from corner strip to corner strip. The cornice is a plain molded front railroad cornice. The cost of the building with a cellar under one room would be about $675.

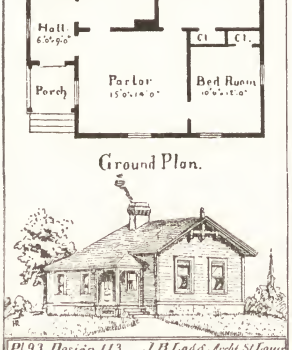
Plate 97, Design 117.— This cottage is a little more pretentious than the preceding one and has 3 rooms, but the entrance is not directly



into the rooms, a small vestibule being provided. The front is entered from the porch, which is covered by continuing the roof of main building over it. Passing into the vestibule, lighted by a window on the left side, you can go into the parlor, sitting-room, or kitchen. The parlor, on the right of the vestibule, is 15 by 16 ft.,

and has windows on 3 sides, 2 in front and 1 on the right and left. From this room doors enter the kitchen and bedroom. The bedroom, 10 ft., 6 in., by 14 ft., has windows on 2 sides, and is cut off from the kitchen. The kitchen is 12 by 14 ft., and has a window on 2 sides and a door leading to the yard in the rear. The rooms are well lighted, and having windows on 2 sides, will be cool in summer. The door from the vestibule into the parlor, and the one from parlor to bedroom, might have transoms, although not necessary. One chimney serves the 3 rooms. The exterior shows a broken roof, with a gable in front over the parlor and one over the kitchen, the roof in the rear at outer corner of the bedroom being hipped up. The outer architraves of the windows have molded caps. The porch roof is supported by square posts with small solid molded brackets in the angles. The weather-boarding only extends to the line of the eaves in the gables, and is capped by a molded belt rail, the space above which is shingled, as is also the spandrel formed by the roof in front of the porch. This shingling could be stained differently from the color of the siding and produce a pretty effect. The cornice is a plain molded railroad cornice with hanging gutter. The cost of the building with a cellar under the kitchen would be about $750.

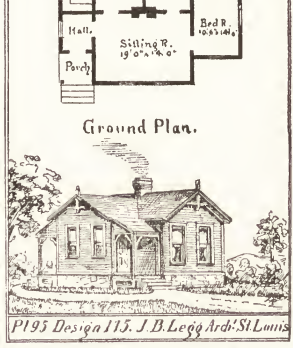
Plate 93, Design 113. — The plan of this 4



Pl.93. Design 113. J.B.Legg, Archt St Louis

room cottage is almost a perfect square, with rooms and porch under one roof. In front the house is entered from the porch into a vestibule, 6 by 9 ft., entering into the kitchen or parlor. The parlor, 14 by 15 ft., has windows on 2 sides, giving good ventilation, and doors to the kitchen and bedrooms. The front bedroom, 10 ft., 6 in., by 12 ft., and the rear bedroom, 15 by 12 ft., have each a closet, and windows on 2 sides of the rooms. The rear room has a stove flue, but the front room will require to be warmed from the parlor. The kitchen, 10 ft., 6 in., by 14 ft., has a door in the rear leading to the yard. On the left of the kitchen, and opening into same, is a large pantry or store-room, 6 by 9 ft., which is of sufficient size to contain the family stores. This plan has the same features described in previous examples as to the single chimney, style of architraves, cornice, etc., and needs no further explanation. Cost about $950.

Plate 95, Design 115. — This is a small 4 room cottage, adapted to farm or village, and by its economical construction suitable to persons of limited means. A small porch in front and rear covers the entrances and is roofed in with the building. Entering at the front is a small hall which leads into the sitting-room, 14 ft. wide and 19 ft. long, and designed to be a general family room. The side bedroom, 10 ft., 6 in., by 14 ft., and rear bedroom, 9 ft. 4 in. by 14 ft., are entered from this room. Each of these bedrooms is provided with a roomy closet. The rear bedroom has a flue-hole for a stovepipe in the chimney, which contains a fireplace for the sitting-room, and flues for the bedroom and

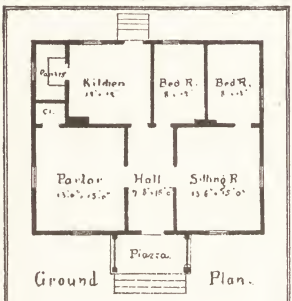


Pl.95 Design 115. J.B.Legg Archt St Louis

kitchen. The kitchen, 9 ft., 4 in., by 14 ft., is entered from the yard, or from the sitting-room. An extra large pantry opens into the kitchen, provided with shelving and roomy enough to be used to store flour, etc., in. A window gives the

pantry light and air. Though rather small, the kitchen is of a size to enable the family to use it as a dining-room; otherwise the sitting-room will be used. The exterior has been kept plain, and much of its good effect depends on the play of light and shade which the broken outline of plan and roof insure. The perspective represents the building with a stone foundation, though if posts or piers are used, the space below the water-table will have to be inclosed with matched boards placed upright and finished on the ground on a plain base. The water-table is simple, but enough to break the line between the foundation and superstructure. Molded top architraves are used on the front windows, the sides and rear being plain; it has a railroad cornice and the roof as flat as will work shingles. The corner boards are plain. One of the best features is the way in which the chimney comes through the ridge of the roof. The roof of side bedroom can be hipped into the main roof with good effect. The cost would be about $800.

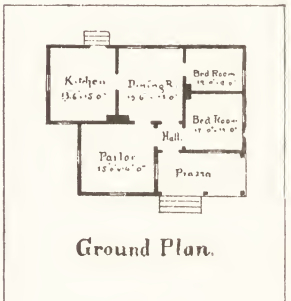
Plate 96, Design 116. — In plan nearly square, this house contains no waste spaces, and every portion of the floor space is utilized. In the



Pl.96 Design 116 J.B.Legg Arch.t St.Louis

front of the house is a roomy porch. The house is entered by square hall, 7 ft., 8 in., by 15 ft., which is a great assistance in making the house comfortable in summer, as it allows the ventilation of the rooms opening on it. To the left of the hall is the parlor, 13 ft., 6 in., by 15 ft., and on the right the sitting-room of same size. Both rooms have windows on 2 sides, and the parlor a good sized closet; both are provided with flues for stoves. The parlor has no connection with any other room, but from the sitting-room a door enters one of the bedrooms, 8 by 12 ft. The rear end of the hall opens into the kitchen, 12 ft. sq., or the second bedroom, 8 by 12 ft. Both of the bedrooms have flues for stoves. The kitchen has a pantry lighted by a window. The uses to which the rooms can be put may be varied to suit the needs of those living in it; for example, a door could be placed between the kitchen and parlor and the latter room used as a dining and family room, and the sitting-room and bedroom used as sleeping apartments. The building has a straight gable roof which extends across the building and broken into by the porch roof. This porch has neat, square, chamfered posts, molded corner brackets, and gable roof with ornamental gable and finial. Cost about $1,050.

Plate 94, Design 114. — A little better class of

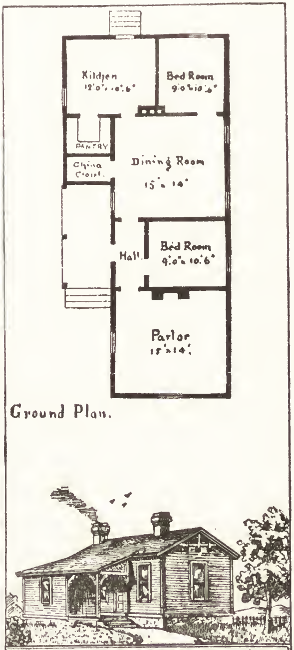


Pl.94 Design 114 J.B.Legg Arch.t St.Louis

cottage than the foregoing, requiring a wider lot, a corner being well adapted to it. A piazza in front, 16 ft. long, fills out the break made by

the projection of the parlor; from this you enter a small hall only large enough to prevent a direct entrance into the rooms, and thus obviate the tracking in of dirt in bad weather, and draughts when the front door is opened. To the right of the hall is the front bedroom, on the left the parlor, and directly to the rear the dining-room. The parlor, 14 by 15 ft., has windows on 3 sides and a door leading into the dining-room; one of the windows opens on the porch and might be made a bulk-head window, so that one could step directly on the porch without passing through the hall. The front bed room is 12 by 12 ft., and the rear one 12 by 9 ft., both containing flues for stoves; the rear bed room opening into the dining-room. The dining-room is 13 ft., 6 in., by 15 ft., and has 2 large windows in the rear. The kitchen to the left of the dining-room and of same size has windows to the front and side and a door leading to the yard. Two chimneys supply the rooms with flues. The windows have a plain architrave finish with molded sills. The front porch has a flat roof, to be covered with tin and a small modillion cornice. The porch columns are square with corner brackets. There is a gable over the front end of parlor and one on the right side over bedrooms, both finished plain with a drop and cross-bar and terminating on the top with finials. The broken outline of this roof is an effective feature of the design; the rear side is hipped up and the whole crowned by a small deck with neat cornice. This deck, like the porch, should be covered with tin. A good painter, and a little artistic feeling in the selection of colors, will repay, as an opportunity is offered for effective trimming. The porch, porch cornice, corner boards, gables and deck cornice and outer architraves allow of good contrasts. The cost of this building would be about $1,000.

Plate 92, Design 112. — A neat plain 5 room cottage is represented. Its long, narrow shape makes the rooms cool in summer and well ventilated, as it gives them windows on 2 sides. Though the arrangement may seem unhandy because of the distance between the rooms, an investigation will show that the rooms that will be used mostly in connection have been grouped. The house is entered by a porch into the hall, from which latter doors lead into the parlor, bedroom and dining-room. To the rear, adjoining the dining-room, is the kitchen, to the right of which, entered from the dining-room, is a second bedroom. The parlor, 15 by 14 ft., is in the front of the house and has windows on 2 sides and an open fireplace. The bedroom, between the parlor and diningroom, is 9 ft. by 10 ft., 6 in., and has a stove flue entering the parlor chimney. The dining-room extends across the width of the front of the house, and is 15 by 14 ft., and is provided with a closet large enough to contain all the dishes required, and has windows on either end. To the rear of the dining-room is the kitchen and a bedroom; the bedroom, 9 ft. by 10 ft., 6 in., and the kitchen, 10 ft., 6 in., by 12 ft. The kitchen has a pantry and store-room with ample shelf room. The kitchen, bedroom and dining-room are served by the same chimney, containing a flue for each. An entrance to the kitchen from the back yard is provided. The exterior follows the same style as in the preceding examples. The roof is low, and has as little pitch as would be safe to give a shingle roof. The gable in front has an ornamental drop composed of 3 posts and a cross-bar. The porch



Pl. 92 Design 112. J. B. Legg Arch't St. Louis

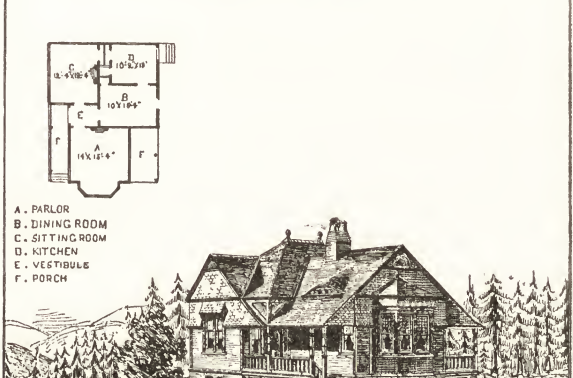
columns are square and without base or cap, running up to the eaves of roof with a spandrel in front intended to be shingled. Molded brackets are placed on the posts in the angles. The porch is large and will shade the sunny side of the house. The approximate cost of the building would be about $1,200.

Plate 89, Design 109. — A small 5 room cottage, somewhat out of the usual run of such buildings, but well adapted to a hilly situation. A large veranda extends across the front, and returns at the side as far as the vestibule, shading

the front part of the house. The steps to this porch on the right side of the house have the roof extended over them to form a shelter. A small vestibule with window, in which stained glass would be an ornamental feature, is entered from the porch and has doors opening into the parlor, A, and chamber, C. The parlor, 14 ft. by 15 ft., 4 in., has windows on 3 sides and also a door leading directly on the front porch. This room is only provided with a stove flue; but an open fireplace could be substituted, and would be a great improvement, though somewhat more expensive. A door leads from the parlor into the kitchen and dining-room, B, 12 ft., 4 in., by 15 ft., 4 in., having windows on 2 sides and a door leading to the yard. The chamber, C, can only be entered from the vestibule, and though adjoining the kitchen, will not be made uncomfortable thereby. This room is of the same size as the kitchen. Up stairs (the plan of which is not given), there are 2 bedrooms, comfortable and airy, though, from the shape of the roof, not high at the walls. Externally this cottage is picturesque, the effect of light and shade being quite apparent. The roof pitches upon a high gable over the rear part of the house, and the front portion, including porch, is then shedded up against it. These roof lines are broken by small dormers which run out through them. The sides of the house, instead of being weather-boarded, are covered with stained shingles. The porch posts are turned with square tops and bottoms. The cost would be about $1,000.

Plate 88, Design 108.— In general plan the house is nearly square, with the exception of the bay window in front, and is inexpensive from a constructional standpoint. The arrangements of porches on either side of the vestibule, E, open on it. The other porch, or balcony, as there is a balustrade inclosing it and no steps leading to yard, is entered from the parlor, A, or dining-room, B, by means of bulk-head windows reaching to the floor. The parlor is 14 ft. by 15 ft., 4 in., and further enlarged by the bay window, making a large-sized room, which would make a fine family room. The vestibule, E, 6 ft. wide, affords protection in winter to the rooms opening into it, and allows passing from either one of the 3 principal rooms to the outside without going through any of them. The dining-room, B, is 10 ft. by 15 ft., 4 in., and has a nice closet. The kitchen, D, 10 ft., 2 in., by 12 ft., has a closet and pantry in which there is a slide to the dining-room closet, allowing the passage of dishes. There is a door leading direct from the kitchen to the yard. The sitting-room, C, has a closet, and is 12 ft., 4 in., square. Good ventilation is secured by having transoms

over the doors entering the vestibule from the rooms. In the second floor plan (which is not shown), there are 3 bedrooms, well lighted and ventilated. In case less room is required, the dining-room and kitchen could be combined, and the sitting-room and dining-room used as bedrooms, leaving the parlor as a large family room. In this case the room could be simplified and the cost of the cottage reduced. The style of house shown in the perspective, is a good example of the prevailing "American Cottage style" and is picturesque. The effect can be heightened by use of a little coloring in painting, and would give the house a cosy, home-like appearance, with just ornamental features

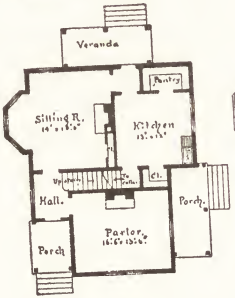


PL. 88. Design 106. J.B. Legg Architect. St. Louis.

leads on to the side porch to the right, which is of a large size. The dining or sitting-room has a bay window, adding to the size of the room and affording a view of the front yard. A small closet is provided at the side of the chimney breast. One of the best features is the small hall which separates the dining-room and kitchen, giving a double door connection and thus preventing odors from the kitchen being carried to the dining-room. The dining-room has a fireplace. The kitchen, 12 by 13 ft., has a pantry in the rear end and a closet on the side next to the parlor near the door leading to the cellar steps which go down under those to the second floor. On the second floor is a large hall, enough in the bay window, dormer windows and gables to make it attractive. Cost about $1,600.

Plate 86, Design 106. — An unusually complete house in its arrangement, for a small one. No detail for convenience has been forgotten. A small entrance hall has doors leading to the parlor, 15 ft., 6 in. by 13 ft., 6 in., occupying the front of the first floor and to the sitting and dining-room, 14 ft. 6 in. by 16 ft., 6 in. In this hall the stairs to the second floor ascend up between the parlor and rooms in the rear part of the house, and are 3 ft. wide. The parlor has an open fireplace and windows on 3 sides, that in front being a double-mullion window. A door at the end of which is the bath-room, located over the kitchen sink, thus simplifying the plumbing. The front chamber over the parlor and the one over the dining-room are of same size as the rooms below; and connect, through a large closet placed over the steps to the first floor. The front room has a fireplace, and the other 2 stove flues. The chamber over the kitchen is 12 by 13 ft., and a closet. All these rooms have connection with the main hall. The perspective elevation shows a cosy house, with an air of home-like comfort. The molded cornices, bay window, well proportioned and decorated gables, and steep pitched roof add to

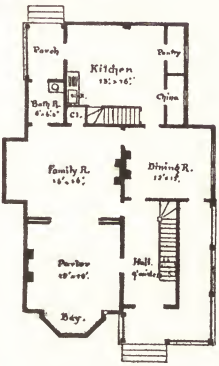
Pl. 86. Design 106.



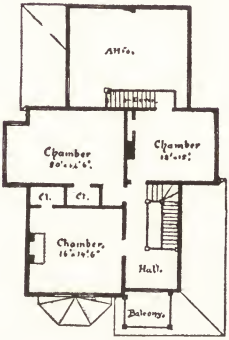
First Floor. Second Floor

Pl. 86. Design 106. *J. B. Legg, Architect. St Louis.*

Pl. 82. Design 102.



First Floor.

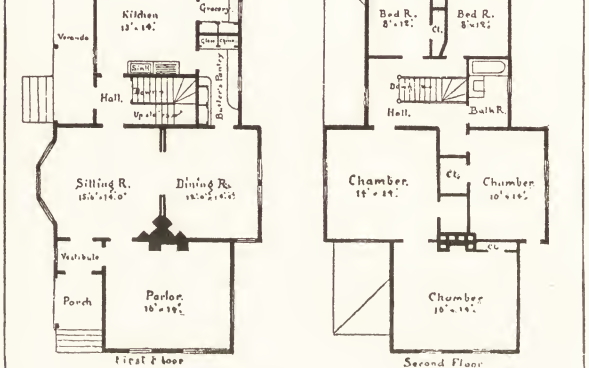


Second Floor.

Pl. 82 Design 102. J. B. Legé, Architect, St. Louis.

the attractiveness of the building, while the large porches, with balconies in the second story, convey the idea of ease. The small gable windows ventilate the space under the roof, and the upper rooms will be cool and agreeable in the warmest weather. Cost about $1,800.

Plate 82, Design 102.—Any one possessing a well situated lot in a hilly locality will find this design adapted to such a place. The house contains 7 good rooms and a large attic and bath room. The general plan is much after that of a city house. A large porch, with a balustrade, extends around the front and side of the hall, which is 9 ft. wide, and will show a nice stairway to advantage. To the left, on entering the hall, is the parlor, 15 by 16 ft., with a bay window in front and the fireplace located opposite into the kitchen. The bath-room is placed on the first floor so that a pump can be used to draw the water for the tub direct from the cistern. The hall (main) in the second story is of same width as on first. The front chamber is 14 ft., 6 in., by 16 ft., the one over family room 12 ft. 6 in., by 20 ft., and the small one, 13 by 16 ft., the same as the dining-room. The front chamber has a fireplace, the others flues. Large clothes closets connect with the large bedrooms. A nice feature is the balcony over the front door, entered from the hall by a bulk-head window. In the elevation, this house is only $1\frac{1}{2}$ stories high, cutting the corners of the second story rooms, but high enough at the eaves to allow 6 ft. in the clear. The gables are different in height and decoration, and the cornice has a heavy pro-

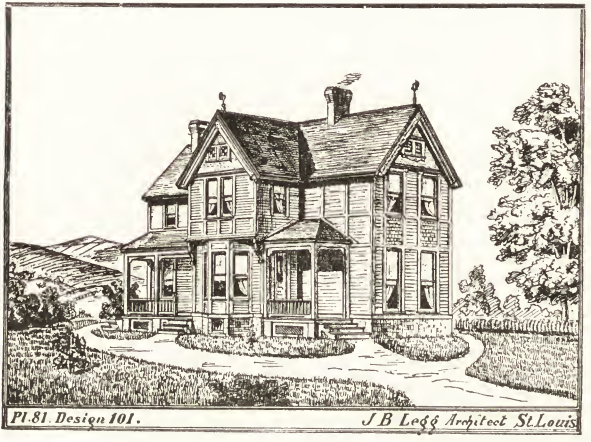


the centre of the door to the hall. This room is connected with the family room back of it by sliding doors. The family room is 16 by 16 ft., and has a large square bay window with windows on all sides, giving a view of the street. A door leads from this family room into the dining-room and also into the front hall. The family room and dining-room both have open fireplaces. In the rear of the back stairs is a closet, opening into the family room, for keeping articles desired under lock and key. The dining-room is 12 by 15 ft., and has a door leading on to the front porch. The closet and store-room, in the kitchen, are large. On the left of the kitchen, which is 13 by 16 ft., is the bath-room and a small porch with a door from the latter

jection throwing a good shade. The roof over the main body of the house is carried up very high and has an ornamental cresting in the ridge. Cost about $3,500.

Plate 81, Design 101.—A complete 9 room frame house, suited for a family of medium income, in the suburbs of a city or in a country town. It is compactly arranged and economically constructed. From a small front porch the vestibule is entered, from which the parlor and sitting-room can be gained. The parlor, occupying the front part of the house, is 16 by 14 ft., with 2 windows to the front and 1 on the side; it has an open fireplace, at the side of which is the door leading into the sitting-room. The sitting and dining-room are connected by

sliding doors, which when thrown open, make a fine apartment. The end of the sitting-room is bay-shaped, has 3 windows, and is 15 ft., 6 in., by 14 ft. The dining-room, 12 by 14 ft., has a double window in the end opposite the centre of the sliding doors and 1 to the front. These rooms have fireplaces placed in the angles of the sliding doors, making a unique finish. To the rear of the sitting-room, with a door leading into it from the sitting-room, is the hall with the stairway. This hall is 6 ft. wide on the first floor. From the end of the hall a door opens on a large veranda, extending the length of the rear wing. The steps to the second floor start on the right hand side of the hall, and on the left are those to the cellar. This is a boxed or inclosed stairway, a partition separating the upper from the room over **the sitting-room has not the bay** end of the latter, but is brought out square by means of brackets under the corners. This room has a stove flue and a large closet between it and the bedroom over the dining-room. The door leading into the hall is opposite the landing of the stairs, which end with double newels on second floor. The chamber over the dining-room is entered directly from the hall by a door placed alongside of that entering the bath-room. This room is 10 by 14 ft., and has a closet. The windows in these rooms come directly over those in the lower story. The bath-room contains a tub and water closet, but there is room for a washstand, if desired. The plumbing, if there is no public service, can be supplied by a tank, as described under *Country Town Dwell-*



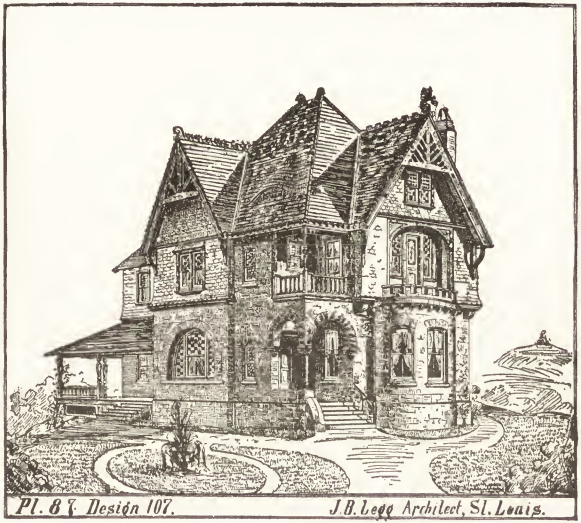
Pl. 81. Design 101. J B Legg Architect St Louis

lower flight. Passing from the dining-room to the kitchen, a large butler's pantry is entered, having a closed cupboard and inclosed closets in the rear end; on the right side is a long serving shelf. This pantry is lighted by a side window. The kitchen, 13 by 14 ft., has a door and window opening on the veranda, a door into the hall, and 2 windows in the rear end, being thus well supplied with air and light. A large pantry is on the right hand side, with long shelving and a good window. On the second floor, over the parlor and of the same size, is a chamber, intended for principal bedroom, and to be used in connection with chamber over sitting-room, 14 by 14 ft., which should serve as a children's room. The front chamber has a clothes closet and an open fireplace. The bed-

ings in HOUSES. In the rear wing, over the kitchen and pantries, are 2 small bedrooms, each 8 by 12 ft., with a closet for each, and stove flues. This is a complete, compact and comfortable house. The elevations have been designed in the "American style," if it may be so called, and have a pleasing appearance. The sheltered entrances, with porches and balustrades, throw effective shades on the building. The walls are broken by false framework panels, with those under the front windows shingled, making a contrast with the siding in the balance. The gables terminate in finials, and have small ornamental windows and shingled walls. The cornices are boxed railroad style, with paneled facine. The porch columns are plain, and the cornices correspond with those

of the building. The good result of corbeling-out the second story room over the sitting-room are evident from the perspective. Two chimneys give the rooms flues and fireplaces, and come through the roofs at the ridges. The building will cost about $3,350.

Plate 87, Design 107. — In the last few years many very fine examples of ancient and mediæval architectural designs, executed in a modern form, have been produced. This is a modern Gothic application, and shows what a careful adaptation of that style to our present wants may accomplish. The plan is of unusual compactness and groups those rooms used in connection successfully. A side entrance porch leads to dining-room. The kitchen is 14 by 16 ft., and has a good-sized pantry. A butler's pantry is located at the end of the hall leading from the dining-room to the kitchen. The rear side of the house is protected by a large porch with a smaller one at the kitchen door connected with it. Doors from the rear hall and kitchen open on these. The front chamber on second floor is 13 ft., 6 in., by 20 ft., has 2 large closets, dressing room and a balcony over the parlor bay. The bedroom over the sitting-room is 14 by 15 ft., 6 in., and has a closet. The one over the dining-room is squared over the bay of latter, and is 14 by 18 ft.; it connects with the front chamber and has a door leading into the private bath-room

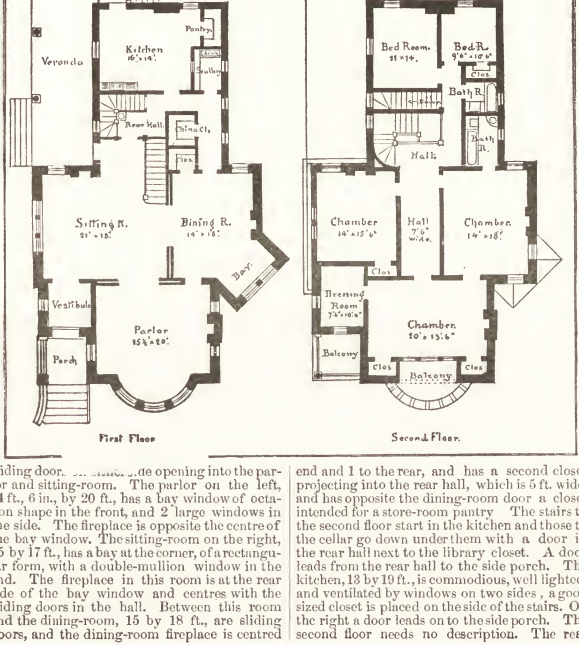


Pl. 87. Design 107. *J.B. Legg Architect, St. Louis.*

the vestibule of larger dimensions than usually found, opening directly into a hall used, at the same time, as a sitting-room; this is 10 by 21 ft., connected with the parlor, 15 ft., 6 in., by 20 ft., and the dining-room, 14 by 18 ft., by sliding doors. A small side door leads from the dining-room into the parlor. Each of these rooms has a bay window. The main stairs start in the sitting-room and land on a separate hall in the second story. The rear stairs start in the back hall in rear of the sitting-room, and there is a washstand in this hall. Between the dining-room and kitchen is a hall in which a large closet is located; a smaller one opens into the intended for this suite of rooms. A general bath-room is located back of the private one. Over the kitchen there are two bedrooms, 11 by 14 ft., and 9 ft., 6 in., by 10 ft., 6 in. All the bedrooms open directly into the halls. Noteworthy is the elevation of this plan. The first story is designed to be executed in rough ashler, and the second story faced with shingles. A heavy corner column supports the balcony over the portico from which massive arches are sprung to the walls on either side. The balcony over the parlor bay has a heavy stone balustrade. The grouping of the windows under the large arches is picturesque and adapted to emphasize the style. The high

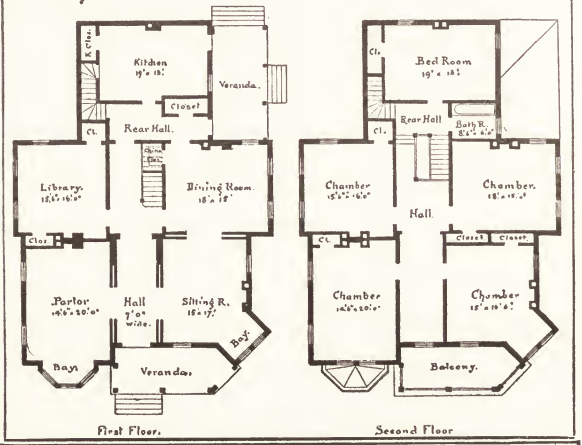
pitched hip and gabled roof finishes the structure, and is appropriately finished with a heavy cresting. Good staining of the shingles is required to carry out the effect. The cost would be about $7,500.

Plate 83, Design 103. — This plan contains 1 more room than the preceding design, and is larger and more expensive; the many projections and angles combine to make it more costly; but for one with the means to erect such a building, it would make an excellent dwelling. It is a double house with a large 9 ft. hall; a veranda, with a balcony on the second floor, shades the front doors, which are double. The hall has with them, making, when all the sliding doors are thrown open, a grand suite of rooms. The dining-room has 2 windows in the end and 1 on the side. The hall, between the dining-room and the library, located behind the parlor, is widened to 10 ft., and here the stairway to the second floor starts. Under this stairway is the closet for the dining-room. A door from the latter room enters the rear hall at the side of the fireplace. The library, 15 ft., 6 in., by 16 ft., has a fireplace which backs up against that in the parlor, and a closet formed by filling up the recesses made by the depth of the 2 fireplaces. This room is well lighted by 2 windows in the



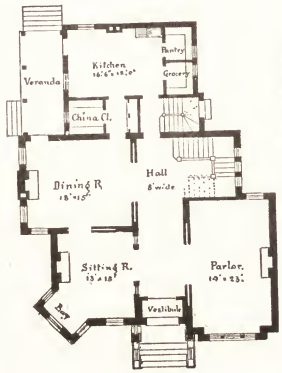
sliding door [illegible] opening into the parlor and sitting-room. The parlor on the left, 14 ft., 6 in., by 20 ft., has a bay window of octagon shape in the front, and 2 large windows in the side. The fireplace is opposite the centre of the bay window. The sitting-room on the right, 15 by 17 ft., has a bay at the corner, of a rectangular form, with a double-mullion window in the end. The fireplace in this room is at the rear side of the bay window and centres with the sliding doors in the hall. Between this room and the dining-room, 15 by 18 ft., are sliding doors, and the dining-room fireplace is centred end and 1 to the rear, and has a second closet projecting into the rear hall, which is 5 ft. wide, and has opposite the dining-room door a closet intended for a store-room pantry. The stairs to the second floor start in the kitchen and those to the cellar go down under them with a door in the rear hall next to the library closet. A door leads from the rear hall to the side porch. The kitchen, 13 by 19 ft., is commodious, well lighted, and ventilated by windows on two sides, a good sized closet is placed on the side of the stairs. On the right a door leads on to the side porch. The second floor needs no description. The rear

Pl 83. Design 103.

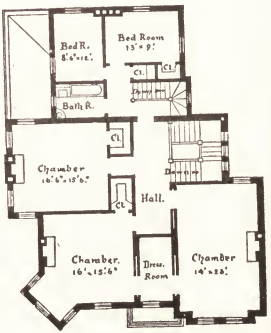


Pl 83. Design 103. J.B. Legg. Architect. St. Louis.

Pl. 84. Design 104.



First Floor.



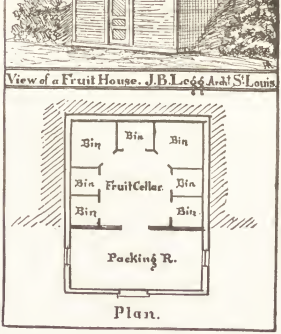
Second Floor.

Pl. 84. Design 104. J. B. Legg. Architect. St. Louis.

building, not being as high as the main one in the first story, has 3 steps rising from the platform where the rear stairs land to the level of the second floor of the main building. All the bedrooms are of the sizes of the rooms below and have closets. The window in the front of the hall should be a bulk-head window affording exit to the balcony over front porch. The design works up nicely in the elevations, the many breaks and projections in the ground plan affording opportunities for an artistic treatment of the roof. The outer architraves have molded caps and styles and the sills are also molded. The porch columns have small molded bases and caps, and large angle and face brackets extending to the frieze of the modillionod cornice. The bay window has a cornice to match. The roof has a large deck with a plain molded cornice. The main cornice is supported by brackets. Especially well treated are the gables, each slightly varying from the others. The chimneys are of ornamental brick work of effective design. The cost would be about $7,000.

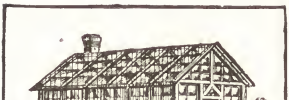
Plate 84, Design 104. — A large city or suburban residence well adapted to a corner lot. A stone portico with balcony on the second floor, supported on stone columns, covers the main entrance. The vestibule is made large enough to receive the storm doors. The front hall is 8 ft. wide in the clear and extends back to the stair hall back of the parlor. The parlor, 14 by 23 ft., is to the right on entering, and is connected with the hall by sliding doors; opposite the centre of these doors is the chimney; it is lighted from the front by a large triple window. On the left of the hall is the sitting-room, separated from the hall by an open archway to be closed by a curtain. The fireplace in the sitting-room is opposite the centre of the arch into the hall, and when the sliding doors of the parlor are open, the two fireplaces, sliding doors and arch all range. A feature of the sitting-room is the square angle bay which works up prettily and makes a pleasant corner, from the windows of which a fine view is commanded. This sitting-room is 13 by 15 ft. A single sliding door opens from the sitting-room into the dining-room, 15 by 18 ft., also connected with the stair hall by sliding doors. In the end of this room the fireplace is located, on either side of which are windows, and also one facing the street at the side. A door opens from the dining-room on the rear porch. The connection of dining-room and kitchen is through a closet of large dimensions. A window opening on the side veranda lights this closet, which on that side is shelved. The right hand side has closed cupboards. The main stair hall is finely designed. The stairs start on the rear side and wind up with platforms and drop newels, landing on the second floor on a line with the wall of right hand front chamber. Small stained glass windows furnish light for these stairs. The rear stairs start in the back building, back of the main stairs, and the cellar steps go down under them. The kitchen is 12 by 16 ft., 6 in., and has a pantry and grocery. The second floor contains bedrooms over all the rooms in main building and 2 in the rear over the kitchen, provided with large closets, and the front suite with a dressing room. The bath-room has a tub, water-closet and washstand. The third story may be finished and will give the same number of rooms as the second. The design of the exterior shows a stock-brick front with stone trimmings. The columns of the front portico are intended to be of polished granite. The base course, which is a heavy one, should be of limestone or other non-absorbent variety. The die course of pitch face ashler with tooled margins, the water-table, window-sills, skrewbacks and belt courses of some stone which will make a contrast with the color of the brick. The gables are of good design, and the high pitched mansard, with its heavy deck cornice, raises the house to a sufficient height to prevent a squatty appearance. The cost is about $6,500.

FRUIT AND VEGETABLE CELLAR. —The plan and perspective show the arrangement and construction. The site selected is a hill-side, where the cellar end of the building can be buried in the hill; a part of the roof is covered with 1 ft. or more of earth; this keeps the cellar cool and

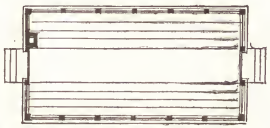


of an even temperature through the year. The projecting portion of the house is lighted by windows and used as a packing room. In constructing bins they must be arranged so as to allow the air to circulate freely, and for this purpose a ventilator should run out through the roof and a slide be made to open or close it. The portions of building coming in the hill ought to be of stone or brick; or, when wood has to be used, some variety that does not easily decay. Cost about $375.

GREENHOUSE. — The perspective and plan



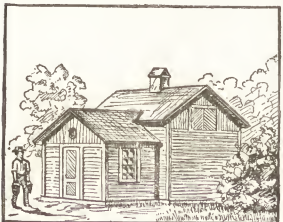
View of a Greenhouse. J.B. Legg Arch.t St Louis



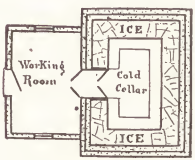
Plan.

of a greenhouse is here shown. The method of heating will be readily seen.

ICE AND DAIRY HOUSE. — Where butter is made, and ice inaccessible during warm weather, the farmer should have his dairy and ice-house; these can be combined as illustrated to good advantage. The walls of the ice-house are made by setting up 2 lines of studding, ceiling on both sides of each line, with matched flooring under which a layer of deodorized paper will be effective, then filled in between the stud with sawdust or cotton seed hulls, thus forming between the stud walls an air space. A third partition of stud with flooring on the one side separates the ice from the cold storage room or milk cellar. In front of these rooms is the working room for arranging the milk supply, churning and packing butter. This room prevents the warm outer air from entering the ice-room when opened. The ceiling of ice and cold storage rooms should be constructed the same as the walls, and the space between the ceiling and the roof ventilated. The cost of these houses depends upon the size required. It might be about $450.



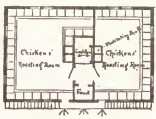
Combined Ice and Dairy House. J.B. Legg Arch.t St Louis



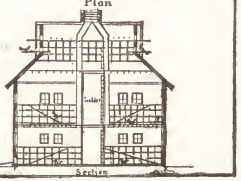
Plan.

POULTRY-HOUSE. — The illustration shows a large poultry-house, with 4 separate apartments for chickens, and a large loft for pigeons. To be used to advantage, the yard must be di-

View of a large Poultry House. J.B. Legg Arch.t St Louis

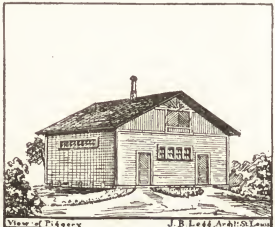


Plan



vided to match the apartments. The centre of the poultry rooms contains the roosts, and alongside the walls are nest boxes. The door shown leads to a ladder in the centre of the building, by which access to all the apartments is gained. Though neat in appearance this building would not be very expensive, the cost being about $600.

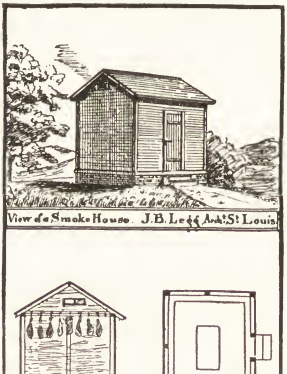
PIGGERY. — Successful pig raising requires attention to the comfort of the stock, and the cut shows a compact and economical way of arranging a piggery. 2 doors lead into their respective aisles, and the pens are arranged alongside the building. In the centre are the breeding



pens and feed bins, and at the front side the pump, boiler and mixing trough for the feed. The feeding troughs run along the sides of the bins and can be filled from the aisles. Cost about $500.

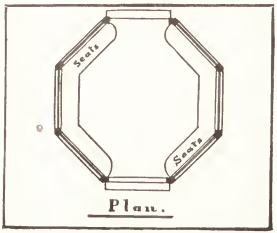
STABLE. —In cities, where room is small and valuable, the necessity of compact, small stables is keenly felt by all who are desirous of keeping their carriage at home. This plan embodies all the conveniences required and still does not cover much ground. The first floor contains a carriage-room sufficient for 3 vehicles, with a harness closet and grain chutes and stall room for 3 horses. The partition separating the stable from the carriage-house cuts off all gases from the former which would destroy in a short time the paint on the vehicles. The second floor has a large hay-loft and good-sized driver's room, with a closet. The elevation shows smooth press brick fronts and a high roof. A neat brick gable breaks the monotony of the front. Cost about $1,350.

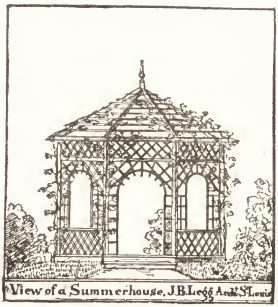
SMOKE-HOUSE. — In the accompanying illustration is shown a very desirable form of

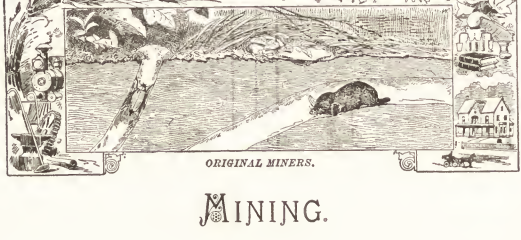


smoke-house, which is one of the most useful of the buildings connected with the farm. The plan and section of the same are here given.

SUMMER HOUSE. — In the illustration is shown the perspective and plan of a neat, cheap summer house, which will be an adornment to any landscape.







ORIGINAL MINERS.

MINING.

PROSPECTING.

REMARKS.—Before giving rules for searching for mineral substances, the way in which the more important ones generally occur will be noticed. The minerals useful to man form three categories: *1st.* The earthy, as gypsum, clay, marble; *2d.* The carbonaceous, as coal, lignite, petroleum; *3d.* Metallic, as iron, gold, silver. The metals occur rarely native, often as ores, that is combined with sulphur, silica, carbonic acid, etc. These form deposits differing from each other. They may be grouped into three classes: *1st.* Superficial deposits; *2d.* Stratified deposits; *3d.* Unstratified deposits. The first class includes gold, stream tin, platinum, gems, etc., obtained from the surface material; gravel, sand and clay, derived from the mechanical decomposition of rock masses through which metals or ores are sparsely distributed. Stratified deposits can be classed into two groups, which are, first, where the ore forms the whole strata, and second, where the ore forms only part of the strata. All stratified deposits are found in a horizontal position; hence, when looking for such deposits of iron ore, coal, lignite, etc., they are found in a nearly level position. Unstratified deposits include mineral veins, in which most of the silver, and part of the gold, lead, copper and zinc are found. Veins or fissures are cracks in the earth's crust, which have subsequently been filled with mineral more or less different from that in the surrounding rock, and are nearly always in a position more or less vertical. When the presence of any mineral is premised from the directions given, it must be proved by sinking shafts, digging trenches, or by some such means.

COAL.—One of the best means of determining the possibility of finding coal is by a study of the geology of the district. To those who do not understand geology, the following hints will be found valuable: First ascertain if coal is mined or known to exist in the neighborhood. Always expect to find coal in a more or less level bed. Examine the hillsides and the banks of creeks to see if the bed crops out. Although coal itself may not be seen, there are indications of its presence, the most important of which is a more or less thick and level smutty line in the creek bank or on the hillside; luxuriant vegetation on the hillside at about the same level; also, springs or wet places point to the possible presence of coal. But when the ground is level, the only sure way is to bore, or sink a small shaft.

DIAMONDS.—It is difficult to distinguish these from crystals of quartz or topaz. They are of various shades of yellowish brown, green, blue and rose-red, closely resembling the gravel by which they are surrounded. Often they are not unlike a lump of gum Arabic, neither brilliant nor transparent. The finest are colorless, and appear like rock crystals. In Brazil, the method of searching for them is to wash the sand of certain rivers in a manner similar to that employed in the gold fields, by prospecting pans. A shovelful of earth is thrown into the pan, which is then immersed in water, and gently moved about. As the washing goes on, the pebbles, dirt and sand are removed, and the pan then contains about 1 pt. of thin mud. Caution is now observed, and ultimately there remains only a small quantity of sand. The diamonds and particles of gold sink to the bottom, and are removed by practiced fingers. The stones suspected to be precious may be tried by attempting to cut with their sharp corners glass, crystal or quartz. When too minute the specimens may be pressed into the end of a stick of hard wood, and run along the surface of window glass. A diamond will make its mark and cause a fracture in the line over which it has traveled. It will easily scratch rock crystal as no other crystal will. But a more certain and peculiar characteristic is the form of its crystals. No mineral which will scratch quartz has the curved edges of the diamond. In small crys-

tals this peculiarity can be seen only by means of a magnifying glass, but it is invariably present. Interrupted, convex or rounded angles, are sure indications of genuineness. Quartz crystal is surrounded by 6 faces, the diamond by 4. The diamond breaks with difficulty, and a test sometimes used is to place the specimen between two hard bodies, as a couple of coins, and force them together with the hands; such a pressure will crush a particle of quartz, but the diamond will only indent the metal.

GOLD.—May occur, like diamonds, in the beds of rivers, creeks, etc., and is prospected for in the same manner that diamonds are (see *Diamonds*); or it may be found in mineral veins. In looking for veins expect to find them in mountainous regions, and at an elevation above the surrounding country. Examine the gravel and bowlders of the mountain streams, and note carefully the structure and character of the gravel wash. Try the sands at the head of the gravel bars for free gold, or for any crystallized minerals, etc. If fragments of ore are found on a mountain side, it is evident that the vein must have a higher location, for these fragments very probably came down the mountain. If the position of the vein is horizontal, and fragments of its minerals are found on the top of the mountain, there is no probability of finding the vein, for it is washed away. If fragments of mineral are found in a stream, the veins which supplied them must be higher up the stream; and the farther up, the lighter the material. Heavy minerals do not drift far, and, in consequence of their weight, are easily destroyed. Gold never drifts far in a stream; it is always found close to its source. If the current of water is strong enough to move grains of gold, it soon rubs them into such a fine dust that it can be carried off by the most gentle current. Therefore, gold is seldom found in the beds of rivers. Native metals, and sulphurets of metals, are always found near their source, because they cannot move far without destruction.

SILVER, LEAD AND COPPER.—Silver is to be searched for as directed in the case of mineral veins in *Remarks*. Lead, copper and zinc may also be found in the same way. They are also found in low, flat regions, and their presence in this case is only to be suspected when pieces of the ore are picked up on the surface. The ore body is then to be found by digging trenches or sinking small shafts.

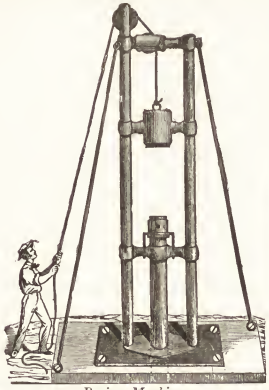
WATER.—In the early part of the year, if the grass assumes a brighter color and hardier growth in one particular part of a field; or, when the latter is plowed, if a part be darker than the rest, it may be suspected that water may be found. In summer, the gnats hover in a column, and remain always at a certain height, over the spot where springs are concealed. In all seasons of the year, denser vapors arise from the surface covering subterranean springs, especially in the morning and evening. The springs to which these rules apply, are those near the surface; when lower down, the only safe guide is boring; but to execute such operations successfully, a knowledge of elementary geology is necessary. Provided that the sources do not descend to any great depth, the principle that subterranean waters follow precisely similar laws to those upon the surface, holds good; but, when deep-seated, many disturbing causes modify their action. If, in a valley formed in a diluvial or alluvial deposit lying upon a more retentive stratum, the two sides are of the same height, the water must be sought in the middle; but if one side be steeper the stream would pass near the steeper side; in both cases, supposing that the materials of the upper stratum are equally permeable throughout, and that the depression of the lower stratum presents a basin-like depression. Springs are not often met with at the head of valleys; they are more frequently found at the intersection of secondary valleys with the principal one; and the most favorable point for finding water is that furthest from the intersection of these valleys, and in the lower parts of the plain, at those positions where there is the least water upon the surface. When the transverse valleys, giving forth streams to a river in the bottom of a longitudinal valley, are nearly at right angles to the direction of the latter, the quantity of water they yield is much less than when they form an angle with it. This law holds good equally with subterranean and surface waters, and it may be laid down as a maxim that the most favorable point for seeking a well would be at the mouth of long transverse valleys inclined to the principal one.

BORING.

REMARKS.—When it is wished to bore for any purpose, such as to get water or oil, or for prospecting purposes, the work may be done by the aid of steam or horse-power, or by 2 or 3 men without such aid.

HAND-BORING.—This should only be undertaken where the rock to be passed through is of moderate hardness. For hard, compact rocks, the diamond drill is the best for boring deep. The method here described is the simple hand boring. The simplest way to reach bed-rock is to drive down an iron pipe shod with a steel shoe. The pipe is made in sections, which are added on as the pipe is driven down. The driving may be done by means of a maul, but can be better done by using a machine as shown in the illustration. This machine holds the pipe firmly in its place, and guides it while being driven. As it is impossible for the pipe to get out of a direct line, and as the drop always hits a direct blow, it neither breaks the pipe nor bursts the sockets, saving labor and expense. It is so light and portable that it can be carried about in a light wagon and set up in a few minutes. Its whole weight is 125 lbs. The boring proper is done by means of a drill attached to a rope. This is raised, and the rope being then released, the drill drops, and this breaks up the rock beneath. The comminuted material is then removed by drawing up the drill and working a sand or sludge pump attached to a rope, up and down in the bottom of the hole. The pump consists of a cylinder with a valve in the bottom which opens upwards. The drill must

be heavy to do effective work; for this reason a proper height for an easy elevation of the feet of the operators, and the plunging motion of the excavator is imparted to the tools by the operators throwing sufficient weight upon their feet in the stirrup to flex or bend the spring, which allows the excavator or drill to fall of their own free weight, to be immediately picked up again by the reaction of the spring. As the tools have a direct connection with the windlass through means of the cable, they can be lowered by the ratchet as the work progresses, or withdrawn from the hole without loss of time in breaking or making other connections.



Boring Machine.

Machine for Raising Drill.

Tools for Drilling.

a heavy bar of iron, called the drill bar, is added to the drill. To keep the rope tight when the drill drops, a "jar" must be used. The construction of these tools and the means of attaching the rope will be understood by the illustration.

RAISING AND DROPPING DRILLS. — A machine such as represented in the illustration in the next column, should be used. It should be light and portable. Two men can set it up in a few minutes, and the same men can make a hole through earth from 6 to 12 in. in diameter, at the rate of 15 ft. per hour. It consists of a windlass, with ratchet wheel and pawl dog, light derrick, a strong hickory spring plank to raise the tools, and a hawser laid cable to which the tools are attached. The cable passes from the windlass through a pulley on the outer end of the spring, thence over a crown sheave at the top of the derrick and down to the tools. When in position to operate, the tools are suspended to the height of the stroke from the bottom, the stirrup is clamped to the drill bar or cable at

Developing and Working.

REMARKS.—Mining consists of two distinct descriptions of work—"dead work and extraction;" the first is necessary in opening a mine, making it advantageous for the extension of future operations. The preparatory work consists in sinking shafts or pits, driving drifts or in excavating drains. These remarks apply to the working of bed deposits, or irregular masses, as well as to veins.

SHAFTS.— These are usually made vertical and with greater or less degree of inclination. When steam or water power can be applied at a certain point, the transportation of which to another point would cost too much, an inclined shaft may be serviceable. There may be advantages in a sloping shaft under peculiar circumstances; but they should be well considered before the plan is adopted. The sectional dimensions of a shaft depend on the amount of ore to be raised in it; if the quantity is not so large as to require a double shaft, a single one may be sunk 4x4 or 4x5 ft. in the clear. Double shafts are made 4 to 6 ft. one way by 8 to 14 ft. the other. If merely intended for ventilation, any form or size will do. Shafts are made rectangular for convenience, as it makes the timbering easier. The timber is usually 6 to 8 in. sq., and framed rectangularly, the inside of the frame being the inside of the shaft. These frames are usually placed 1 to 1½ yds. apart, but when the lateral pressure is considerable and the timber cheap, but of inferior quality, they may be placed in contact. The timbers composing a frame are united at the corners by a half-check; the longer pieces extend 1 ft. or more beyond the frame and

rest in holes cut in the rock. When the frames do not touch each other, facing boards of strong planks or split rails are fastened behind the frames, to sustain the pressure of the ground. If the ground around the shaft is wet, puddle should, if possible, be put behind the planking.

TUNNELING.—If the tunnel or drift is only for drainage, it may be made narrow but high enough for the miner to stand upright. If the gallery is for transportation of materials, the height and width must be increased; a width of 4 ft. and a height of 6 ft. will generally be sufficient. If water is to be discharged by the drift, a drain should be cut in the floor and covered by cross timbers and planks; it should never be constructed upon a dead level, as the water always carries sediment, which requires a strong current to float it away; ¼ in. fall in 1 yd. may be sufficient. The drift must be timbered when the rock, mineral, or ground has not sufficient cohesion to sustain the pressure of the superincumbent mass. If only the roof of the level requires support, the upright timbers should be placed against the walls on both sides of the level and connected at the top by a cross-piece, which, while it keeps the uprights in position, rests firmly upon them and forms a support for the roof. The uprights should be slightly inclined towards each other at the top, so as to reduce the length of the cross-piece. When the drifts are narrow, the uprights should be set into the walls. When timber is scarce, uprights may be dispensed with and the ends of the cross-pieces let into the rock and rest upon it. When the strata is nearly, but not quite perpendicular, only the roof and one wall need support, and but one row of props be used, the other end of the cross-pieces resting in the rock. If the floor is not strong, a complete frame should be made, that is, with cross-ties at the top and bottom. If the ground is so loose that timber frames alone will not support it, facing boards should be used to keep the loose material behind the timbers.

WORKING BED DEPOSITS.—The principal mineral occurring in a bed deposit is coal; for this reason only the principles of coal mining will be given here. Coal seams about 7 or 8 ft. thick are the most economical to work. Only the general methods of working moderately thick beds of coal will be given, ignoring entirely the methods employed when the seams become very thin or when they are of great thickness. Before selecting the position for the shaft, it is desirable to know the dip of the bed (that is, the angle it makes with a level surface and whether it is basin shaped or has only one general slope). The shaft should be so situated that there will be room for surface buildings and railroad switches, etc., and placed so that it will reach the bed of coal at its lowest point. This is necessary, so that, in getting out the coal, the water will run to the bottom of the shaft and can be pumped from there to the surface. The shaft having been sunk to the bed of coal, two levels or tunnels are run in the coal, one on each side of the shaft, at right angles to the dip of the bed. These serve as the main roadways for conveying the coal, when mined, to the bottom of the shaft, whence it is hoisted to the surface. The two general systems followed in mining coal; viz., the post and stall, and the long wall systems. In the first method a set of excavations parallel to one another, and at certain intervals apart, are driven through the coal. These excavations are made as wide as possible, say 4 or 5 yds. or more. At right angles to these are run another set, farther apart and much narrower than the first set. These excavations leave rectangular blocks of coal. These are now generally taken out and the roof finally allowed to fall. In the second system the levels are run to the limits of the property and all the coal is then worked out in one long face, the roof being allowed to fall as the coal is removed. To protect the miners 2 or 3 lines of props must be kept behind the workmen to prevent the roof from falling. In this country mining is done almost entirely upon the post and stall system. To assist ventilation, a second shaft is sunk, and, to cause a draft up the shaft, a fire is built at its foot. This causes a current of fresh air to pass through the mine. In general it will not pay to work seams of coal below two feet in thickness.

WORKING VEINS.—Whether an ore is profitable depends upon the ease of separating it from the rock or "gangue" as it is called. Thus the minimum percentage of metal, below which the working of ore ceases to be profitable, is—

Of Iron	25	Per cent.
" Zinc	20	"
" Lead	20	"
" Antimony	20	"
" Copper	.02	"
" Tin	.01½	"
" Quicksilver	.01	"
" Silver	1–2000	"
" Platinum	1–10000	"
" Gold	1–100000	"

That is, an ore of iron which contains less than 25 per cent. of metal will not pay for working; for the reduction of iron in comparison with copper ore is difficult. Gold is easily extracted, hence quartz rocks which do not apparently contain a particle of gold, pay well, a bushel of rock often yielding ½ oz. Having discovered a paying vein, the next thing is to get it in a condition for the extraction of the ore. Select that point on the line of the outcrop where the best ore is found, then sink a shaft on the lode, following the angle of dip, keeping both foot wall and hanging wall exposed, if possible. If the lode is too wide for this, follow the best ore streak of the vein, and at every 50 ft. in depth make cross cuts to the walls of the vein. After 100 ft. deep has been reached, run levels each way from the shaft on the line of the vein, to determine the extent of the ore-chute or chimney on the horizontal line. When the limit of the ore body on the horizontal line has been ascertained, sink 100 ft. more, and drift right and left. If more than one chimney of ore is found on the line of the vein, a shaft should be sunk on it and drifts run, being careful to confine all the exploring work within the walls of the vein itself. The principal galleries must be connected at suitable points by small shafts, in order to secure good ventilation throughout the mine. In extracting the ore, the part of the vein between

two series of galleries is divided into terraces; one being 6 ft. in height, and a gang of men put to work on each terrace. In well managed mines preliminary explorations must be kept ahead of the ore extraction to show two years' output in sight. At least 1 ton of ore should be exposed in new ground for every ton extracted in the working parts. After a mine has been well opened and in good condition for output of ore, the success of the enterprise must depend upon the efficiency of the business management.

"THERE IS NOTHING LIKE LEATHER."

LEATHER AND SKINS.

CURING AND DRESSING.

REMARKS. — In curing skins and preparing leather, the skins are first taken from the animal (as directed in *Skinning*), and if not tanned immediately, are stretched and dried. Leather is either tanned or tawed, and it is afterwards curried to render it soft and pliable.

ALLIGATOR.—A large variety of pocket books, card cases, hand bags, and other articles are made from this leather. While the beauty of alligator leather is its chief characteristic, its durability is of hardly less importance. All sizes of alligators, from 2 to 18 ft. in length, are now killed. The choice skin is 6 ft. long. The skins are packed in lime 2 months, to remove the horny scales. The remaining process is much like that for any leather. It takes 4 months to prepare a skin.

BLADDERS. — Soak them 24 hours in water, to which a little chloride of lime or potash has been added; then remove extraneous membranes; wash them well in clean water, and dry them.

BUCKSKIN. — Take a skin, either green or well soaked, and flesh it with a dull knife; spread the skin on a smooth log, and grain it by scraping with a sharp instrument; rub nearly dry over the oval end of a board held upright. Take the brains of a deer or a calf; dry by the fire gently; put them into a cloth, and boil until soft; cool the liquid with water sufficient to soak the skin in, and soak until pliable; wring out dry; wash in strong soap suds, and rub dry; smoke well with wood smoke. Instead of brains, oil or lard may be used, and the skin soaked therein 6 hours.

BUFFALO. — The Indian process is as follows: Flesh and pare down the green hide with a bone, toothed something like a saw, and knives; cover it on the flesh side with the brains, blood, liver, grease, and the contents of the gall bladder of the buffalo or elk; thoroughly work it in near a fire or in the sun; after the hide is partially dried, work it over a cord and beam till the rope becomes soft and flexible.

CATGUT.—Take the entrails of sheep, or other animal, newly-killed, clean them from all impurities and fat, and wash well in clean water; soak in soft water 2 days, or in winter 3 days; then lay them on a table and scrape them with a small plate of copper, having a semicircular hole cut in it, the edges of which must be smooth and not capable of cutting; after washing, put them into fresh water, and let them remain till the next day, when they are again scraped, the larger ends cut off, and after washing, again steeped for a night in fresh water, and then for 2 or 3 hours in a weak lye of pearlash or potash (2 oz. to the gal.). They are lastly washed in clean water, and passed through a polished hole in a piece of brass to smooth and equalize their surface; after which they are twisted, and sorted, according to the uses intended. For many purposes the prepared gut is dyed or sulphured, and rubbed with olive oil. Catgut is used for strings of harps, violins, etc. Whipcord is made from it, being sewed together while soft with the filandre or scrapings, after which it is put into a frame and twisted. Bowstrings for hatmakers are made out of the largest intestines, 4 to 12 of which are twisted together, until the cord is extended 15 to 25 ft. It is then rubbed smooth, half dried, sulphured twice, again stretched and sulphured, and lastly dried in a state of tension. Clockmakers' cords are made of the smallest intestines. Coarse catgut, for turning lathes, etc., is made from the intestines of horses, cut into 4 or 5 strips, by forcing a ball with projecting knives placed crosswise along them. These strips are twisted, dried, and rubbed smooth with fish skin.

CHAMOIS. — It is not derived from the skin of the chamois, but from the flesh side of either doe or sheepskins split. The skins, having passed through the earlier processes of washing, etc., are soaked in lime-water, next in a mixture of bran and water, or in a weak solution of sulphuric acid; after which they are beaten in a mill till no moisture remains. Fish oil is then poured over the skins, which are again beaten till they are impregnated with it. This is done repeatedly until the skins can receive no more

oil, and then they are hung for a short time in a heated room. They are then washed in a solution of potash, which removes any oil that may still remain about the leather. Chamois skins are used for inside linings of gloves, etc., and for cleaning purposes in many departments.

COW HIDES. — Lay the hides flat, flesh side up, and form a nearly square bed 12 by 15 ft., folding in the edges so as to make them solid; split the ear in the cords that run up the ear in each one, so as to make them lie flat; sprinkle the hides with 2 or 3 shovelfuls coarse salt, covering the hides well, as it need not be wasted; let them lie in this 12 to 20 days, after which take them up, shake the salt out and use it again.

CURRYING. — Leather, after being tanned, is soaked in water, and beaten to render it supple; then scraped on the inside with a two-handled knife; the grain on the outer side is rubbed with pumice stone, the leather being frequently wetted; while wet it is smeared with oil or grease, called "dubbing," which penetrates the leather as the moisture evaporates. It next undergoes waxing; first rubbing it on the flesh side with a mixture of oil and lamp black; then black-sized with a brush or sponge, and, when dry, is tallowed with a proper cloth, and slicked upon the flesh side with a broad and polished lump of glass. Leather, curried on the hair or grain side, termed "black on the grain," is blackened by wetting it with iron liquor, and rubbing it with an iron slicker before applying the oil or grease. The grain is finally raised by the pommel or graining board, passed over it in various directions.

DEER SKINS, For Gloves. — For each skin take 1 bucket water and put it into 1 qt. lime; let the skin lie 3 to 4 days; then rinse in clean water, hair and grain; soak them in cold water to get out the glue; pound in good soap suds ½ hour; after which take white vitriol, alum and salt, 1 tablespoonful, each, to a skin; dissolve in sufficient water to cover the skin, and let it remain 24 hours; wring out, dry, and spread on with a brush ½ pt. currier's oil, and hang in the sun 2 days; after which scour out the oil with soap suds, and hang out again until dry; then pull and work until soft; and if time does not make them soft, scour out in suds again as before, until complete. The oil may be saved by pouring or taking it from the top of the suds, if left standing a short time. Buff color is given by spreading yellow ochre evenly over the surface of the skin when finished, and rubbing it well with a brush.

GLOVE-KID.—Lamb and kid skins are principally employed. For fine gloves the skins of young animals only can be used. The common style of manufacture is as follows: The dried skins are soaked in large wooden tubs, which occupies 3 to 4 days, according to the character of the soak water, size of skins, and time they have been stored. The skins, when thoroughly softened, are unhaired by painting the flesh side with a thin paste of lime, or in lime pits. In unhairing, by painting, the skins, after coating the flesh-side with lime, are folded together, so that the lime comes as little as possible into contact with the wool, and these bundles are placed in a tub and covered with water. After unhairing with a blunt knife, the skins must be limed some days that the leather may stretch; by this method the wool is preserved uninjured, but it is not suitable for finer sorts of leather. The unhairing in lime pits, is done with the so-called "poison lime," prepared by mixing red arsenic (arsenic sulphide) with lime, while it is being slaked, and is at its hottest. The calcic sulphydrate (and, perhaps, sulpharsenite) formed, hastens the unhairing, and gives the grain a higher gloss. The liming lasts 10 days, and is of great importance. It is essential that the interfibrillary substance shall be dissolved, that the leather may be stretched without springing back. It also depends upon the liming (and this is of special importance in the case of lamb skins) whether the tissue of the fat glands is well loosened, so that the fat may be readily worked out. Skins in which this is neglected, can never be properly dyed. When the hair or wool is loosened, the skins are rinsed in water, and then unhaired with a blunt knife. The water employed in washing should not be much colder than the limes. The skins are then put into water to which a little lime liquor has been added, to prevent precipitation of the lime in the skins by the free carbonic acid of the water, which would make them rough grained. Next, the loose cellular tissue on the flesh side is removed, with the head, ears and shanks, and the flanks trimmed. The skins are then thrown into water, softened with lime liquor as above described, and then into a bate of dog's dung, prepared by stirring up white and putrid dog's dung with boiling water, and straining it. The bate must be used tepid and not too strong. When the skins come out of the bate, they are stretched, and worked on the flesh with a sharp knife, and any extraneous tissue removed; then rinsed in warm water, and beaten with clubs in a tub, or worked in a tumbler drum, using but little water; and, finally, brought into a tank of water (not too cold) and kept in constant motion with a paddle-wheel. The skins are next cleansed on the grain side by working on the beam with plates of vulcanite with wooden handles, and are a second time washed in the paddle-tumbler, first in cold, and then in tepid water. After draining the water from them, they are transferred to the bran-drench, prepared by soaking wheaten bran in cold water, diluting with warm water, and straining through a hair sieve. Sufficient liquid must be employed to cover the skins, and the temperature range from 50° to 68° Fahr. The tawing mixture is composed of alum, salt, flour and egg yolks, in thin paste. The skins are either trodden in it, with the feet, or put into a tumbler drum with it. The tawed skins are dried by hanging on poles, grain inwards. Rapid drying in well ventilated, moderately heated, rooms is essential to a satisfactory product. The dry leather is rapidly passed through tepid water, and, after draining for a short time, is trodden tightly into chests, to remain for 12 hours. It is then trodden on hurdles, composed of square bars of wood, joined corner to corner, so as to make a floor of angular ridges. The next op-

eration is stretching over a circular knife, called the "stolmond;" then the leather is dried and slaked again.

IMITATION LEATHER. — 1. Mix 16 parts gelatine and 5 of glycerine; coloring is then added as required; caoutchouc to give elasticity, and boiled linseed oil to give flexibility. This is spread upon linen while hot, printed with any pattern desired. The surface is then treated with a solution of alum, sulphate of iron, copper or zinc. These solutions may also be mixed with the composition before it is spread on the linen. The surface is then varnished, and may be bronzed or gilt. — 2. Boil linseed oil with quicklime and borax; this, on cooling, becomes a thick paste; it is then mixed with rasped cork and more quicklime. — 3. Cork cut in sheets, or strips, and covered on either side with a skin of india-rubber, loses its friability, while keeping every advantage. Cork, thus treated, may be wrung out like a dish-cloth, doubled into any shape, and beaten with a mallet, but suffers no damage. It is water-proof and heat-proof.

KID. — The skins employed are those of the sheep, lamb and young goat. The skins are cleansed by immersion in running water for several hours (or for 2 days, if dry); then made flexible by rubbing them on the flesh side with the back of the flesh knife while spread over the beam. Next, they are hung singly, to dry as quickly as possible. The flesh side is then smeared with cold milk of lime, prepared by agitating 12 oz. good lime in 1 gal. water. The limed skins, placed back to back in pairs, are stacked in piles for several days, or until the hair gives readily; then well rinsed in running water and fleeced by plucking out the wool with spring tweezers and smoothing the hair side with a whetstone or rolling-pin. After fleecing, the skins are put into lime water for several hours, and then immersed in an old or weak lime water bath two weeks. While in this bath they are frequently taken out, drained and put back. They then undergo steeping for several days in the following mixture: Bran, 2 gals.; soft water, 1 gal. When the skins sink in the liquor they are sufficiently raised, and should be removed. The raising requires about 2 days in summer and 4 in winter. Next the skins go to the white bath, the composition for which for 100 skins may be alum, 10 lbs.; water, 12 gals.; salt, 2½ lbs. The salt increased to 3 lbs. in winter. In this bath, heated to boiling, the skins are passed separately and then transferred to it in bulk for 10 minutes; then removed and the bath allowed to cool. To this bath is then added 15 lbs. wheat flour, and afterwards the yolks of about 50 eggs, and then stirred to a smooth paste. The skins are passed singly through this paste, then transferred to it in bulk, and allowed to remain 24 hours or more. This makes them soft and white.— They are next stretched upon poles in a drying loft and left there about 10 days; then moistened with water, stretched and ironed; spread upon the beam with a clean undressed skin underneath, and worked over with the back of the fleshing knife. The finer skins are rubbed down with pumice stone powder and finished with a warm flat iron. In large factories the skins are put into a **churn with the alum bath and other** tanning materials. The skins, after dressing, are stretched on a zinc table and receive the color (if not to remain white) from a rubbing brush; the surface pumiced down, partly dried on a frame, and again stretched on the table to receive more color. These coloring, smoothing, stretching and drying operations are often repeated 3 times to insure full color. The skins are finally dried on hooks in lofts, where they can be suspended so as not to touch, and finally ironed.

LEATHER SCRAPS. To Utilize. — First clean the scraps; soak them in water containing 1 per cent. sulphuric acid until they are soft and plastic; then compress in blocks and dry by steam. In order to soften the blocks, 1 lb. glycerine is added to 100 lbs. material; then passed through rollers, and brought to proper thickness for inner soles of boots and shoes.

LEATHER, To Clean. — Mix well together 1 lb. French yellow ochre and 1 dessertspoonful sweet oil; then take 1 lb. pipeclay and ½ lb. starch; mix with boiling water, and, when cold, lay it on the leather; when dry, rub and brush it well.

LEATHER, To Gild. — Dampen the skin with a sponge and water, and strain it tight with tacks on a board; when dry, size with clear double size; then beat the white of eggs with a wisp to a foam, and let them settle; then take a book of leaf silver and blow out the leaves on a gilder's cushion; pass over the leather carefully with the egg size, and with a tip brush lay on the silver, closing any blister that may be left, with a bunch of cotton; when dry, varnish over the silvered surface with yellow lacquer, until it assumes a gold color. The skin gilded may be cut into suitable strips or patterns. Have the skin well dry before sizing it.

LEATHER, To Soften. — 1 pint boiled linseed oil; 2 oz. of beeswax; 1 oz. of Burgundy pitch; 2 oz. of turpentine; mix, and melt them over a slow fire. The mixture should be rubbed into the leather on both sides, but principally on the flesh side.

MOROCCO LEATHER.—Made of tanned goat skins. The skins are softened in water several days, treading them under the feet, and scraping on the fleshy side to produce evenness; then placed in lime pits (these preliminary operations require great care). The hair is easily detached after one month's soaking; then they are scraped on the beam, after which they are placed in a milk of lime, and fleshed with a scraping knife. The vatting of the unhaired skins is more important in making morocco than any other kind of leather, as a small quantity of lime will often destroy the action of the dye. To insure the skins being well washed after the vatting, they are placed in cylinders ½ filled with water, which revolve on a horizontal axis; afterwards frequently placed in a bath of lactic acid; in this manner the lime becomes soluble. Sumac, in nearly every case, is used for tanning. The skins are sewn together; the amount of tanning substance placed in the sack formed; then inflated with air, and sewn tightly to prevent its escape, and thrown into a vat contain-

ing a shallow depth of a weak solution of sumac; they are made to float 4 hours, being agitated occasionally in order to secure a uniform action of the sumach. They are then piled one on the other, the pressure produced by their weight being sufficient to force the tanning through the pores of the skin. This operation is repeated, after which the bags are unstitched, scraped on the beam, and placed in the drying-room, which has a direct communication with the open air. When dry, they are moistened, rubbed with a copper tool to make them smooth, and again hung to dry. The skins are now ready to be dyed. (See VEGETABLE DYES, IN DYEING.) The finest are dyed red. There are two kinds of morocco—the genuine and the imitation. The difference between the two is that the latter is obtained by the splitting of calf, sheep, and other skins, and is chiefly employed for book-binding. The preparation of these skins is the same as the above, except after being stripped of their wool they are submitted to a powerful hydrostatic pressure to get rid of oleaginous matter, which would interfere with tanning. Dyed skins are enhanced by dressing, and the grain given. They are first rubbed on the hair side with linseed oil, applied by flannel; then glazed by machinery. The peculiar appearance of the surface is given by rolling the skins on a table, under a weighted roller, having a grooved surface.

MOROCCO, To Restore.—Find some dyes the color required, and dilute for shade desired. When dry, finish with the white of eggs whipped and allowed to stand. The liquid is poured off, and this is the article required.

PATENT, JAPANNED, or ENAMELED LEATHER.—1. These are terms used to designate those leathers which are finished with a water-proof and varnished surface, similar to the lacquered wood-work of the Japanese. The term enameled is used when the leathers are finished with a roughened or grained surface; and patent, or japanned, when the finish is smooth. Though generally black, yet a small quantity is made in a variety of colors. The hides are generally tanned with hemlock, and require high liming and weak sour liquor to secure a soft grain. They are then run through splitting machines; the heavier hides passed through several times. The great essential in making superior patent leather consists in applying the polishing substance. The first coats of the Japan are made with linseed oil and Prussian blue, boiled together some hours; the last coat (or varnish), with linseed oil and lampblack, similarly boiled. Each coat is dried at 160° to 180° Fahr., and rubbed on the leather by hand, the skin nailed to the surface of a board. Any roughness found at any stage of the process is polished off with pumice stone, the dust being removed by a wet brush, followed by a dry one. The entire operation occupies 1 to 3 weeks. Enameled leather requires to be passed through a graining machine, with a heavy brass corrugated roller which presses upon the leather and performs a portion of the work of finishing; the balance being done by beating the leather with pine blocks. — 2. (*French.*) Work into the skin 3 or 4 successive coatings of drying varnish, made by boiling linseed oil with white lead and litharge (1 pound each of the latter to 1 gal. of the former), and adding chalk or ochre, each coat being dried before application of the next. Ivory-black is then substituted for the chalk or ochre, the varnish thinned with spirits turpentine, and 5 applications made in same manner as before, but put in on thin and not worked in. The leather is rubbed with pumice stone, in powder, and then placed in a room at 90°, out of dust. The last varnish is prepared by boiling ½ lb. asphaltum with 10 lbs. of the drying oil used in the first stage, stirring in 5 lbs. copal varnish and 10 lbs. turpentine. It must have 1 month's age before using it.

PATENT LEATHER, To Separate. — Patent and enameled leather will (if the glazed sides are placed together in warm weather) stick together, and unless carefully separated, the leather will be spoiled. To separate the sides place them in a drying room; when hot, they can be taken apart without injury to the surface. If a drying-room is not accessible, lay the sides on a tin roof on a hot day, and they will soon become heated to allow separation. Any attempt to separate without heating to a high degree will prove a failure.

RUSSIA. — Calf-skins being steeped in a weak bath of carbonate of potash and water, are cleaned and scraped, to remove hair and dirt; then immersed in a bath, containing dog and pigeons' dung in water; thus freed from alkali, they are thrown into a mixture of oatmeal and water, to slightly ferment. To tan these hides use birch instead of oak bark; and during the operation they should be handled or agitated. When tanned and dry, they are made pliable by oil and friction; then rubbed over gently with birch tar, which gives that agreeable odor peculiar to this leather, and which secures it against the attacks of moths and worms. This odor of the leather lasts for years and on account of it is much used in binding books. The marks or intersecting lines are given to it by passing over its grained surface a heavy iron cylinder, bound round by wires. To dye this leather of a black color, it is to be rubbed over, after tanning, with a solution of acetate, or pyrolignite of iron; to dye it red, alum and Brazil wood are used. — 2. Deer and goat skins after being cleaned and dressed are then put into a bath of bran in a state of fermentation with water for 3 days. Each skin is then put into a wooden tray, where, being spread out, it receives a portion of a liquor composed of honey and water. When the skin has combined with this liquor, it is immersed in salt brine a short time, and then dried. To dye red, it is to be made up in bags, and dipped in a bath of cochineal water and alkali; it is now to be immersed in a solution of alum, and then tanned with sumac. To give a brilliant and more lasting red, it is dipped in an infusion of galls, instead of sumac. To dye yellow, berries of buckthorn or the flowers of wild camomile are used. The graining is given by an iron instrument of great weight, having a number of blunt points.

SHAGREEN. — Prepared from the skins of the horse, wild ass, and camel, as follows: The skin,

freed from epidermis and hair by soaking in water, and, after dressing with the currier's fleshing knife, is sprinkled over, while still wet and stretched, with the seeds of a species of chenopodium, which are imbedded in it by strong pressure, and in this state it is dried; the seeds are then shaken off, and the surface rubbed down, nearly to the bottom of the seed-pits or indentations; it is next soaked in water, by which the skin swells, and the recently depressed surface rises into a number of minute prominences; it is, lastly, dyed and smoothed off. Black is given to it with galls and copperas; blue, with a solution of indigo; green, with copper filings and sal ammoniac; and red, with cochineal and alum. Shagreen was formerly very extensively used for covering the cases of watches, spectacles, surgical instruments, etc.

SKINNING. — As soon as possible after an animal is dead and dry, attend to skinning. For fur alone, small animals should be skinned by beginning at one of the hind feet; slitting the skin down to the anus; cutting around this and thence up to the other foot. To strip the skin from the tail, pull the skin back from 2 or 3 of the first joints; tie them firmly with a strong cord, and attach it to a strong hook in the wall; then introduce a cleft stick between the vertebræ and the skin; then force the stick to the extremity, and the tail bones will come out of the skin. Peel the skin off by drawing it wrong side out over the body; leave the fur side in. Larger animals are skinned by cutting from the front of the lower jaw to the anus, and peeling (without slitting) the legs, if possible; but if inconvenient, slit in a straight line on the inside of the leg from one foot to the other, making a double cross; chop off the feet, and remove the hide, as before. In removing the skin from the otter, and other wide-tailed animals, rip the skin along the under side of the tail, and open it out stretched flat on a board.

STRETCHING AND DRYING.—In drying skins it is important that they should be stretched tight, like a drum-head. There are 3 modes of stretching: The *Board Stretcher* is of light wood, and of various sizes. For a small one prepare a board 2 ft., 3 in. long, 3½ in. wide at one end, and 2½ in. at the other, and ⅜ in. thick; bevel it from centre to sides almost to an edge; round and bevel the small end 1 in. up on the sides; saw this board through the middle, and make a wedge of same length and thickness, 1 in. wide at the large end and ⅜ in. at the other, and drive it between the 2 pieces. This is suitable for a mink or marten. Two larger sizes, with similar proportions are required for the larger animals. The largest size, suitable for the full grown otter or wolf, should be 5½ ft. long, 7 in. wide at the large end when fully spread by the wedge, and 6 in. at the small end. For the fox, raccoon, fisher and some other animals, the board should be 3 ft., 7 in. long, 4½ in wide at widest part, 3⅜ in. at narrowest, and the wedge about the same width as given for a mink. These stretchers require that the skin of the animal should not be ripped through the belly, but stripped off whole. The skin should be drawn over the 2 pieces, stretched and tacked, the wedge driven in, and all made solid by a tack in the end of the tail; hang up to dry. For musk-rat and other small animals, take a thin board, 20 in. long, 6 in. wide at one end, tapering to 5½ in. at 6 in. from the small end, beveled and rounded as before; stretch the skin on tight and tack. The *Bow Stretcher*. Take a strip of any elastic wood, such as hickory, birch, elm, etc., bend it into the shape of an ox-bow, and shove it into the skin, which is drawn tight, and fastened by splitting down a sliver in the bow, and drawing the skin of the lip into it. For curing in this manner a musk-rat skin, for instance, the feet are first cut off; the skin is ripped with a knife from the centre of the under jaw down the middle of the belly, a little beyond the holes left by the forelegs; the skin is next cut loose around the lips, ears and eyes, and finally stripped backwards off the body. The *Hoop Stretcher*. The skins of large animals are best dried by spreading them at full size, in a hoop. Cut a stick of hickory, or other flexible wood, long enough to entirely surround the skin when bent, or splice together 2 small ones, place this in the skin, and lap and tie the ends. The skin of the legs must not be ripped in this method. This is the proper method of stretching the skin of the deer. When it is dry, it may be taken from the hoop, and is ready for packing and transportation. Skins stretched by these methods should not be dried in the sun nor by the fire, but in a cool place, and sheltered from rain. No salt or other preservative is used upon skins intended for the market.

TANNING. With the Hair on. — 1. First scrape off all the fat with a blunt knife so as not to cut holes into the hide; this should be done on a log, having a couple of legs in one end, like a trestle; the other end resting upon the ground. After the fat is cleaned off, take the brains of the animal, or of any other recently killed, and work them into the hide. This renders it pliable. Take 1 spoonful alum; 2 of saltpetre; pulverize, mix and sprinkle on the flesh side. If the hair side is greasy, a little weak lye will take it out. Yellow ochre, mixed with the brains, gives a fine color to the under side. The whites of several eggs, or the soaking of the skin ½ day in oil or lard is said to produce the same effect as brains. This process is good for deer skins, sheep-skin mats and saddle covers, and for tanning all small furs. — 2. If the skin has been already dried, soak it in clean running water 24 hours, working it with the hands until it becomes soft; remove any small pieces of flesh or fat, and in the case of full-sized tiger-skins, pare or scrape them down until reasonably thin. If the skin is fresh, and has not been dried, it need only be washed to remove any dust or dirt. Prepare the following mixture (the quantities given are sufficient for a small tiger-skin, and must be proportionately increased or diminished for different sized skins): Alum, finely powdered, 5 lbs.; salt, powdered, 2 lbs.; coarse wheat meal, 2 lbs. Mix in a large stoneware basin, and add gradually sufficient sour milk to bring it to the consistency of cream. After the skin has drained until the moisture has evaporated, lay it on a firm table, with the hair underneath, and rub some of the above mixture

into every part of the flesh side; the success of the operation depends upon giving the skin as much rubbing and handling as possible. When it will absorb no more, cover it with a layer of the composition about ½ in. thick; fold it up with the flesh surfaces together, and the hair outside, and lay it aside in a cool place. Next day open out the skin; add more of the mixture; rub thoroughly, and fold up as before. Repeat daily for 2 days more. Next wash the skin in clean water, removing all the composition; hang up to drain, and when half dry rub in a fresh supply of the mixture, and repeat the rubbing daily, adding more composition when necessary. In 5 days from the first washing, wash again; apply fresh mixture; and rub once daily for 7 or 8 days more, in all 17 days. This should be ample for a full-sized tiger-skin. For smaller skins 8 or 10 days will be sufficient, according to the amount of rubbing. When tanned, wash thoroughly in clean water repeatedly changed, or, in a running stream; take a strong solution of plain alum without salt, and after the skin has drained lay it out on a flat surface, exposed to the sun; apply the alum solution to the flesh side, and let it dry. The skin will now be found as hard as a board. Roll it up into a tight roll, fur outside; take a mallet and beat it thoroughly until it is less stiff; open it out, and stretch it as follows: Take a blunt instrument with a rounded edge, and laying the skin on the floor, work it from the centre to the sides with the blunt end of the tool, steadying the skin by placing the foot on it, using the tool with the right hand, and holding the skin with the left. When thoroughly worked all over, smooth with pumice-stone, and it is finished. The more it is worked the softer it will be.— *Without The Hair.* — 1. Flesh it with a dull knife and grain by scraping with a sharp instrument; then soak in pure water several days; afterwards in limewater till the hair pulls out easily; remove the hair by scraping backwards and replace the skin in fresh, weak limewater. Altogether, the skin should be in limewater 2 or 3 weeks, with a change of water every 4 or 5 days. Take out, scrape, trim, rinse in clean water and put in a mixture of wheat bran and water; after 2 weeks transfer to a mixture of alum, salt and water, stir well and replace for a day or two in the bran mixture; remove to a dry room, stretch for a while and then soak in warm water. While soaking prepare a paste in the following proportions (double the quantity, if necessary): ½ lb. salt, 1 lb., 3 oz. alum, 3 lbs. wheat flour, and the yolks of 16 eggs; mix with water, dissolving first the alum, then the salt. This is to be used in the next step when wanted—a little of the paste with a great deal of water. Change the soaking skin to a tub containing a proper quantity of the above preparation beaten to a froth; trump and work well; then remove, stretch, dry, and lastly run over it with a warm flat-iron. This process, though slow, makes a splendid leather, and is good for sheep, deer, dog, calf, and all smaller skins. — 2. Soak in lime water, remove the hair and cleanse the hide as above; then fill a boiler of copper, or any other metal that does not stain or color the liquor, half full with ground oak bark, and pour water upon it, up to the brim; the whole is then to be boiled for 3 hours, till the tanning principle is completely extracted; the liquor is then to run off by a cock into pits, where it stands to cool; the hides are put into the liquor, and handled frequently, by taking them out and putting them in again, because the liquor is too powerful for them to remain long at a time in the first stages of tanning; they are then to be removed to fresh liquors from time to time as the old is weakened, until the operation is complete. If leather is required with a lighter color or bloom, a small quantity of the dust of bark should be mixed with the liquor. Besides bark, oak chips and oak saw-dust may be used; and the barks of most trees that produce hard wood have a tanning principle in them. If, after being tanned, the leather is immersed in a bath of glycerine and left for several weeks, the pores will be impregnated with the greasy substance and the leather will be found more elastic. —3. For a 12-lb. calf-skin, take 3 lbs. terra japonica; common salt, 2 lbs.; alum, 1 lb.; put in a copper kettle with sufficient water to dissolve the whole without boiling. The skin will be limed, haired and treated every way as for the old process, then put into a vessel with water to cover it, and put in 1 pt. of the composition, stirring well, and adding the same night and morning for 3 days; then add the whole, handling 2 or 3 times daily, all the time tanning; continue to use the tanning liquid by adding ½ the quantity each time, by keeping these proportions for any amount. If it is desired to give a dark color to the leather, put in 1 lb. Sicily sumac; kip skins will require 20 days, light horse hides for harness 30 days, calf-skins from 6 to 10 days.— —4. After having removed the hair, scouring, soaking, and pounding in the suds, etc., take oil of vitriol (sulphuric acid) and water, equal parts, and wet the flesh side of the skin, with a cloth or sponge upon a stick; then, folding up the skin, let it stand for 20 minutes; have ready a solution of sal-soda and water (1 lb. to 1 bucket water), and soak the skin 2 hours; then wash in clean water, and apply a little salt; letting it lie in the salt over night; remove the flesh with a blunt knife, or by the regular beam and flesh knife; when dry, soften by pulling and rubbing with the hands, and with pumice stone. — 5. The raw hides are unhaired and swelled in the ordinary manner, and then placed in a solution of sour bichromate of potassa, or sour chromate of soda, or sour chromate of magnesia and alum, or sulphate of alumina and salt. They remain in this solution a few days, according to thickness and quality, and the concentration of the solution. Instead of placing the hides directly into one of the above solutions, they can be first submitted to the action of a solution containing about 10 per cent. alum and some small pieces of zinc. By the action of the alum and the zinc, amorphous alumina (clay) is deposited upon the fibres of the hide and prevents an injurious action of the strong solutions. If the hides have been in the above solutions of soda or alum for a certain time, a few per cent. of ferrocyanide or ferricyanide of potassa are added, which will prove to be very effective for leather to be used for uppers of shoes. They are then placed in a

solution of chloride of barium or acetate of lead, or soap, for a few days, to fix the tanning substances. They are then dried and treated with fat or paraffine, or naphtha dissolved in benzine and similar substances, to which a small quantity of thymol or carbolic acid should be added. This process requires but 3 to 5 days.

TAWING. — Soak and scrape the skins, and hang in a warm room until the odor of ammonia is given off, when the hair or wool may be readily removed. Soak several weeks in water and quicklime, changed several times; beam smooth, and trim the skins again; wash and soak in a vat containing bran and water, where they must gently ferment some weeks. Remove and place in a warm solution of alum and salt, and well work; again ferment in bran and water; then remove, drain, stretch on hooks, and hang to dry in a warm room. Place in water to soak again, and then work about in a mixture of the yolks of eggs beaten to a froth in water; stretch and hang to dry; smooth with a warm iron. To shorten this process, after the first soaking in bran and water, the skins may be soaked in part of the following mixture, largely diluted with water: Dissolve 8 lbs. alum and 3½ lbs. common salt in sufficient boiling water; add 21 lbs. wheat flour and yolks of 100 eggs; make into a paste.

POLISHES.

ENAMELED LEATHER SHOES. Polish For.— 1 pt. pure sweet cream; ½ pt. linseed oil; make them lukewarm separately, and mix them well together. Having cleaned the shoes, rub them over with a sponge dipped in the mixture; then rub with a soft, dry cloth, until a lustre is produced.

FRENCH POLISH.—To 1 pt. spirits wine, add ¼ oz. gum copal, ¼ oz. gum Arabic, and 1 oz. shellac; bruise the gums, and sift through muslin; put the spirits and gums together in a vessel closely corked; place near a warm stove, and frequently shake them; in 2 or 3 days they will be dissolved; strain through muslin, and keep it tightly corked for use.

GRAIN-SIDE BLACKING. — Take a barrel and into it quite a quantity of old iron; then fill nearly full of soft water, and add 1 pt. oil of vitriol; stir it up well, and in a month or two it will be ready for use.

HARNESS. — 1. Molasses, ½ lb.; lampblack, 1 oz.; yeast, 1 spoonful; sugar, olive oil, gum tragacanth and isinglass, each 1 oz.; and a cow's gall; mix with 2 pts. stale beer, and let stand before the fire for 1 hour. — 2. 4 oz. best glue; 1½ pts. best vinegar; 2 oz. gum Arabic; ½ pt. black ink; 2 dr. isinglass. Dissolve the gum in the ink, and melt the isinglass in another vessel in as much hot water as will cover it. Having first steeped the glue in the vinegar until soft, dissolve it by the aid of heat, stirring to prevent burning; add the ink to the gum and heat gently. Lastly, mix in the solution of isinglass and remove from the fire. When used, a small portion must be heated until fluid, then applied with a sponge and allowed to dry on. Dried in the sun or by the fire, it will have a better polish. — 3. Alcohol, 1 gal.; white turpentine, 1½ lbs.; gum shellac, 1½ lbs.; Venice turpentine, 1 gill; stand in a jug in the sun or by a stove, until dissolved; then add sweet oil, 1 gill, and lampblack, 2 oz. This will not crack when the harness is twisted. — 4. Shellac, 12 parts; white turpentine, 5 parts; gum sandarac, 2 parts; lampblack, 1 part; spirit turpentine, 4 parts; alcohol, 96 parts; stir, and digest in a covered vessel, until solution is complete. — 5. Isinglass or gelatine, ½ oz.; powdered indigo, ½ oz.; soft soap, 4 oz.; logwood, 4 oz.; glue, 5 oz. Boil together in 2 pts. vinegar till the glue is dissolved; then strain and bottle for use. — 6. Melt 8 oz. beeswax in an earthen pipkin; stir it into 2 oz. ivory black, 1 oz. Prussian blue ground in oil, 1 oz. oil turpentine, and ½ oz. copal varnish; make it into balls; apply with a brush, and polish with an old handkerchief.—7. Dissolve 3 sticks black sealing wax in ½ pt. alcohol, and then apply with a sponge. — 8. Dissolve lac in alcohol, and color with lampblack. This is a quick drying, hard varnish, liable to crack the leather, and should be put on as seldom as possible.

LEATHER, French Finish for. — Take a common pailful of scraps (the legs and pates of calf-skins are best), and put 1 handful, each, of salt and alum upon them, and let stand 3 days; then boil until they get a thick paste; in using warm it, and in the first application put a little tallow with it, and for a second time a little soft soap, and use it in the regular way of finishing, and the leather will be pliable, like French leather.

LEATHER SEATS, Polish for.—Beat well the yolks of 2 eggs and the white of 1; mix 1 tablespoonful of gin and 1 teaspoonful of sugar; thicken it with ivory black; add it to the eggs, and use as common blacking; the seats or cushions being left a day or two to harden.

LEATHER, Varnish for.—1. Spirits of wine, ¾ pt.; vinegar, 5 pts.; gum senegal, in powder, ½ lb.; loaf sugar, 6 oz.; powdered galls, 2 oz.; green copperas, 4 oz. Dissolve the gum and sugar in the water; strain and put on a slow fire, but don't boil; now put in the galls, copperas, and the alcohol; stir well 5 minutes; set off; when nearly cool, strain through flannel, and bottle for use. Apply with a pencil brush. — 2. 4 oz. shellac; ½ oz. lampblack; place in a stoneware vessel, into which pour 1¼ lbs. alcohol; cover it with a moist bladder; let them be frequently shaken for 24 hours; then puncture the bladder and add ½ oz. turpentine, and leave the whole 24 hours. Repeated applications of this will crack the leather, but for some purposes it is very useful. — 3. Durable leather varnish is composed of boiled linseed oil, in which a drier, such as litharge, has been boiled. It is colored with lampblack.

LIQUID BLACKING, For Boots and Shoes.—1. 4 oz. molasses; ½ oz. lampblack; 1 teaspoonful yeast; 1 teaspoonful oil of turpentine; mix well; apply with a sponge. — 2. Soft water, 4 gal.;

logwood extract, 6 oz.; dissolve by gentle heat; soft water, 1 gal.; borax, 6 oz.; shellac, 1½ oz.; boil until solution is effected; potassium dichromate, ⅜ oz.; water, ½ pt.; dissolve, and add all together; add to this before boiling, 3 oz. spirit of ammonia, or aqua ammonia. — 3. 3 oz. ivory black; 2 oz. molasses; ½ oz. sweet oil; mix to a paste; add gently ½ oz. vitriol; then add ½ pt. vinegar and 1¾ pts. water or sour beer. The oil of vitriol may be mixed with sweet oil. — 4. 1 dr. isinglass; ½ dr. indigo; ½ oz. soft soap; 2 oz. glue; small handful logwood raspings; boil all together slowly in 1 pt. vinegar until reduced ½; clean the shoes of all dirt and blacking with cold water; dry the shoes, and apply with a sponge. —5. Dissolve 18 oz. caoutchouc in 9 lbs. hot rape oil; add 60 lbs. fine ivory black, 45 lbs. molasses, and 1 lb. finely powdered gum Arabic, previously dissolved in 20 gals. vinegar; triturate all together in a paint mill till smooth; add 12 lbs. sulphuric acid in small successive quantities, with powerful stirring ½ hour; add 3 lbs. ground gum Arabic; stir ½ hour, repeating daily for 14 days; this gives a liquid form. For the paste, take same quantities of caoutchouc, oil, ivory black, molasses and gum Arabic, but dissolve the last in 5 qts. vinegar; grind to a paste; then add 12 lbs. oil of vitriol; stir daily 1 week, when it is ready for use. — 6. Gum Arabic, 4 oz.; molasses or coarse sugar, 1½ oz.; good black ink, ½ pt.; strong vinegar, 2 oz.; rectified spirit of wine and sweet oil, each, 1 oz.; dissolve the gum in the ink; add the oil, and rub them in a mortar, or shake them together till they are united; then add the vinegar, and lastly the spirit. Apply with a sponge, and dry out of the dust. — 7. Lamp-black, ¾ oz.; indigo (in powder), 1 dr.; put them in a mortar and rub with sufficient mucilage (made by dissolving 4 oz. gum in ½ pt. strong vinegar) to form a thin paste; add gradually sweet oil, 1 oz.; triturate until union is complete, adding toward the end the rest of the mucilage; further add of molasses, 1½ oz.; afterwards, successively, of strong vinegar, 2 oz.; rectified spirit, 1 oz.; bottle for use. Apply with the tip of the finger, or with a sponge. — 8. Mix the whites of 2 eggs with 1 tablespoonful spirit of wine, 2 lumps of sugar (crushed), and sufficient powdered ivory black to give the color and thickness, avoiding excess. Apply with a sponge or soft brush; when almost dry, polish with a brush or soft rubber. — 9. Boneblack (commercial ivory-black), 16 parts; molasses, 12 parts; oil of vitriol, 3 parts; sperm oil, 2 parts; gum Arabic, 1 part; strong vinegar, or sour beer, 48 to 50 parts (all by weight); place the boneblack in a capacious wooden, stoneware, or enameled iron vessel (avoid vessels of metal); add the oil, and rub well together; next gradually add the molasses, and grind or rub the mass, after each addition, until the oil is killed; then dilute the vitriol with about 3 times its bulk of water, and add it in separate portions to the former mixture, stirring together rapidly, on each addition of acid, and for some minutes after the whole is added, to render the mass homogeneous; let it stand, covered 2 or 8 days, stirring 15 or 20 minutes daily; lastly, having dissolved the gum in the vinegar, add the solution gradually to the rest, and stir together briskly and again daily for 3 or 4 days. It may be diluted with more vinegar or beer, or with water; but excessive dilution injures the richness of the blacking. If all the ingredients (except the vitriol) be made hot before admixture, the shining quality of the product will be improved, and the process shortened. — 10. Place 3 lbs. rainwater over the fire, and, when boiling, add 4 oz. white pulverized wax, 1 oz. clear, transparent glue in small pieces, 2 oz. pulverized gum Senegal, 2 oz. white soap scraped fine, and 2 oz. brown pulverized sugar; place the ingredients in one by one and stir up every time; take the pot from the fire every time a substance is added, to prevent boiling over; when all is added remove from the fire; when cool add 3 oz. alcohol, and finally 3 oz. fine Frankfort black, well mixed. Put on with a brush, and polish like shoe blacking.—11. Dissolve an equal quantity copperas and gum Arabic in a little boiling water; add a little extract of logwood; if it gums, dilute with hot water. Concentrated solution of shellac in hot aqueous solution of borax may be used in place of a portion of gum. — 12. Extract of logwood, 1 to 2 oz.; tincture of iron, 1 to 2 oz.; sweet oil, 1 to 2 dr.; diluted alcohol, 1 pt. — 13. Extract of logwood, 4 oz.; bichromate of potassa, 12 gr.; yellow prussiate of potassa, 12 gr.; rain water, 1 gal.; apply with a brush, and burnish with a hot iron.

MOROCCO SHOES. Polish For. — Pound black sealing wax and put it in a bottle with ½ pt. alcohol; shake frequently; when dissolved rub it on morocco shoes when sealed or defaced, and they will look like new. Dry in the sun.

PASTE BLACKING, For Boots and Shoes. — 1. 4 oz. oil of vitriol; 10 oz. tanners' oil; 2 lbs. ivory black; 10 oz. molasses; mix the vitriol and oil together, and let stand 24 hours; then add the ivory black and molasses, and mix into a thick paste. This will not injure the leather. —2. Mix 3 lbs. lampblack, ½ lb. bone-black, and 5 lbs. molasses and glycerine in equal parts; melt 2½ oz. gutta-percha in an iron saucepan; add 10 oz. olive oil and 1 oz. stearine, stirring; add this to the first mixture and stir thoroughly; dissolve 5 oz. gum Senegal in 1½ pts. water; and 1 oz., each, oils of rosemary and lavender; stir well into the double mixture. For use dilute the blacking with 3 to 4 parts water.

PATENT LEATHER, To Restore Enamel of. — When the enamel of the leather has chipped off, clean the parts well with fullers' earth and water, and then apply the following varnish: 2 oz. pure Prussian blue; 1 oz. vegetable black; 1 qt. drying oil; with a little copal or amber varnish. Stove at a heat not exceeding 160° Fahr.; but take care that the pigments are carefully ground in the drying-oil, and don't add the amber varnish till the third and last coat; polish with a piece of pumice stone.

WATER-PROOF BLACKING, For Boots and Shoes. — Take an old pair of india-rubber shoes, cut them up and pull off the cloth lining; put the rubber in about 1 pt. neat's foot oil, and set it on the stove until the rubber is melted, stirring once in a while, and don't let it boil or burn. It will take 2 days to melt. As soon as melted, stir in ½ lb. beef or mutton tallow, and ½ lb. bees-

wax. If it is not black enough, add lampblack. Wash the boots clean; when nearly dry, apply the water-proof; if the weather is cold, work near the stove, rubbing it in well with the hands.

SHOES, To Polish With a Banana.—Rub the shoe all over with the skin of a banana, and no blacking will be needed.

WATER-PROOF BLACKING, For Harness. — Melt in a glazed pipkin 2 oz. black resin; add 3 oz. beeswax; when melted, take it from the fire; add ½ oz. fine lampblack, and ½ dr. Prussian blue in fine powder; stir them so as to be perfectly mixed, then add spirits of turpentine to form a thin paste; when cool, apply with a linen rag evenly, and brush with a polishing brush.

WATER-PROOF BLACKING, For Leather. — 1. Shellac, ½ lb., broken small, in 1 qt. bottle; cover with methylated spirits; cork tight and set in a warm place, shaking several times each day; add camphor size of an egg; shake, and add 1 oz. lampblack. Pour a little into a saucer and apply with a brush, not drying it in. — 2. Neats-foot oil, ½ pt.; beeswax, 4 oz.; 4 tablespoonfuls lampblack; camphor size of a hen's egg; melt over a slow fire, stirring, never allowing it to boil; warm the leather and apply with a brush. Use little and often.

WATER-PROOFING. For Boots and Shoes.—1. Mutton tallow, 1 part; beeswax, 2 parts; melt together. Apply at night, and wipe off the boots next morning with a colored flannel. It will be more difficult to make the boots thus treated take a polish, but after a few times they will be as susceptible of polish as ever. — 2. Dissolve ½ oz. Burgundy pitch in ½ pt. drying oil, and mix with ½ oz. turpentine. Warm the boots and apply the mixture with a soft brush; dry thoroughly; then paint again. Put them in a warm, dry place 24 hours. — 3. 24 parts oleic acid; 18 parts ammonia soap; 24 parts water; 6 parts raw stearic acid; 3 parts tannin extract; melt the oleic acid with raw stearine; add the ammonia soap; afterwards the extract and water. The ammonia soap is obtained by treating oleic acid with ammonia until the smell of the latter does not appear after lengthy stirring. By adding to the mixture a solution of 2 parts copperas in 6 parts water, a deep black is obtained. — 4. A coat of gum copal varnish, applied to the soles of boots and shoes, and repeated as it dries, will make the soles waterproof. — 5. Put ½ lb. resin and 1 lb. tallow in an earthen pot; melt and mix over a slow fire. Warm the boots and apply the hot mixture with a brush until neither the sole nor the leather will absorb any more. With care the leather may be made hot through, so that the preparation may fill all the pores. For a polish, dissolve 1 oz. wax and 1 teaspoonful lampblack in a little turpentine. A day or two after the boots have been treated to the tallow and resin, apply the polish, but not before the fire. This gives the exterior a coat that will shine like a mirror. — 6. Mix 3 parts lard and 1 part rosin or black lead, and apply it. Shoes treated with it will soon take polish when blacked, and the soles may be saturated with it without danger of soiling the floor.

WATER-PROOFING, For Harness.—Beeswax, 2 lbs.; resin, ½ lb.; fish oil and neat's foot oil, each, ¾ pt.; spirits turpentine, 2½ pts.; glycerine, ½ oz.; lampblack, ½ lb.; melt the wax and resin; stir in the other ingredients, and it is ready. Apply with a brush, and polish with a wet brush. Excellent for boots, shoes and harness.

WATER-PROOFING, For Leather.—1. Mix 1 gal. nut and poppy oils with 3 gals. linseed oil; or, 1 gal. either nut or poppy oil may be added to 3 gals. of that expressed from linseed; or 2 gals. linseed oil may be combined with 1 pt., each, poppy and nut oil. These ingredients, either in the above proportions, or such others as may be required by the nature of the oils, being mixed in an iron pot, are placed over a gentle fire; to each gal. oil add 1 lb. white copperas, sugar of lead, colcothar, or other drying substance; when the whole has remained 6 or 7 hours over a degree of heat till sufficiently dry, it is taken off to cool; it is then ready for use.—2. Take 1 lb. gum resin, ½ lb. pitch, and ½ lb. each, tar and turpentine; mix these with 1 gal. of the oils prepared according to the first method, by gently heating the mass, then increasing the fire till the whole is incorporated. When the oils prepared according to the first method, or the gums according to the second, are cool, either is to be rubbed into the leather with a brush dipped in the respective composition; the impregnated leather stretched on a board, and the superfluous matter removed. Sole leather and other thick substances are first warmed, and after being fully saturated and properly dried in a warm place, they are ready for use.—3. First rub the leather with the following mixture: 1 oz. linseed mixed with 12½ lbs. concentrated sulphuric acid, neutralized with soda, water being added. This mass is heated; a solution of 4 lbs., 6 oz., of thick gum mucilage is added, to which either 3 oz. oxalic acid or 10 oz. salicylic acid have been added, in order to render the gum insoluble. Before using, fat or oil is added, or turpentine or tar oil; it can be made more fluid by the addition of alcohol or water. The leather is rubbed with this mixture, then dried and passed through the following bath: 5 lbs. gum or gelatine are dissolved in 100 gals. water; 3 lbs. oxalic or 10 lbs. salicylic acid are added, the whole being mixed with 50 lbs. of a solution of acetate of alumina. The leather is then dried, rubbed on both sides with the first mixture, tanned, dried and put in cold water, where the matter which has not been well absorbed by the leather can be removed. By this same process, textiles, wood, paper, etc., can be rendered water-proof and more durable.

TAXIDERMY.

REMARKS.—The preservation and stuffing of the skins of animals so as to preserve their natural appearance, requires skill and taste. It is more difficult with bird skins, as the preservation of the plumage is imperative. In killing birds, the feathers are often soiled with blood, which is difficult to remove. Be provided with some cotton wool, a dish to hold water, small sable brushes, and a piece of stiff wire rounded at one end. Get the bird as soon as possible after shooting; plug the shot holes with cotton by using the wire; also the mouth and throat. Clean the feathers with water and the brushes. If the blood is removed before it dries, it will leave no stain.

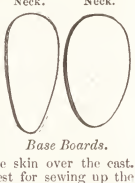
APPARATUS.—The following tools are required: The scalpel, which has a short, sharp blade; 2 pairs surgeons' scissors, one small and sharp pointed, the other of medium size; 2 or 3 spring forceps of various dimensions; a small

Implements of Taxidermy.

pair of pliers for clipping wire; some spools of cotton (Nos. 10, 30 and 100); a quantity of excelsior and tow; some cotton batting; prepared glue; a number of pieces of wire, about 15 in. long and straight (No. 20); a box of dry oatmeal and some arsenical soap.

DEER HEAD. To Mount.—Make a cut across the top of the head, from one horn to the other; run the knife from the middle of the head down the back of the neck to the shoulders; cut the skin around and a little below the neck, until free from the shoulders, and loosen the skin up to the ears; sever them at the base and skin to the bur of the horns; cut the pelt away around the horns and to the eyes; sever the skin carefully from the eyes, and flay down over the muzzle; skin the ears part way down; trim away most of the flesh on the under side of the lips, and rub the flesh side of the skin with arsenical soap. The head may be mounted on a cast or on the skull. *Mounting on a Cast.* Saw off the top of the skull from the top of the eye-holes, back to the upper part of the hole in the occipital bone. To have a perfect cast, take a mold of plaster from a shaved head, and make the mold in 4 pieces. To make the cast, grease the molds, tie tightly together, and run them full of thinly mixed plaster Paris. Take a piece of board of the shape shown in the illustration, with a wire through it to run down into the nose, and thrust it into the plaster until it bears against the front and rests on the top of the mold; place a heavy weight on the board to keep it in place until the plaster sets for 1 hour; then remove the cast; heat and dry it. Saw the cast off just above the eyes, to fit the portion of skull holding the horns; scoop out the eye-holes for glass eyes. If a head has a long neck, the neck-board can be pieced, screw an oval shaped base board on to the neck board, to fasten the skin to. If the head has a short piece of neck skin, the board in the cast will be long enough, and should have a long base board; if a long neck skin, it should have a short base board. Bore 2 holes into the top of the skull, 2 in. apart, directly over the wood in the cast; countersink the holes to receive the heads of the screws. Model with potters' clay where the skull bone joins the cast, to perfect the anatomy. Draw the skin over the cast. Waxed hemp twine is best for sewing up the skin. Gather the skin around each antler; draw it tightly about the base of the horns, and tie firmly; take a stitch through the 2 points of skin at the base of each antler, and tie fast; sew with 2 strings from each horn to the middle, by cross-stitching from the under side; then tie the strings tightly together; cut 1 string and continue the seam down the back of the neck; close the neck half way down; push clay under the skin about the horns until it looks natural. Fasten the eye-holes over the cavities in the cast by driving $\frac{3}{4}$ in. wire tacks through the skin at the inner corners of the eyes. Model about the eyes by inserting clay through the eye-holes. Tuck the skin about the mouth underneath. Finish the seam down the neck; draw the skin

Neck Board.



Base Boards.

The Taxidermist at Work.

tight, and nail it to the middle of the top of the base board; then draw the neck skin tight, and nail to base board. Stuff by forcing excelsior under the skin, between the nails, upon each side of the neck board, until the neck has the natural shape. Draw down the skin tight with pliers, and nail firmly to edge of base board. Put a large screw hook in the top of base board to hang up the head. Turn down the skin covering the under jaw; put a little clay under it around the edges, and nail with round nails. Pull down the nose skin; fill out the nostrils slightly with clay, also the lip, and turn in the dark skin of the lip over the clay; make a narrow fold at

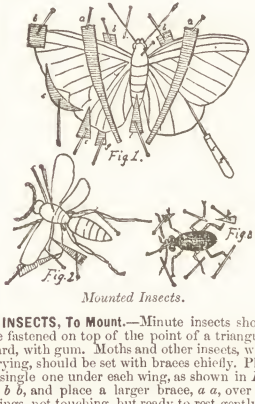
each corner of the mouth, that the skin may lie naturally, and secure it with wire tacks. Drive a small nail part way into the centre of the nose to hold the muzzle in position when drying. Model the nose, insert the eyes, and perfect the anatomy around them. Fill the ears full of clay at their bottoms, and sew pasteboard on their insides to hold them in position until dry. Make them stand in a pricked condition, and draw slightly together with thread; como the coat with a fine metal comb. Coat the hair with thin flour paste; hang up to dry; when dry, remove the pasteboard from the ears, and brush the hair clean. Draw the nail from the nose; perfect the nostrils and under parts of the eyelids with putty; paint them and also the muzzle with Cassel earth, and when dry, varnish. Clean the horns with a damp brush and cloth, and varnish. Fasten the head on a shield by running screws through it from the back into the base board of the neck. Remove the screw hook from the neck board to the shield.—*Mounting on the Skull.* Clean the skull and dry well; fill the brain cavity with plaster Paris, and insert an iron rod, bent double, inside the skull; when the plaster is set, perfect the anatomy by modelling with the same. Make a base neck-board, and run the iron rod through it, and clinch it in position in a groove with wire staples; bend the iron to the desired curve, and complete the head as above.

Cast Ready for Covering.

DRIED SKINS, To Prepare for Mounting. — When a skin is to be mounted, it must be soaked in alum water to soften it; ¼ lb. to 1 gal. water is about right. Soak till pliable. If the skull has been removed, replace it with a plaster of Paris one. The skin is then stuffed. Dried bird skins should have balls of wet cotton placed in the orbits of the eyes, and the legs and feet wrapped with wet cotton rags; a damp cloth thrown over the bird, and allowed to remain until next day. The neck and body are then filled with wet cotton, and in 4 or 5 hours it will be ready to stuff and mount.

FISH, to Mount.—Before skinning, the scales, as well as color, may be preserved by applying tissue paper, which will adhere firmly; this, being allowed to remain until the skin has dried, may be removed with a damp cloth. All small fish should be mounted in section, while larger varieties may be preserved entire. Supposing the fish to be of such a size as to be mounted in section, let it be as fresh as possible. Place the fish on one side, and cover the side uppermost with tissue paper; extend the fins by means of the same, and allow them to remain a few moments until dry. Spread a damp cloth upon the table, and place the fish upon it, papered side down. With the dissecting scissors, cut the skin along an oval line, following the contour of the body, a little below the extreme dorsal edge and a little above the ventral one, and remove the skin included within this line. The remaining skin must be detached from the flesh, beginning at the head down toward the tail. The spine must be severed close to the head, and also at the tail, and the entire body removed; the flesh having been taken from the skin, and the eyes removed, the inside must be wiped out and arsenical soap applied. The skin should now be filled with tow, evenly placed. When filled, it should be laid, open side down, upon a board, and fastened by small tacks, beginning at the head and fastening the edges down toward the tail; then set aside to dry. The paper is, after drying, removed, and eyes of wood (painted to the proper colors and not varnished) are inserted with putty. Finally the skin should receive a coat of colorless varnish.

INSECTS, to Preserve.—1. Saturated solution of alum, 100 grammes; saltpetre, 2 grammes. The article is to be immersed in the solution, when it becomes decolorized; in a few days the color returns, when it is taken out of the solution, and kept in a saturated solution of alum and water only.—2. Glycerine, 1 part; water, 2 parts.—3. Wood naphtha, 1 part; water, 8 parts.—4. Alum, 1 part; water, 16 parts.—5. Bay salt, 4 oz.; alum, 2 oz.; corrosive sublimate, 4 gr.; water, 2 gr.—6. Creosote, 25 drops; water, 1 wineglass.—7. A solution of arsenious acid.



Mounted Insects.

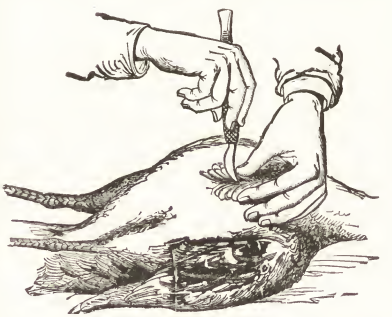
INSECTS, To Mount.—Minute insects should be fastened on top of the point of a triangular card, with gum. Moths and other insects, while drying, should be set with braces chiefly. Place a single one under each wing, as shown in *Fig. 1, b b*, and place a larger brace, *a a*, over the wings, not touching, but ready to rest gently on them when required. Raise the wings to the proper position with the setting needle, and use the other braces, *b, c, g, l, t.* The feet and other parts are kept in position by pins. Bodies of insects of the cricket and locust kind, shrivel in drying, and the intestines should be extracted and the body filled with cotton. They are set as shown in *Figs. 2* and *3*.

SKELETON. To Mount. — There are 2 ways: one in which the bones are connected with wire; the other, in which they are connected by the natural ligaments. 1. To make wired skeletons, study the manner in which the bones are naturally connected. Boil the flesh off; then strip off the ligaments; they will look better by afterwards boiling them in a weak alum solution. Connect the bones with brass wire. To do this study the skeletons in museums. — 2. Remove all muscles; dry the ligaments left in the desired position; then varnish. — 3. To obtain skeletons of mice, rats, squirrels, etc., place the dead animal (cleaned) near a nest of ants, and cover with a tin pan; they will take all the flesh and leave the ligaments and cartilages, so that the skeleton, when clean, will not want wiring.

SKINNING ANIMALS.—An accurate measurement should be taken of birds and animals before skinning to prevent stretching; the neck is liable to be unduly stretched; the natural length should be preserved. Skinning should be done as soon as possible, for when decomposition sets in the hair will come out. Lay the animal on its back; plug the nostrils, mouth and wounds with cotton. Make a longitudinal incision in the lower part of the belly, in a straight line from the root of the tail ¼ the length of the body; sometimes as high as the collar bone. Do not cut the abdominal muscles; separate the hair, right and left, to prevent cutting; loosen the skin as far as possible; sever the legs from the body at the hip joints; cut off the intestinal canal a little above the anus; separate the tail close to the body; pull the back part of the body out of the skin; remove the forelegs from the body at the shoulder joint; when the joint of one shoulder has been separated, put the leg again into the skin, and repeat the process with the other, returning the limb; draw the skin carefully over the head and neck and loosen it as far as the nose, so as not to injure the eyelids; avoid cutting the lips too close; cut the ears off close; separate head from the body by disjointing the neck at the upper joint of the vertebræ; remove the muscles of the head and face and leave the bones clean; open the occipital bones with a sharp knife, and remove the brains with a scoop; cover the parts well with arsenic, and return the head to the skin. Pull the forelegs out of the skin by drawing the legs one way and the skin the other; clean the bones, preserving the ligaments and tendons; return the bones into the skin; treat the hind legs in the same way. To remove the skin from the tail, see *Skinning* in CURING AND DRESSING. After removing all muscles and particles, cover the inside of the skin with arsenical soap, rubbing it in by hand.

SKINNING BIRDS.—In cool weather let the bird lay 24 hours before skinning, previously inclosing it in a cone of paper that the feathers may be kept smooth. Before skinning place fresh plugs in the holes, mouth and nostrils. In commencing, the left hand is used to part the feathers, exposing the skin from the apex of the breast bone to the tail. With the scalpel, held like a pen, make a free incision between these points; divide the skin without cutting the flesh; press apart the skin and dust oatmeal into the cut, to absorb any fluids; carefully lift the skin clear of the flesh until the leg is reached; then use the scalpel to separate the thigh joints; push back the skin the whole length of the thigh; remove the flesh; replace the bone, and treat the other thigh in the same manner. Cut the wings from the body at the joint next the same, and scrape the bones. Divide the neck so that the skin, with the head attached, can be peeled to the root of the tail; bend the tail toward the back with the left hand, keeping down the detached parts of the skin on each side of the vent; make a deep cut across the vent and sever the back bone at the joint, leaving enough bone at the root of the tail, so that it will not come out. Pull the skin of the neck over the flesh till the skull is exposed; remove the ears; carefully separate the lids from the eye-balls. Scrape out the eye cavities. Cut away the flesh of the neck, removing at the same time a small portion of the base of the skull; through this cavity extract the tongue and brains; clean away all fleshy matters; paint the eye orbits with arsenical soap. Care should be taken not to detach the skin from the bill. Fill the interior of the skull with tow, after it has been

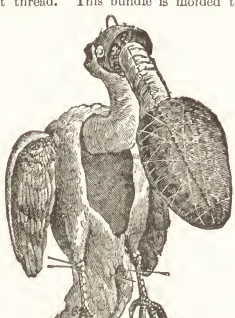
Paper Cone.



First Incision in Skinning.

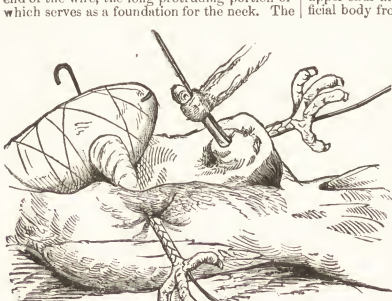
coated internally with the prepared soap.

STUFFING AND MOUNTING BIRDS.—1. Before skinning, measure girth and length. From these data an artificial body is constructed as follows: On a piece of straight wire, a bunch of excelsior is secured by repeated winding with stout thread. This bundle is molded to re-



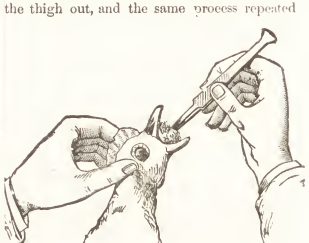
Attaching the False Body.

semble the bird's body. It is attached at the end of the wire, the long protruding portion of which serves as a foundation for the neck. The



Stuffing the Legs.

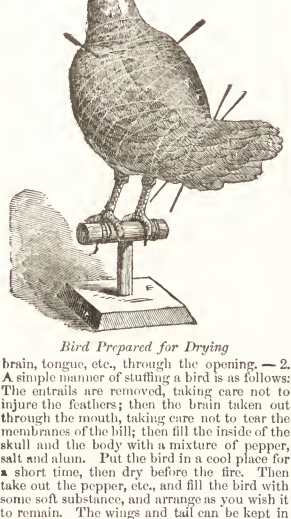
extremity of the wire is clipped to a point, and forced diagonally upward through the skull, on top of which it is clinched flat. Cotton batting is wound about the wire between the skull and body, sufficient to fill the skin of the neck. Paint the inside of the skin with arsenical soap; then draw the skin back to envelop the false body; a needle and thread are thrust through the nostrils to make a loop for convenience in handling. The finest pair of forceps is employed to pull the eyelid skin into place, arrange the feathers, and pull up the cotton in the orbits. More cotton is pushed down the throat until filled; 2 pieces of wire are then sharpened at one extremity; taking the wire in one hand and guiding it with the other, shove it into the leg from the ball of the foot up alongside the thigh bone, the skin being turned back; cotton is then wound about both wire and bone to fill the thigh out, and the same process repeated



Filling the Throat.

for the other side, the ends of the wire below protruding to support the bird on a perch; the upper ends are pushed clean through the artificial body from below, and clinched on the upper side; this secures the legs, which are afterwards bent in natural position. The bird can now be set up. For small birds, the cut in the breast need not be sewn up; a chicken or larger fowl will require a few stitches. If the tail feathers are to be spread, a wire is thrust across the body and through each feather; the wings are then gathered closely into the body, and 2 wires, one from each side, are pushed in diagonally from up, down and through the skin of the second joint. (See illustration, *Bird Prepared for Drying.*) The wings are thus held, and the wires, as well as that through the tail, are left protruding. A touch of glue within the eye-lids prepares for the eyes, which may be purchased from taxidermists; for smaller birds, black beads will answer. If plain glass beads can be readily obtained, by the aid of a little paint they can be made to imitate the eye of a chicken. After the eyes are inserted, a needle is used to pull the lids around them and into place; then, with a fine pair of forceps, adjust the feathers, smoothing them with a large camel's hair brush. Thread must then be wound over the body loosely, beginning at the head, and continuing

until all the feathers are bound. The bird is left to dry for a day or two, when the thread is removed, the ends of the wire cut off close to the body, and the work is complete. In ducks, hens, etc., the neck is so long and narrow that the skin cannot be drawn over the head with these birds; therefore, skin the neck high and cut it off; make a cut through the skin from the angle of the jaw to the bottom of the piece of neck attached to the head, and remove the neck,



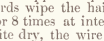
Bird Prepared for Drying

brain, tongue, etc., through the opening. — 2. A simple manner of stuffing a bird is as follows: The entrails are removed, taking care not to injure the feathers; then the brain taken out through the mouth, taking care not to tear the membranes of the bill; then fill the inside of the skull and the body with a mixture of pepper, salt and alum. Put the bird in a cool place for a short time, then dry before the fire. Then take out the pepper, etc., and fill the bird with some soft substance, and arrange as you wish it to remain. The wings and tail can be kept in position with fine wire.

STUFFING AND MOUNTING SMALL ANIMALS.—Select a piece of wire of such thickness that 4 pieces, introduced into the legs, will support the animal. A thinner piece, 2 ft. long, is next taken and bent ½ its length into an oval shape smaller than the hand; the 2 ends twisted together, leaving 1 end shorter than the other; then the wire must be cut the same length as the tail, independent of the oval. Wrap the wire in flax, constantly increasing towards the oval; rub the whole with paste to preserve the shape. With a small brush put a little of the preparation into the tail, and coat the towed wire with the same, and put it into the skin of the tail; place the oval end within the body; this serves to fix the tail to the iron backbone. Take 5 pieces of iron wire, the diameter of a straw; 1 a foot longer than the body of the animal, the 4 others the length of the legs they are to support; the points must be sharp at one extremity in a triangular form. Form a ring at the unpointed end of the long wire, large enough to pass the little finger through, bending the wire back on itself 1½ turns with round pincers; form a similar ring on the same wire, by 1 turn, in the part that will come between the animal's shoulders. The rest of the wire must be straight and pointed triangularly. Having anointed the skin with preservative, fill the hollows of the head with chopped flax; insert one end of the long piece of wire into the middle of the skull, and restore the head to its place; stuff the skin of the neck with the same, preserving dimensions. The second ring of the wire must correspond with the pelvis. Next take one of the foot wires and pass it behind the bone of the front leg, placing the point which comes out at the sole under the highest ball of the foot; then draw the bones of the leg up within the skin, and tie the wire to the bone of the arm and forearm with packthread; anoint the parts and twist them with chopped flax. To fix the forelegs, pass their wires in the little ring of the middle or back wire, and twist the ends together with pincers. For an animal the size of a fox the pieces left to twist should be 5 to 6 in. long. Bind the wires on the under side against the back wire, and fasten with packthread; replace the 2 legs, and bend them according to the attitude intended. The skin of the shoulders and belly are next stuffed, putting sufficient flax under the back wire. Sew the anterior part of the opening, preserving the appearance of the scapulæ, and that thickness which appears at the junction of the shoulder and bone of the forefoot. The wires for the hind legs should be longer than for fore legs, and be inserted into the paw, loosely fastened to the thigh and leg bone, and the flax applied. If the whole is bound round with thread, it will prevent slipping up when the leg is placed within the skin. Pass the extremities of the wires of the hind legs through the second ring of the back wire, which ring should be at the pelvis; bend the ends and twist them in opposite directions round the ring. To give strength, pass a piece of packthread several times round these 3 wires and tie it. Replace the body by chopped flax, laying it under the wires, preserving the circumference and imitating irregularities caused by the muscles; then, with a triangular pointed needle and strong silk, sew up the incision down the belly; pass the needle from the inner surface, dividing the hairs to prevent their being drawn in with the edge of the skin. When the skin is sewed up turn the subject in all directions, and press it into a correct shape, and restore the appearance of the muscles. Next take a board and drill 4 holes same circumference as the foot wires, at a distance to suit attitude; insert the wires of the feet through the holes, and with pincers draw them close to the board, so that the soles rest firm; bend the wires on the underside of the board, and clinch with short nails.

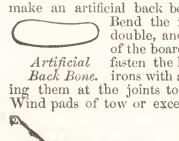
The specimen being erect, give proper attitude to the head, imitating muscles by stuffing in cotton at the orifices. Put the artificial eyes in while the eyelids are still fresh. Place cotton inside the lips and secure by pins; distend the nostrils with cotton closely pressed, and the flesh saturated with the preservative. If the ears are to be erect, pass a connecting thread through the base of each, tightening it until sufficiently near to each other. If the ears are large, pasteboard of the same form may be placed within and fastened round the edges with small pins. Anoint the ears, nose, lips and paws with a brush dipped in spirits of turpentine, and afterwards wipe the hair with cotton. Repeat this 7 or 8 times at intervals of some days. When quite dry, the wire which passes from beyond the head may be cut.

STUFFING AND MOUNTING LARGE ANIMALS.—Pour the skull full of plaster; bend double an iron rod and insert inside the skull; make an artificial back bone of 1½ in. plank.



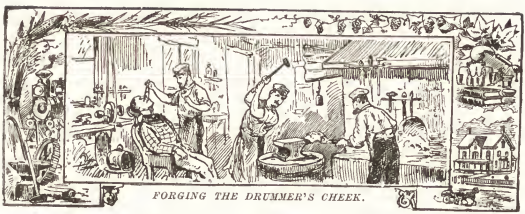
Artificial Back Bone.

Bend the iron for the neck double, and fasten to the side of the board with wire staples; fasten the leg bones to the leg irons with annealed wire, bending them at the joints to the desired shape. Wind pads of tow or excelsior with string, to form the legs and quarters; substitute the main cords of the hind legs, running from the hocks, with wires covered with tow. Drill holes into the projecting bones of the hocks, and fasten the wires by inserting the ends; give them the right curve, and lash the other ends to the legs. Coat with thin glue to give an even surface. When the legs are formed, bend the projecting irons like *a*, in the illustration; fasten them on the board, in position, with wire staples, 1 set of staples holding both irons. Reverse the bending of the irons to the hind legs, and fasten as before. Take a piece of wire longer than the tail of the animal; bend at one end and fasten it on the board with wires, as shown in the illustration. The whole anatomy of the body is made by binding on pads of tow. The dummy is fastened on a stand by bending the irons under, plugging the holes tightly around them, and clinching them with wires. Having coated the skin with arsenical soap, lay it on the body; and if a good fit is made, commence sewing up the legs, cross-stitching from the inside; correct any imperfections in the anatomy by cramming stuffing under the skin. Model the feet in cement and nail them in position. The lower parts of the legs may be modeled in clay over the excelsior. When the last seam has been closed the coat should be combed out with a fine metal comb. The anatomy of the head should be first roughed out over the skull with plaster or cement; then the skin should be tacked in position, with the eyes straight. Model the under jaw first, holding the skin in position by stitching across the inside of the mouth. Fill the nose with clay or cement. Turn the skin of the lips in under; then form the upper lip into shape and work down to a natural position. The features are gradually worked out, the eyes set, the ears erected by sewing on pieces of pasteboard, and the hair combed smooth. The eyes, lips and claws should be painted naturally and varnished.



Position of Irons.

STUFFING. Preparations for. — Camphor, 1 oz.; corrosive sublimate, 1 oz.; alum, ½ oz.; sulphur, 1 oz.; all powdered and mixed. — 2. Tanners' bark, dried and powdered, 2 oz.; burnt alum, 1 oz.; snuff, 1 oz.; mix, and add arsenic, ¼ oz.; camphor, ¼ oz.; sulphur, 1 dr. — 3. Arsenic, 4 oz.; tanners' bark, 8 oz.; mix and reduce to powder; sift fine; add camphor (reduced to powder with spirits of wine), 2 oz.; musk, 30 gr.; keep in a closed jar. — 4. (*Arsenical Soap.*) Camphor, 5 dr.; arsenic, 4 oz.; white soap, 4 oz.; carbonate of potash, 12 oz.; air-slaked lime, 4 oz.; make a stiff paste with a little water.



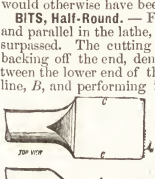
FORGING THE DRUMMER'S CHEEK.

METAL WORKING.

ALL METALS.

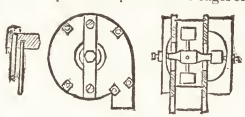
THE method herein adopted for treating of metal working is to divide it according to the metal operated upon. Certain operations are common to all the metals, namely, polishing, grinding, etc.; there are, also, certain machines and tools employed in working all the metals, such as the lathe, file, scraper, etc.; for these reasons the subject of ALL METALS is adopted. On account of the importance of BRASS it will be classed as one of the metals and passed unnoticed among ALLOYS, under which head it would otherwise have been treated.

BITS, Half-Round. — For drilling holes true and parallel in the lathe, the ½ round bit is unsurpassed. The cutting edge, *A*, is made by backing off the end, denoted by the space between the lower end of the tool and the dotted line, *B*, and performing its duty along the radius, denoted by the dotted line in the end and top views. It is only necessary to start the ½ round bit true, to insure its boring a hole of any depth true. To start it, the face of the work should be made true; this is not positively necessary. A recess, true and of the same diameter as the bit, must be turned in the work, the bit placed in position, and the dead centre employed to feed it to its duty, which (if the end of the bit is square, if a flat place be filed upon it, or any other method of holding it sufficiently tight be employed) may be made as heavy as the belt will drive. This is simple, positive and effective.



Half Round Bits.

BLOWER. — A simple method suitable for the sand blast: Make 2 wooden side pieces, of the form shown in the side elevation. Cut a groove in each to receive the sheet iron strip which forms the curved sides. Turn a wooden shaft. Insert metal bearing pieces in its ends. Bore 4 holes in the hub, and insert 4 arms with fans attached. Support the shaft on pointed screws inserted in the cross pieces attached to the side pieces. Clamp the side pieces to the edges of the



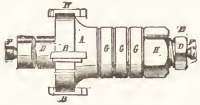
Blower.

sheet iron by small bolts. The dimensions are: Diameter of case, 6 in.; thickness of case inside, 2½ in.; size of opening in sides, 2½ in.; size of fans, 1½ x 2 in.; discharge opening, 1½ x 2½. The size and proportions may be varied. A fan of this sort will answer for the sand blast or for a small forge, but if it is to be used continuously, the shaft should be iron or steel, and it should be run in well made boxes.

BORING ARBOR AND TOOL THAT WILL NOT CHATTER. — Boring tools, when used in small arbors, are always liable to chatter and make a rough hole. To best prevent this, the tool should be turned in a lathe, while in its position in the arbor, upon the circle of the size of the hole to be bored, and the bearing lengthwise of the arbor, only as wide as the feed of the lathe; for if the bearing of a tool is on the face, the more it will chatter.

BORING-BAR, For Lathe-Work. — In boring work chucked and revolved in the lathe, as axle boxes for locomotives, the boring bar is an excellent tool. *A* represents a cutter head, which slides along, at a close working fit, upon the bar, *D D*, and is provided with the cutters, *B B*, fastened into slots provided in the head, *A*, by keys. The bar, *D D*, has a thread upon part of its length, the remainder plain, to fit the sliding head. One end is squared to receive a wrench, which prevents the bar from revolving upon the lathe centre, *F F*, by which the bar is held in the lathe. *G G G* are plain washers, provided to make up the distance between the thread and

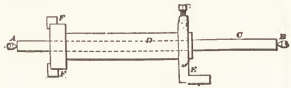
plain part of the bar where the sliding head, *A*, requires considerable lateral movement, there



Boring Bar.

being more or fewer washers employed according to the distance along which the sliding head is required to move. The edges of these washers are chamfered off to prevent them from burring easily. To feed the cutters, the nut, *H*, is screwed up with a wrench. The cutter head, *A*, is provided in its bore with 2 feathers, which slide in grooves provided in the bar, *D D*, preventing the head from revolving upon the bar. It is obvious that this bar will take out a much heavier cut than any boring tool; and there being 4 cutters, they can be fed up 4 times as fast as would be possible with a single tool or cutter.

BORING-BAR, For Tapering Holes.—In the illustration one end of the work is secured in the chuck with the other end running in the steady rest. The turned bar, *C*, mounted on the centres, *A B*, serves as a guide for the cutter head, *D*, and its long sleeve, the hind end of the sleeve being secured to the tool-post by means of the

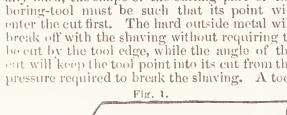


Boring-Bar for Tapering Holes.

dog, *E*, so as to effect a feed. By setting the tail stock over, as in taper turning, a hole of any desired taper may be bored. The main feature of this bar is that the work revolving may be trued by outside or other parts. Any degree of taper that can be turned may be bored by using this bar. One or two cutters, *F F*, may be used.

BORING TOOL, For Metal Having a Hard Skin.—When the skin of a metal to be cut is unusually hard, the shape of the cutting part of the boring-tool must be such that its point will enter the cut first. The hard outside metal will break off with the shaving without requiring to be cut by the tool edge, while the angle of the cut will keep the tool point into its cut from the pressure required to break the shaving. A tool

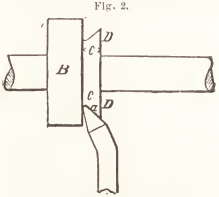
Fig. 1.



Tool for Cast Iron.

of this description is represented in the illustration, *Fig. 1*. *a* is the point of the tool, and from *a* to *B* is the cutting edge; the dotted lines, *c* and *D*, represent depth of cut, *c* being the inside skin of the metal. The angle at which the cutting edge stands causes the pressure to be in the direction of *c*, which keeps the tool point into its cut; while the resistance of the tool point to this force, reacting upon the cut, from *a* to *B*, causes the hard skin to break away. But for use on wrought iron, the tool presented below will work better. In the event of a side face being hard, it possesses the advantage that the point of the tool may be made to enter the cut first, and, cutting beneath the hard skin, fracture it off without cutting it, the pressure of the shaving on the tool keeping the latter to its cut, as shown in *Fig. 2*. *a* is the cutting part of the tool; *B* is

Fig. 2.



Tool for Wrought Iron.

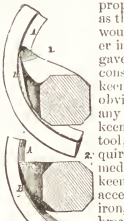
a shaft with a collar on it; *c* is the side cut being taken off the collar, and *D* is the face, supposed to be hard. The cut is here shown as being commenced from the largest diameter of the collar, and fed inward so that the point of the tool may cut well beneath the hard face, *D*, and the pressure of the cut on the tool keep it to its cut. The tool will cut equally well if the cut is commenced at the smallest diameter of the collar and fed outward, if the skin, *D*, is not unusually hard.

BORING TOOLS, Shapes of.—The pressure on the cutting edge of a tool acts in 2 directions, 1 vertical, the other lateral. The downward pressure remains the same; the lateral pressure varies according to the direction of the plane of the cutting edge of the tool to the line or direction in which the tool travels; the general direction of pressure being at a right angle to the general direction of the plane of the cutting edge. For example, the lateral pressure, and hence the spring of the various tools, shown in the illustration, will be in the direction denoted by the dotted lines. *D* is a section of a piece of metal requiring the 3 inside collars to be cut out; *A B* and *C* are variously shaped boring tools, from which it will be seen that *A* would leave the cut in proportion as it suffered from

Lateral Pressure of Tool.

spring, which would increase as the tool edge became dull, and that the cut forms a wedge, tending to force the tool toward the centre of the work. *B* would neither spring into nor away

from the cut, but simply require more power to feed it as the edge became dulled, while *C* would have a tendency to run into the cut in proportion as it springs; and as the tool edge became dull, it would force the tool point deeper into the cut until something gave way. In addition to this consideration of spring, is the keenness of the tools, it being obvious that (independent of any top rake or lip) *C* is the keenest and A the least keen tool; since wrought iron requires the keenest, cast iron a medium, and brass the least keen tool, it follows that we may accept, as a rule, *C* for wrought iron, *B* for cast iron, and *A* for brass work. In the illustration of boring tool for brass, *B* represents a section of the work; the first represents a boring tool with top rake, for wrought iron, and the second a tool without top rake, for brass work, which may be used for cast iron when or clamp. **A tool for use on wrought iron should** have the same amount of top rake, no matter how far it stands out from the tool post; whereas one for use on cast iron or brass requires to be the less keen the further it stands out from the tool post. To take a smooth cut on brass work, the top face of the tool, shown at 2 in the second cut, must be ground off, as denoted by dotted line. A positively sharp corner, unless for a special purpose, is undesirable, because the extreme point wears away, leaving the cutting qualification of the tool almost destroyed, and the work rough, and can only be employed with a very fine feed. As a rule, for roughing cuts, the corner should be sufficiently rounded to give strength to the tool point; in finishing cuts, the point may be made as round as possible without causing the tool to jar or chatter. Since the tendency of the tool to chatter depends upon 4 points, the distance it stands out from the tool post, the amount of top rake, the acuteness or keenness of the general outline of the tool, and the shape of the cutting corner, it will be seen that judgment is required to determine the most desirable form for particular conditions, and that it is only by understanding the principles governing the conditions that a tool to suit them may be at once formed. The illustrations show the forms of boring tools in ordinary use.



Boring Tool for Brass.


For Heavy Cutting on Wrought Iron.


For Heavy Work on Wrought Iron.


For Cast Iron, where Tool is Liable to Vibrate, or Tremble.


To Cut Out a Straight Corner at Bottom of a Hole in Wrought Iron.


For Cast Iron. The Back Part is for Scraping; the Front Corner is for Cutting.


For Wrought Iron, where Tool is Liable to Spring on account of Distance from Tool Post.

Boring Tools.

the tool stands a long way out from the tool post

CASTING.—To reproduce from a broken casting, without the original pattern, put the pieces together, and mold them, and cast from this mold. When the casting is drawn from the sand, place it in a charcoal fire and anneal it. It will expand to the original size of the pattern, and remain in that state.

CASTINGS, Sands and Facings for.—For castings, such as pipes or small cylinders, fine sand, termed No. 1, is used, the facing being plumbago. A good facing for loam castings is made of 1 part Whitehead sand to 3 parts fire sand. For very fine faced castings, Albany or Waterford sand is unsurpassed. Another facing for fine castings is 1 part of sea coal to 8 or 10 of Albany sand; for heavy castings, 1 to 5 will answer.

CASTINGS, Shrinkage of.—Shrinkage sideways and endwise, on castings of 3 in. and less size, is compensated for by the shake in the sand given by the molder to the pattern in order to extract it from the mold.

Iron, small cylinders	= 1-16 in.	per foot.
" Pipes	= $\frac{1}{8}$ "	"
" Girders, Beams, etc.	= $\frac{1}{8}$ "	in 15 in.
" Large Cylinders, the contraction of the diameter at top	= 1-16 in.	per ft.
Ditto at bottom	= 1-12 "	"
" in length	= $\frac{1}{8}$ in	16 in.
Brass, thin	= $\frac{1}{8}$ "	9 "
" thick	= $\frac{1}{8}$ "	10 "
Zinc	= 5-16 in.	in 1 ft.
Lead	= 5-16 "	1 "
Copper	= 3-16 "	1 "
Bismuth	= 5-32 "	1 "

CASTINGS, Small.—In small castings requiring to be of correct size, allowance should be

made in the pattern for the shake of the pattern in the sand. A pattern of an in. cube will require to be made 1-22 in. less endwise and sideways, and the usual allowance above an in. must be made on the top face of the pattern, which should have "top" marked on it; thus the shake endwise and sideways given to the pattern, to extract it without lifting the sand, will be allowed for in the size of the pattern. The effect of this shake in the sand is appreciable in patterns up to about 4 in. diameter. It is a common practice to cool brass castings to loosen or remove the sand. The effect is to place conflicting strains and tensions upon the whole skin of the metal, which will alter its shape when the outer skin of such faces is removed; so that, supposing the casting to be a cube, no one face will be true when planed, no matter how true the surfacing.

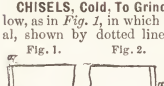
CASTINGS, Smooth. — A means recommended for obtaining smooth castings, is mixing with the green foundry sand forming the mold about 1-20 part of tar without the addition of any other substance.

CASTINGS, Weight of. —

A Pattern Weighing 1 lb., and Made of	Will Weigh When Cast in				
	Cast Iron.	Zinc.	Cop.	Yel. Brass	Gun Metal
Mahogany	8	8	10	9.8	10
" (St. Domingo)	10	9.5	12	11.5	12
Maple	10	9.8	12.5	12	12.4
Beech	11	11	14	13.4	13.8
Cedar	11.5	11.4	14.5	14	14.5
Yellow Pine	13	12.6	16	15.5	16
White Pine	14	14.5	18	17.5	17.8

CHISELS, Cold, To Grind.—Chisels made hollow, as in *Fig. 1*, in which are 2 sections of metal, shown by dotted lines, *a a*, are liable to break from weakness and the strain outward placed upon them by the cut, which endeavors at each blow to drive them outward instead of inward, as would be the case in a properly shaped chisel, as shown in *Fig. 2*, *a* being the cutting edge. When using, hold it firmly against the cut, and it will do work smoother and quicker. The cape, or cross cut chisel, is used to cut furrows across the work to be chipped, which being cut at a distance from each other less in width than the breadth of the flat chisel, relieve the flat chisel and prevent its corners from "digging in" and breaking. If a large body of metal requires to be chipped off cast iron or brass, the use of the cape chisel becomes advantageous, for the metal, weakened by the furrows, will break away in pieces from the force of the blow, without requiring to be cut by the chisel; care must be taken to leave sufficient metal to take a clean finishing cut; when the metal is broken away, by the force of the blow, it is apt to break out below the level of the cut. It is necessary to nick deeply with a chisel the outside edges of the work at the line representing the depth of the metal to be chipped off, so that the metal shall not break away at the edges deeper than the cut is intended to be. The chisels should weigh about 1¾ lbs., and have handles 15 in. long.

Fig. 1. Fig. 2.



Cold Chisel.

CHISELS, Cold, To Harden.—Heat the chisel to a distance about equal to its width; immerse it about ½ that distance in the water; hold it still about 4 seconds; suddenly dip it a little deeper, and then withdraw. Brighten one flat surface with a piece of grindstone or an emery block; then brush the hand or a piece of waste over the brightened surface to remove the false color, and finally cool out in the water, when the clear blue color appears.

CHISELS, Cold, Use of.—Hold a cold chisel firmly to its cut, without removing it at every blow. This increases effectiveness, and decreases liability to break. Rest the head upon a block of iron, and strike the burrs from the under side and they will break readily and easily off. Chisels should be kept thin at the cutting end, which saves time and labor.

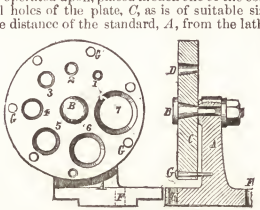
CLOUDING.—Metal work may be clouded by putting a piece of fine emery paper under the thumb or finger and working it over a surface of the metal with a spiral motion.

COCKS, To Grind Plugs in.—The best material for this purpose is the red, well burnt sand from the core of a brass-casting, the sand being sifted before using. It will cut more truly and smoothly than any other material; use with water. After the cock is ground, wash it and barrel with clean water; after wiping (but not quite dry), revolve the plug backward and forward in its place under a slight pressure, and the surface will assume a rich brown color, showing very distinctly the precise nature of the fit and leaving a smooth surface. Valves may be ground to their seats in a similar manner.

COLORING.—1. Metal can be dyed any color by dissolving any of the aniline dyes in methylated spirit and adding shellac. This solution must be painted on until the desired shade is obtained. If the iron has been previously painted white so much the better. — 2. Take hyposulphite of soda, 4 oz., dissolved in 1½ pts. water; add a solution of 1 oz. acetete of lead in same quantity of water. Articles to be colored are placed in the mixture, which is then gradually heated to boiling. The effect of the solution is to make iron resemble blue steel; zinc becomes bronze, and copper or brass becomes successively yellowish-red, scarlet, deep blue, bluish white, and finally white with a tinge of rose. The solution has no effect on lead or tin. By replacing the acetate of lead in the solution with sulphate of copper, brass becomes of a fine rosy tint, then green, and finally of an iridescent brown color. Zinc does not cover in this solution; but if boiled in a solution containing both lead and copper, it becomes covered with a black crust, which may be improved by a thin coat of wax.

CONE-PLATE, For Boring in the Lathe. — For chucking shafts and similar work in the lathe (to bore holes in the ends of the shafts, etc.), the cone plate shown in the illustration is the best appliance known. *A* is a standard, fitting in the shears of the lathe at *E*, and holding the circular plate, *C*, by means of the bolt, *B*, made to clamp

the plate, *C*, tightly when the nut is screwed. The plate contains conical holes, 1, 2, 3, etc. (shown in section at *D*). The object of coning the pin, *B*, where it carries the plate, *C*, is that the latter shall be made to a good working fit. The operation is to place the shaft in the lathe, one end provided with a driver, placed on the running centre of the lathe; the other end, to be operated upon, placed in such one of the conical holes of the plate, *C*, as is of suitable size, the distance of the standard, *A*, from the lathe-



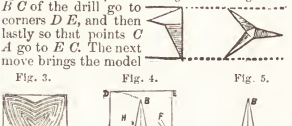
Cone-Plate for Boring in the Lathe.

centre is to be adjusted so that the work will revolve in the coned hole with about as much friction as it would have were it placed between both the lathe centres. The conical hole will take the place of the dead centre of the lathe, leaving the end of the shaft free to be operated on. *F F* are holes to bolt the standard, *A*, to the lathe shears or bed; and *G G*, etc., are taper holes to receive the pin, *G*. These holes and pin are to adjust the conical holes so that they will stand true with the lathe centres. Hole No. 7 is shown in position to operate the pin, *G*, locking the plate, *C*, in that position. In setting the work, the nut on the pin, *B*, should be eased back to allow the plate, *C*, to revolve by hand; the work then put in position, the pin, *G*, put in place, the standard, *A*, adjusted to its distance from the live lathe centre, and bolted to the lathe bed; finally, the nut on the pin, *B*, is screwed up tight, when the work will be held true, and the cone-plate prevented from springing. Care must be taken to supply the conical holes with oil, otherwise they will abrade.

CONES IN HOLES, Fitting. — Rub the cone with red marking or else chalk; a narrow strip running from the end of the cone will do. Put the cone into its place, press it forward and revolve it back and forth, and the marks will show where it binds.

COTTON-WASTE, To Clean Greasy. — Boil in a strong solution of common soda in water, and save the resultant soapy liquid to keep drills and reamers wet when boring iron.

DRILLING SQUARE HOLES. — The tool is the form shown in *Figs. 1* and *2*. Clamp or chuck this drill in its holder so that "it will wobble." Instead of making a round hole, if tightly grasped, when loosely held it produces a square one. The tool mark, enlarged, is represented in *Fig. 3*. Evidently the boundaries of the figure inclosed in the square are arcs of circles having for their centres the corners. To see how this is produced, make a card-board model of any size, representing a section of the drill, as in *Fig. 4*, bearing in mind that the points, *A B*, and *C* are equidistant. Now draw a square having sides equal to the distance between two points of the drill, as *A C*. Place the model upon this square, as in *Fig. 5*. The points *A* and *C* will plainly enter corresponding corners of the square, but there will be a space between the point *B* and the side *D E*. Now, retaining the point *A* in its corner, swing the model to the left, so that the point *B* will enter corner *D* (dotted-line arc). The point *C* will then pass to *F*, and the centre of the model *G* to *H*. The points *A* and *B* of the model then correspond with *A* and *D* of the square. Swing the model again, so that the points *B C* of the drill go to corners *D E*, and then lastly so that points *C A* go to *E C*. The next move brings the model



Tools for Drilling Square Holes.

back to its first position, and it will have made an entire revolution. Now if we have marked the arcs described by the points, the outline of a figure similar to that represented in *Fig. 3* will be found, and it will be clear that this may approximate closely to the square. The material in the re-entering angles on the sides of the figure is probably cut away by abrasion of the chips after the drill has penetrated a short distance. The amount of "wobble" to give to the drill is measured by the distance of point *B*, *Fig. 5*, from side *D E*. It will be seen that this principle can be extended; for example, to the boring of a hexagonal hole by a 5 pointed or varied drill, easily tried with a card-board model. Begin by swinging the side *A B* on *A* as a centre to *A F*. The distance *B F* represents the "wobble." From this position swing the point *C* a distance equal to *B F* from this point *D*, and so on around the pentagon. The figure described by the sides will be found to be a hexagon.

DRILLING HOLES WITHOUT A REAMER. — It is sometimes necessary to drill a hole to fit a certain shaft, and have it smooth without reaming. This may be done by first drilling a hole 1-100 in. smaller than the size desired, and then making a drill the exact size and running it through to finish with. This last drill should have the corners of its lips rounded, like a reamer, and the hole finished without holding the drill with a rest.

DRILL SOCKETS, or COLLETS. — The best collets for correct work on drill lathes are formed to screw on to the spindle, and constructed with a tapering hole for the retention of the drill, and a key-way to secure the end of the drill from turning. Sockets for ordinary job form should be shaped with a set-screw to retain the drills, and the aperture for the drills drilled circu-

lar, adapted for the reception of round drill steel about 7-16 in. in diameter. For collets to screw on the drill lathe, bore out the end and shape the screw to conform to the spindle, and attach it by screwing it on to the lathe where it is required for use. Next, bore a hole for the drill shank 1¼ in. deep, straight and true, ream it tapering, and cut a key-way through the metal, below the lower part of, and running into the aperture bored for the shank. This key-way is intended to secure the drill and ought to be ¼ in. long and ¼ wide. A collet for upright drills should be made by drilling the centres and turning up the ends to be drilled for the shank to adapt it for running in a back rest; then insert the end to be drilled into the back rest and the other end on the lathe centre and proceed to drill out the hole for the shank; then remove it from the back rest, and, making use of the hole for a centre, turn it to fit the drill, insert a set screw in it, and all is finished.

DRILLS, To Temper. — Select the finest and best steel for drills. Never heat higher than a cherry red, and hammer till nearly cold. Do the hammering in one way; for if, after having flattened the piece out, you attempt to hammer to a square or a round it will spoil it. When the drill is in shape heat it to a cherry red, and thrust it into a piece of resin or quicksilver. Some use a solution of cyanuret potassa and rain water for tempering drills, but resin or quicksilver seems to work better.

EMERY, To Prepare Fine. — When no fine emery is at hand, place coarse emery upon an iron block or plate, and hammer it with the face end of the hammer; after which grind it with the hammer face.

EMERY WHEELS.—1. These can be made with shellac powdered fine, a piece of rosin size of a walnut to 1 oz. shellac, and a piece of old vulcanized india-rubber same size, which gives it toughness.—2. Shellac, 1 oz. to 1 lb. emery; melt, and stir in a frying pan; well mix the powders before applying heat. Be careful not to burn it, or get grease in it; have a ring of iron and a piece of plate iron prepared with black lead and beer pretty thick; place the ring upon the plate and make a mold; turn the stuff into it, and ram down evenly; when cold, turn out and chuck in lathe, and with a piece of red-hot iron bore a hole for spindle; after spindled put between centres and trice up with hot iron.—3. Good grindstones may be made with silver sand mixed with powdered glass; it is necessary to have some body besides shellac for coarse emery to form a body to bed the grains in. Emery dust from grinding glass, and Turkey stone slips and slate, may be used as a substitute for the flour. —4. The best emery wheels are formed of clean emery with sufficient of boiled linseed oil, the mixture being agitated under exposure to a considerable temperature and a free access of atmospheric air; it assumes the necessary degree of tenacity, and while warm, being exposed to hydraulic pressure in a suitable mold, and subsequent drying in a stove, the emery wheel is complete. Emery wheels may be trued by means of a diamond tool, a red hot iron, or a file applied to the wet periphery of the wheel. In using emery paper or cloth for nnishing, the paper, although the easiest to destroy, imparts the smoothest polish to the metal.

PROPER SIZE, SPEED, ETC., OF EMERY WHEELS.

Diam. of Wheel in In.	Revolutions per Minute.	Number of Emery.	Grade of Cut.
2.....	5600.....	... 8 to 10...	Wood Rasp.
4.....	3000.....	... 16 " 20...	Rasp File.
6.....	2000.....	... 24 " 30...	Rough File.
8.....	1500.....	... 36 " 40...	Bastard File.
10.....	1200.....	... 46 " 60...	Second Cut File.
12.....	1100.....	... 70 " 80...	Smooth File.
14.....	900.....	... 90 " 100...	Superfine File.
16.....	750.....	...120.....	Dead Smooth File.
18.....	700		
20.....	600		
22.....	550		
24.....	500		
26.....	450		
30.....	400		
36.....	325		

ENAMEL. — Mix 100 parts pure lead with 20 to 25 best tin, and bring them to a low red heat in an open vessel. The mixture then burns nearly as rapidly as charcoal, and oxidizes fast; skim off the crusts of oxide successively formed, till the whole is calcined; then mix the skimmings, and heat until no flame arises and the whole is of a gray color. Take 100 parts of this oxide 100 parts white sand, and 25 or 30 of common salt; melt the whole by a moderate heat. This gives a grayish mass, often porous and apparently imperfect, but which runs to a good enamel when afterwards heated.

ENAMEL, To Remove. — To remove enamel from work without annealing it, take fluor-spar; pound it fine; use enough of the powder to cover well the article; then take a lead cup and pour vitriol on sufficient to make a thin liquid; boil the article in this and the enamel will be removed. Be careful to let the fumes pass up chimney, as they are injurious.

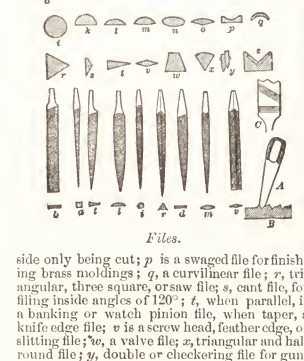
EXPANSION. —

LINEAR, PRODUCED BY RAISING THE TEMPERATURE FROM 32° TO 212° FAHR.

	1 Part In		1 Part In
Zinc	.322	Gold	.682
Platinum	.351	Bismuth	.719
Tin (pure)	.403	Iron	.812
Tin (impure)	.500	Antimony	.923
Silver	.524	Palladium	1000
Copper	.581	Platinum	1100
Brass	.584	Flint Glass	1248
Falmouth Tin	.462	Soft Rolled Iron	.819
English Brass Rod	.528	Prism of Cast Iron	.901
Brass Wire	.517	Reflector Metal	.517
Blistered Steel	.870	Refined Silver	.528

FILES. —Files are graded by shape, size, and fineness of cut; and also are known by their purpose. The series given in the illustration will be readily understood: *a, b, c, d, e, f, g, h* are sections derived from the square; *i, k, l, m, n, o, p, q* are derived from the circle, and *r, s, t, v, w, x, y, z*, from the triangle. The files are known as follows :*a* is a square file, parallel or taper, sometimes with a safe side; *b*, when large, is a cotter file, when small, a verge or pivot file; *c* is a flat file; when small, a pottance file; when narrow, a pillar file; *d*, when parallel, is an equaling, clock pinion, or endless screw file; when taper, a slitting, entering, warding, or barrel hole file; *e f* is a French pivot or shouldering file; when parallel, a V file; *g* is a nail file for the finger nails; *h*,

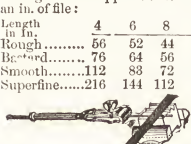
a pointing mill saw and round edge file; *i*, round, gulleting, or rat edge file; *k*, frame saw file; *l*, half round, nicking, piercing, or round off file; *m*, cross file, double half round file; *n*, oval file; *o*, balance wheel or swing wheel file, the convex



Files.

side only being cut; *p* is a swaged file for finishing brass moldings; *q*, a curvilinear file; *r*, triangular, three square, or saw file; *s*, cant file, for filing inside angles of 120°; *t*, when parallel, is a banking or watch pinion file, when taper, a knife edge file; *v* is a screw head, feather edge, or slitting file; *w*, a valve file; *x*, triangular and half round file; *y*, double or checkering file for gunsmiths; *z*, double or pencil sharpening file. As to teeth, the classes are: Double cut, having 2 sets of teeth crossing obliquely; single cut or float, having but 1 row of teeth; rasp, having detached teeth made by a punch instead of a chisel. At *A* is shown the position and action of the file chisel on the blank. *C* shows the appearance of the rows of teeth. The following table gives the approximate number of cuts in an in. of file:

Length in In.	4	6	8	12	16	20
Rough.....	56	52	44	40	28	21
Bastard.....	76	64	56	48	44	34
Smooth.....	112	83	72	72	64	56
Superfine.....	216	144	112	88	76	64

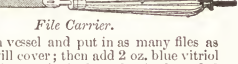


Filing Block.

The first of the annexed illustrations is a tool holder, and used to mount a file in a similar manner. The file block is of wood, gripped in a vise. It has grooves of varying depth, in which small rods, bars, or wires may be laid, to be filed conveniently.

FILE, Choosing.—To select a flat file, turn its edge upward, and look along, selecting those that have an even sweep from end to end, and having no hollows. To choose a ½ round file, turn the edge upward, look along it, and select that which has an even sweep, and no hollow places on the half round side

FILES, Resharpening. — The files must be cleansed in warm water containing potash, which readily removes all dirt; then washed with warm water and dried. Next place 1 pt. warm water



File Carrier.

in a wooden vessel and put in as many files as the water will cover; then add 2 oz. blue vitriol (sulphate of copper), finely pulverized, and 2 oz. borax, well mixed, taking care to turn the files over so that each may come in contact with the mixture. To the mixture add 7 oz. sulphuric acid and ½ oz. cider vinegar, which will cause the files to assume a red appearance at first, but they will in a short time resume their natural color. Then remove, wash in cold water, and dry. When dry, sponge with olive oil, wrap in porous paper, and lay aside for use.

FILING. — In draw filing, take short, quick strokes, which will prevent the file from pinning and scratching. To prevent files from pinning and scratching, properly clean them, and then chalk them well. Long strokes are useless save to make scratches. Remember that it is less the number of strokes you give the file than the weight you place upon it that is effective; therefore, when using a rough file, stand sufficiently away from the vise to bring the weight of the body upon the forward stroke. To file a surface true, on commencing squeeze the file tightly between the third and fourth fingers and palm of the hand until used to it. The position in filing should be half left face to work, with the middle of the right foot 15 in. behind the left heel; to file work true or square, reverse the work often so as to see the whole surface you are filing and whether you are filing true. When work is heavy file first to the right and then to the left, as by this means you can see the file marks, and this assists you in filing true. New files should be used at first upon broad surfaces, since narrow edges are apt to break the teeth. For brass work, use the file on a broad surface until its teeth are dulled, then make 2 or 3 strokes of the file under a heavy pressure upon the edge of a piece of sheet iron, which will break off the dulled edges of the teeth, and leave a new fibrous edge for the brass work. Use bastard cut files to take off a quantity of metal of ordinary hardness; second cut, in fitting, and also to file unusually hard metal; smoothing, to finish in final adjustment, or preparatory to applying emery cloth; dead smooth, to finish very fine work; float-file on lathe work.

FILING SQUARE HOLES. — To file a hole square, reverse the work often; a square file should first be used, and the holes finished with a diamond shaped file, or a half round.

GRAVERS, Grinding. — Gravers should be ground on the end only, and not on the sides of the square, except when applied to brass work.

GRAVERS, To Temper.—Gravers and other instruments larger than drills, may be tempered in quicksilver, or you may use lead instead of quicksilver. Cut down into the lead, say ½ in.; then, having heated your instrument to a light

cherry red, press it firmly into the cut. The lead will melt around it and an excellent temper will be imparted.

GRINDSTONE, Artificial. — Washed silicious sand, 3 or 4 parts; shellac, 1 part; melt together, and form the mass into the proper shape while warm, with strong pressure. The fineness of the sand must depend on the work the stone is intended for. The same composition is formed upon pieces of wood, as corn rubbers, and for the purpose of sharpening knives, and cutting stones, shells, etc.

GRINDSTONES. Care of,—These should never be left in the sunlight, or with one side standing in water, since heat evaporates the water in the stone, leaving it harsh and hard, while saturation softens it. The grindstone is a self sharpening tool; and after being turned in one direction for some time, if a hard stone, the motion should be reversed. Sand of the right grit applied occasionally to a hard stone will improve it.

GRINDSTONE-SPINDLES.—Common spindles are open to the objection that the stone will never keep round, because every person is inclined to follow the motion of his foot with his hand, which causes the pressure on the stone to be unequal. The harder pressure being applied to the same part of the stone, will soon make it uneven. To avoid this put in place of the crank a small cog-wheel to the spindle, say with 12 cogs; have another short spindle with a crank and a cog-wheel of 13 cogs, to work into the former. The stone will make about .07 of a revolution more than the crank, and the harder pressure of the tool on the stone will change to another place at every turn, and the stone keep perfectly round.

HARDENING.—Iron, 60 parts, chrome, 40 parts, form a composition as hard as the diamond. A high degree of hardness may also be imparted to iron or steel by adding ½ part of silver. Copper may be externally hardened by the fumes of zinc and tin. The specula of Lord Ross' telescope is 1 part tin and 1 part copper; this is hard as steel, and takes a high polish; if more than this be added it will scarcely cohere.

KEYS AND KEY-WAYS. — Keys should in all cases be made to fit the key-ways for which they are intended at a good easy fit on all sides, without being tight, the locking being performed by the taper of the top and bottom, the amount of which should be about ¼ in. per ft. of length. When it is not convenient to take locks apart in the event of keys being lost, stolen, or missing, and you wish to fit a new key, take a lighted match or candle and smoke the new key in the flame; introduce it carefully into the key-hole and then press it firmly against the opposing wards of the lock, withdraw it, and the indentations in the smoked part of the key will show you exactly at what place the key ought to be filed.

LATHE. — The lathe in its improved form as shown in the illustration, is simple in design, heavy and has back gears, screw cutting apparatus, compound rest, power cross feed, adjustable journal head boxes, etc. The cones are for belts as wide as 3½ in., and the screw is cut 4 threads to the in. The feed gearing is connected to rack on the bed and driven from a slot in the screw. Pulleys on counter shaft are 16 in. in diameter by 9 in. in face, and should make 85 revolutions per minute.

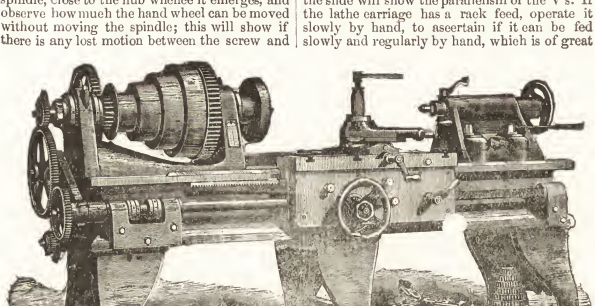
LATHES. Care of. — To utilize lathes, etc., for nice, fine work, and keep the ways, arbors, and centres in order, keep them clean by brushing away all the rubbish from the working parts; clean well by frequent rubbing with cotton waste, and keep them in easy working order by regular oiling.

LATHES. Deadening Noise of. —Two methods are here given: 1. Rubber cushions under the legs of the work bench. 2. Kegs of sand or sawdust applied in the same way. A few in. of sand or sawdust is first poured into each keg; on this is laid a board or block upon which the leg rests, and around the leg and block is poured fine dry sand or sawdust. All noise, vibration and shock are prevented; an ordinary anvil, so mounted, may be used in a dwelling house without annoying the inhabitants.

LATHES, Face Plates of. — To set work on the face plate of a lathe, let the work be set out and first lightly prick-punched; then clamp to place lightly as near as possible, but never set the "dead-centre" against the work, for that will not bring it true; now with a scratch awl or sharp pointed centre, with the point resting in the prick-mark, and the other end held against or on the dead centre, revolve the work. If the point marked is out of true, the scratch awl will vibrate. Put into the lathe rest a tool, without fastening it, and push it up to the scratch as the work is revolved, and the extent of the vibration can be seen. The work can be driven as thus indicated when there is no vibration of the scratch or centre, the work is perfectly set, and may be securely fastened.

LATHES, Testing. — To test if the cone spindle is parallel with the ways or shears, bore a long hole in cast iron, using a stout tool holder and a short, stiff tool, taking a fine cut, with a tool having its cutting edge slightly rounded, with a feed of 16 to an in., at a speed of 25 ft. per minute. Let the tool feed through the hole and back again, so that the tool does not spring from the work. Then, without moving the tool, wind the tool to the entrance of the hole, and let it stand there while the lathe runs 40 or 50 revolutions. Traverse the tool to the other end of the hole; let it stand while the lathe runs; then stop the lathe, and traverse the tool (without taking it from the cut) along the hole; if it marks a line stronger at one end of the hole than at the other, the tool has sprung, and another fine cut must be taken; but if not, and the hole is parallel, the spindle is true. To avoid wear, the tool is made hard. If the cut was started at the front, and the hole bored is smallest at the back, another cut should be taken, commencing at the back and feeding toward the front. If the hole is still smallest at the back, the lathe cone spindle is not parallel with the ways. To determine whether the cross slide is at a right angle with the ways or shears, take a fine cut over a radial face, and test the finished plate with a straight edge. If the plate runs true and shows true with a straight edge, grind a piece of steel a little rounding on its

end, and fasten it in the tool post or clamp, with the rounded end next to the face plate. Let the rounded end be about ¼ in. from the face plate; put the feed motion into gear, and with the steel near the periphery of the face plate, let the carriage feed up until the rounded steel end will grip a piece of thin paper against the face plate tight enough to cause a strain in pulling the paper out; wind the tool in toward the lathe centre, and try the friction of the paper there; if equal, the cross slide is true. In taking a cut down a radial face, to test the truth of the cross slide of the rest, start from the periphery, as by beginning the cut at the outer diameter, the strain will get less, while the tool edge becomes duller. To test the workmanship of the back head or tailstock, place the forefinger on the spindle, close to the hub whence it emerges, and observe how much the hand wheel can be moved without moving the spindle; this will show if there is any lost motion between the screw and the nut in the spindle. Next wind the back spindle as far as it will go, take hold of the dead centre and pull it back and forth; an imperfect fit between the spindle and the hole in which it slides will be shown by the lateral motion of the dead centre. Wind the dead centre in again, and tighten and loosen the spindle clamp, and see if doing so moves the spindle in the socket. Wind the dead centre out again, and slide the tailstock up the lathe bed until the dead centre nearly touches the live one, and after bolting the tailstock to the lathe bed, bring the centre points together, and see if they coincide. If the tailstock sets over, for turning tapers, the setting screws may be operated to adjust the centres. The lathe centres should be of equal height. It is as well to turn the back centre partly in its socket while making this test, so as not to be deceived by any want of truth in the back or dead centre.



Lathe.

To examine the slide rest, move the screw handles back and forth, to find how much they may be moved without giving motion to the slides; this will determine the amount of lost motion between the collars of the screws, and between the screws themselves and the nuts in which they operate. To try the fit of the movable slides in the stationary sliding ways, or V's, remove the screws, and move the slide so that only about ½ in. is in contact with the V's, then move the slide back and forth laterally, to see if there is any play. Move the slide to the other end of the V's, and make a similar test, adjusting the slide to take up any play at either end. Then clean the bearing surfaces, and move the slide back and forth on the V's, and the marks will show the fit, while the power required to move the slide will show the parallelism of the V's. If the lathe carriage has a rack feed, operate it slowly by hand, to ascertain if it can be fed slowly and regularly by hand, which is of great importance. Then put the automatic feed in gear, and operate the feed gear back and forth, to determine how much it can be moved without moving the slide rest. To test the fit of the feed screw to the feed nut, put the latter in gear, and operate the rack motion back and forth. It has been assumed, in this method of testing, that means of adjustment are provided, whereby any play in the cone spindle bearings may be taken up.

LATHES, Turning Shafting on. — See that the centres are true, adjust correctly if they are not, using a square end tool, keeping them true to a three-square gauge. Now set your puppet head so that it will turn the shaft true and straight, and if without a straight mark upon it, turn one end of the shaft for about 1 in.; next, without stirring your tools, take the shaft from the lathe, run the carriage down to the main head, and if

the tool comes in contact with the spot you have turned, the machine is straight; if not, screw over the puppet head, and keep adjusting it until the tool touches the place turned at both ends of the lathe.

LATHES, Turning Tapering on. — Calculate a certain amount of taper to the foot or the extension of the piece to be turned; for instance with a shaft 1 ft. long with a thickness of 1 in. at one end larger than the other, set the puppet head over $\frac{1}{2}$ in. and you will obtain the desired taper of 1 in. per ft. With a shaft 20 in. long you will obtain a taper of 2 in. over its whole length, by setting your lathe over 1 in. The following table shows the angle to set a compound rest to bore a given taper:

Taper in In. to 1 Ft. in Length.	Angle to Set Rest. Deg.	Min.	Taper in In. to 1 Ft. in Length.	Angle to Set Rest. Deg.	Min.
$\frac{1}{8}$	0	18	$2\frac{3}{4}$	6	32
$\frac{1}{4}$	0	36	3	7	8
$\frac{3}{8}$	0	54	$3\frac{1}{4}$	7	47
$\frac{1}{2}$	1	12	$3\frac{1}{2}$	8	18
$\frac{5}{8}$	1	30	$3\frac{3}{4}$	8	53
$\frac{3}{4}$	1	47	4	9	28
$\frac{7}{8}$	2	5	$4\frac{1}{4}$	10	2
1	2	23	$4\frac{1}{2}$	10	37
$1\frac{1}{4}$	2	59	$4\frac{3}{4}$	11	12
$1\frac{1}{2}$	3	35	5	1	46
$1\frac{3}{4}$	4	10	$5\frac{1}{4}$	12	20
2	4	46	$5\frac{1}{2}$	12	54
$2\frac{1}{4}$	5	21	$5\frac{3}{4}$	13	28
$2\frac{1}{2}$	5	57	6	14	2

LINERS, Thickness of. — To ascertain the proper thickness of a liner, necessary to go between a pair of brasses so that (when the faces do not meet), the liner may be placed between them and the brasses, when bolted up tight, without jamming the journal, place a piece of lead wire between the brasses, and then screw the cap down tight, and the lead wire will compress, denoting the necessary thickness of liner. The latter should be made a shade thicker than the distance the wire was compressed, so that the brasses may fit without binding the journal.

MOLD JOINTS, Asbestos for.—Asbestos can be employed for making the joints of molds for casting steel and other metals under pressure. The method is to use strips or rings of asbestos, millboard, or asbestos fibre made into a gaskin between the bottom of the ingot mold and the bottom upon which it stands, and the lid and the top of the mold, and if the mold is made into more than one piece, between the joints of the pieces.

NUTS, Tight, To Ease.—To ease a nut upon a bolt, place it upon the bolt, and resting it upon an iron anvil or block, strike the upper side with a hammer, turning the nut so that not more than two blows will fall upon the same face. The smaller the nut the lighter the blows, and *vice versa*.

NUTS, Tight, To Unscrew.—To start a nut that is corroded so that the wrench fails to move it, strike a few blows upon its end face; then holding a dull chisel across the chamfer of the nut, strike the chisel-head several sharp blows, which will, in a majority of cases, effect the object.

OIL STONES, To Face.—Take a piece of planed iron; scatter emery or fine sand on the iron plate; add a little water on the face of the stone, renewing the emery or sand and water as requisite, and finishing with water without sand. This makes the stone perfectly straight in 5 to 10 minutes.

PATTERNS.—These should never be left in the foundry. To get a pattern to fit closely over an irregular casting having angles or crooks (such as a casting with which to patch cylinders or junctions of pipes), take sheet lead, and hammer it lightly with a round pene hammer, closing it round the casting until it will, by stretching, conform to the shape of the surface. The molder can then cast a patch from the sheet lead, making it of any required thickness.

PENING, Setting Work by. — The operation termed "pening," is stretching the skin on one side of work to alter its shape, the principle of which is that, by striking the face of the metal with a hammer, the face of the metal struck stretches, and tends to force the work in a circular form, of which the part receiving the effect of the hammer, is the outside circle or diameter. *Fig. 1* represents a piece of flat iron, which would, if well hammered on the face, *a a a*, with the pene of a hammer, alter its form to that denoted by the dotted lines. Or, let the rod, *a*, be attached to a double eye at one end, the other end requiring to come fair with the double eye, *b*, at the other end; then, if it is pened perpendicularly on the face, *c*, of the rod, the stretched

Fig. 1.

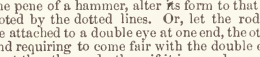
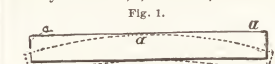


Fig. 2.



Pening.

skin will throw the end around so that it will come fair with the eye, *b*. Connecting rod straps a little too wide for the rod ends, may be closed so as to fit by pening the outside of the crown end; or if too narrow, opened by pening the inside of the crown end; in either case the ends of the strap alter most in consequence of their lengths, and the strap will require refitting between its jaws.

PIPE, Connecting Lead and Iron. — A safe method of connecting lead and iron waste-pipes is with tinned brass ferrule, the taper end of which is slipped into the lead pipe and soldered fast; the other end, provided with a flange, drops into the soil-pipe branch and is secured in place by a well-caulked lead joint.

PITH FOR CLEANING. — The stalk of common mullen affords the best pith for cleaning pinions. Gather it when the stalk is dry. Some use cork, but it is inferior.

PLANING.—The first operation is to oil the planer and find out if the bed is smooth; if not, file off rough places; change the dogs to see if they work well, and find out the movements of

the planer; then bolt the work on the bed, and if it is a long, thin piece, plane off a chip; turn it over and finish the other side, taking 2 chips, the last of which should be light. Care should be taken in bolting it to the bed, not to spring it. After finishing this side turn it to the other side, and take off a light cut to finish it. In planing perpendicularly, swivel the bottom of the small head around, so that it will stand $\frac{3}{8}$ in. inside of square towards the piece to be planed; this prevents breaking the tool when the bed runs back.

POLISHING.—The polishing of metals differs according to kind, but there are general principles common to all. All polishing is begun by rubbing down the surface with some hard substance that will produce scratches in all directions, the level of which is the same, so as to obliterate the marks of the file, scraper or turning tool that has been used. For this, coarse emery, pumice stone and water, or sand and water, is applied upon a piece of felt or similar material. When the first marks have been removed, proceed to remove those left by the pumice stone, by finely powdered pumice stone ground with olive oil, or fine emery and oil. In some cases polishing stones are employed, as a kind of hard slate used with water. To proceed, still finer powders are used, as tripoli and rotten stone. Putty of tin and crocus martis are also used for high polishing. But the whole process consists in removing scratches by substituting those which are finer, until no longer visible to the eye; and even after that, if the surface is examined with a microscope, it will be seen covered over with an infinity of them. Care must be taken to have the last polishing material very fine, for a single grain of coarse substance will produce a scratched instead of a polished surface.

POLISHING MATERIALS.—*Rouge.* The rouge used by artisans is a mineral. In its preparation crystals of sulphate of iron, known as copperas, are heated in iron pots, by which the sulphuric acid is expelled and the oxide of iron remains. Those portions least calcined, when ground, are used for polishing gold and silver, and are of a crimson color. The darker and more calcined portions are known as crocus, and are used for brass and steel. For the finishing process of the specula of telescopes, crocus gives a splendid polish. Others prefer the peroxide of iron precipitated by ammonia from a dilute solution of sulphate of iron, washed, compressed until dry, then exposed to a low red heat and ground to powder. — *Crocus.* Put pure tin into a glass vessel and pour in sufficient nitric acid to cover it. Great heat is evolved, and care must be taken not to inhale the poisonous fumes. When there is nothing left but a white powder, heat in a Hessian crucible to drive off the nitric acid. Crocus, mixed with a little linseed oil, makes a hard and useful cement. — *Powders for Cleaning Plate.* 1. Take equal parts precipitated subcarbonate of iron, and prepared chalk. — 2. An impalpable rouge may be prepared by calcinating oxalate of iron. (See *Silver, Powders for Polishing* in HOUSEHOLD.) — *Jewelers' Rouge.* For fine work decompose a solution of sulphate of iron with oxalic acid in solution; a precipitate of oxalate of iron falls, which must be washed and dried; when gently heated, the salt takes fire, leaving an impalpable powder of oxide of iron. — *Putty Powder,* or *Oxide of Tin.* Metallic tin is dissolved in nitro-muriatic acid, and precipitated from the filtered solution by liquid ammonia, both fluids being largely diluted with water. The peroxide of tin is then washed in abundance of water. Collect in a cloth filter, and squeeze dry in a piece of new linen. The mass is now subjected to pressure in a screw press, or between 2 lever boards, to make it quite dry. When the lump thus produced has been broken, it is placed in a crucible, and closely covered up to prevent jets from entering, then exposed and heated to a white heat, and ground for use in the usual way. This is used for cements and polishing astronomical object glasses for astro-telescopes. The putty powder of commerce, if of good quality, is alloyed with equal parts of tin and lead, which answers for ordinary purposes, but not for polishing lenses, in which good work is dependent on the quality of the powder. — *Specula Powder.* Precipitate a dilute solution of sulphate of iron by ammonia in excess; wash the precipitate; press it in a screw press till nearly dry; then expose to heat until of a dull red color in the dark.

PROPERTIES. — The following table shows the ductility, malleability, heat conducting power and power of conducting electricity of metals, beginning with the highest:

Ductility.	Malleability.	Power of Conducting Heat.	Power of Conducting Electricity.
Gold.	Gold.	Silver.	Silver.
Silver.	Silver.	Copper.	Copper.
Platinum.	Copper.	Gold.	Gold.
Iron.	Tin.	Tin.	Zinc.
Nickel.	Platinum.	Iron.	Iron.
Copper.	Lead.	Lead.	Tin.
Zinc.	Zinc.	Bismuth.	Lead.
Tin.	Iron.		Antimony.
Lead.	Nickel.		Bismuth.

PUNCHING.—The same elements of resistance enter into the operation of punching as in that of shearing. A punch and die may be considered as shears with circular blades. The coefficient of pressure in punching, for any given area of section, will be exactly that for shearing the same area of section, without reference to thickness of material. The measure of force necessary to effect the various punchings, gives the value of the resistance to shearing in cases of ordinary metals. This resistance per sq. ft. is determined to be in lbs.: For lead, 392.548; block tin, 450,784; alloy of lead and tin, 731,176; zinc, 1,843,136; copper, 4,082,941; iron, 103,333.

REAMERS.—Fluted Reamers should be turned to a 32nd of an in. of the finished size, then heated and allowed to cool in a perpendicular position, previous to finishing. The treatment removes the strains and the occasional hardness made by the hammering, so that they will not spring in heating for tempering. The lips of a reamer should be uneven; otherwise, when it chatters, it leaps from one lip to the other. In reamers from 1 in. to $1\frac{1}{4}$ in. in diameter, the channels should be 9 in number, and 11 in

reamers of from $1\frac{1}{2}$ to $1\frac{7}{8}$ in. in diameter. Reamers from $\frac{1}{4}$ to $\frac{5}{8}$ in. in diameter, should have 5 flutes, and reamers from $\frac{5}{8}$ to 1 in. should have 7. After cooling, turn the part intended for the lips a 100th of an in. larger than the finished size; afterwards turn a spot in the middle of it $\frac{5}{8}$ long, and 1-12 the size of the reamer smaller than the reamer. After hardening, this is the place to pene straight. When the turning of all but the upper part is finished, put it on the centres, and prepare to flute it, deferring turning of the upper part until after the hardening and straightening. Place it on the centres; if on a planer, then flute with a round end tool, 1-10 in. thick, and plane down to the face of each lip, to the bottom of the spot intended for the pening, and

Fluted Reamer.

Sq. Thread Tap.

Single Lipped Drill.

Single Lipped Reamer.

Counter Boring Tool.

Reamers, Taps and Drills.

plane them so that the space between every other of the 2 lips will be shorter than the 2 just before them. The next step is to plane off the back side of the lips with a square end tool to within a 32nd of an in. from the face. The faces of the lips should be placed even with the centre, the lips dressed smooth with the file, hardened again, and then pened straight. Finish by turning the upper part to the desired size, and polish; grind the lips to a sharp edge and to the proper size. To flute taps, adjust the work on the centres, and plane the faces of all the teeth with a cutter or planing tool, made circular at the end, the thickness at the end being $\frac{1}{4}$ the diameter of the tap. Taps should be fluted with the teeth slightly hooking on the face. Dress the faces of all the teeth with the planer $\frac{1}{2}$ the depth of the thread deeper than the bottom of the thread; this done, plane off the back parts of the teeth, giving them $1\frac{1}{2}$ the breadth of their pitch, leaving them, if the pitch is 10, a 10th and a 20th. Trim the back parts of the teeth with a planing tool equal in thickness to the size of the tap. Two taps should be used for each thread; with the 1st, remove $\frac{3}{4}$ of the thread, and finish off with the other. No taper is required on taps for 5 threads; if they are fabricated by this plan they are not liable to break. Extra large mongrel-thread taps should be of 2 or more sizes, owing to the coarse thread and the mass of metal to be removed by them, which would be crushed and torn. Single lipped reamers should be made from a piece of steel, with head forged square to adapt it to a proper wrench; turn it tapering and exactly round, and, after placing it on the centres, plane a groove through its length, one side of which will form the lips of the reamer. From this

End View of Counter Boring Tool.

End View of Fluted Reamer.

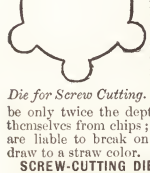
groove dress off the 64th of an in. half the distance round. Finish by filing up the face of the the lips on a line through the middle on the end; next harden and temper. Rose reamers should be made with square ends, with the corners removed, lips cut about 9 to the in. on the end, and a little hooking, with a temper like other reamers.

SANDIRONS, Finishing. — The buff wheels should be well balanced after covered. Let the wheel be covered with thick leather before covering with emery. Get a good surface on the article from a wheel covered with No. 70 emery. Mix flour of emery with melted beeswax, and stir in till it is thick. When the mass is cool, rub it on a newly covered wheel with No. 80 emery. Then set the wheel running, and hold on a flint to smooth it until the surface is sufficiently fine.

SCRAPERS. — All work should be fitted as true as possible before being scraped with the flat scraper, which is intended for flat surfaces only. For hollow work, curves, etc., the $\frac{1}{4}$ round scraper is the best, the 3 cornered being least efficient. Part of the blade of a broken saw makes a good scraper; but it is difficult to cut it into the required form. The best way is to mark it

out to the size wanted; then place the blade or steel plate in a vise whose chaps shut close, placing the mark even with the face of the vise, and the part to be cut off to waste, above the vise; then, with a cold chisel, holding it close to the vise, and rather inclined upwards, begin at one end of the steel plate, and with a sharp blow of the hammer it will cut it. Keep going on, and you will cut it to the shape required; grind the edges of the scraper level, and finish by rubbing it on Turkey stone.

SCREW-CUTTING DIES. — In making dies for screw cutting, they should be lapped with a taper tap, as they cut more easily and wear longer than when cut straight, and then tapered off to make the screw "take." Very fine threaded screws cut well with straight dies. Small dies should only have 3 lips in them. Dies from $\frac{1}{4}$ to $\frac{1}{2}$ in. should have 4 lips in them. Dies from $\frac{3}{4}$ to 1 in. should have 6 lips in them; and dies from 1 in. to $1\frac{1}{2}$ in. should have 7 lips in them. The cuts through dies should be only twice the depth of the thread to free themselves from chips; when cut too deep they are liable to break on the face. Harden and draw to a straw color.



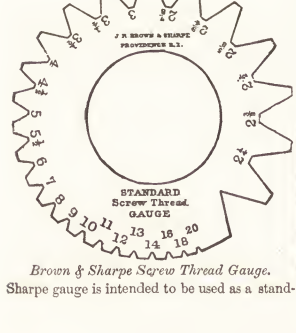
Die for Screw Cutting.

SCREW-CUTTING DIES, To Ease when Tight. —Supply them with fine emery and oil, and work them backward and forward in their place along the travel.

SCREW-CUTTING DIES, To Fit to Quadrants. —When the dies or quadrants are to be hardened, make them a shade too small to allow for swelling during the process of hardening.

SCREW-CUTTING DIES, To Renew Worn-out. — Slightly close the holes by swaging; fill the clearance-holes with Babbitt-metal, and recut them with the hub.

SCREW-CUTTING GAUGE. — The Brown & Sharpe gauge is intended to be used as a standard for grinding tools to cut threads according to the system recommended for adoption by the Franklin Institute of Philadelphia. The angles are 60°, and the flat surfaces at top and bottom of threads are equal to $\frac{1}{8}$ of the pitch.



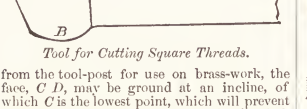
Brown & Sharpe Screw Thread Gauge.

SCREW-CUTTING. Gearing Lathe for. — Every screw-cutting lathe contains a long screw called the lead screw, which feeds the carriage of the lathe while cutting screws; upon the end of this screw is placed a gear to which is transmitted motion from another gear placed on the end of the spindle; these gears contain a different number of teeth for the purpose of cutting different threads, and the threads are cut a certain number to the in. from 1 to 50. To find the proper gears to cut a certain number of threads to the in., first multiply the number of threads to cut to the in., by any small number (4 for instance); this will give the proper gear to put on the lead screw; with the same number, 4, multiply the number of threads to the in. in the lead screw, and this will give the proper gear to put on the spindle. Always multiply the number of threads to be cut first. Most small lathes are made with a stud geared in the spindle, which runs $\frac{1}{2}$ as fast as the spindle, and in finding the gears for these lathes, first multiply the number of threads to be cut, and then multiply the number of threads on the lead screw, as double the number it is.

SCREW-CUTTING HAND-STOCK DIES. — Dies for use in hand-stocks are cut from hubs of a larger diameter than the size of bolt the dies are intended to cut; this being done to cause the dies to cut at the cutting edges of the teeth which are at or near the centre of each die, so that the threads on each side of each die act as guides to steady the dies and prevent them from wobbling; the result is that the angle of the thread in the dies is not the correct angle for the thread of the bolt, even when the dies are the closest together; and hence taking the finishing cuts on the thread, although the dies are nearer the correct angle when in that position than in any other. A little practice at cutting threads with stocks and dies demonstrates that the tops of the threads on a bolt cut by them are larger than was the diameter of the bolt before the thread was commenced to be cut, from the pressure placed on the sides of the thread of the bolt by the sides of the thread on the dies, in consequence of the difference in their angles; which pressure compresses the sides of the bolt thread and causes an increase in diameter. The variation of angle in adjustable dies prevents a square thread being cut by them, and they do not cut a good V-thread. In the case of a solid die, the teeth or threads are cut by a hub the correct size, and stand at the proper angle; each diameter in the depth of the teeth of the die cuts the corresponding diameter on the bolt, and there is no strain upon the sides of the thread save that due to the force necessary to cut the metal of the bolt thread.

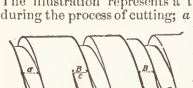
SCREW-CUTTING SQUARE THREADS. — For cutting square threads, the tool here represented is used. The point at *C* is made thicker than the width at *D* to give the sides clearance from the sides of the thread. At *B* it is made thin-

ner to give the tool clearance, and deeper to compensate for lack of substance in thickness. The top face may, for wrought-iron or steel, be ground hollow, *C* being the highest point, to make it cut cleaner; while, when held far out



Tool for Cutting Square Threads.

from the tool-post for use on brass-work, the face, *C D*, may be ground at an incline, of which *C* is the lowest point, which will prevent the tool springing into the work. If the pitch of the screw to be cut is coarse, a tool nearly $\frac{1}{2}$ width of space between one thread and the next should be employed, to avoid the spring which a tool of full width would undergo. After several cuts the tool must be moved laterally to the amount of its width, and cuts taken off as before until the tool has cut deeper than before being moved, when it must be placed back into its first position, and the process repeated until the required depth of thread is attained. The illustration represents a thread or screw during the process of cutting; *a a a* is the groove taken out by the cuts before the tool was moved; *B B* the first cut taken after it was moved; *c* the point to which the cut, *B*, is supposed to have traveled. The tool used having been a little less than $\frac{1}{2}$ the proper width of the space of the thread, the thread will be left with more than its proper thickness, which is done to allow finishing cuts to be taken upon its sides, for which purpose the knife tool is used, and placed true, so as to cut both sides of the thread of an equal angle to centre line of screw. Adjustable dies, which take more than one cut to make a full thread, should never be used in cases where a solid die will answer, because adjustable dies take every cut at a different angle to the centre line of bolt.



Screw During Cutting.

SCREW THREADS.—Screw threads are employed for 2 principal purposes, for securing and for transmitting motion. There are in use in machine shop practice 4 forms of screw threads: 1. The sharp V-thread shown in *Fig. 1*, in common use in the United States. 2. The U. S. standard thread, the Sellers' thread, or the Franklin Institute thread, as it is sometimes called, all 3 designations signifying the same form of thread. This thread was originally proposed by Wm. Sellers, and afterward recommended by the Franklin Institute. It was finally adopted as a standard by the U. S. Navy Department. This form is shown in *Fig. 2*. 3. The Whitworth or English standard thread shown in *Fig. 3*, sometimes termed the round top and bottom thread. To a small extent it is used in the U. S. 4. The square thread shown in *Fig. 4*, used in all countries for coarse pitches and for transmission of motion.

Fig. 1. Fig. 2.

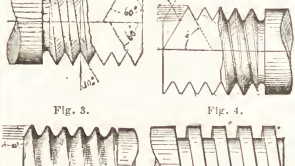


Fig. 3. Fig. 4.

Screw Threads.

The sharp V-thread, *Fig. 1*, has its sides at an angle of 60° one to the other, or each side of the thread is at an angle of 60° to the axial line of the bolt. The U. S. Standard, *Fig. 2*, is formed by dividing the depth of the sharp V-thread into 8 equal divisions and taking off one of the divisions at the top and filling in another at the bottom, so as to leave a flat place at the top and bottom. The Whitworth thread, *Fig. 3*, has its sides at an angle of 55° to each other, or to the axial line of the bolt. In this the depth of the thread is divided into 6 equal parts, and the sides of the thread joined by arcs of circles that cut off one of these parts at the top and another at the bottom of the thread. The centres from which these arcs are struck, are located on the second lines of division, as denoted by the dots. Screw threads are designated by their pitch or the distance between the threads. Mougrel, or $\frac{1}{4}$ V, $\frac{1}{8}$ square threads, are made for great wear, and should be cut the depth of their pitch, and for extraordinary wear may be cut $1\frac{1}{2}$ the depth of the pitch. The point and the bottom of the grooves should be in width $\frac{1}{4}$ the depth of their pitch. What is meant here by the point of the thread, is the outside surface; the bottom of the groove is the groove between the threads. In cutting these threads use a tool about the shape of the thread, and in thickness about 1-5 less than the thread is when finished. As it is impossible to cut the whole surface at once, cut it in depth about 1-16 at a time; then chip off the sides of the thread, and continue in this way alternately until at the depth required. Make a gauge of the size required between the threads, and finish by scraping with water. It is best to leave such screws as these a little large until after they are cut, then turn off a light chip to size them; this leaves them true and nice.

SOLDERING. — Soldering, or uniting the surfaces of metals by means of a more fusible metal or alloy, is one of the indispensable arts, and one which, once thoroughly understood, is invaluable to every mechanician, whatever his branch of mechanics may be. It is the purpose of this article to describe such of the processes for sol-

dering as may be of the most general application. A few solders, the metal to which they

Fig. 1.

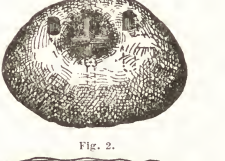


Fig. 2.

Soldering.

are applied, and their appropriate fluxes are tabulated below.

NAME.	COMPOSITION.
Soft, coarse	Tin, 1; Lead, 2.
" fine	" 2 " 1.
" fusible	" 2 " 1; Bis. 1.
Pewterer's	" 3 " 4; " 2.
Spelter, soft	Copper, 1; Zinc, 1.
" hard	" 2; " 1.
Silver, fine	Silver, 66.6; Copper, 23.4; Zinc, 10
" common	Silver, 66.6; Copper, 30; Zinc, 3.4
" for Brass and Iron	Silver 1; Brass 1.
" more fusible	" 1; " 1; Zinc, 1.
Gold; for 18 Carat Gold	Gold, 18 Carats fine, 66.6. Silver, 16.7; Copper, 16.7.
" more fusible	Same as above with a trace of Zinc.
Platinum	Fine Gold.

MATERIAL TO BE SOLDERED.	SOLDER.	FLUX.
Tin	Soft, coarse or Fine.	Rosin or Zinc, Chl.
Lead	Soft, coarse.	Rosin.
Brass, Copper, Iron and Zinc	Soft, coarse.	Zinc, Chl.
Pewter	Pewterer's or fusible.	Rosin or Zinc, Chl.
Brass	Spelter, soft	Borax.
Copper and Iron	" " or hard.	" "
Brass, Copper, Iron, Steel	Any Silver S.	"
Gold	Gold, S.	"
Platinum	Fine Gold	"

The chloride of zinc solution is prepared by cutting zinc in muriatic acid to repletion, and diluting with an equal quantity of water. For iron, a small quantity of sal ammoniac may be added. For large work, where spelter is used, it is powdered and mixed with pulverized borax, the mixture made into a paste with water and applied with a brush. Soft solders are fused with a copper, or blowpipe after the application of the flux. While the work is hot and the solder fluid, surplus may be removed with a moist brush. A mat joint may be made between closely-fitting surfaces by placing a piece of tin foil between the parts, and fusing in a blowpipe flame. For small work spelter and silver solders are fused by means of the blowpipe; the work being laid upon a charcoal or piece of pumice stone. It is often desirable to flank the work with an additional piece of charcoal, to economize the flame, as well as that resulting from coal. If the work is inconvenient to clasp or rivet together, or to wire it, it may be kept in place upon the coal by tacks forced in at points where they will be effectual. When tacks are unavailable, parts may be held by wire loops and stays. (See *Fig. 1.*) If part of the work has been already done, and it is desired to unite pieces having parts previously soldered, in close proximity, these may be held in any position, and the joints already soldered prevented from melting by encasing the work in the following manner (see *Fig. 2*): Take equal parts plaster Paris and fine, sharp sand; add sufficient water to make a batter, and imbed the work in it, leaving the entire joint to be soldered and the adjacent parts exposed. Do not get the plaster into the joint, as it will prevent the solder flowing. It is difficult to hold the various parts to be united so as to apply the plaster; these may be put into position and fastened temporarily by means of a drop of wax, which, when the work is encased and the plaster sets, may be melted out and the flux and solder applied. In every case the flux should be brushed into the joints before placing the work on its support. A convenient way of preparing flux for small work is to rub a piece of borax with a few drops of water on a slab until it appears like paste; this should be applied to the work with a camel's hair pencil. Small pieces of solder are dipped into the borax paste and put on the joints of the work. A pair of tweezers will be convenient for this. When the job is encased, as in *Fig. 2*, it may be placed in a common fire until it has nearly attained a red heat, when, on applying the blowpipe, the solder will flow with little expenditure of time and breath. Work too large to be readily soldered by the means noticed, may be done in a charcoal fire with a blast; even a common fire may be made to answer the purpose. Brazing or hard soldering must not be tried in a fire, or with coals or tools which have the least trace of soft solder or lead about them; neither must the brazing of work previously soft soldered be attempted. A neglect of these cautions insures failure. A wash of clay applied to surfaces not to be joined, prevents the flow of solder. The vitrified flux may be removed by boiling the articles a few moments in dilute sulphuric acid; this is best done in a copper vessel.

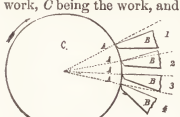
SOLDERING WITHOUT HEAT. — Brass filings, 2 oz.; steel filings, 2 oz; fluoric acid, ½ oz; put the filings in the acid, and apply the solution to the parts to be soldered, after cleaning the parts in contact; then dress together. Keep the fluoric acid in lead or earthen vessels.

SOLDER, To Remove Zinc and Iron from. — Digest the metal in grains in diluted sulphuric acid. The acid will dissolve the zinc first, the

iron next, and all traces of these metals by subsequent washing.

SURFACES, To Protect from Moisture. — Inclose them in tight compartments containing lumps of quicklime.

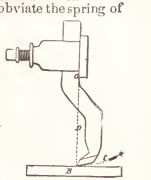
TOOLS, Cutting versus Scraping. —A tool will either cut or scrape, according to the position in which it is held, as, for instance, below the line *A* in the illustration. Line *A* is in each case one drawn from the centre of the work to the point of contact between the tool edge and the work, *C* being the work, and *B* the tool. The angle of the top face of the tool varies in each case with the line *A*. In position *1*, the tool is a cutting one; in *2*, it is a scraper; in *3*, it is a tool which is a cutter and scraper combined, since it will perform both functions at



Cutting and Scraping.

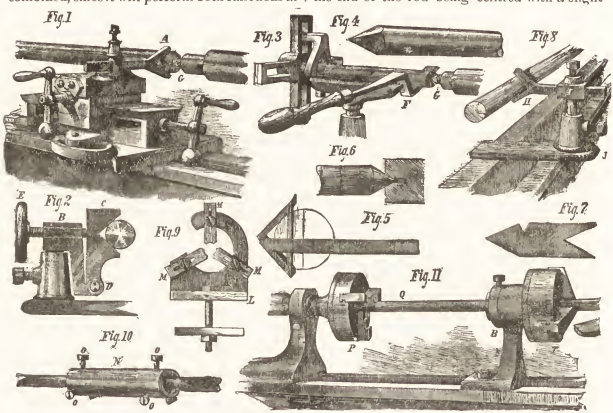
off clean, if desired, as from a knife blade; or it may be thinned with coal oil or benzine.

TOOLS, Spring of. — To obviate the spring of tools which must, of necessity, be held out a long way from the tool post, the fulcrum off which the tool springs must be adjusted so as not to stand in advance of the tool's cutting edge.



Spring Tool.
a, fulcrum; *B*, work to be cut; *C*, line in which the point of the tool would spring; *D*, line perpendicular to the line of the back

TOOLS, Steadying and Centreing.—The method of centreing in *Fig. 1* is most common where the lathe is fitted with an engine rest. A forked tool, *A*, is clamped in the tool-post so that a line drawn from the point of the tail centre will bisect the angle of the fork. A square-pointed centre, *G*, part of the tool, is inserted in the tail spindle and moved against the end of the rod being centred with a slight



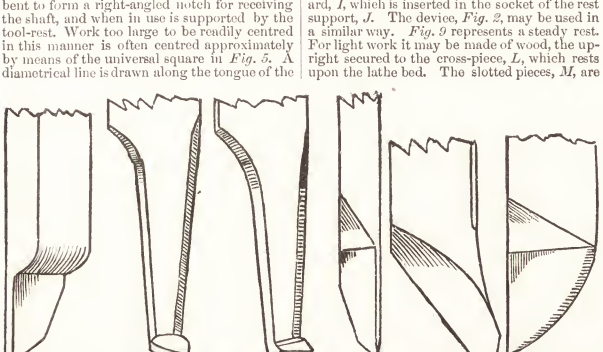
Steadying and Centreing Tools.

one and the same time; and in *4* it is a good cutting tool, the shapes and angles of the tools being the same in each case.

TOOLS, Keeping. — When tools are clean and bright, they may be kept so by wiping, before putting them away, with a cloth dipped in melted paraffine. The following is a simple preparation to prevent tools from rusting: Slowly melt together 6 or 8 parts lard to 1 of rosin, stirring till cool. This remains semi-fluid, always ready for use, the resin preventing rancidity and supplying an air-tight film. Rubbed on a bright surface thinly it protects and preserves the polish effectually, and it can be wiped

pressure, the tool, *A*, at the same time moved forward by the screw of the engine rest until the rod turns smoothly in the fork and the square-pointed centre has found the centre of the rod; the tail spindle is then moved forward until the cavity is sufficiently deep to permit of starting the centre drill. The angle of square centre, *G*, for hard material, should be a little more obtuse than in *Fig. 4*. In any case it should be of good material and well tempered. In *Fig. 2* a centreing tool takes the place of the engine rest and fork in *Fig. 1*. The part *B* is fitted in the place of the ordinary tool-rest, and the jaw, *C*, which has in it a V-shaped notch, is hinged to

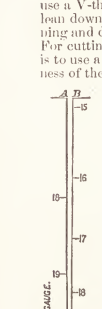
the part *B* at *D*. A screw, *E*, passes through the upper end of the part *B* and bears against the jaw *C*. After what has been said in connection with the engine rest, the manner of using this contrivance will be understood. In *Fig. 3* the hand tool, *F*, is employed for steadying the shaft and bringing it to a centre. This tool is bent to form a right-angled notch for receiving the shaft, and when in use is supported by the tool-rest. Work too large to be readily centred in this manner is often centred approximately by means of the universal square in *Fig. 5*. A diametrical line is drawn along the tongue of the uniformity in everything, the centre gauge, *Fig. 7*, should be used for getting the required angle on the lathe centres and on the drills used in centreing. The matter of steadying long, slender rods being turned in the lathe is often perplexing; it may be done tolerably well as in *Fig. 8*. The fork, *H*, is supported by the standard, *I*, which is inserted in the socket of the rest support, *J*. The device, *Fig. 2*, may be used in a similar way. *Fig. 9* represents a steady rest. For light work it may be made of wood, the upright secured to the cross-piece, *L*, which rests upon the lathe bed. The slotted pieces, *M*, are



Turning Tools.

square, the work is then turned through of a $\frac{1}{4}$ revolution, and another line drawn. The intersection of these lines will be the centre approximately. This point may now be marked with a centre punch, and the work may be tested in a lathe. If found to revolve truly on the centres it may be drilled, otherwise the centre must be corrected with the centre punch and the work tested in the lathe. After centreing by any of these methods, the centre must be drilled and countersunk with a suitable tool so that it will fit the lathe centre as in *Fig. 6*. The angle of the lathe centres should be 60°. To insure adjustable lengthwise to accommodate size and position of shaft. When required to support a bar not round, the sleeve, *N*, *Fig. 10*, is used. It slips over the shaft and revolves in the steady rest. The bar is centred by the screws *O*. The device, *Fig. 11*, is used where a hollow mandrel lathe is not at hand. A piece of gas-pipe, *Q*, is held by the chuck, *P*, and secured by a set screw in the sleeve, *B*, which is journaled in the standard, *S*, and carries the chuck, *T*. This arrangement may be employed by turning the ends of long rods where not desirable to put them ularly on the centres of the lathe.

TOOLS, Turning.—For turning balance wheels, or squaring up large surfaces, use a round end tool constructed well tapering to cut from the side. The best tool for turning small shafting is a diamond point tool; for heavy shafting use a round end tool, shaped to stand high like a diamond point and to cut full and free from the side. For cutting off a shaft, use a tool shaped thin and having the tapering down the reverse of turning tools. For cutting a V-thread screw use a V-thread tool, with the points ground to lean down when finished, so as to prevent running and destroying both the tool and the work. For cutting a square thread screw, the best way is to use a square point tool about $\frac{3}{4}$ the thickness of the thread you intend to cut, and finish with another the exact size of the thread. In cutting a thread within a hole apply the same method. For boring out a hole use a lathe boring tool with the end turned on a right angle to the left, and the point turned up hooking. The side for wrought iron, should, for light work, be hardened right out; temper to a straw color for heavy work. For heavy work on a slotting machine, temper to a brownish purple, and grind so that the cutting edge first strikes the cut near the body of the tool, and not at the point ends; use at a speed of about 10 ft. per minute. (See *Side Tools* in Iron.) Milling tools or cutters ought to be chucked to fit loosely on the arbor, so that they may not prove to be too small for after hardening. Now turn them to within a 32nd of an in. of the required thickness, and again heat previous to finishing. (See illustrations on page before this.)



Wire Gauges.

WIRE GAUGES. — The want of uniformity in common wire gauges is well known; but if they all agreed with published tables of sizes, there would still exist objections to their use, as the variations between different numbers are irregular. This will be seen by reference to the diagram. The 2 lines *A C* and *B C* meeting at *C*, represent the opening of an angular gauge. The divisions on the line *A C* show the size of wire by the Birmingham gauge, those on the line *B C* by the new standard American gauge. Wire to be measured by such a gauge, is passed into the angular opening till it touches on both sides, the division at the point of contact indicating the number. Thus, No. 26, old gauge, would be No. 25 by the new. The angular principle is used in the cut. It is proposed to make gauges to correspond with the new standard. The divisions on the line *A C* are irregular, while those on *B C* increase by a regular geometrical progression. This principle is thought to be the true one for the construction of a gauge. The annexed table gives the dimensions of each size of several of the gauges in ordinary use, and show the necessity of the adoption of a common standard by which the confusion now exis-ting may be avoided.

DIMENSIONS OF SIZES IN DECIMAL PARTS OF AN INCH.

Number of Wire Gauge.	American, or Brown & Sharpe.	Birmingham, or Stubs'.	Washburn & Moen Mfg. Co., Worcester, Mas.	Trenton Iron Co., Trenton, N. J.	G. W. Prentiss, Holyoke, Mass.	Old English, from Brass Mfr's. List.	Number of Wire Gauge.
0000000	....	.46	....	....	....	....	0000000
000000	....	.43	.45	....	....	....	000000
00000	.46	.454	.4305	.4	....	....	00000
0000	.40964	.425	.362	.36	.3586	....	0000
000	.3648	.38	.331	.33	.3282	....	000
00	.32495	.34	.307	.305	.2994	....	00
0	.2893	.3	.283	.285	.2777	....	0
1	.25763	.284	.263	.265	.2591	....	1
2	.22942	.259	.244	.245	.2401	....	2
3	.20431	.238	.225	.225	.223	....	3
4	.18194	.22	.207	.205	.2047	....	4
5	.16202	.203	.192	.19	.1885	....	5
6	.14428	.18	.177	.175	.1758	....	6
7	.12849	.165	.162	.16	.1605	....	7
8	.11443	.148	.148	.145	.1471	....	8
9	.10189	.134	.135	.13	.1351	....	9
10	.090742	.12	.12	.1175	.1205	....	10
11	.080808	.109	.105	.105	.1065	....	11
12	.071961	.095	.092	.0925	.0928	....	12
13	.064084	.083	.08	.08	.0816	.083	13
14	.057068	.072	.072	.07	.0726	.072	14
15	.05082	.065	.063	.061	.0627	.065	15
16	.045257	.058	.054	.0525	.0546	.058	16
17	.040303	.049	.047	.045	.0478	.049	17
18	.03589	.042	.041	.039	.0411	.04	18
19	.031961	.035	.035	.034	.0351	.035	19
20	.028462	.032	.032	.03	.0321	.0315	20
21	.025347	.028	.028	.027	.029	.0295	21
22	.022571	.025	.025	.024	.0261	.027	22
23	.02011	.022	.023	.0215	.0231	.025	23
24	.01791	.02	.02	.019	.0212	.023	24
25	.01594	.018	.018	.018	.0194	.0205	25
26	.014195	.016	.017	.017	.0182	.01875	26
27	.012641	.014	.016	.016	.017	.0165	27
28	.011257	.013	.015	.015	.0163	.0155	28
29	.010025	.012	.014	.014	.0156	.01375	29
31	.008928	.01	.0135	.013	.0146	.01225	31
32	.00795	.009	.013	.012	.0136	.01125	32
33	.00708	.008	.011	.013	.0123	.01025	33
34	.006304	.007	.01	.01	.0118	.0095	34
35	.005614	.005	.0095	.009	.0109	.009	35
36	.005	.001	.009	.008	.01	.0075	36
37	.004453	....	.0085	.0072$\frac{1}{2}$	.0095	.0065	37
38	.003965	....	.008	.0065	.009	.00575	38
39	.003531	....	.0075	.00575	.0083	.005	39
40	.003144	....	.007	.005	.0078	.0045	40

WHETSTONES. — For oil on whetstones, a mixture of glycerine and alcohol may be used. The proportions vary according to the instrument operated on. An article with a large surface sharpens best with a limpid liquid, as 3 parts of glycerine to 1 part of alcohol. For a graving tool, it is necessary to employ glycerine pure, with but 2 or 3 drops of alcohol.

ALLOYS.

REMARKS. — Alloys of metals differing in fusibility, are made by adding the more fusible, either in a melted state or in small portions at a time, to the other melted or heated to the lowest temperature at which union will take place between them. The mixture is usually effected under a flux, or some material that will promote liquefaction, and prevent unnecessary

exposure to the air. Thus, in melting lead and tin together for solder, resin or tallow is thrown upon the surface; in tinning copper the surface is rubbed with sal ammoniac; and in combining some metals, powdered charcoal is used. Quicksilver combines with many metals in the cold, forming amalgams.

AMALGAM. — Mercury unites with many of the metals by contact, and with some, as gold, silver, tin and lead, in certain proportions without losing fluidity. In a few cases, as with potassium, this union is attended with violence and the production of light and heat. Most of these compounds may be formed by agitating or rubbing the mercury with the other metal in the state of filings or small fragments, either with or without heat; or with the easily fusible metals, by adding it to them in the melted state, care being taken in both cases that the heat be not sufficient to volatilize the mercury. Some amalgams are solid and crystalline; others are fluid. Of the latter, several crystallize after a time, being probably merely solutions of the solid amalgams in excess of mercury. The amalgams of gold, silver, tin, zinc, etc., are employed in gilding, silvering, dentistry, etc.

AMALGAMATING SALT.—This is a mercury salt with 3 acids, and is composed of the sulphate, nitrate and bichloride of this metal. It is liquid, colored, dense, and gives in water a yellow precipitate which is dissolved by an excess of acid. It produces a violet stain on the skin, and amalgamates copper and its alloys rapidly. It is used for amalgamating the zincs of batteries and dispenses with metallic mercury; it is easily applied, and prevents much trouble in gilding works. It is prepared by boiling the nitrate of binoxide of mercury upon an excess of a powder composed of equal parts of bisulphate and bichloride of mercury; the liquor only, remaining after cooling, is used.

AMALGAM, Electrical. — Used to cover cushions of electrical machines. A little of the powder is poured on paper, crushed smooth with a flat knife, and spread thinly on the surface of the cushion, previously slightly smeared with tallow; or, the powder may be rubbed down with a little tallow, prior to the application of it. — 1. Take zinc and grain tin, each, 1 oz.; melt in an iron ladle; remove it from the fire, and add of mercury, hot, 3 oz.; stir the whole together with an iron rod; pour it into a well-chalked box, and agitate it violently until cold; or, instead of this, it may be stirred until cold, and then powdered. Preserve in a corked glass bottle. — 2. Zinc, 2 oz.; grain tin, 1 oz.; beeswax, ½ oz.; melt; add of mercury, 6 oz.; proceed as before. — 3. Zinc, 2 oz.; mercury, 5 oz.

AMALGAM, Gilding. — Grain gold, 1 part; mercury, 8 parts; put them into a ladle, and apply a gentle heat, using a smooth piece of iron as a stirrer; when solution is complete pour it out on a smooth slab. Used to gild brass, copper, etc., in the common process of wash or fire gilding. A less proportion of gold is used when a cheap gilding is required; as by increasing the quantity of the mercury the same weight of the metal may be extended over a larger surface.

AMALGAM, Silvering Globes. —Pure lead and grain tin, each, 1 oz.; melt in a clean ladle and add 1 oz. bismuth; skim off the dross, remove the ladle from the fire, and before the metal sets add 1 oz. quicksilver; stir well, avoiding the fumes.

ANTI-FRICTION METALS.—1. (*Babbitt's well-known Anti-Attrition Metal.*) Copper, 4 lbs.; regulus of antimony, 8 lbs.; Banca tin, 96 lbs.— 2. Grain zinc, 7½ lbs.; purified zinc, 7½ lbs.; antimony, 1 lb. —3. Zinc, 17 parts; copper, 1 part; antimony, 1½ parts. This possesses unsurpassable anti-friction qualities, and does not require the protection of outer casings of harder metal. —4. Block tin, 8 lbs.; antimony, 2 lbs.; copper, 1 lb. If the metal be too hard, soften by adding lead. — 5. Melt in a crucible 1½ lbs. copper, and, while the copper is melting, melt in a ladle 25 lbs. tin and 3 of antimony, nearly red hot; pour the 2 together, and stir until nearly cool. This makes the finest kind of lining metal.—6. Lead, 100 lbs.; antimony, 15 lbs.—7. (*For Bearings to Sustain Great Weights.*) Copper, 1 lb.; zinc, ½ oz.; tin, 2½ oz. — 8. (*Hard Bearings for Machinery.*) Copper, 1 lb., tin. 2 oz. — 9. (*Lining Metal for Boxes of Railway Cars.*) Mix tin, 24 lbs.; copper, 4 lbs.; antimony, 8 lbs.; then add tin, 72 lbs. — 10. (*Lining Metal for Locomotive Axle Trees.*) Copper, 86.03; tin, 13.97.

ANTI-FRICTION METAL, Lining Boxes with.— The article to be lined, having been cast with a recess for the lining, is to be nicely fitted to a former, which is made of the same shape as the bearing. Drill a hole for the reception of the metal ½ to ¾ in. Coat over the part not to be tinned with a clay wash, wet the part to be tinned with alcohol, and sprinkle on it powdered sal ammoniac; heat it till a fume arises from the sal ammoniac, and then immerse in melted Banca tin, taking care not to heat it so that it will oxidize. After the article is tinned, should it have a dark color, sprinkle sal ammoniac on it, which will make it a bright silver color. Cool gradually in water; then take the former, to which the article has been fitted, and coat it with a thin clay wash and warm it till dry; heat the article until the tin begins to melt, lay it on the former and pour in the metal, which should not be so hot as to oxidize, through the drilled hole, giving it a head, so that as it shrinks it will fill up. After it has sufficiently cooled remove the former. A shorter method may be adopted when the work is light enough to handle quickly; namely, when the article is prepared for tinning, immerse in the lining metal instead of the tin, brush lightly in order to remove the sal ammoniac from the surface, place immediately on the former and line at the same heating.

BELL METAL. — Castings in bell metal are more or less brittle; and, when recent, are of a dark ash gray to grayish white, which is darkest in the more cupreous varieties, in which it turns somewhat on the yellowish red or bluish red. The larger the proportion of copper the deeper the tone. The addition of tin, iron, or zinc, causes them to give out their tones sharper. Bismuth and lead are added to modify the tone, which each metal affects differently. The addition of antimony and bismuth is frequently made to

give a crystalline grain to the alloy. All these additions are prejudicial to the sonorousness of bells, and of doubtful utility. Rapid refrigeration increases the sonorousness of all these alloys. Where the quality of tone is the chief object care should be taken to use commercially pure copper. The presence of a lead or any similar metal lessens sonorousness, while that of silver increases it. The specific gravity of a large bell is seldom uniform; nor can the sp. gr. from any given proportion of its constituent metals be exactly calculated, owing to many interfering circumstances. The nearer this uniformity is approached, or chemical combination is complete, the more durable and finer toned will be the bell. In general it is necessary to take about 1-10th more metal than the weight of the intended bell in order to allow for waste and scorification during the operations of fusing and casting. A cracked bell which gives a jarring sound may be improved by sawing or filing the ruptured edges so that they are not brought together by the vibration of the blow. The following are some of the formulæ used for bell metal: 1. Copper, 72 parts; tin, 26½ parts; iron, 1½ parts. Used for bells of small clocks or pendules. — 2. Copper, 72 parts; tin, 26 parts; zinc 2 parts. Used for small bells. — 3. Copper, 70 parts; tin, 26 parts; zinc, 2 parts. Used for bells of repeating watches. — 4. Melt together copper, 100 parts; tin, 25 parts. After being cast into the required object, it should be made red hot, and then plunged into cold water to impart the requisite degree of sonorousness. For cymbals and gongs. — 5. Melt together copper, 80 parts; tin, 20 parts. When cold it has to be hammered out with frequent annealing. — 6. Copper, 78 parts; tin, 22 parts. This is superior to the former, as it can be rolled out. For tom-toms and gongs. —7. Melt together copper, 72 parts; tin, 26 to 56 parts; iron, 1.44 part. Used in making the bells of pendules or ornamental clocks.

BRITANNIA METAL, or PEWTER. — 1. Plate brass, bismuth, antimony, and tin, equal parts, melted together, and the resulting alloy added at discretion to melted tin, until it acquires the proper color and hardness. — 2. To the alloy, prepared as in 1, add 1-5 of its weight of metallic arsenic, before mixing it with the melted tin. — 3. Antimony, 1 part; brass, 4 parts; tin, 5 or 6 parts; melted together.—4. Tin, 150 parts, copper, 3 parts; antimony, 10 parts. — 5. Tin, 46½ parts; copper, 1 part; antimony, 3 parts.— 6. (*For Casting.*) Tin, 100 parts; hardening (tin, 105 parts; copper, 2 parts; antimony, 12 parts), 5 parts; antimony, 5 parts. —7. (*For Handles.*) Tin, 140 parts; copper, 2 parts; antimony, 5 parts. — 8. (*For Lamps, Pillars and Spouts.*) Tin, 75 parts; copper, 1 part; antimony, 3¾ parts. — 9. (*For Registers.*) Tin, 25 parts; antimony, 2 parts; hardening, 2 parts. — 10. (*For Spinning.*) Tin, 25 parts; antimony, 1 part; hardening, 1 part. — 11. (*For Spoons.*) Tin, 20 parts; antimony, 2 parts; hardening, 1 part.—12. (*For Spouts.*) Tin, 46½ parts; copper, 1 part; antimony, 2 parts.

BRITANNIA METAL, Hardening for. — Tin, 1 part; copper, 2 parts.

BRONZE. — On the small scale this alloy is prepared in crucibles; but for statues and large works on reverberatory hearths. The fusion of the mixed metals is conducted rapidly under pounded charcoal, and the melted mass frequently stirred to produce a perfect mixture before casting.

BRONZE, Aluminium.—1. 100 parts copper and 10 aluminium, measured by weighing, when combined, is a durable alloy, which may be forged and worked in the same manner as copper, and is the same color as pale gold. — 2. 80 parts copper, 19 zinc, and 1 aluminium, form a good durable alloy.

BRONZE, Antique. — Copper, 100 parts; Tin, 7 parts; Lead, 7 parts.

BRONZE, Blue. — The blue bronzes are produced in the wet way by coloring white bronze with aniline blue. A white bronze made of pure English tin is boiled for 5 hours in a solution of 20 grammes alum in 4½ litres water; then washed clean and put into a porcelain dish, and covered with a solution of 15 grammes aniline blue in 1½ litres alcohol, and stirred until dry; this manipulation repeated 6 or 8 times until the desired blue is obtained. When the bronze is dark enough it is washed in warm water, and before it is quite dry a large spoonful of petroleum is poured upon each kilo of bronze, mixed, and the odor allowed to escape into the air for a few days.

BRONZE, Brownish Gold. —This is made from fine clean iron filings by moistening repeatedly with a little water and exposing them to the air, then boiling several times and drying. It forms a deep rust-brown powder, which becomes intensely red if nitric acid is added in the last boiling. It is elutriated to separate any metallic particles, and dried. By mixing this with imitation gold bronze, mosaic gold, copper bronze, and greenish bronze, separately or together, the most varied and different shades can be obtained.

BRONZE, For Door Knobs. — The alloy used in bronze busts, door knobs and similar articles, is made of copper, 89 parts; tin, 8 parts; zinc, 3 parts.

BRONZE, For Edge-Tools.—Copper, 100 parts; tin, 14 parts. When skilfully hardened and tempered this alloy is capable of receiving an edge nearly equal to that of steel.

BRONZE, For Small Castings. — Copper, 95 parts; tin, 4 parts; melt together.

BRONZE, Gilding.—1. Copper, 82 parts; zinc, 18 parts; tin, 3 parts; lead, 2 parts. — 2. Copper, 83 parts; zinc, 17 parts; tin, 2 parts; lead, 1 part.

BRONZE, Imitation Silver. — Bismuth and tin, of each 2 lbs.; melt together and add 1 lb. of quicksilver; pound all into a powder. This is used as an imitation of silver bronze for plaster figures and other common purposes, in the same way as the *aurum musivum* is for gold colored articles. It may be used as spangles in sealing-wax; it must then be mixed when the resinous part of the wax is getting cold.

BRONZE, Platinum. — Nickel, 100 parts, tin 10 parts, platinum 1 part. It is unoxidizable, and especially adapted for cooking utensils.

BRONZE, Red. — Made by using the follow-

ing: 86 parts copper; 11 parts zinc; 3 parts tin.

BRONZE, Statuary. — 1. Copper, 88 parts; tin, 9 parts; zinc, 2 parts; lead, 1 part.—2. Copper, 82½ parts; zinc, 10½ parts; tin, 5 parts; lead, 2 parts. — 3. Copper, 90 parts; tin, 9 parts; lead, 1 part. — 4. Copper, 91 parts; tin, 9 parts.

BRONZING BRASS BLACK. — 1. Dip the article bright in aquafortis; rinse the acid off with clean water, and place it in the following mixture until it turns black: Hydrochloric acid, 12 lbs.; sulphate of iron, 1 lb.; and pure white arsenic, 1 lb.; then take out, rinse in clean water, dry in sawdust, polish with black lead, and then lacquer with green lacquer.

BRONZING COPPER. — Dissolve in vinegar 2 parts verdigris and 1 part sal ammoniac; boil, skim, and dilute with water, until white precipitate ceases to fall; set in a pan the articles to be bronzed, made clean and free from grease; boil the solution briskly and pour over the articles in the pan and boil them briskly. A bright reddish brown color is acquired; but the articles should be frequently inspected, and removed as quickly as the desired shade is obtained; then repeatedly washed and dried. The solution must not be too strong, for then the bronze will come off by friction, or turn green on exposure to air.

BRONZING COPPER ANTIQUE. — Dissolve in 20 parts by weight of strong vinegar 3 parts carbonate or hydrochlorate of ammonia, and 1, each, common salt, cream of tartar, and acetate of copper, and add some water. When an intimate mixture has been obtained, smear the copper object with it, and let it dry at the ordinary temperature for nearly 48 hours. After that time the object is covered with verdigris of various tinges. Then brush the whole, especially the reliefs, with the waxed brush. If necessary, the raised parts are set off with chrome yellow, or other suitable colors. Light touches with ammonia give a blue shade to the green portions, and carbonate of ammonia deepens the color of the parts on which it is laid.

BRONZING ELECTROTYPES GREEN. — Steep the figure in a strong solution of salt or sugar or sal ammoniac, a few days; wash in water and allow to dry slowly; or suspend over a vessel containing a small quantity of bleaching powder, and cover over; the length of time it is allowed to remain will determine the depth of the color.

BRONZING GAS FIXTURES.—1. Boil the work in strong lye, and scour it from all grease or old lacquer; pickle it in diluted nitric acid till clean (not bright); then dip in strong acid, and rinse through 4 or 5 waters; repeat the dip, till it is bright; next bind it very loose with some thin iron wire, and lay it in the strongest of the waters you have used for rinsing. This will deposit a coat of copper over it if the water or pickle be not too strong; if such is the case the copper will only be deposited round where the wire touches. When the copper is of sufficient thickness wash it again through the waters, and dry it with a brush in some hot sawdust; boxdust is best, but if not at hand, oak, ash, or beech will do. It is now ready for bronzing. The bronze is a mixture of black lead and red bronze, varied according to shade required, mixed with boiling water. The work is to be painted over with this and dried, then brushed until it polishes. If there are black spots or rings on the work, another coat of the bronze will remove them. Lacquer the work with pale lacquer, or but very slightly colored, for if it is too deep it will soon chip off. — 2. Mix vinegar or dilute sulphuric acid (1 part acid, 12 water) with powdered black lead in a saucer or open vessel; apply this to the brass with a soft plate brush by gentle brushing. This will soon assume a polish, and is fit for lacquering. The brass must be made slightly warmer than for lacquering only. The color, black or green, varies with the thickness of black lead.

BRONZING GREEN. — 1. (See *Bronzing Gas Fixtures, 2.*) — 2. Repeated applications to copper or brass of alternate washes of dilute acetic acid and exposure to the fumes of ammonia will give a very antique-looking green bronze; but a quick mode of producing a similar appearance is often desirable. To this end the articles may be immersed in a solution of 1 part perchloride of iron in 2 parts water. The tone assumes darkness with the length of immersion. Or the articles may be boiled in a strong solution of nitrate of copper. Or they may be immersed in a solution of 2 oz. nitrate of iron, and 2 oz. hyposulphite of soda in 1 pt. water. Washing, drying, and burnishing complete the process.

BRONZING GUN BARRELS. — 1. Chloride of antimony has been used for bronzing gun barrels, and called, in consequence, bronzing salt. It is used for bronzing, mixed to a creamy consistence with olive oil; the iron is slightly heated, dressed upon its surface with this mixture, and left until browning is produced. The sharpening of the chloride of antimony can be effected by adding a little nitric acid to the paste of olive oil and chloride of antimony, so as to hasten the operation. — 2. Aquafortis, ½ oz.; sweet spirit of nitre, ½ oz.; spirit of wine, 1 oz.; blue vitrol, 2 oz.; tincture of chloride of iron, 1 oz.; water, 40 oz.; dissolve the blue vitriol in the water; then add the other materials, and the water is warmed to dissolve the blue vitriol; let it get cold before adding the other materials. The burnishing and marking can be effected with the burnisher and scratch brush. The polishing is effected by rubbing with a piece of smooth, hard wood, called polishing wood; then varnished with shellac varnish, and polished with the hard wood polisher. Some prefer the brown produced by blue vitriol, 1 oz.; sweet spirit of nitre, 1 oz.; water, 20 oz. In any case, the surface of the iron must be cleaned, and rendered bright; it is then freed from grease by rubbing with whiting and water, or with powdered quicklime and water. The browning composition is then placed on, and allowed to remain 24 hours; it is then rubbed off with a stiff brush. If not sufficiently browned, repeat the last process after browning. Clean the surface with hot water containing soda or potash, and, lastly, with boiling water, and dry it. The surface can be burnished and polished. Varnish with tinsmith's lacquer, or with gum shellac, 2 oz.; dragon's blood, 3 dr.; methylated spirits of wine, 4 pts. The metal should be made hot

before applying this varnish, and will present an excellent appearance. If the varnish is not required to color, but to preserve the actual tint produced by the browning fluid, leave out the dragon's blood.

BRONZING HARDWARE. — Brown bronze dip, for coating hat hooks and similar hardware articles, is made of iron scales, 1 lb.; arsenic, 1 oz.; muriatic acid, 1 lb.; zinc, solid, 10 oz. The zinc should be kept in only when the bath is used. The castings must be free from sand and grease.

BRONZING LIQUID. — 1. (*Acid.*) Cobalt, 4 lbs., pulverize; sift through a fine sieve; put in a stone pot; add ½ gal. nitric acid, a little at a time, stirring frequently for 24 hours; add about 5 gals. muriatic acid, or until the work comes out dark brown. — (*Alkali.*) Dissolve 5 lbs. nitrate of copper in 3 gals. water and 5 lbs. pearlash; add 1 or 2 pts. potash water; then add from 2 to 3 lbs. sal ammoniac or until the work comes out the required color.

BRONZING MEDALS AND COINS, — This gives to new metallic objects the appearance of old ones, especially to copper and its alloys. 1. The most simple bronze is obtained by applying upon the cleansed object a thin paste of water with equal parts of plumbago and peroxide of iron, with a certain proportion of clay. Then heat, and when the object is cold, brush in every direction for a long time with a middling stiff brush, which is frequently rubbed upon a block of yello. wax, and afterwards upon the mixture of plumbago and peroxide of iron. This gives a very bright red bronze, suitable for medals kept in a show case. — 2. Dip the article into a mixture of equal parts perchloride and nitrate of sesquioxide of iron, heating until these salts are dry; then rub with the waxed brush as described. — 3. Cleanse the article, and cover it with hydrosulphate of ammonia, which allow to dry, then brush with peroxide of iron and plumbago, and afterwards with the waxed brush. If the piece impregnated with hydrosulphate of ammonia is gently heated, a black bronze is obtained, which being uncovered at certain places produces a good effect. — 4. Clean and dip in a strong aqueous solution of cupric chloride.

BRONZING TIN. — Sulphate of iron and sulphate of copper, each, 1 oz.; water, 1 pt.; dissolve; wash the surface of the articles with it; let them dry; then apply a solution of verdigris, 2 oz., dissolved in strong vinegar, ½ pt; when dry, polish with a soft brush, and either some plumbago or colcothar. Used for tin castings.

BRONZING ZINC. — The zinc to be bronzed must receive an electro-deposit of brass, which is then dipped into a weak solution of sulphate of copper for a red tinge. When dry, wet with a rag dipped into hydrosulphate of ammonia, or a solution of polysulphide of potassium, or protochloride of copper dissolved in hydrochloric acid. After another drying, the surface is brushed over with a mixture of peroxide of iron and plumbago, according to tint desired. The brush may be wetted with essence of turpentine, which aids the adhesion of the powders. The raised parts are rubbed to uncover the brass. Afterwards give a coat of colorless varnish.

BULLET METAL. — 38 parts lead to 2 parts arsenic. **For round** shot the fused metal is dropped from a high elevation in a shot tower into a basin of water; or thrown down a stack of limited height, in which a strong draught of air is produced by a blast machine.

CANNON METAL. — Tin, 10 parts; copper, 90 parts; melt.

CASTINGS, Alloy for Defects in. — Lead, 9 parts; antimony, 2 parts; bismuth, 1 part. This expands on cooling.

CYLINDERS OF LOCOMOTIVES. Alloy for. — Copper, 88.63 parts; tin, 2.38 parts; zinc, 6.99 parts.

CYMBALS, Alloy for. — 100 parts of copper with about 25 of tin. To give this compound the sonorous property in the highest degree, the piece should be ignited after it is cast, and plunged immediately into cold water.

FUSIBLE ALLOY. — 1. An alloy of 7½ parts bismuth, 4 of lead, 1½ of tin, and 2 of cadmium, melts at a temperature of 151° Fahr. There are several alloys of bismuth, lead and tin, which melt below the boiling point of water. The one which is simplest in composition, consists of 2 parts bismuth, 1 of lead and 1 of tin. A bit of it dropped into boiling water becomes at once a melted globule. — 2. Tin, 8 parts; lead, 4 parts; bismuth, 3 parts; melt together, removing the scum. Used as a metal bath. — 3. Bismuth, 8 parts; lead 5 parts; tin 3 parts. Used as a metal bath. — 4. Lead 3 parts, tin 2 parts, bismuth 5 parts. This melts at 197° Fahr. — 5. (*For Anatomical Injections.*) Melt together with a gentle heat 174 parts tin, 312 of lead, 514 of bismuth, with a little charcoal; remove from the fire, and add 100 parts of mercury, previously heated. It is fluid at 173°; solid at 140° Fahrenheit.

GERMAN SILVER. — A well known alloy; the finer varieties nearly equal silver in whiteness and susceptibility of receiving a high polish, while they surpass it in durability. The following formulæ give the composition of German silver for various purposes: 1. Copper, 50 lbs.; zinc, 25 lbs.; nickel, 25 lbs.—2. (*Second Quality, for Casting.*) Copper, 50 lbs.; zinc, 20 lbs.; best pulverized nickel, 10 lbs. — 3. (*For Rolling.*) Copper, 60 lbs.; zinc, 20 lbs.; nickel, 25 lbs. — 4. (*For Bells and other Castings.*) Copper, 60 lbs.; zinc, 20 lbs.; nickel, 20 lbs.; lead, 3 lbs.; iron (that of tin plate is the best), 2 lbs. — 5. (*For Castings.*) Lead, 3 parts; nickel, 20 parts; zinc, 20 parts; copper, 60 parts; mix. — 6. (*For Rolling.*) Nickel, 5 parts; zinc, 4 parts; copper, 12 parts; mix. — 7. Copper, 40.62 parts; zinc, 43.76 parts; nickel, 15.62 parts. — 8. Copper, 41.47 parts; zinc, 26.08 parts; nickel, 32.35 parts. — 9. Copper, 55.55 parts; zinc, 5.55 parts; nickel, 38.90 parts. — 10. Copper, 53.40 parts; zinc, 29.10 parts; nickel, 17.50 parts. — 11. (*Alfenide.*) A trace of iron; copper, 59.60 parts; zinc, 30.30 parts; nickel, 10.10 parts. —12. (*Genuine German Silver*). Iron, 2½ parts; nickel, 31½ parts; zinc, 25½ parts; copper, 40½ parts; melt.

GERMAN SILVER, To Melt.—Use a black lead crucible, cover with charcoal, and give a good white heat in a small crucible or melting furnace.

GERMAN SILVER, To Polish.—Take 1 lb. peroxide of iron, pure, and put ½ into a wash basin,

pouring on water, and keeping it stirred until the basin is nearly full. While the water and crocus is in motion, pour off, leaving grit at the bottom. Repeat this a second time, pouring off with another basin. Cleanse out grit, and do the same with the other $\frac{1}{2}$. When the second lot is poured off, the crocus in the first will have settled to the bottom; pour off the water gently, take out the powder, and dry it, and put both when clear of grit and dried, into a box into which dust cannot get. If the silver work is dirty, rub the mixture of powder and oil on with the fingers, and then it will be known if any grit is on the work. If the work is not black, take a piece of chamois leather, and rub some dry crocus on, and when well rubbed, shake out the leather, and let the powder fall off that is not used, or rub it off with a brush. Do not put down the leather in the dust.

GERMAN SILVER, Soldering. —To solder German silver, rub a lump of borax with a drop or so of water on a slab, until a paste is produced. Clean the surfaces to be soldered and paint on the borax paste; dip the silver solder in the borax paste and place it in position on the work. Pin the work on a charcoal or piece of pumice stone, with common tacks, not tinned; direct the reducing flame of a blowpipe upon the work until it becomes red hot, then project it on the solder. The small silver 3 cent pieces make excellent solder for German silver, brass, copper, iron and steel.

GILDING METAL. — The metal employed as a base for gilding is usually brass, or a mixture of brass and copper. The following proportions have been recommended: 1. Copper, 6 parts; brass, 1 part.—2. Copper, 4 parts; Bristol brass, 1 part. — 3. Copper, 13 parts; old Bristol brass, 3 parts; tin, 14 parts.

GOLD MOSAIC.—Melt 1 lb. tin in a crucible; add $\frac{1}{2}$ lb. purified quicksilver to it; when cold, reduce to powder and grind with $\frac{1}{4}$ lb. sal ammoniac and 7 oz. flour of sulphur, till thoroughly mixed; they are then calcined in a matrass, and the sublimation of the other ingredients leaves the tin converted into the mosaic gold powder found at the bottom of the glass; remove any black or discolored particles. The sal ammoniac must be white and clear, and the mercury of the utmost purity. When a deeper red is required, grind a small quantity of red lead with the above materials.

GUN METAL.—An alloy containing 90.5 per cent. copper, and 9.5 per cent. of tin, used for casting pieces of ordnance (sometimes erroneously termed "brass guns"), also those parts of machinery which may be subjected to considerable friction.

JOURNAL BOXES, Alloy for.—Copper, 24 lbs.; tin, 24 lbs.; antimony, 8 lbs.; melt the copper first, then add the tin, and lastly the antimony. It should be first run into ingots, then melted and cast in the form required for the boxes.

KUSTITIEN'S METAL. — Take of malleable iron, 3 parts; beat it to whiteness and add of antimony, 1 part; Molucca tin, 72 parts; mix under charcoal, and cool. Used to coat iron and other metals with a surface of tin; it polishes without a blue tint, is hard, and has the advantage of being free from lead and arsenic.

MUNTZ METAL, For Ships. — Best selected copper, 60 parts; best zinc, 40 parts. Melt together in the usual manner, and roll into sheets of suitable thickness. This resists oxidation from exposure to sea water, and prevents adhesion of barnacles.

NIELLO SILVER.—9 parts silver, 1 part copper, 1 part lead, and 1 part bismuth, melted together and saturated with sulphur. This produces the gorgeous blue erroneously spoken of as steel blue.

NUTS OF COARSE THREADS AND BEARINGS, Metal for. — Copper, 1 lb.; brass, $1\frac{1}{2}$ oz.; tin, $2\frac{1}{2}$ oz.

PIPE METAL FOR ORGANS.—Melt equal parts of tin and lead. This alloy is cast in the form of sheets, in order to obtain a crystallized metal, which produces a finer tone. The sheets are formed by casting the metal on a horizontal table, the thickness regulated by the height of a rib or bridge at one end, over which the superfluous metal flows off. The sheets are planed with a carpenter's plane, bent up, and soldered.

POT METAL. — Copper, 40 lbs.; lead, 16 lbs.; tin, $1\frac{1}{2}$ lbs.

RIVET METAL. — 1. Copper, 32 oz.; tin, 2 oz.; zinc, 1 oz. — 2. (*For Hose.*) Copper, 64 lbs.; tin, 1 lb.

SILVER MOSAIC. — An amalgam of equal parts tin, bismuth, and mercury; $12\frac{1}{2}$ dr. good tin is fused in a crucible, and as soon as melted $12\frac{1}{2}$ dr. bismuth are stirred in with an iron wire until it is all liquid, the crucible then removed from the fire, stirred as long as liquid, and $6\frac{1}{4}$ dr. mercury added, and all mixed until stiff enough to be ground upon a stone.

SILVER WHITE. — Melt together 1 oz., each, bismuth and tin; add to this mixture 1 oz. of

MELTING. —

ALLOYS AND THEIR MELTING HEATS.

No. 1					1	Tin,	25	Lead,	258	Fahrenheit.
" 2					1	"	10	"	541	"
" 3					1	"	5	"	511	"
" 4					1	"	3	"	482	"
" 5					1	"	2	"	441	"
" 6					1	"	1	"	370	"
" 7					1½	"	1	"	334	"
" 8					2	"	1	"	340	"
" 9					3	"	1	"	356	"
" 10					4	"	1	"	365	"
" 11					5	"	1	"	378	"
" 12					6	"	1	"	381	"
" 13				4	Lead,	4	Tin,	1	Bismuth,	320
" 14				3	"	3	"	1	"	310
" 15				2	"	2	"	1	"	292
" 16				1	"	1	"	1	"	254
" 17				2	"	1	"	2	"	256
" 18				3	"	5	"	2	"	202

FLUXES.

A. Borax.
B. Salam. or Mur. of Amm.
C. Muriate or Chlor. of Zinc.
D. Common Resin.
E. Venice Turpentine.
F. Tallow.
G Gallipoli Oil, or common Sweet Oil.

MODES OF APPLYING HEAT.

a. Naked fire.
b. Hollow furnace or muffle.
c. Immersion in melted solder.
d. Melted solder or metal poured on.
e. Heated iron not tinned.
f. Heated copper tool, tinned.
g. Blowpipe flame.
h. Flame alone, generally Alcohol.
i. Stream of heated air.

mercury; afterwards cool, and then powder.

SLIDING LEVERS OF LOCOMOTIVES, Metal for. — Copper, 85.25 parts; tin, 12.75 parts; zinc, 2 parts.

SPECULUM METAL. — 1. Take copper, 64 parts; pure tin, 69 parts; melt them separately under a little black flux; next incorporate thoroughly by stirring with a wooden spatula, and run the metal into the molds, so that the face of the intended mirror may be downwards; lastly, allow the whole to cool very slowly. — 2. Pure copper, 2 parts; pure tin, 1 part. Used to make mirrors of reflecting telescopes. The addition of a little metallic arsenic renders it whiter.

STATUARY METAL. — 91.4 parts copper; 5.53 parts zinc; 1.7 parts tin; 1.37 parts lead.

STERRO METAL. — Copper, 55 to 60 parts; zinc, 34 to 44 parts; iron, 2 to 4 parts; tin, 2 to 4 parts. Sterro metal is used for the pumps of hydraulic presses, etc. It is capable of withstanding a pressure of from 43,000 to 85,000 lbs. per sq. in.

TINNING, Hard Compound for. —The proportions of nickel and iron mixed with tin, to produce the best tinning, are 10 oz. best nickel and 7 oz. sheet iron, to 10 lbs. tin. These metals are mixed in a crucible to prevent oxidation of the tin by high temperature necessary for fusion of nickel; the metals are covered with 1 oz. borax and 3 oz. pounded glass. The fusion is complete in ½ hour, when the composition is run off through a hole made in the flux. In tinning metals with this composition proceed in the ordinary manner.

TINNING METAL. —Malleable iron, 1 lb.; heat to whiteness; add 5 oz. regulus of antimony, and Molucca tin, 24 lbs.

TYPE METAL.—An alloy formed of antimony, 1 part; lead, 3 parts; melted together. Small types are usually made of a harder composition than large ones. A good stereotype metal is made of lead, 9 parts; antimony, 2 parts; bismuth, 1 part. This alloy expands as it cools, and brings out a fine impression.

WETTERSTEDT'S PATENT SHEATHING FOR SHIPS.—Lead with from 2 to 8 per cent. of antimony; about 3 per cent. is the usual quantity. The alloy is rolled into sheets.

WHITE METAL.—1. Melt together 20 oz. lead; 10 oz. bismuth, and 8 dr. regulus of antimony. — 2. Melt together 4 lbs. regulus of antimony, 1 lb. brass, and 20 oz. tin.

ALUMINUM.

REMARKS.—A cubic inch of pure aluminum weighs approximately 1-10 of a pound avoirdupois, being about ⅜ the weight of an equal bulk of pure silver. Pure aluminum can be rolled, drawn, spun, stamped, engraved, burnished, polished, and soldered, almost to the same extent and by the same processes as used on brass.

ALLOYS.—1. (*Aluminum and Tin.*) Aluminum, 100 parts; tin, 10 parts.—2. Aluminum, 90 per cent; tin, 10 per cent.—3. Aluminum and tin, equal parts. This alloy solders easily. —4. (*Aluminum and Zinc.*) Aluminum, 8 parts; zinc, 92 parts.—5. Aluminum, 12 parts; zinc, 88 parts.—6. Aluminum, 15 parts; zinc, 85 parts.—7. Aluminum, 20 parts; zinc, 80 parts. The aluminum is first melted, the zinc added gradually, finally some fat is added, and the whole is stirred with an iron rod and poured into molds. For flux use copaiba balsam, 3 parts; Venice turpentine, 1 part; and a few drops of lemon juice. Dip the soldering iron into the same flux.—8. (*Aluminum Bronze.*) 100 parts copper and 10 parts aluminum, measured by weighing, when combined, is a durable alloy, which may be forged and worked in the same manner as copper, and is the same color as pale gold. 80 parts copper, 19 zinc, and 1 aluminum form a good durable alloy.—9. (*Aluminum Silver.*) The following alloy takes a high silver polish, and exhibits a beautiful silvery color: Copper, 70 parts; nickel, 23 parts; aluminum, 7 parts.

ANNEALING. — A very low and even temperature should be maintained in the muffle. Aluminum melts at about 1,300 degrees Fahrenheit—a very dark red. The inexperienced therefore cannot judge the proper annealing temperature by the eye alone, without danger of fusing the metal. When the metal has been heated enough to char the end of a pine stick, thus leaving a black mark in the wake of the stick as it is drawn across the metal, it is sufficiently annealed. The metal should then be withdrawn from the furnace and allowed to cool slowly in the air. For some work, such as stamping and drawing, it is sometimes better not to heat the metal so hot as to leave a dead black mark with the stick, but just enough to show a dark brown mark instead. Very thin sheets or wire can be annealed sufficiently for some purposes in boiling water.

BRAZING.—Aluminum bronze will braze as well as any other metal by using ½ brass solder (copper, 50 per cent; zinc, 50 per cent), and ¾ borax.

BURNISHING. — Use a bloodstone or steel burnisher. For hand burnishing use either kerosene or a solution composed of 2 tablespoonfuls of ground borax, dissolved in about 1 qt. of hot water, with a few drops of ammonia added. For lathe work the burnisher should wear upon the finger of his left hand a piece of Canton flannel, keeping it soaked with kerosene, and bringing it in contact with the metal, supplying a constant lubricant. Very fine effects can be produced by first burnishing or polishing the metal, and then stamping it in polished dies, showing unpolished figures in relief.

DIPPING AND PICKLING.—Remove the grease and dirt by dipping in benzine, to whiten aluminum, leaving on the surface a beautiful white mat; dip first in a strong hot solution of pot-

ash, then rinse in water and dip in undiluted nitric acid, 42°. Then wash in water and dry as usual in hot sawdust.

ELECTRO-PLATING.—1. Aluminum may be deposited on copper from a dilute solution of the double chloride of aluminum and ammonia. —2. Aluminum is one of the most difficult and uncertain of metals to deposit electrolytically. Following is said to furnish excellent results: 50 parts by weight of alum are dissolved in 300 of water, and to this is added 10 parts of aluminum chloride. The solution is heated by 200° F., and when cold 30 parts of cyanide of potassium are added. A feeble current should be used. The object to be plated has to be cleaned, and to be absolutely free from grease in any form, whereupon it is suspended in the bath over the electro-positive electrode, the plate of metallic aluminum to be suspended on the negative pole. The electric current ought to be weak.—3. Dissolve in distilled water the required quantity of aluminum, either the sulphate, muriate, nitrate, acetate or cyanide. Concentrate this solution to 20° Baume. Use 3 pairs Bunsen's zinco-carbon cells, connected for intensity. Attach an anode of aluminum to the negative wire. Acidulate the solution slightly with the appropriate acid heated to 140° F. Keep this solution at this temperature during the operation.

MILLING, PLANING AND TURNING. — Use plenty of oil to prevent the clogging of the tool and to make it cut smooth.

POLISHING.—Use fine white polishing composition or rouge, and a rag buff.

SAND CASTINGS.—Use open, but very fine, sand, and bake the mold. Large feeding gates should be provided, and the mold should be well vented. Pour the metal quickly, at a temperature but little above the melting point. Use either Taylor's or Dixon's plumbago crucibles.

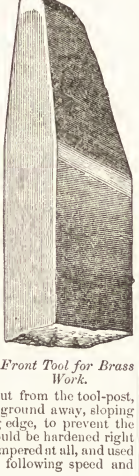
SOLDERING.—The inventors claim that surfaces of aluminum may be soldered to each other, and to other metallic surfaces by using silver chloride as a flux in conjunction with ordinary solder. After the pieces of metal are placed in the required position, finely powdered fused silver chloride spread along the line of junction, and solder melted on with a blow-pipe or other device. The joints are thus easily and rapidly made, and neither crack, flake nor check.

Brass.

REMARKS.—Brass is generally manufactured by plunging copper, in slips, into zinc melted in the usual manner. The former metal combines with the fluid mass, and the addition is continued until an alloy somewhat difficult of fusion is formed, when the remainder of the copper is added. The brass obtained is broken into pieces, and remelted under charcoal, and a proper addition of zinc or copper made, to bring it to the color and quality desired, then poured into molds of granite. Before being submitted to the rolling-press for reduction to thin plates, it undergoes annealing. The proportions of metals forming this alloy are varied according to desired color and the purposes to which it is to be applied. The following formulæ give the compositions of brass best suited for the purposes named: 1. (*Yellow, for Turning.*) Copper, 20 lbs.; zinc, 10 lbs.; lead, 4 oz. —2. (*Best Red, for Fine Castings.*) Copper, 24 lbs.; zinc, 5 lbs.; bismuth, 1 oz. — 3. *Red Tombac.*) Copper, 10 lbs.; zinc, 1 lb. — 4. (*Tombac.*) Copper, 16 lbs.; tin, 1 lb.; zinc, 1 lb. — 5. (*Heavy Castings.*) Copper, 6 to 7 parts; tin, 1 part; zinc, 1 part. — 6. (*Malleable.*) Copper, 70.1 parts; zinc, 29.9 parts. — 7. (*German.*) Copper, 1 lb.; zinc, 1 lb. — 8. (*Watchmakers'.*) Copper, 1 part; zinc, 2 parts. — 9. (*Wire.*) Copper, 72 parts; zinc, 28 parts. — 10. (*English Wire.*) Copper, 70.3 parts; zinc, 29.3 parts; lead, 3 parts; tin, 2 parts. — 11. (*Heavy Work.*) Copper, 100 parts; tin, 15 parts; zinc, 15 parts. —12. (*Fine Buttonmakers'.*) Copper, 8 parts; zinc, 5 parts. — 13. (*Common Buttonmakers'.*) Button brass, 6 parts; tin, 1 part; lead, 1 part; mix. —14. (*Mallet's.*) Copper, 25.4; zinc, 74.6; used to preserve iron from oxidizing.—15. (*Best for Clocks.*) Rose copper, 85 parts; zinc, 14 parts; lead, 1 part. The following formulæ, especially intended as brass for machinery work, are also added: 1. Copper, 2 lbs.; tin, 2½ oz.; zinc, ½ oz. — 2. (*Tough.*) Copper, 10 oz.; tin, 1½ oz.; zinc, 1½ oz. — 3. (*Wheels and Valves.*) Copper, 90 lbs.; tin, 10 lbs. — 4. (*Tenacious.*) Copper, 88.9 parts; tin, 8.3 parts; zinc, 2.8 parts. — 5. (*Lathe Bushes.*) Copper, 80 parts; tin, 20 parts. — 6. (*Machinery Bearings.*) Copper, 88 parts; tin, 12 parts. — 7. (*Boxes for Engines Running at High Speed.*) Copper, 7 lbs.; tin, 1 lb.; add spelter, 1 lb. to every 40 lbs. of the mixture. Use steel piston rods for high speed, and lignum vitæ or apple tree wood for shoes or gibbs on the cross-heads.

BEDDING-DOWN.—In bedding down brasses or journal boxes of any description, the following plan should be employed to gauge as much as requires to be chipped or filed away from any part of the bed of the brass to enable it to bed to its seat all over: Take ordinary red marking, composed of Venetian red and common oil, mixed to a thick paint, and paint over the bed into which brass is to be fitted; then take putty, mixed stiffly; roll into pellets, the size of a large pea; place them here and there upon the painted surface; then drive the brass home and drive it out again, when it will be found that the thickness to which the pellets have been smashed by the bottom of the brass registers, to the greatest possible exactitude, how near the bottom of the brass comes to the bed of the bottom of the bearing, indicating the amount to be taken off the bottom of the brass to bed it. Be careful not to take too much off at first, and repeat the process with the pellets. Carefully replace the old pellets with new ones at each trial, otherwise you will be misled. Painting with red marking before placing the pellets, causes them to stick to the box and not to the brass, and pre-

FITTING.—In doing this, a piece of wood must be used to hammer on in driving them in and out; driving them with the hammer, a piece of metal, or a mandrel, stretches the skin and enlarges the diameter across the bore; then when the brasses are bored and the stretched skin is removed, the brass resumes its original shape, and becomes loose in the strap or box. In fitting brasses leave them a little too tight; all brasses contract across the bore in the process of boring. This rule applies to journal boxes of cast iron or any other metal.



Front Tool for Brass Work.

FRONT TOOL. — As shown in the engraving, this tool is ground to suit either roughing out or finishing. For slight work limble to spring, it may be ground more keen on the side faces, the top face not requiring under any circumstances to be ground keener than is shown. When held far out from the tool-post, the top face should be ground away, sloping down toward the cutting edge, to prevent the tool from jarring. It should be hardened right out, and not lowered or tempered at all, and used for roughing out at the following speed and feeds:

Size of Work, in Inches.	Revolutions of Lathe.	Feed.
1 and less	350	.25
2 to 5	250	.25
5 " 12	200	.25
12 " 20	150	.30

For finishing cuts, the cutting speed may be increased about 1-5, which rule will apply to its use upon yellow brass for roughing out as well as finishing purposes.

FROSTING.—Scour the brass with strong ley, and hold the work against a circular scratch brush of fine brass wire, secured in a lathe and driven at a high speed.

LACQUERING.—For flat work, cleanse by boiling the articles in strong potash water. Place the work on an iron plate, at a low heat, and pass the lacquer regularly and rapidly over the surface with a good sized fine camel's hair brush, keeping the iron plate warm until the work is dry. Small circular work, after being cleansed, and burnished if need be, and slightly heated in a stove or over a charcoal fire, should have the lacquer thinly and evenly applied while in motion in the lathe, holding a charcoal brazier under the work for a short time, to avoid cooling too soon.

MELTING.—Place the article in a sand crucible with a little borax. A coal fire with a good draught is necessary to melt it. When ready, place the crucible well down in the fire.

ORMOLU.—The ormolu of the brass founder, known as an imitation of red gold, is used by the French workmen in metals. It is found in combination with grate and stove work. It is composed of a greater portion of copper and less zinc than ordinary brass, is cleaned readily by acid, and burnishes with facility. To give this material the rich appearance, it is not unfrequently brightened up after cleaning in acid by means of a scratch brush, the action of which helps to produce a brilliant gold-like surface. It is protected from tarnish by the application of lacquer.

PARTING TOOL.—The parting tool for brass is governed by the same principle as that for iron, save that its top face must be ground level, except where the cutting edge stands far out from the tool-post, in which event the top face must

Parting Tool for Brass.

be ground away at an angle of which the cutting edge is the lowest part. It is rarely necessary for brass work to grind the cutting edge much below the level of the top face of the body of the tool, as is shown for use on wrought iron. The degree of hardness of the tool should be the same for brass as that given for wrought iron.

PATTERNS.—In making a pattern for a brass to fit in a semi-octagonal bed such as is employed in pillar-blocks, and sometimes in the small ends of connecting rods and axle boxes; after having made the bed of the brass to the same shape as the seat into which it beds, take off 1-16 in. in brasses below 3 in. bore, or $\frac{1}{8}$ in. in brasses above that size, from the crown face of the brass pattern, for the following reasons: The casting of iron or of brass contracts, in cooling, most at the sides, and the above is to compensate for this. It will require only 1-16 in. to be cut off the angles to let a brass (having bed angles at 40°), down $\frac{1}{8}$ in. on the crown; whereas it will require $\frac{1}{8}$ in. taken off the crown face to let the bed angles down 1-16 in. A strict observance of this rule will save half the time required to fit such brasses to their places. In brasses whose bed angles are more acute, a greater allowance must be made.

PINCHBECK. — Put into a crucible 5 oz. pure copper; when it is in a state of fusion, add 1 oz. zinc. These combine, forming an alloy not unlike jewelers' gold; pour it into a mold of any shape. This alloy is used for inferior jewelry. Some use only half this quantity of zinc, in which proportion the alloy is more easily worked, especially in the making of jewelry.

POLISHING.—Rub the metal with rotten stone and sweet oil; then rub off with cotton flannel, and polish with soft leather. A solution of oxalic acid rubbed over tarnishhd brass soon removes the tarnish. The acid must be washed off with

water, and the brass rubbed with whiting and soft leather. A mixture of muriatic acid and alum dissolved in water imparts a golden color to brass articles that are steeped in it for a few seconds. The following may be used for polishing brass work: 1. Seed lac, dragon's blood, annatto and gamboge, each 4 oz.; saffron, 1 oz.; spirit of wine, 10 pts. — 2. Alcohol, 1 pt.; turmeric, 1 oz. (powder); annatto, 2 drs.; saffron, 2 drs.; agitate occasionally for a week; filter, and add seed lac, 3 oz., and let stand 2 weeks with occasional agitation. Keep well stoppered.

SCALE. — To remove the scale from brass castings to give a surface on which solder may be flowed with a hot copper, dissolve 6 oz. bichromate of potash in 3 pts. warm water; when cool, add 6 fluid oz. sulphuric acid. Rinse the castings well after pickling in this solution.

SCRAP.—To utilize scrap brass melt it in with new brass, putting it in with the zinc after the copper is melted.

SETTING. — In setting brasses or any other journal boxes to be bored, place a piece of sheet tin between the joint of the brasses, and bore the brasses or boxes the thickness of the tin too large, which thickness may be gauged by placing a small piece of the same tin under the leg of the inside calipers when trying the bore. Practice demonstrates it to be an invariable rule that a $\frac{1}{2}$ circle or $\frac{1}{2}$ hole, whether in a movable brass or in a solid box, will never fit down upon its journal, but will bind upon the edges across the diameter, and must be scraped or filed on the sides to let the crown down. This defect is obviated by the employment of the sheet tin, which will save $\frac{3}{4}$ the time required to fit such work to a good bearing. This plan is advantageous in boring eccentric straps and large brasses; and the larger the size, the thicker the tin may be.

SIDE TOOL. — This tool fills the same place with reference to brass that the side tool and knife tool do to iron work; it has no superior for taking out corners, for cutting out holes or recesses which do not pass entirely through the metal. In conjunction with the front tool for brass it will perform any duty upon either inside or outside brass work, except cutting out narrow grooves. Its cross section is somewhat diamond shaped; and it is made right and left by bending in opposite directions. It is a better tool than those bent round at the end after the manner of a boring tool; and being more rigid, it is easier to forge and grind, and less liable to jar. It is applicable as a roughing out or a finishing tool. It should be hardened right out, and used at the speeds and feeds given for the front tool for brass.

Side Tool for Brass.

SOFTENING.—Heat it to a low red and plunge in water. It cannot be hardened except by rolling or hammering.

TEMPERING. — Brass is rendered hard by hammering or rolling. When making anything of brass necessary to be in temper, prepare the material before shaping the article. Temper may be drawn from brass by heating it to a cherry red, and then simply plunging it into water the same as when tempering steel.

TUBES.—Brass or other tubes are made of rolled metal, cut to desired width by revolving discs; in the large sizes, the metal is partially curved in its length by a pair of rolls; when in this condition, it is passed through a steel hole or a die, a plug being held in such a position as allows the metal to pass between it and the interior of the hole. Oil is used to lubricate the metal; the motion is communicated by power, the drawing apparatus being a pair of huge nippers, which holds the brass and is attached to a chain and revolves round a windlass or cylinder. The tube in its unsoldered state is annealed, bound round at intervals of a few in. with iron wire, and solder and borax applied along the seam. The operation of soldering is completed by passing the tubes through an air-stove heated with "cokes" or "breezes," which melts the solder and unites the 2 eyes of the metal and forms a perfect tube; it is then immersed in a solution of sulphuric acid to remove scaly deposits, the wire and extra solder having been previously removed; drawn through a "finishing hole plate," and the tube is complete. Mandrel drawn tubes are drawn upon an accurately turned steel mandrel, by this means the internal diameter being rendered smooth. The tubes drawn by this process are adapted for telescopes, syringes, small pump cylinders, etc. The brass tubes for the boilers of locomotive engines are made by casting and drawing without being soldered, and some of them are drawn taper in their thickness. Tubes 1-10 in. internal diameter and 8 or 10 in. long, up to those of 2 or 3 in. diameter and 4 or 5 ft. long, are drawn vertically by means of a strong chain wound on a barrel by wheels and pinions, as in a crane. In Donkin's tube drawing machine, which is applicable to making tubes, or rather cylinders, for paper making and other machinery as large as $26\frac{1}{2}$ in. diameter and $6\frac{1}{2}$ ft. long, a vertical screw is used, the nut of which is turned round by toothed wheels driven by a windlass. The fluted tubes of pencil cases are drawn through ornamental plates with elevations and depressions corresponding to the impressions left on the tube.

TUBES, BENDING.—Run melted lead or resin into the pipe till full; then bend it gradually into any desired shape; the pipe may then be heated and the lead or resin melted and run out.

UNITING WITHOUT SOLDER.—The brass rims of the large mural circles for observatories are sometimes cast in 6 or more segments, and attached by burning. The ends of the segments are filed clean, 2 pieces are fixed vertically in a sand mold in their relative positions, a shallow

space is left around the joint, and the entire charge of the crucible, say 30 to 40 lbs. of the melted brass, a little hotter than usual, poured on the joint to heat it to the melting point. The metal overflows the shallow chamber or hole, and runs into a pit prepared for it in the sand; but the last quantity of metal that remains solidifies with the ends of the segments, and forms a joint as perfect as the general substance of the metal; the process is repeated for each joint of the circle.

WATERED.—1. To put on a watered or mottled appearance to brass articles, the brass is first polished, and if it is a fine surface the mottled appearance is imparted by rubbing over it with a gyratory motion a Scotch gray stone moistened with water. If the work is not fine, a piece of fine emery paper may be used in the same way. If it is coarse, a dead smooth file may be used. — 2. Secure emery cloth or paper to the end of a small round stick, placing the stick in the universal chuck of a lathe, holding the work against it with a light pressure, and moving it along while the lathe revolves.

COPPER.

CASTING. — Cast in green sand and not in dried molds, using 1½ lbs. zinc as a flux, as pure copper will not run sufficiently free to prevent honeycombing.

CLEANING.—1. (*Coins.*) Boil in a strong aqueous solution of caustic soda; rinse in soft water, and dip bright in nitric acid, and quickly rinse again. Polish with a little putty powder, rouge or tripoli. — 2. (*Specimens.*) Use a strong solution of cyanide of potassium and a stiff brush; rinse in cold, then in hot water; as soon as dry, coat with colorless shellac varnish thinned with alcohol, otherwise the metals will soon tarnish again. — 3. (*Buttons.*) To remove tin, solder and dirt, cleanse first in a boiling solution of 3 parts caustic soda, 1 part nitre and 5 parts water, and then in dilute sulphuric acid; or dip momentarily in warm nitric acid, sp. gr. 1.2, and wash immediately in running water.

COATING CASTINGS.—1. The article should be rendered free from rust by rubbing with an emery cloth, or by dipping it into a pickle composed of sulphuric acid, 2 oz.; hydrochloric acid, 1 oz.; water, 1 gal. After remaining some time in this pickle it should be taken out, and the rust removed by a brush and wet sand; if the oxide cannot easily be cleaned off it must be returned to the pickle. As soon as the article is bright it is washed in a warm solution of soda or potash to remove grease; lastly, it is rinsed in hot water, and placed in a concentrated solution of sulphate of copper, to which a little sulphuric acid has been added. In a short time it will be coated with metallic copper. — 2. Have the article clean; then wash with the following solution, and it presents at once a coppered surface: Rain water, 8 lbs.; sulphate of copper, 1 lb.

COATING WITH IRON.—10 parts ferrocyanide of potassium and 20 parts tartrate of soda are dissolved in 220 parts distilled water, adding a solution of 3 parts sulphate of iron in 50 parts water. Caustic soda solution is poured into the mixture until the Prussian blue formed is redissolved.

COPPER DIP. — The solution used by fixture manufacturers on their iron castings is copper sulphate, 3½ oz.; sulphuric acid, 3½ oz.; water, about 1 gal.; place the clean casting in a tumbling barrel with sawdust, bran, or sand moistened with this solution, and revolve a few minutes; a longer exposure will spoil the film of copper deposited. In place of tumbling the articles, they may be rubbed with this mixture.

ENAMELING.—1. Flint glass, 6 parts; borax, 3 parts; red lead, 1 part; oxide of tin, 1 part; mix all together, frit, grind into powder, make into a thin paste with water, apply with a brush to the surface of the vessels, after sealing by heat and cleaning them; repeat with a second or even a third coat; then dry, and fuse on by heat of an enameled kiln. — 2. Pulverize finely 12 parts fluor spar, 12 parts unground gypsum, and 1 part borax, and fuse together in a crucible; when cold, mix with water to a paste, and apply to the interior with a paint brush; when dry the vessel should be baked in a muffle or furnace.

LUSTER.—Obtained by dissolving a piece of zinc with muriatic acid, and mixing the solution with spirit of tar, and applying it to the surface of the iron.

PLATINIZING.— In order to obtain a platinizing fluid capable of platinizing copper, yellow metal and brass, add to a moderately concentrated solution of chloride of platinum, finely powdered carbonate of soda until effervescence ceases; next some glucose, and afterwards as much common salt as will cause a whitish-colored precipitate. When desired to apply this mixture for platinizing, the objects to be treated are placed in a vessel made of zinc, perforated with holes; the vessel then placed, with its contents, for a few seconds in the mixture, which, previous to using, should be beaten to 60° C. On being removed from the zinc vessel, the objects are to be washed with water and dried in sawdust.

PURIFYING. — Black oxide of manganese, 1 part; copperas and common salt, 4 parts each; dissolve in soft water, and boil till dry; when cool, pulverize, and mix freely with nice welding sand. When you have poor iron, heat it, and roll it in this mixture; working for a time, reheating, etc., will soon free it from impurities; by this process you can make good horse nails out of common iron.

REFINING. — Copper may be separated, in a state of purity, from antimony, arsenic, bismuth, lead, iron, tin, zinc, etc., as it exists in bell-metal, brass, bronze, gun-metal, mosaic gold, and other commercial alloys, by fusing it in a crucible for ½ hour, along with copper scales (black oxide) and ground bottle-glass, or other like flux. The

pure metal is found at the bottom of the crucible, whilst the impurities are volatilized or dissolved in the flux. The proportions for refining commercial copper are, metal, 10 parts; copper scales and bottle-glass, each 1 part.

TIN. To Remove.—Immerse the article in a solution of blue vitriol. To remove tin from plates without acid, boil the scrap tin with soda lye in presence of litharge.

WELDING.—Boracic acid, 2 parts; phosphate of soda, 1 part; mix. This powder should be strewn over the surface of copper at a red heat; the pieces then heated up to a full cherry red, or yellow heat and brought under the hammer. Heat the copper at a flame, or gas jet, where it will not touch charcoal or solid carbon.

WIRE DRAWING.—To draw copper wire, which is too large, down to a smaller size, take a well annealed piece of good tool steel ¼ in. thick, drill in it several holes of the size of the smallest wire to be drawn, make them all tapering, and enlarge with a reamer so that the holes will vary regularly down to that of the smallest wire to be drawn. Harden the plate, polish the holes, reduce the size of the end of the wire, and draw it through the several holes in succession, greasing it before each drawing, and annealing it whenever it becomes stiff.

IRON.

BEVEL GEARS. — These are turned a certain bevel to correspond with each other, according to the angle upon which the shafts driven by them are set. If 2 shafts are set upon an angle of 90°, the surfaces of the faces of these gears will stand at an angle of 45°. To get the surface of these gears, in turning them, put a straight edge across the face. Then set the level on an angle of 45°, and try the face of the teeth by placing the level on the straight edge. After turning the face of the teeth, square the outer diameter by the face of the teeth; and to get the size to which you wish to cut, measure from the centre of the face of the teeth.

BLUING WIRE.—1. To blue small wire articles, such as hair pins, fish-hooks, etc., dip them in a lacquer composed of a good quality of alcoholic shellac varnish to which has been added a little aniline blue. — 2. Demar varnish, ½ gal.; fine ground Prussian blue, ½ oz.; mix; makes a splendid appearance. Excellent for bluing watch-hands.

BRASSING WIRE. — To give iron wire a permanent brassing, place the wire, cleaned, in a solution of sulphate of copper, when it immediately becomes covered with a thin film of copper; now cover with a paste of pure oxide of tin, and heat hot enough to fuse the copper.

BRAZING CAST IRON. — There are 2 ways of joining cast iron: 1. Fit the broken pieces exactly together in molding sand and pour melted iron over the parts to be joined. When cold, chip off the superfluous metal and the joint will scarcely be detected. — 2. Well tin the parts to be joined, fit together in sand as above, and pour melted brass over them,

BREAKING OLD CASTINGS. — 1. Old cannon and massive castings may be cut in two by a continuous stream of hot molten iron, which wears away the iron as a stream of hot water would eat into a mass of ice.—2. The gun may be rolled on a frame to the mouth of a furnace, and the muzzle end shoved in as far as possible among other iron, the opening filled up and luted around the gun, the end of which is melted off. At the next charge shove it in another length, and so on until the breech is disposed of. — 3. Large masses of cast iron may be broken up by drilling a hole in the most solid part, filling it up with water, fitting a steel plug accurately into the hole, and letting the drop of a pile driver descend on the plug with its irresistible force.

BRIGHTENING.—When taken from the forge or rolls, articles may be placed in dilute sulphuric acid (1 to 20) for an hour; then washed clean in water, dried with sawdust, dipped for a second or so in nitrous acid, washed and dried as before, and finally rubbed clean.

BURNT IRON, Restoring.— Give a smart heat, protected from the air; if injured by cold hammering, anneal slowly and moderately; if hard or steely, give one or more smart heats, to extract the carbon.

CASE-HARDENING.—The operation of giving a surface of steel to pieces of iron, by which they are rendered capable of receiving great external hardness, while the interior portion retains the toughness of good wrought iron. Iron tools, fire-irons, fenders, keys, etc., are usually case-hardened. — 1. The goods, finished except polishing, are put into an iron box, and covered with charcoal, and cemented at a red heat, for a period varying with the size and description of the articles operated on.—2. Cow's horn or hoof is to be baked or thoroughly dried and pulverized. To this add an equal quantity of bay salt; mix them with stale chamber-lye, or white wine vinegar; cover the iron with this mixture, and bed it in the same in loam, or inclose it in an iron box; lay it then on the hearth of the forge to dry and harden; then put it into the fire; then blow till the lump has a blood-red heat, and no higher, lest the mixture be burnt too much. Take the iron out, and immerse it in water to harden.—3. The iron, previously polished, is to be heated to a bright-red and rubbed or sprinkled over with prussiate of potash. As soon as the prussiate appears to be decomposed and dissipated, plunge the article into cold water.—4. Make a paste with a concentrated solution of prussiate of potash and loam, and coat the iron; then expose it to a strong red heat; and when it has fallen to a dull red, plunge the whole into cold water.—5. To harden to any considerable depth, put the article into a crucible with cyanide of potash; cover over and heat altogether, then plunge into water. This process will harden to the depth of 1 or 2 in. (See *Tempering*, in STEEL.)

CASTINGS, Holes in. — To prevent holes in castings when casting on iron or steel spindles, the molds are cast endwise, letting the cast metal

covering the spindle be an in. longer on the uppermost side than is necessary when the job is finished; the air-holes, if any, will form in the extra in. of length, and may be cut off in the lathe.

COATING WITH EMERY. — Give the iron a good coat of oil and white lead; when this gets hard and dry, apply a mixture of glue and emery.

COATING WITH QUICKSILVER.—Clean the iron first with hydrochloric acid; then immerse it in a dilute solution of sulphate of copper mixed with a little hydrochloric acid, when it will become covered with a layer of copper. It is then to be brought into a diluted solution of mercurial sublimate mixed with a few drops of hydrochloric acid. The article will become covered with a layer of mercury, which cannot be removed even by rubbing. This is a protection from rust.

CUTTERS FOR BOILER-PLATES AND SIMILAR WORK.—Cutters are steel bits, held in either a stock or bar, fitted and keyed to the same; by this means, cutters of various shapes and sizes may be made to fit one stock or bar, obviating the necessity of having a multiplicity of these tools. Of cutter-stocks, which are usually employed to cut out holes of comparatively large diameter, as in the case of tube-plates for boilers, there are two kinds, the easiest to be made being that shown in *Fig. 1*. *A* is the stock, through which runs a slot or key-way into which the cutter, B, fits, being locked by the key, *C*. *D* is

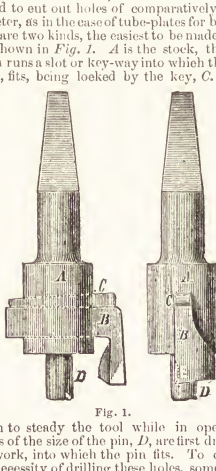


Fig. 1.

a pin to steady the tool while in operation. Holes of the size of the pin, *D*, are first drilled in the work, into which the pin fits. To obviate the necessity of drilling these holes, some modern drill-stocks have, in place of the pin, *D*, a conical-ended pin which acts as a centre, and which fits into a centre punch mark made in the centre of the hole to be cut in the work. Most of these devices are patented, and the principle upon which they act will be understood from *Fig. 2*. *A* being the stock to which the cutters *B B*, are bolted with 1 or more screws. *C* is a spiral spring working in a hole in the stock to receive it. Into the outer end of this hole fits, at a working

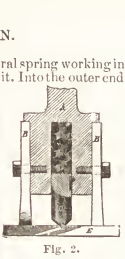


Fig. 2.

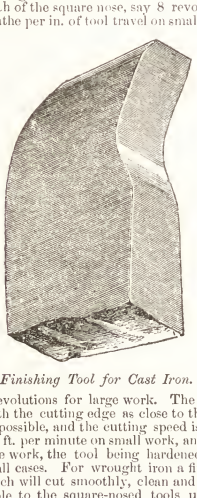
fit, the centre, *D*, which is prevented from being forced out (from the pressure of the spring, *C*), by the pin working in the recess. *E* is the plate to be cut out, from which the centre, *D*, is forced into the centre-punch mark in the plate by the spring, *C*, and serves as a guide to steady the cutters and cause them to revolve in a true circle, so that first drilling a hole, as required in the ene-employment of the form of stock shown in the first figure, is obviated.

ENAMELING CAST IRON. — To enamel cast iron and hollow-ware, use one of the following compositions: 1. Calcined flints, 6 parts; Cornish stone or composition, 2 parts; litharge, 9 parts; borax, 6 parts; argillaceous earth, 1 part; nitre, 1 part; calx of tin, 6 parts; purified potash, 1 part. — 2. Calcined flints, 8 parts; red lead, 8 parts; borax, 6 parts; calx of tin, 5 parts; nitre, 1 part. — 3. Potter's composition, 12 parts; borax, 8 parts; white lead, 10 parts; nitre, 2 parts; white marble, calcined, 1 part; purified potash, 2 parts; calx of tin, 5 parts.— 4. Calcined flints, 4 parts; potter's composition, 1 part; nitre, 2 parts; borax, 8 parts; white marble, calcined, 1 part; argillaceous earth, ½ part; calx of tin, 2 parts. Any one of the above which may be used, must be powdered, mixed and fused. The vitreous mass is to be ground when cold, sifted, and levigated with water; it is then made into a pap with water or gum water. This is brushed over the interior of the vessel, dried and fused with heat in a muffle. Clean the vessels before applying. — 5. Take powdered glass, 1 lb.; feldspar, 8 oz.; borax, 12 oz.; saltpetre, 4 oz.; oxide of zinc, 1 oz.; mix, and fuse in a crucible; then pour out on a slab to form thin cakes. When cold, the material is powdered and ground with water by millstones, when it is ready for use. The iron ware prepared to receive the composition, is covered with the enamel in a moist condition, and allowed to dry; then heated to dull redness in a muffle; the result is a vitrified, brilliant enamel, which adheres strongly to the metal. To obtain various colors the following chemicals may be added to the enamel body before the first melting: For blue, oxide of cobalt; green, carbonate of potassa and sulphur, a fine shade; red, ammoniated copper; black, peroxide of manganese; brown, oxide of iron; yellow, oxide of uranium; gray, 2 parts oxide of tin to 1 of manganese; and white, oxide of tin alone.

FACING CAST IRON.—For squaring or facing up cast iron surfaces, a round end tool is best. A rough chip should first be taken off, over the entire surface to be faced; then speed the lathe up, and, taking a light chip, enough to take out the first tool mark, run over the entire surface again. In turning up surfaces it is best to begin at the centre and feed out, as the tool cuts freer and will wear twice as long.

FACINGS FOR CASTINGS.—1. As a facing for loam castings use fire-sand, 3 parts; Whitehead sand, 1 part; mix.—2. For pipes and small cylinders, use No. 1, or fine sand, facing with plumbago. Albany or Waterford sand is excellent for fine castings; or, use 1 part sea coal to 8 or 10 Albany sand; 1 part to 5 will do for heavy castings.—3. To insure smooth castings, mix with the green foundry sand 1-20 part tar.

FINISHING TOOLS.—Cast iron may be finished true and smoothly by a tool having a broader cutting and scraping surface than is applicable to any other metal; the tool shown in the illustration is therefore used, setting it so that its square nose is placed parallel with the work, and feeding it with a feed almost as coarse as the width of the square nose, say 8 revolutions of the lathe per in. of tool travel on small work,



Finishing Tool for Cast Iron.

and 3 revolutions for large work. The tool is held with the cutting edge as close to the tool-post as possible, and the cutting speed is about 25 to 30 ft. per minute on small work, and 18 ft. on large work, the tool being hardened right out in all cases. For wrought iron a finishing tool which will cut smoothly, clean and true is preferable to the square-nosed tools used for finishing iron, since such tools do not turn wrought iron true, but follow the texture of the metal, cutting deepest in the softer parts, especially when their edges become in the least dull. This tool should be held with the cutting edge as close in to the tool-post or clamp as it can be with a quick speed and fine feed, soapy water being applied to the work. It may be used for taking light roughing cuts on small work, and is an excellent tool upon work so slight as to be liable to spring, for which the cutting point should not be much rounded. Ground keen, it will answer for copper work, the cutting speed being great; at least fourfold that given below, which is for finishing cuts on wrought or cast iron.

Size of Work, Inches Diameter.	Cutting Speed, Feet per Minute.	Feed.
1 and less	38	30
1 to 2	30	25
2 " 5	25	20
5 " 12	23	20
12 " 20	20	16
20 and over	18	14

Finishing Tool for Wrought Iron or Steel.

This tool should be hardened right out; and if used upon cast iron, it should have less keenness upon the top face; the plane of the top face should be ground more nearly to the same plane as the top face of the body of the tool. For use upon steel, the top face must be ground more nearly horizontal, a rule which applies to all tools used upon wrought iron. It should be placed in the lathe so that its cutting edge stands above the horizontal centre line of work.

GALVANIZING.—Cleanse the articles in a chaffing mill, which consists of a barrel revolving on its axis, containing sand; when the sand is removed, take them out and heat one by one, plunging while hot in a liquid composed as follows: 10 lbs. hydrochloric acid and sufficient sheet zinc to make a saturated solution. In making this solution, when the evolution of gas has ceased, add muriate or sulphate of ammonia, 1 lb., and let it stand till dissolved. The castings should be so hot that when dipped in this solution and removed they will quickly dry, leaving the surface crystallized like frost-work. Next plunge them while hot, but dry, in a bath of melted zinc, previously skimming the oxide on the surface away, and throwing thereon a small amount of powdered sal ammoniac. If the articles are small, inclose them in a wrought iron basket on a pole, and lower them into the metal. When this is done, shake off the superfluous metal, and cast them into a vessel of water to prevent them adhering when the zinc solidifies.

HARDENING CAST IRON.—1. Salt, 2 lbs.; saltpetre, ½ lb.; roche alum, ½ lb.; ammonia, 4 oz.; salts of tartar, 4 oz. Pulverize all together, and incorporate thoroughly. Use by powdering all over the iron while hot, then plunging in cold water. — 2. To 1 pk. salt add 1 pt. oil of vitriol, and ½ lb. saltpetre, dissolved in 10 gals. water; mix well. Heat the iron to a cherry red and dip it therein; this will harden cast iron to an unusual degree.

JAPANNING CASTINGS. — Clean them well from the sand; then dip them in or paint them over with good boiled linseed oil; when moderately dry heat them in an oven to a temperature that will turn the oil black without burning. The stove should not be too hot, but the heat gradually raised to avoid blistering; the slower the change in the oil is effected the better the result. The castings, if smooth at first, will receive a fine black and polished surface.

KEYS AND KEY-WAYS. — To insure an easy entrance, apply oil to the key-way and enter the key, marking where it binds, avoiding extreme tightness at the sides, and securing the lock by a proper taper at the rate of about ⅛ in. to the ft. of length. To ease hardened key-ways and slots, use a strip of copper as a file on the surface of the metal, together with emery and oil. To plane a key way in a shaft, drill a hole the size of the way the depth you wish to plane; then plane the key-way narrower than the intended size; this is done with a square point tool; afterwards finish with a tool of desired size; this insures a neater finish, than the use of one tool only. To insure true cutting in adjusting a tool for cutting a key-way, test each side of it by a square set on the planer bed, to see that it is perpendicular. To plane a T shaped slot or way, plane to desired depth with a square point tool, then plane the upper part of the way to proper width. Now plane the bottom part of the way with 2 tools, each being bent to a different angle, one to the right and the other to the left. Shallow ways may be cut out, the upper width and proper depth, then finished with one tool shaped the desired form of the way. Powerful tools should be used in planing large ways in order to avoid breaking, and should cut easily on each of the 3 sides. Use a sheet iron gauge and plane the way to conform to it. To plane a gibe rest or slide, plane it all over, omitting the slide, on both sides; then set the planer head at an angle of 30°, and finish the slide with a taper point tool. In planing thin cast iron surfaces, it is necessary, in order to prevent springing owing to the expansion of the scale, to plane over a cut on each side previous to finishing either. To close a quadrant or link that has sprung or opened in hardening, clamp with bolts and plates, placing the die in the slot to support any part which does not require to be closed. To open the slot of a quadrant or link that has closed in being hardened, take 2 keys having an equal amount of taper upon them, and place them together so that their outside edges are parallel. Insert them in that part of the slot requiring to be opened, and holding a hammer against the head of one key on one side of the link, drive in the other key with a hammer on the other side of the link. After the key is driven as far in as the judgment suggests, measure the width of the slot, so that, if the operation was not performed to a sufficient extent on the first attempt, the operator may judge how much to essay at the second, and so on. To prevent a slot link or quadrant from altering its shape in the process of hardening, fit into the slot, at various parts along its length, pieces of iron of the same diameter as the die intended to work in the slot, and in quenching the quadrant, immerse it endwise and vertically.

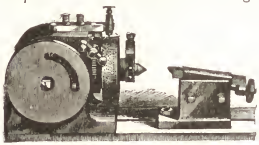
MALLEABLE IRON CASTINGS.—2 oz. fluoric acid, 1 oz. nitric acid, 1 oz. saltpetre, to 10 lbs. metal. When the metal is melted, add the solution. It can be made in a crucible in a brass furnace. When the patterns are cast off, the castings want keeping at red heat for 3 or 4 days in iron boxes in a furnace. For the purpose of casting, pig of a fine quality is needed, and great care is used in preparing the molds, so that there may be no imperfection in casting. The latter, after cooling, is hard and brittle, and it is to remove this and give it the character of malleable iron that the special process is required. The casting is now placed in hermetically sealed pots or boxes, surrounded by powdered ore, and subjected for several days to intense heat, which, by cementation, gradually softens it and renders it malleable to the core, when it may be bent into any shape. The annealing process takes about 10 days. Thus a pot made up on Tuesday is got up to a white heat about Friday, and this heat is maintained for some 24 hours or more, according to the size or thickness of the article annealed. The fire is then allowed to die down, and when the mass is cool the castings are found to be thoroughly annealed and malleable.

MENDING BROKEN IRON.—Zinc dissolved in mercury; mix well; then take the pieces of iron to be joined and sprinkle; stick the 2 pieces together, and keep it pressed close till dry.

MENDING CRACKED VESSELS.—Drill a hole at each extreme end of the crack, to prevent its further extension; plug rivet the holes with copper, and with fine iron filings saturated with urine caulk the crack; 4 parts pulverized clay and 1 part iron filings made into a paste with boiling linseed oil, and applied hot, is a good cement for the same purpose.

MILLING MACHINE. — A milling machine bears the same relation to iron working machines that a molding machine does to wood working machines. In both the work is reduced to shape by rotary cutters, so that the most complex shapes can be made, and even the tools to accomplish this purpose made by the machine itself. These machines can be operated by a cheaper class of labor than any other producing the same work. For finishing nuts and heads of bolts and set screws, the saving of files would, in many shops, more than pay the interest on the cost of a machine. The mills for plain work are cheaply made and extremely durable. By using a proper grinding machine, the mills are ground as readily as a lathe or planer tool. For fluting taps or reamers its superiority over a planer is obvious; the milling tool, if of prop-

er shape, removes all the metal at one cut, and accomplishes the result without disturbing the



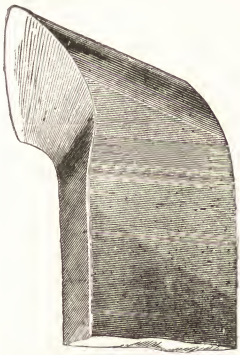
Universal Head.

grain of the steel at the cutting edges of the tap or reamer; while the planer jumps from thread to thread, tearing the corners and straining the steel, so that much filing has to be done in finishing. For cutting key-seats there can be no substitute for the milling machine; the metal is removed at one cut, and of exactly the right width and depth; and 100 to 1,000 may be cut with one cutter, and each one be a duplicate. The illustration represents the "universal head." By the aid of this valuable adjunct, spurs and bevel gears can be cut, and work milled at any angle or position. It takes in work 18 inches long.

PATTERNS, For Cast Iron.—These should be made smooth, then slightly warmed and waxed over with best beeswax.

POLISHING.—1. To polish bar iron and steel, take an ordinary bar of malleable iron; remove the oxide from its surface with diluted sulphuric acid, after which wash the bar in an alkaline solution, then cover it entirely with oil or petroleum. The bar is then ready for the process. A muffle furnace is so prepared that a nearly uniform heat can be maintained within it, and in this the bar is placed. Care must be taken that too great a heat is not imparted to it. When the bar approaches a red heat just perceptible, the proper degree has been attained. The bar is then removed and passed through the finishing rolls 5 or 6 times, when it will be found to have a dark polished surface and the appearance of Russian sheet iron. — 2. A good polish for iron or steel rotating in the lathe, is made of fine emery and oil, which is applied by lead or wood grinders screwed together. 3 good oils for lubrication are olive, sperm and neat's foot. — 3. To make iron take a bright polish like steel, pulverize and dissolve in 1 qt. hot water the following: Blue vitriol, 1 oz.; borax, 1 oz.; prussiate of potash, 1 oz.; charcoal, 1 oz.; salt, ½ pt.; then add 1 gal. linseed oil; mix well; bring iron or steel to the proper heat, and cool in the solution.

ROUGHING TOOL.—The illustration represents the best form of tool for roughing out wrought iron, or for removing a large mass of that metal in the lathe or planing machine. When used on large work it should be tempered to a light straw color, which will leave it strong enough to stand without breaking the heavy strain due to the cut. It must be held firmly and with the cutting edge as close to the tool-post as it can be. The following are its rates of cutting speed and feed; the speed meaning the length of shaving it cuts off, and the feed implying the revolutions of the lathe to feed the tool an in. along its cut.



Roughing Tool for Wrought Iron.

Size of Work, Inches Diameter.	Cutting Speed, Feet per Minute.	Feed.
1 and less	35	.25
1 to 2	25	.20
2 " 5	20	.20
5 " 12	18	.15
12 " 20	16	.12
20 and over	15	.12

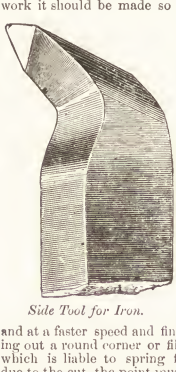
For work of 5 in. diameter and all sizes below, the tool should be made as hard as fire and water will make it, and not tempered. For work of a larger size it should be tempered to a light straw color. This tool, with the top face ground more nearly horizontal, is excellent for steel, and the harder the metal to be cut, the more nearly horizontal the top face must be. It should be placed, for lathe work, so that the cutting edge stands a little above the horizontal centre line of the work.

SCALING CAST IRON. — Vitriol, 1 part; water, 2 parts; mix, and lay on the diluted vitriol with a cloth in the form of a brush, enough to wet the surface well; after 8 or 10 hours wash off the water, when the scaly surface will be removed.

SIDE TOOLS.—The illustration represents a side tool for wrought iron, employed for squaring the ends of work held between the lathe centres, and in other cases where there is not sufficient room to admit a stouter tool. The cutting edge should be made more keen for wrought than for cast iron. In forging it, the hammering edgewise should be performed first, nor should any hammering be done to it edgewise after the steel has lost its redness. It should, for light duty and for all finishing purposes be hardened right out, and for heavy duty be tempered to a straw color. If this tool is employed

for heavy duty on a slotting machine, taking a cut, say, 2½ in. deep and ⅛ in. thick, it must be lowered to a brownish purple, and used at a cutting speed of about 10 ft. per minute, and be ground so that the cutting edge first strikes the cut near the body of the tool, and not at the point end. For ordinary work, it is best used with a comparatively fine feed and quick speed, since it is not sufficiently strong when made very hard to stand heavy duty.—*Side Tool for Wrought Iron, Cast Iron or Steel.* The illustration below represents the most superior side tool for use on wrought or cast iron or steel, the only difference being that it requires to be less keen for the latter than the former. It is used to cut side-faces and to take out round or square corners. For small work it should be made so that it will cut at the point, and not on both edges at one time when used in a square corner. For heavy work it may be made more round-nosed, and allowed to cut all round the curve; it will, in either shape, work well as a roughing out or finishing tool, only requiring to be ground keener to fit it for finishing purposes (which should be, on wrought iron, performed with soapy water applied to the work), and at a faster speed and finer feed. For taking out a round corner or fillet in slight work, which is liable to spring from the pressure due to the cut, the point must be rounded very little, the curve being made by operating both the straight and cross feeds of the lathe. This tool is made right or left-handed by bending it in the required direction, the illustration showing a left-hand tool. It should be made as hard as fire and water will make it, and used at the following speeds and feeds:

Side Tool for Squaring Ends of Wrought Iron Work.



Side Tool for Iron.

Diameter of Work, in Inches.	Speed, in Feet, per Minute.	Feed.
1 and less	30	.30
1 to 2	25	.25
2 " 5	22	.20
5 " 12	20	.20

When it is employed for roughing-out purposes, these speeds may be slightly diminished and the feeds increased.

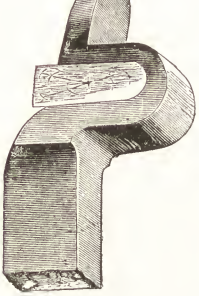
SLEIGH BELLS.—In making sleigh bells, the iron ball is put inside a sand core just the shape of the inside of the bell. Then a mold is made of the shape of the outside of the bell. This sand core, with the jingle inside, is placed in the mold of the outside, and the melted metal poured in, which fills up the space between the core and the mold. The hot metal burns the core so that it can be all shaken out, leaving the ball within the shell. Ball valves, swivel joints, and many other articles are cast in the same manner.

SOFTENING.—Either of the following methods will make iron or steel soft: 1. Anoint it all over with tallow, temper it in a gentle charcoal fire, and let it cool. — 2. Take a little clay, cover the iron with it, temper it in a charcoal fire. — 3. When the iron or steel is red hot, strew hellebore on it. — 4. Quench the iron or steel in the juice or water of common beans. — 5. To soften bright work without damaging the finish, place the pieces in an iron box, and fill in the interstices with iron turnings; close the box, lute the cracks with fire-clay, and heat to a red, allowing the box to cool slowly. It is a good plan to let the furnace fires go out and leave the box in the furnace to cool. — 6. To soften for drilling, heat cast iron to a cherry red; let it lie level in the fire; then, with a pair of cold tongs, put on a small piece of brimstone (the same to be smaller than the hole you wish to drill); this softens the iron entirely through. Let it lie in the furnace until it is somewhat cool, when it is ready to drill.

SOLDERING IRON PIPES TO LEAD. — File the end of the iron pipe bright; see that the soldering iron is well tinned; have the iron ready, and as hot as it will bear; wet the part to be tinned with spirits of salt that has had as much zinc chippings put in it as it will dissolve, then apply the solder with the iron. The pipe will have to be very hot with the iron before it will tin; it would be well to tin the iron pipe with a little block tin or pewter. If any difficulty is found in tinning the iron pipe, sprinkle a little powdered sal ammoniac over it when hot; this done, the lead pipe must be widened out so as to form a lip all round the iron pipe, and soldered, round with fine solder, keeping the heat of the iron on the iron pipe rather than the lead; or a plumber's joint may be made by pouring on a quantity of plumbers' solder from a ladle, and wiping off superfluous solder with a greased cloth.

SPRING TOOL.—The spring-tool is adapted to finishing sweeps, curves, or round or other corners, and answers for any metal. The face is given an upward incline to make it keen for wrought iron or steel. For brass work, this face should be made horizontally level; or, if the cutting stands with its cutting edge far out from the tool-post, it may be inclined downward to make it cut smoothly. The piece of wood driven in the bend is to correct any tendency of the tool to spring away from the hard parts of the metal. The spring-tool does not turn as true

as is desirable; still the smoothness of its finish makes it a desirable tool. It should have its face filed smoothly before being hardened, and should



Spring Tool.

not be ground on that face. The application of the oilstone improves it for finishing. It should be tempered to a brown color on the face and left soft around the bend.

STRAIGHTENING WIRE.—The most simple straightener is 3 steel pins driven into a plank. If the pins are properly arranged and the wire drawn over the first, under the second, and over the third, it may be straightened enough for some purposes.

TUBE MANUFACTURE.—In the present method of manufacturing the patent welded tube, the end of the skelp is bent to the circular form; its entire length raised to the welding heat in an appropriate furnace, and as it leaves the furnace at the point of fusion, it is dragged by the chain of a draw-bench, after the manner of wire, though a pair of tongs with 2 bell-shaped jaws opened at the time of introducing the end of a skelp, which is welded without the agency of a mandrel. By this arrangement wrought iron tubes may be made from the diameter of 6 in. internally and about $\frac{1}{8}$ to $\frac{3}{8}$ in. thick, to as small as $\frac{1}{4}$ in. diameter and 1-10 bore. Sometimes the tubes are made one upon the other when great thickness is required; but those stout pipes, and those larger than 3 in. are seldom required.

WEIGHTS OF BAR-IRON.—If a bar of iron be thicker than contained in the table, add together the weight of two numbers, or treble the weight of one number, Wanted, the weight of 1 ft. of bar iron, 4 in. broad and $2\frac{1}{2}$ in. thick. Opposite 4 and under 1 is 13.364, which, doubled, is 26.728; add the weight of $\frac{1}{4}$ (3.341), and it equals 30.069 lbs.

Breadth in Inches.	THICKNESS IN PARTS OF AN INCH.								
	$\frac{1}{4}$	5-16	$\frac{3}{8}$	7-16	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 In.
1	.835	1.044	1.253	1.461	1.670	2.088	2.506	2.923	3.340
$1\frac{1}{8}$	.939	1.174	1.409	1.644	1.878	2.348	2.818	3.287	3.755
$1\frac{1}{4}$	1.044	1.305	1.566	1.826	2.088	2.609	3.132	3.653	4.176
$1\frac{3}{8}$	1.148	1.435	1.722	2.009	2.296	2.870	3.444	4.018	4.592
$1\frac{1}{2}$	1 252	1.566	1.879	2.192	2.504	3.131	3.758	4.384	5.008
$1\frac{5}{8}$	1.358	1.696	2.035	2.374	2.716	3.392	4.070	4.749	5.432
$1\frac{3}{4}$	1.462	1.827	2.192	2.557	2.924	3.653	4.384	5.114	5.848
$1\frac{7}{8}$	1.566	1.957	2.348	2.740	3.132	3.914	4.696	5.479	6.264
2	1.671	2.088	2.475	2.922	3.342	4.175	5.010	5.845	6.684
$2\frac{1}{8}$	1.775	2.218	2.662	3.105	3.550	4.435	5.324	6.210	7.100
$2\frac{1}{4}$	1.880	2.348	2.918	3.288	3.760	4.696	5.636	6.575	7.520
$2\frac{3}{8}$	1.984	2.479	2.975	3.470	3.968	4.957	5.950	6.941	7.936
$2\frac{1}{2}$	2.088	2.609	3.131	3.653	4.176	5.218	6.262	7.306	8.352
$2\frac{5}{8}$	2.193	2.740	3.288	3.836	4.386	5.479	6.576	7.671	8.772
$2\frac{3}{4}$	2.297	2.870	3.444	4.018	4.594	5.740	6.888	8.036	9.188
$2\frac{7}{8}$	2.402	3.001	3.601	4.201	4.804	6.001	7.202	8.402	9.608
3	2.506	3.131	3.758	4.384	5.012	6.262	7.516	8.767	10.024
$3\frac{1}{4}$	2.715	3.392	4.071	4.749	5.430	6.784	8.142	9.498	10.860
$3\frac{1}{2}$	2.923	3.653	4.384	5.114	5.846	7.306	8.768	10.228	11.692
$3\frac{3}{4}$	3.132	3.914	4.697	5.479	6.264	7.828	9.394	10.959	12.528
4	3.341	4.175	5.010	5.845	6.682	8.350	10.020	11.690	13.364
$4\frac{1}{4}$	3.549	4.436	5.300	6.210	7.098	8.871	10.646	12.421	14.192
$4\frac{1}{2}$	3.758	4.697	5.605	6.575	7.516	9.393	11.272	13.151	15.032
$4\frac{3}{4}$	3.966	4.958	5.950	6.941	7.932	9.915	11.898	13.881	15.864
5	4.075	5.219	6.263	7.306	8.350	10.437	12.526	14.612	16.700
$5\frac{1}{4}$	4.184	5.479	6.573	7.671	8.768	10.958	13.152	15.343	17.536
$5\frac{1}{2}$	4.593	5.741	6.889	8.037	9.186	11.480	13.778	16.078	18.372
$5\frac{3}{4}$	4.801	6.001	7.202	8.402	9.602	12.002	14.404	16.804	19.204
6	5.010	6.622	7.515	8.767	10.020	12.524	15.030	17.535	20.042

WEIGHTS OF CAST IRON.—

WEIGHT OF A SUPERFICIAL FT. FROM $\frac{1}{4}$ TO 2 INCHES THICK.

Size.	Wt.	Size.	Wt.	Size.	Wt.	Size.	Wt.	Size.	Wt.
in.	Lbs.	in.	Lbs.	in.	Lbs.	in.	Lbs.	in.	Lbs.
$\frac{1}{4}$	9.37	$\frac{3}{4}$	23.43	1	37.50	$1\frac{3}{8}$	51.56	$1\frac{3}{4}$	65.62
$\frac{5}{16}$	14.06	$\frac{7}{8}$	28.12	$1\frac{1}{8}$	42.18	$1\frac{1}{2}$	56.25	$1\frac{7}{8}$	70.31
$\frac{3}{8}$	18.75	$\frac{15}{16}$	32.81	$1\frac{1}{4}$	46.87	$1\frac{5}{8}$	60.93	2	75.

WEIGHTS OF ROLLED IRON.—

FROM 1-16 IN. TO 12 IN. AND 1 FT. SQ.

Size in In.	Wt. in Lbs.	Size in In.	Wt. in Lbs.	Size in In.	Wt. in Lbs.	Size in In.	Wt. in Lbs.
1–16	.013	$2\frac{1}{4}$	17.112	$4\frac{3}{8}$	72.305	8	216.336
$\frac{1}{8}$	.053	$2\frac{5}{16}$	19.066	$4\frac{1}{2}$	76.264	$8\frac{1}{4}$	230.068
3–16	.118	$2\frac{3}{8}$	21.120	$4\frac{5}{8}$	80.333	$8\frac{1}{2}$	244.220
$\frac{1}{4}$	.211	$2\frac{7}{16}$	23.292	$4\frac{3}{4}$	84.480	$8\frac{3}{4}$	258.800
$\frac{5}{16}$	.475	$2\frac{1}{2}$	25.560	$4\frac{7}{8}$	88.784	9	273.792
$\frac{3}{8}$	.845	$2\frac{9}{16}$	27.939	$5\frac{1}{4}$	93.168	$9\frac{1}{4}$	289.220
$\frac{7}{16}$	1.320	$2\frac{5}{8}$	30.416	$5\frac{3}{8}$	97.657	$9\frac{1}{2}$	305.056
$\frac{1}{2}$	1.901	$2\frac{11}{16}$	33.010	$5\frac{1}{2}$	102.240	$9\frac{3}{4}$	321.332
$\frac{9}{16}$	2.588	$2\frac{3}{4}$	35.704	$5\frac{5}{8}$	106.953	10	337.920
$\frac{5}{8}$	3.380	$2\frac{13}{16}$	38.503	$5\frac{3}{4}$	111.756	$10\frac{1}{4}$	355.136
$\frac{11}{16}$	4.278	$2\frac{7}{8}$	41.408	$5\frac{7}{8}$	116.671	$10\frac{1}{2}$	372.672
$\frac{3}{4}$	5.280	$2\frac{15}{16}$	44.418	6	121.664	$10\frac{3}{4}$	390.628
$\frac{13}{16}$	6.390	3	47.534	$6\frac{1}{4}$	132.040	11	408.980
$\frac{7}{8}$	7.604	$3\frac{1}{16}$	50.756	$6\frac{1}{2}$	142.816	$11\frac{1}{4}$	427.812
$\frac{15}{16}$	8.926	4	54.084	$6\frac{3}{4}$	154.012	$11\frac{1}{2}$	447.024
1	10.352	$4\frac{1}{16}$	57.517	7	165.632	$11\frac{3}{4}$	466.674
$1\frac{1}{4}$	11.883	$4\frac{1}{8}$	61.055	$7\frac{1}{4}$	177.672	12	486 656
$1\frac{1}{2}$	13.520	$4\frac{3}{16}$	64.700	$7\frac{1}{2}$	190.136		
$1\frac{3}{4}$	15.263	$4\frac{1}{4}$	68.448	$7\frac{3}{4}$	203.024		

WELDING. — To obtain a good weld, the following points should be observed: The scarf should be larger than the finished side to permit the weld to be well drawn out after welding. The joint surface of the scarf should be rounding, so that, when the 2 pieces are placed together to weld, there will be no air inclosed between them. They should be heated in a clear fire of bright coal. Thick pieces should not be heated too quick, or the interior metal will not be brought to the required temperature. They should be frequently turned in the fire and made as hot as possible without burning them. They should be withdrawn occasionally and sprinkled with sand to exclude air, prevent oxidation and cool the outer surface and thin edges, so that the interior metal and thicker parts will have time to heat through. When the pieces are placed upon the anvil to weld they should be cleaned with a wire brush or a piece of wood made ragged; the scarfs placed to overlap each other, and receive light and quick blows at first, and heavier ones afterward. As soon as the pieces are joined, the blows should be directed so as to close the edges of the scarf, so that the joint of the weld shall not show. It requires precision and quickness to do a nice job. The metal must be handled while hot enough to join well under the hammer's blows and the work finished during that time.

WELDING POWDERS.—1. Mix borax with 1-10 of sal ammoniac; fuse, and pour it on an iron plate. When cold, pulverize and mix it with an equal weight of quicklime; sprinkle it on iron heated to redness, and replace it in the fire. It may be welded below the usual heat.—2. To 1 lb. borax add red oxide of iron, $1\frac{1}{2}$ oz.; melt together in a crucible; let the mixture become cool and then pulverize it, after which it is ready for use.—3. 4 parts iron turnings; 3 parts borax; 2 parts borate of iron; 1 part water.—4. For welding iron and steel a composition has been patented in Europe, of iron fillings, 40 parts, borax, 20 parts, balsam of copaiba or some other resinous oil, 2 parts, and sal-ammoniac, 3 parts; mixed, heated and pulverized. The process of welding proceeds as usual, the surfaces being powdered with the composition and then brought to a cherry red heat, at which the powder melts, when the portions to be united are taken from the fire and joined.

LEAD.

BURNING.—There is required a cast-iron furnace, 2 or 3 ladles, and some molding sand. Burning is resorted to where soldering will not stand, such as retorts in bleaching works where acid destroys soldering. Cast a sheet of lead of the proper thickness, and cut the proper size, turn it up round like a hoop, bringing the ends together to form a joint on the outside, and firmly tack them together on the inside; roll it over to see that the joint is close on the outside, and paste stout brown paper 4 in. wide over the length of the joint. The sand must be tempered and have no wet lumps in it; make a level bed with the sand 5 or 6 in. thick; roll the hoop on the sand so that the joint will come under; be careful not to shift it backwards or forwards, but ram up under both sides. Have a strip of wood longer than the joint, $\frac{3}{4}$ in. thick, to form the runner with; place it along on edge on the top of the joint; now place on sand on both sides and ram it together until there is a good bank on the top of the work; smooth off with a trowel; cut it down towards the strip, so as to form a funnel, leaving 2 in. of the strip buried; draw out the strip endways; be careful not to break the sand, leaving one end stopped up; the other end stop up about 1 in. high. At this end make a pond for the overflow to run into. Have the metal red hot, be careful that the runner is free from loose sand; shake a little pounded rosin along in the runner; have a trying stick that can be drawn easily along the runner. Now begin to pour the metal, holding the ladle 1 ft. above the runner to give weight and force to the burning metal. When the joint is burnt through, try

it by drawing the trying stick along in the runner; if it feels smooth along the bottom it is burned; if not, pour some more until it is; stop up the end where the metal has been running off, and fill up about 2 in. high, and watch for shrinkage; have some hot metal ready to fill up as it shrinks in cooling, or else the joint will not be round. When set, remove it from the sand, and cut off the runner with a mallet and chisel, finishing off with a piece of cardwire; the paper on the outside will strip off, leaving it clean. Proceed with burning in the bottom, having a hole or pit in the floor deep enough for the hoop to go down level with the floor; place it in level. Fill up with sand inside and out rather slack. When filled within 4 or 5 in. from the top, ram it down for the other part quite hard on the outside, leaving the sand rather higher than the edge; then with a straight-edge scrape off level with the edge of the lead. Now with a scribe take out the sand the thickness of the required bottom; plane the sand off with a trowel, and the work will turn out clean. The sand on the outside being up level with the edge, smooth off and cut a bay all round to take the overflow; shake pounded rosin round the edge; having the metal red hot, begin to pour quickly the hot metal along the edge until it is properly burned down; when burned deep enough, pour a few ladlefuls over the bottom, to get it in a fluid state; then with the edge of the trowel clean off the dross, leaving a bright surface; let it remain to set. If well burned it will be perfectly solid.

CORROSION, To Prevent.—Pass a strong solution of sulphide of potassium and sodium through the inside of the pipe at a temperature of 212°, and allow it to remain 10 or 15 minutes. It converts the inside of the pipe into an insoluble sulphide of lead and prevents corrosion.

DETECTING IN TIN.—To determine the presence of lead in tin, touch with nitric acid and heat, when the acid evaporates. If lead be contained, stannic acid and nitrate of lead remain. Iodide of potassium is then applied, forming yellow iodide of lead; while the stannic acid is white. The yellow stain indicates lead, the white tin.

EXPLOSIONS, To Prevent.—A piece of resin, the size of the end of a man's thumb, dissolved in the ladle of melted lead designed to be poured around a wet joint, will prevent explosion.

MIXING WITH ZINC.— When working a mixture of lead and zinc for casting, mix the fused metals together; stir until cooled nearly to solidification; then cast. If the casting is large, so that the alloy does not chill at once, the metals are apt to separate somewhat unless the mold can be reversed or moved about.

PLATES, To Join. — The joints of lead plates may be made as follows: The edges are brought together, hammered down into a channel cut out of wood, and secured with tacks. The hollow is then scraped clean, rubbed over with candle-grease, and a stream of hot lead poured into it, and the surface afterwards smoothed with a red hot plumbers' iron.

PIPE. — Lead pipe is made by forcing lead, while heated to a plastic state, over an annular mandrel or die to form the core, by means of the use of powerful hydraulic pressure.

PIPES, To Join. — Widen out the end of one pipe with a taper wood rift, and scrape clean inside; scrape the end of the other pipe outside a little tapered, and insert it in the former; then solder it with common lead solder; or, if it requires to be strong, rub a little tallow over, and cover the joint with a ball of melted lead, holding a cloth (2 or 3 plies of greased bedtick) on the under side; and smoothing over with it and the plumber's iron.

PIPES, To Repair.—It frequently happens that lead pipes get cut or damaged when the water is running at a high pressure, causing trouble to make repairs, especially if the water cannot be turned off. In this case plug both ends of the pipeat the break and place a small pile of broken ice and salt around them. In a few minutes the water in the pipe will freeze; next, withdraw the plugs and insert a new piece of pipe; solder perfectly, thaw the ice, and it will be all right.

SHOT.—The following is a short outline of the manufacture of shot in the ordinary shot tower: The lead is mixed with a certain proportion of a combination of mineral substances called "temper." The "temper" is fused with the lead, and gives the metal consistency to make it drop. If it were not for the "temper," the lead would be molded by the sieve, and form little pencils instead of round shot. When shot are to be made, the lead is poured into a pan perforated with holes corresponding to that size. The pellets come pouring down in a shower, and fall into a tank filled with water on the ground floor. In their descent of 200 ft. they become spheres, firm and dense. The shot must fall in water, for if they should strike any firm substance they would be knocked out of shape. To get the pellets dry after they have been in the "well," is most difficult. An elevator, with small buckets, carries the shot up as fast as they reach the bottom of the "well," and deposits them in a box 60 ft. above the first floor. The water drips from the buckets as they go up, and not much is poured into the receiver above, although it is intended to be a sort of dripping machine. From this receiver the shot run down a spout into a drying pan of sheet iron. The pan rests at an angle which permits the wet shot to roll slowly down to the chamber below, and the pellets become dry as they pass over the warm sheet iron.

SULPHIDE OF LEAD, To Remove. — Allow a not concentrated solution of sulphide of sodium to flow through the pipes for 10 or 15 minutes. The inside of the pipes will then appear as if coated with a gray glaze, and water may then be passed through them free of lead.

UNITING TO IRON.—For uniting thin sheet lead to cast iron the sulphur sulphide composition, called Spence metal, is said to answer very well. In a capacious iron vessel with a loose cover melt by heat 2 lbs. sulphur. Heat to bright redness in a sand crucible 3 lbs. coarsely powdered sulphide of iron. Remove the crucible and melted sulphur out of doors; quickly, but cautiously, transfer the contents of the former to the latter; cover, and smother the flames by covering the pot with moist earth or sand. When cold remelt the contents of the pot at a

gentle heat, and after having packed the base of the joint, lead on the outside, with oakum, pour in the previously melted composition.

WEIGHTS OF LEAD PIPE.—

Calibre.	AAA Weight per Foot.		AA Weight per Foot.		A Weight per Foot.		B Weight per Foot.		C Weight per Foot.		D Weight per Foot.		D Light Weight per Foot.		E Weight per Foot.		E Light Weight per Foot.	
Inches.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
⅛	1	8	1	5	1	2	1	0	0	13	0	10	——		0	8	——	
¼	3	0	2	0	1	12	1	4	1	0	0	13	——		0	11	0	9
⅜	3	8	2	12	2	8	2	0	1	12	1	8	1	4	1	0	0	12
½	4	8	3	8	3	0	2	4	2	0	1	12	1	8	1	4	1	0
1	6	0	4	12	4	0	3	4	2	8	2	0	——		1	8	——	
1¼	6	12	5	12	4	12	3	12	3	0	2	8	——		2	0	——	
1½	9	0	8	0	6	4	5	0	4	4	3	8	——		3	4	——	
2	10	12	9	0	7	0	6	0	5	4	4	0	——		——		——	

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NICKEL.

CLEANING.—To clean nickel-plated brass or iron which has become coated with burned grease and dirt, without injuring the surface, boil in strong solution of potash or soda; rinse in water, and rub first with moistened and then with dry rouge or chalk.

PLATING.—To deposite nickel without the aid of a battery, proceed as follows: To a solution of from 5 to 10 per cent. chloride of zinc, pure as possible, add enough sulphate of nickel to produce a strong green color, and bring to a boil in a porcelain vessel. The piece to be plated, must be bright and free from grease, then introduced so that it touches the vessel as little as possible. Boiling is continued 30 to 60 minutes, water being added to replace that evaporated. During ebullition nickel is precipitated in the form of a white coating. The boiling may be continued for hours without increasing the thickness of the coating. As soon as the object appears to be plated, it is washed in water containing a little chalk in suspension, and dried. The chloride of zinc and sulphate of nickel must be free from metals precipitable by iron. If, during precipitation, the liquid becomes colorless, sulphate of nickel should be added. The spent liquid may be used again by exposing it to the air until the iron is precipitated, filtering and adding the zinc and nickel salts as above. Cobalt also may be deposited the same way.

PLATING, Imitation.—Coarse rasped granulated zinc is boiled for some time in a mixture of 3 parts by weight of sal ammoniac, and 10 of water, the object immersed and stirred with a zinc rod. The deposit is silvery, and resists mechanical action as well as a coating of nickel. The process can be recommended for goods meant for a second coating of some other metal, since any other is easily deposited on zinc.

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STEEL.

REMARKS.—In working steel for tools, care should be taken to hammer all sides alike; for if one side is hammered more than another, it will cause it to spring in hardening. When being hammered, steel should be heated as hot as it will stand, until finishing, and then be hammered until almost black hot, as it sets the grain finer, and gives the tool a better edge. Heating the steel so hot while hammering makes the steel tougher when hardened, and softer when annealed; while, if it were worked at a low red heat, the continued percussive shocks of the hammer would so harden it as to make it impossible to anneal it, and at the same time render it brittle when hardened. A good, soft heat is safe to use, if steel be immediately worked. Good steel will endure more pounding than iron. If steel be left long in the fire it will lose its nature and grain, and assume that of cast iron. Steel should never be kept hot longer than necessary for the work to be done. It is entirely mercurial under the action of heat, and an injurious internal strain is created whenever two or more parts of the same piece are subjected to different temperatures. When steel has been subjected to heat not absolutely uniform over the whole mass, careful annealing should be resorted to. As the change of volume, due to a varied degree of heat, increases rapidly with the quantity of carbon present, high steel is more liable to dangerous internal strains than low steel, and great care should be exercised. Hot steel should be put in a dry place of even temperature while cooling. A wet place in the floor might cause serious injury.

ANNEALING.—1. For a small quantity, heat the steel to a cherry red in a charcoal fire; then bury the steel in sawdust, in an iron box, covering the sawdust with the ashes, and let it remain till cold. For a larger quantity, and when it requires to be soft, pack the steel with cast iron (lathe or planer) chips in an iron box as follows: In the bottom of the box have a layer of ¾ in. in depth of chips; put in a layer of steel, then more chips to fill spaces between the steel, and also the ½ or ¾ in. space between the

sides of the box and the steel, then more steel; and lastly, from 1 to 2 in. chips in depth, well rammed down, on top of steel. Heat to and keep at a red heat for from 2 to 4 hours. Let the box remain quietly in its place till cold. —2. Heat the steel to a red heat, and let it lie a few minutes, until nearly black hot; then throw it into soap-suds; steel in this way may be annealed softer than by putting it into the ashes of the forge.

BLUE BLACK COATING.—To produce a blue black coating on polished steel, dip it into melted nitrate of potash. The bloom improves its appearance and seems to wear well.

BLUING.—To blue small articles, put in a box or on an iron plate a small quantity of charcoal ashes; place over the fire and heat slowly. Place the articles in the ashes, and as the same get heated, take them out occasionally to see how the color is. When the articles become blue, let them remain until they become white again, then remove them, and let them cool. Then return the articles to the ashes again to become reheated, and you will have the second blue. The second blue will wear a length of time; to get a good color, polish the article free from grease of any kind; and in no case must you dip the article in oil or water before or after the bluing, as it injures the color. Give the articles a fine polish, after which lay them in a sheet-iron pan, with some slaked lime. Place the pan over any place where the heat can be regulated and pay attention until you have obtained the right color. If the steel be a good article, they will take on a vivid blue.

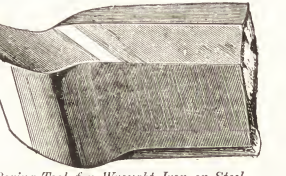
BLUING SCREWS. — To blue screws evenly, take an old watch barrel and drill as many holes into the head of it as you desire to blue screws. Fill it ¼ full of brass or iron-filings; put in the head, and fit a wire, long enough to bend over for a handle, into the arbor holes, head of the barrel up. Brighten the heads of the screws; set them, point down, into the holes drilled, and expose the bottom of the barrel to the lamp till the screws assume the color wished.

BLUING, To Remove. — Immerse in a pickle composed of equal parts muriatic acid and elixir vitriol. Rinse in pure water and dry in tissue paper.

BLUING WITHOUT HEAT. — Mix finely powdered Prussian blue with rather thin shellac varnish; gently heat the steel, and apply the varnish.

BORING GUN BARRELS.—Take a piece of rod, cast steel, ¼ in. smaller than the interior of the barrel, and a few in. longer; beat one end up something larger than the size of the bore; then turn or file it in the shape of an egg, leaving the swell or centreing part 1-20 in. larger than the bore. With a saw file cut longitudinal cuts, ⅛ in. apart, laying them the same angle as a rose bit countersink, taking care not to injure the periphery of the tools; harden and temper to straw color.

BORING-TOOL, For Wrought Iron or Steel. — The cutting end of this tool must not be bent, in forging, any further round than shown in the illustration; the strain placed upon the tool by the cut will be in a direction tending to revolve the tool in the tool-post, giving a tendency to spring away from its cut; and so stout a tool could not be got into the same size of hole. The degree of bend or angle of the centre-line of the bent end to the centre-line of the length of the body of the tool, causes the strain of the cut to be placed endwise of the tool, endeavoring to force it back into the tool-post, and thus places the strain in the direction in which the tool is best capable of withstanding it. The keenness and shape given to the top face of the tool make the cutting edge perform its duty on the front edge, which tends to place the strain endwise



Boring-Tool for Wrought Iron or Steel.

on the tool, operating by the strain on the top face of the tool (caused by its bending the shaving), to keep the tool to its cut by giving it an inclination to feed itself forward, relieving the feed-screw and nut of the slide-rest of a part of the duty of feeding. The cutting edge should not, even when the tool is newly forged, stand much above the horizontal plane of the top of body of the tool, otherwise so stout a tool cannot be got into a given size of hole. Boring-tools are apt to spring away as the cutting proceeds toward the back end of the hole, making the latter a taper, of which the back end has the smallest diameter, necessitating fine finishing cuts in order to make a parallel hole. If every means is taken to use as stout a tool as the size of the hole will admit, the boring-tool will bore a true and smooth hole. To prevent chattering or jarring when extending far out from the tool-post, or when it is very slight in body, it should have the top face depressed toward the cutting edge. When this tool is a stout one, the point may be ground more round, which will make it cut to finer finish.

BURNT, To Restore. — 1. 2 parts horn filings; 10 parts tallow; 1 part sal-ammoniac; 1 part pulverized charcoal; 1 part soda; pulverize the hard ingredients separately; mix all with the tallow; bring the burnt steel to a cherry red, and dip it in the mixture; when it gets cold it may be hardened in the usual manner. — 2. Burnt steel may be instantaneously restored by plunging it while hot in cold water, and hammering it with light strokes on the anvil, turning it so as to hammer all over it; again dipping in the cold water, and repeating the hammering as before.—3. Borax, 3 oz.; sal ammoniac, 8 oz.; prussiate of potash, 3 oz.; blue clay, 2 oz.; resin, ½ lb.; water, 1 gill; alcohol, 1 gill; put all on the fire, and simmer till it dries to a powder. The steel is to be heated, dipped in this powder, and afterwards hammered.—4. 1 oz.

bicarbonate potassa; ½ oz. copperas; fine salt, 3 oz.; and 3 lbs. sand; mix well, and sprinkle over the steel when hot.—5. To 4 lbs. fine white sand pulverized, add ½ lbs. sal ammoniac, ¼ lb. copperas, and ½ lb. resin, all pulverized; mix well. When the steel is hot, sprinkle, and let cool. This process will restore any burnt steel.

CLEANING. — 1. Unslaked lime is a capital thing to clean steel articles. If steel ear-rings, brooches, etc., are kept in powdered quick-lime they suffer little from rust. They should be cleaned when put away, to remove moisture that may have collected on them by handling. To clean swords, etc., rub them with powdered brick-dust and oil, rub dry with brick-dust, polish with crocus and leather.— 2. Cocoanut husks are better than waste and turpentine.

COLORING WIRE.—To color bright wire black or blue and perfectly smooth for use, take asphaltum, 3 oz.; boiled oil, 4 qts.; burnt umber, 8 oz.; mix by heat, and thin with turpentine (oil) before the mixture becomes cool; dip the wire in this (not too thick) and harden in a Japanner's oven at as high a heat as will bear without blistering.

CUTLERY. — There are 3 kinds of steel employed in manufacturing cutlery, common, shear and cast steel. All edge tools which require to be tenacious without being very hard, are made of shear steel. The best scissors, razors, penknives, etc., are made from cast steel, which takes a fine polish; common steel is only used in making cheap articles. In making good table-knives, shear steel and cast steel are preferred. In the ordinary method of making knives, the blades are cut out of a sheet of steel, and the backs, shoulders and tangs of wrought iron, are attached to the steel blades by welding. The knife is then ground to proper shape, and the blade polished and hardened. Fork manufacture is a distinct branch, and manufacturers of knives buy their forks from the fork makers ready to be put into handles. In making table knives, 2 men are employed; maker and striker. Penknives were forged by a single hand, with hammer and anvil. The grinding and polishing of cutlery are performed by machinery; the business of the grinders is divided into grinding, glazing and polishing. Those articles which require temper are ground on wet stones. Glazing gives a lustre to cutlery; it is performed with a glazier, consisting of a circular piece of wood, covered with leather, or an alloy of lead and tin; it is fixed on an axis like a grindstone. Polishing is last, and is performed on a similar piece of wood covered with buff leather. Only articles of cast steel which have been hardened and tempered are subjected to this operation. Butcher knives are forged out until near the proper thickness, care being taken not to heat too high. To temper they are heated to a cherry red; it is plunged plumb into water, and when taken out it is straight; taken from the water and passed through flame until it is a little hot; then rubbed on both sides with a candle; passed again through the flames until the tallow disappears, as though it soaked into the steel; then taken out and the operation of rubbing the candle repeated as before; again placed in the flames, and there kept until it starts into a blaze with a snap; an even heat over the entire length and width of the tool is necessary; then the operation three times of rubbing the tallow and placing it in the flames is repeated; lastly the tallow is rubbed over it again, pushed into the dust of the forge, and let remain until cold.

CUTTERS AND REAMERS, To Prevent Cracking when Hardening. — Drill a small hole from the side to meet the large one at its enclosed termination.

CUTTING. — It is known that soft iron discs running at a circumferential speed of 12,000 ft. per minute will cut hard steel; but 5,000 ft. per minute will not cut iron—a fact which is taken advantage of in rolling mills to cut large bars and beams exact lengths. To fit up the periphery of a disc of soft iron to cut steel, cut it with heavy shears as nearly round as practicable, after which hold a piece of grindstone or sandstone so that the edge of the disc will strike it when in motion, Use a stone and file, and then attempt to cut steel a little, thus working off the periphery until it is as smooth and true as it can be made. Then the cold and soft iron when in high motion will literally melt the hard and cold steel and drive the melted metal from the bar in a stream of white-hot sissing and burning steel dust.

DIES, To Temper.—In using dies for cutting sheet metal, both dies should be tempered. To temper large curved dies for cutting iron and steel plate, fill the holes with fire-clay and wire to keep it in place. Heat evenly and slowly in a furnace. Lift the dies from the furnace with the face vertical and plunge vertically into water heated to about 50° and containing about ½ lb. salt per gal. Hold them still at the bottom of the water until cooled.

DRILLING.—1. Make the drill oval in form, instead of in the usual shape, and temper as hard as it will bear without crumbling. Roughen the surface of the object into which you desire to drill with a little diluted nitric acid. Start the drill, and, to prevent it from becoming heated, use spirits turpentine instead of oil. Some use kerosene with gum camphor dissolved in it instead. When the drill begins to run smooth in consequence of the bottom of the holes becoming burnished, clean out the turpentine or kerosene and roughen with acid; then proceed. —2. Cover the steel with melted beeswax; when cooled and cold, make a hole in the wax with a fine-pointed needle the size you require; put a drop of nitric acid upon it; after an hour rinse off, and apply again; it will gradually eat through.

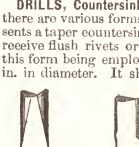
DRILLING, Spiral Tool For.—These are annealed, and turned to 1-50 of an in. larger than the finished size; then heated again, and annealed in a vertical position, among lime, ashes, or soap-suds; the shank is then turned to fit a proper collet socket, and afterwards the point may be turned to desired dimensions and shaped. The spiral grooves are cut on a machine containing a spindle, which imparts the double movement of sliding and revolving slowly while the spirals are being cut. The spindle contains a screw, on which a chuck to hold the drill is

adjusted. The drill being inserted in the chuck, proceed to elevate the sliding block beneath the

Spiral Drill.

drill, so that it will touch it, adjusting it so as not to raise it too high; then insert a cutter, which should be ½ the diameter of drill, and groove your drills, which should, for a drill 1 in. in dianeter, be cut 1 to the in., and down to within a 32nd of the centre; for ½ in. drills, cut the grooves 1½ to the in., down to within a 64th of the centre; for ¼ in. drills, cut the grooves 2 to the in., down to within a 100th of the centre, computing as you would in cutting a screw in a lathe, the index plate giving you the two starting points at which to commence the work.

DRILLS, Countersink-Pin. — Of these tools there are various forms. The illustration represents a taper countersink employed for holes to receive flush rivets or countersunk head-bolts, this form being employed for holes above 5-16 in. in diameter. It should be made, tempered and used as pin-drills. In tempering these tools, or any others having a pin or projection to serve as a guide in a hole, the tool must be hardened right out from the end of the pin to about ⅜ in. above the cutting edges. Then lower the temper of the metal (most at and near the cutting edges), leaving the pin of a light straw color.



Countersink-Pin Drill.

DRILLS, Slot, For Key-ways. — For drilling out oblong holes, such as key-ways, or for cutting out recesses required to receive short feathers in shafts, the drill known as the slotting-drill is brought into requisition. No. 1 is the form in which this tool was employed in the early days of its introduction; it is the stronger form of the two, and will make the heaviest cut. The objection to it is that, in cutting out deep slots, it is apt to drill out of true, the hole gradually running to one side. The method of using these drills is to move the work back and forth, in a chuck provided for the purpose, the drill remaining stationary. If these tools were used as common drills, they would cut holes of the form shown in No. 2.

Slot Drills.

EXPANSION.—It is important to remember that if a piece of cast steel be made red hot and quenched in cold water it will become longer, but if the same operation be performed upon a piece of wrought iron it will become shorter.

FILES, To Soften.—Cover them with oil and hold them over the fire until the oil blazes; as soon as the flame runs all over the file, plunge it into the water; or put them in a moderate hot oven for ½ hour if large files, but if small the first plan is the best.

FINISHING.—For hollow finishing the following wheels are required: A mahogany wheel for rough glazing; a mahogany wheel for smooth glazing; a lead wheel, or lap. For flat finishing: A buff wheel, each, for rough, for smooth, and for finishing; lastly, a polisher. To make glaze wheels: Get spindles, and point them on each end; then get a block of beech and wedge it on the steel at one end with iron wedges, and turn it for the pulley for the band to run on. Take 2 pieces of flat mahogany and glue and screw them together, so that the grain of one piece crosses the other, to prevent warping. Let it get dry, and wedge on the spindle and turn true. The lead wheel is made the same way, but wider, and a groove turned in the edge. Then the wheel is put into sand, and a ring of lead run round the edge; it is then turned true. To make buff wheels, proceed as with the glaze; but pine or deal will do as well as mahogany, only leave it about double the width of the glaze, which is about ½ in. wide by 12 or 14 in. across. The buff wheels are covered with glue, and then the leather is tacked on with tacks driven in about ½ way, so that they may be easily drawn out again. The leather is then turned true. The polisher is made the same way, but the size of the polisher must be a little less than that of the other wheels, say about 1 in. The buff wheels are dressed by laying on a fine, thin coat of clear glue, and rolling them round—No. 1, in superfine corn emery; No. 2, in smooth emery; No. 3, by making a cake of equal parts of mutton suet, beeswax, and washed emery; then it is held on the wheel while it goes round. The glaze wheels are dressed while using, by mixing a little of the emery with oil, and putting it on the wheel with a stick or the finger. The leather of the polisher is not covered with glue, but dressed with a mixture of crocus and water, not oil. Care must be taken to keep each wheel and substance to themselves, and the work carefully wiped after each operation. Cleanliness must be studied in using the polisher, as the slightest grease getting on it stops the polishing.

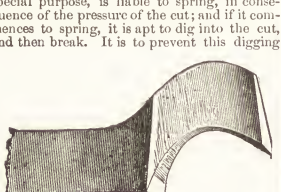
HARDENING AXLETREES.—The method used in the manufacture of axletrees is to use wrought iron and weld 2 pieces of steel into the lower side, where they rest upon the wheels and sustain the load. The work is heated in an open forge fire, in the ordinary way, and when it is removed, a mixture, principally prussiate of potash, is laid upon the steel; the axletree is immediately immersed in water, and additional water allowed to fall upon it from a cistern. The steel is considered to be materially hardened and the iron around the same is partially hard-

ened. One good way to chill axletree boxes is to mold from wooden patterns on sand, and cast them upon an iron core, which has the effect of making them hard. To form the annular recess for oil, a ring of sand, made in appropriate core-box, is slipped upon the iron mandrel, and is left behind when the latter is driven out of the casting.

HARDENING TAPS.—In hardening a tap, use a clear, bright fire; a fire of charcoal is best; heat to a cherry red, and holding it by the upper end immerse the entire thread-part first, keeping it stationary until the smooth part attains a dark red color; then gradually dip the whole tool, holding it stationary until cold. Brighten the fluted parts and proceed to temper the tool by heating a piece of iron pipe to a bright red; remove it from the fire, place it in a vertical position, and insert the tap in the centre of the tube (not touching any part of it) with the threaded part outside. The interior of the tube should be twice the diameter of the tool, and the length but ½. Revolve the tap in the hot pipe until the smooth part is warm enough to slightly pain the hand, keeping it in motion endways, back and forth through the pipe and turning it until the thread is tinted to a deep brown, and the rest of the tool to a brown purple; modify irregularity in the color by holding the light colored parts longer in the tube, or if any parts color too deep, cool off with a little oil. The squares of taps should be tempered to a deep blue color.

MARKING TOOLS. — To mark tools, warm them slightly, and rub the steel with wax, or hard tallow, till a film gathers. Scratch your name on the wax, cutting through to the steel. A little nitric acid poured on the marking will quickly eat out the letters. Wipe acid and wax off with a hot, soft rag, and the letters will be found etched.

PARTING TOOL.—The parting tool is applicable to cutting grooves or for parting. The cutting point is made thicker than the metal, vertically and horizontally, behind it, so that the latter shall clear and not grind against the sides of the groove. This tool, if made thin to suit a special purpose, is liable to spring, in consequence of the pressure of the cut; and if it commences to spring, it is apt to dig into the cut, and then break. It is to prevent this digging



Parting Tool for Iron or Steel.

in that the top face of the cutting part of the tool is placed below the top face of the body of the tool, which may be dispensed with when the cutting edge is held close in to the tool-post, and the grooving is not required to be deep. When these requirements exist, the form illustrated is indispensable to rapid and reliable duty, whether the tool be used in a lathe or a planing-machine, the cutting edge of the tool being kept at about the horizontal centre of lathe-work, by packing-pieces placed beneath the body of the tool. If the width of the tool is not less than 3-16 in., and does not require to cut a groove deeper than ⅜ in. it should be hardened right out; if these conditions are reversed, it should be tempered to a dark straw, and for weak tools even to a purple color, as lowering the temper increases the strength of tools. If the groove to be cut is sufficiently broad to cause the tool to spring, it is best to use a narrower one and cut it out in two separate cuts, moving the tool.

POLISHING.—Use bell-metal polishers for arbors, having first brought up the surface with oilstone dust and oil and soft steel polishers; for flat pieces use a piece of glass for the oil-stone dust, and a bell-metal block for the sharp red stuff, and a white metal block for the fine red stuff. The polishing stuff must be well mixed up and kept clean; the polishers and blocks must be filed to clean off the old stuff, and then rubbed with soft bread; put only a little red stuff on the block and keep working it until it is quite dry; the piece will then leave the block clean; use bread to clean off surplus red stuff before using the brush. If the piece is scratched, put on some more red stuff, which must not be too wet, and try again.

RAZOR PASTE.—1. Mix fine emery with fat and wax until of proper consistency, and then rub it well into the leather strap. Prepare the emery by pounding in a mortar the coarse kind, throwing it into a large jug of water and stirring well. When the large particles have sunk, pour off into a shallow plate, and let the water evaporate. This emery is better for engraving and other purposes than that prepared at the emery mills. — 2. The grit from a fine grindstone is efficient for a razor paste. — 3. Levigated oxide of tin, prepared putty powder, 1 oz.; powdered oxalic acid, ¼ oz.; powdered gum, 20 gr.; make into a stiff paste with water, and spread it thinly over the strap. This gives a fine edge to the razor, and its efficiency is increased by moistening it. — 4. Emery reduced to impalpable powder, 2 parts; spermaceti ointment, 1 part; mix and rub over the strap. — 5. Jewelers' rouge, black lead and suet, equal parts; mix.

SPIRAL SPRINGS.—Unless the circumstances of the case necessitate that the spring be put to its utmost tension, brass will do as well as steel, and better, providing the strain or the spring is well within its capacity. If the length or diameter of the spring is of no consequence, a brass spring will serve as well as a steel one, if the situation in which the spring is to be used renders a steel one liable to corrosion, thus destroying its temper. If the space in which the spring is to operate is confined so that the spring is made as small as possible, it is imperative that it be made of either spring or double-shear steel. For electrical purposes, brass-springs may be used, except where from derangement of the insulation the spring may be liable to become

heated and softened, and a brass-spring that has lost any of its temper thus is worthless. Cold rolled or drawn iron wire may be used to make springs in which their sizes are large in proportion to the duty required. The iron wire must have been cold rolled or drawn without being annealed to produce upon it a close-grained and clean surface, having a dull polish. Cast steel may be used for springs, but it is apt to break in cold weather. If the spring is to be of brass select a mandrel to run between the lathe centres, having upon it a spiral groove of the requisite pitch, but smaller than the diameter of the required finished spring, because the spring unwinds a little as soon as it is released from tension around the mandrel. The mandrel must be longer than the required length of spring to admit of the application of a lathe dog to drive it, allowing clearance between the end of the spiral groove and the dog. Near one end of the mandrel a small hole is drilled, there being sufficient space between the hole and the end of the mandrel to admit of a loose washer being placed thereon; the bore of this washer requires to be larger in diameter than the outside diameter of the spring, when wound upon the mandrel, and requires to be provided with a key-way and key. Now wind the spring as shown in *Fig. 1*, in which *A* represents the man-

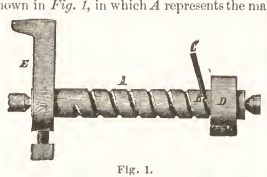


Fig. 1.

drel, *B* the small hole with the wire inserted, *C* the wire, *D* the loose washer and *E* the driver. While keeping a stiff tension on the wire by pulling it against the mandrel, start the lathe and wind the spring, closing it around the mandrel, if it does not wind closely, by tapping it with a hammer. When the spring is wound to the requisite distance slip the washer up and drive the key home, as shown in *Fig. 2*, and

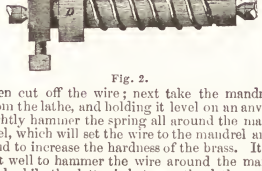


Fig. 2.

then cut off the wire; next take the mandrel from the lathe, and holding it level on an anvil, lightly hammer the spring all around the mandrel, which will set the wire to the mandrel and tend to increase the hardness of the brass. It is not well to hammer the wire around the mandrel while the latter is between the lathe centres, which would damage the centres and bend the mandrel. If the wire is too stiff to be held by the hand against the mandrel with sufficient force to cause it to bend closely round the mandrel, while the lathe is slowly revolving, and if the lathe is a self-acting one, put on the gearing necessary to cut a thread of the same pitch as the spring requires to be, and then fasten in the tool-post of the lathe a grooved piece of metal as shown in *Fig. 3*, *A* representing the mandrel,

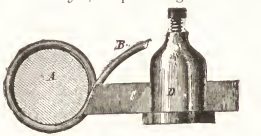


Fig. 3.

B the spring wire, *C* the piece of metal acting as a guide and also to bend the wire close to the tool-post of the lathe in which *C* is fastened. If the lathe is not a self-acting one and has a hand-slide rest, take the screw out from the straight feed of the rest and use the metal guide, allowing the groove to carry the wire along, the groove being as deep as $\frac{3}{8}$ of the diameter of the wire. Having wound the spring, place the washer in position, as shown in *Fig. 2*, and cut off the wire. If the wire is of iron or brass take it to an anvil and hammer it all over its circumference, beginning at one end and following along the wire with blows delivered not more than $\frac{1}{4}$ in. apart. If the wire is of steel take the mandrel with the spring wound on it and fastened by the washer as shown in *Fig. 2*, and heat to a low red heat so as to set the spring to the mandrel; the hammering process only tends to close the grain of the metal and add to its elasticity without having much effect towards closing the spring around the mandrel except the spring be made of small wire. To harden spiral springs made of light wire, or those long in proportion to their diameter, they should be placed on a mandrel fitting easily to their bore, and should be heated while on the mandrel, otherwise they are apt to become bent and the coils disarranged during heating. The fire should be clear. A good plan is to make a clear fire around a piece of gas-pipe, and insert the spring in the gas-pipe, which will facilitate getting an even heat. The spring being heated to a cherry red must be plunged endways into clear water having the chill taken off, and held until cold. If on taking the spring from the water its surface is found to be black and not mottled, it is not sufficiently hardened, which may arise from the poor quality of the steel, or because it was not sufficiently heated. Steel of good quality is sufficiently heated when hot enough to just form scales when taken from the fire. If it is found difficult to harden the steel (known from the fact that well-hardened steel is white when taken from the water), the water should have sufficient salt dissolved in it to make a strong brine, and the hardening process repeated. The whiteness of the surface is a better test of the degree of hard-

ness of the metal than testing the metal with a file. The most reliable method of tempering an ordinary spring is to fry it in oil, heated sufficiently to cause it to blaze. The spring should be occasionally (before being finally removed from the oil) taken from and re-dipped in the blazing oil 2 or 3 times; after the blazing takes place freely all over the spring, and has on the last remove from the tank burned out at any one part of the spring, the latter should be dipped in lukewarm water and left to cool off. This diminishes the danger of any one part of the spring being lowered more than another, and the heating takes place sufficiently slow so that the metal gets heated through. The thicker the spring the longer it should blaze, it being dipped frequently and removed; to insure that every part of the spring shall be heated, and to give the steel time to get heated equally inside and out. It is well in blazing a spring to reverse it in the pan, and to revolve it so that the blazing oil shall not run down along one side of the spring. A good oil composition for blazing is made in the following proportions: 1 gallon spermaceti oil; 1 lb. rendered beef-suet; 1 gill neat's foot oil; ½ lb. resin. The pan or tank in which this composition is used should have a closely-fitting cover, so that the blaze may be put out when the tempering is finished.

SPIRAL SPRINGS, To Repair. — Take a piece of flat metal, about 1-16 in. in thickness, and cut it in the shape of a parallelogram, the length ½ in. greater than the diameter of the broken spring, the width equal to 4 of its coils; bore 2 holes on each side exactly the diameter of the spring apart, and sufficiently large to admit the spring wire; make, with a round file, a slight groove opposite each hole. Screw the broken ends of the spring into these holes from opposite sides, and the job will be complete, and at as trifling a cost.

SPRINGS, Reducing Elasticity of. — A well-tempered bar-spring will lose much of its elastic strength by filing off a very thin scale from the surface.

TAPS. — In making taps, have immediately under the square head, a place the accurate size of the outside of the thread, so that there will be no trouble in getting dimensions of the thread wherever an odd number of flutes exist. Every tap should be the accurate size of the bottom of the thread to within about ½ in. of the square head; shaping it this way, when a strain comes in the work, it will twist instead of breaking. The threads on V taps ought to be cut with a tool exactly three square (unless the thread is rounded on the top), and then finished with a sharp tool without polishing, as this produces a glaze on the metal while being tapped. In making a tap for common machine screws or for bolts, measure with calipers the lower part of the thread of one of the screws, and proceed to cut your tap at the bottom of the thread the size of the measurement. Strong taps for square thread screws ought to be cut ½ the depth of their pitch; so if the thread is 5 to the in. cut 1-10 in. deep. The threads being 5 to the in. leaves a space between the threads of 1-10 in., and the thread being 1-10 in depth and 1-10 wide, would make the thread square. In square threads required for wear, the cut should be ⅔ the depth of their pitch. In finishing taps and reamers, the forgings are got out in the usual way, left to anneal, centred, and turned sufficient to remove the scale. Then anneal again, and turn down to within 1-32 in., or less, of finishing size. Anneal once more, and finish in the lathe. If not sprung in turning, the tap or reamer will come out all right when hardened. This has been tested successfully with taps from ½ in. in diameter and 3 in. long up to those of 1 in. in diameter and 2 ft. long.

TEMPERING or HARDENING.—When cast steel, heated to redness, is plunged into water until its temperature is reduced to that of water, it is hardened. The degree of hardness will depend upon the quality of steel, the temperature to which it was heated, and upon the temperature of the water in which it was cooled. Reheat the steel and a softening process will accompany the increasing temperature, until upon becoming red-hot it will assume its normal softness, and if allowed to cool in the atmosphere the effects of the first hardening will be removed. If after the steel is hardened, it is polished on one of its surfaces and slowly reheated, that surface will assume various colors, beginning with a pale yellow and ending in a blue with a green tinge, each color appearing when the steel has attained a definite degree of temperature; by the appearance of the colors the temperature of the steel is known, as also to what extent the re-softening has progressed. This fact is taken advantage of to obtain in steel any required degree of hardness less than that of the absolute hardness obtained by hardening, and is termed tempering. The temperatures at which these respective colors appear are as follows:

Very pale yellow	430° Fahr.
Straw yellow	460° "
Brown yellow	500° "
Light purple	530° "
Dark purple	550° "
Clear blue	570° "
Pale blue	610° "
Blue tinged with green	630° "

As the steel becomes heated it expands; if one part becomes hotter than another, it expands more, and the form of the steel undergoes the change necessary to accommodate this local expansion, and this alteration of shape becomes permanent. In work finished and fitted, this is of great consideration, and, in the case of tools, it assumes sufficient importance to entirely destroy their value. If an article has a thin side, it requires to be so manipulated in the fire that such side shall not become heated in advance of the rest of the body of the metal, or it will become locally distorted; though there exists little difference in the temperature of the various parts, the more solid parts are too strong to give way to permit the expansion; hence the latter is accommodated at the expense of form of the weakest part of the article. It does not follow that the part having the smallest sectional area is the weakest when in the fire, unless it is as hot as the rest of the body. It is well to consider

the size of an article in heating it, because by heating steel in the open fire it becomes decarbonized; and the smaller the article in sectional area the more rapidly this takes place. In large bodies the decarbonization due to a single heating is not sufficient to have much significance; but if a tool requires frequent renewal by forging, the constant reheating will impair its value; and in any event it is an advantage to maintain the quality of the steel at its maximum. To prevent decarbonization, for ordinary work charcoal instead of coal is used; and where hardening is not done continuously it is a good practice. Charcoal should be used for forging as well as for hardening. Green coal should never be used for heating the steel for hardening; because, while the steel is being well forged its quality is maintained, but afterward the deterioration due to heating is more rapid. A coke suitable for heating to harden should be made and kept on hand. The whole value of the temper will be destroyed if the steel is made too hot and becomes what is known as burned. Steel may have its quality impaired by over-heating without giving evidence of being burned. If a piece of hardened tool steel shows a crystalline formation under fracture, it has most probably been burned; but if the fracture appears dull and even, it has not. When a tool requires to be tempered at and near the cutting edge only, and it is desirable to leave the other parts soft, the tempering is performed by heating the steel for some little distance back from the cutting edge, and immersing the cutting edge ½ of the rest of the steel, which is heated to as high a degree as a red-heat in the water until it is cold; then withdraw the tool and brighten the surface which has been immersed, by rubbing it with soft stone or a piece of coarse emery cloth, the object being to cause the colors to show themselves so as to indicate the state of the steel. The instant this operation has been performed the brightened surface should be brushed by switching the finger rapidly over it; for unless this is done the colors appearing will be false, in which case the steel after quenching will be of one color, and, if then wiped, will appear of a different hue. A piece of waste or other material may be used in place of the hand. The heat of that part of the tool which has not been immersed will become imparted to that part which was hardened, and by the deepening of the colors denote the point of time at which it is necessary to again immerse the tool and quench it altogether cold. The cooling requires as much skill as the heating, to prevent warping and cracking and to straighten the article as much as possible during the cooling process, and should be performed with a view to prevent the contraction of the metal from warping the weaker parts; to aid this, those parts are made a little hotter than the more solid parts, the extra heat required to be extracted compensating for the diminution of sectional area from which the heat must be extracted. The distance a tool requires to be heated and dipped at the first dipping, and the distance to which the transient dipping should be performed, vary with the substance of the metal; no rule can be given more than to say that the heating should be to a red-heat for a distance of about 3 times the diameter of the steel. A great deal of the cracking occurring during hardening arises from improper dipping. Cylindrical or square bar pieces should be dipped endwise. Blades should be dipped vertically and edgewise, with the length of the blade horizontal. The steel should be lowered vertically in the water, and for hardening should be held quite still near the bottom of the tank. The thick side should enter the water first. The water should be heated to prevent liability to crack; a difference of 40° or 50° makes no practical difference in the effectiveness of the quenching water, providing its temperature is at least 20° above the freezing point. Soft water is better for tempering than hard water, and the water improves by age, providing it is kept clean. Water at 200° will harden, and reduce the liability of the work to crack, but it should contain 1 lb. salt per gal. in solution.

TEMPERING ANVIL FACES. — Fill a vessel with water; place bricks or other support for the anvil, so that the top of the anvil will be about 1 in. below the top of the vessel; have a hogshead or tank filled with water and elevated 5 to 10 ft. above, with a pipe from it arranged to discharge water on the face of the anvil. When the anvil is properly heated lower it into the first tank face up, then open the pipe from the higher tank to discharge the water on the face of the anvil till it is cooled. When you open this pipe, keep away from the anvil, for if any portion of the steel is not welded, it may crack and fly off.

TEMPERING LIQUIDS. — 1. Water, 3 gals.; soda, 2 oz.; saltpetre, 2 oz.; prussic acid, 1 oz., or oil vitriol, 2 oz.—2 Water, 6 gals.; saltpetre, sal ammoniac and alum, of each, 4 oz., and draw no temper.—3. Water, 4 gals.; saltpetre and alum, of each, 4 oz.; sal ammoniac, pulverized, 1 oz.; salt, 3 lbs.; heat to a cherry red and plunge in, drawing no temper.—4. Water, 4 gals.; saltpetre, 1 oz.; pulverized borax, 1 oz.; pulverized sal ammoniac, 1 oz.; white vitriol, 2 oz.; salt, 3 pts.; do not hammer too cold nor heat too high. —5. Water, 4 gals.; salt, 2 teacupfuls; saltpetre, 2 oz.; pulverized alum, 4 teaspoonfuls; never heat over a cherry red, nor draw any temper.—6. Water, 2 gals.; add corrosive sublimate, 1½ oz.; common salt, 2 handfuls; when dissolved it is ready for use. The first gives toughness to the steel, while the latter gives the hardness, causing the water to adhere to the steel, which otherwise would be repelled by the heat.—7. (*For Mill Picks.*) Water, 3 gals.; spts. of nitre, 3 oz.; hartshorn, 3 oz.; white vitriol, 3 oz.; alum, 3 oz.; sal ammoniac, 3 oz.; salt, 6 oz., with 2 handfuls parings of horses' hoofs. Heat the steel to a cherry red. A large jug of this preparation should be kept corked tight, in order to retain its strength. Use soft water in all these tempering liquids.—8. Resin, 2 lbs.; tallow, 2 lbs.; black pitch, 1 lb.; melt together, and dip in the steel when hot. — 9. Wheat, flour, salt and water, using, say, 2 teaspoonfuls water, ½ teaspoonful flour, and 1 of salt. Heat the steel to be hardened enough to coat it with the paste by im-

mersing it in the composition, after which heat to a cherry red and plunge into soft water. If properly done, the steel will come out a beautiful white.

TEMPERING, Metallic Bath for.— Use a black lead or cast iron crucible and place the same, filled with lead, on a fire made of coal or charcoal, and surrounded by a metallic or brick wall, level with the top of the crucible, but at a sufficient distance (5 or 6 in.) from it, to receive the fuel to maintain the fire, to keep the lead in a melted state. Let the crucible rest on iron bars, and leave apertures to admit air to the fire. The articles, slightly greased, are immersed in the melted lead (kept at a red heat) by means of tongs, 2 or 3 pairs being generally used, in order that 1 or 2 pieces may be heated while the other is undergoing manipulation by hardening. Keep the lead covered with charcoal dust or cinders. This plan is used by cutlers and file manufacturers for giving the proper degree of heat in tempering their wares, and the process is highly valued.

TEMPERING RAZORS AND CUTLERY.—Razors and penknives are frequently hardened without the removal of the scale arising from the foregoing; this practice cannot be too much deprecated. The blades are heated in a coke or charcoal fire, and dipped in the water obliquely. In tempering razors, they are laid on their backs upon a clean fire, about ½ doz. together, and removed one at a time when the edges come down to a pale straw color. Should the backs accidentally get heated beyond the straw color, the blades are cooled in water. Pen blades are tempered 1 or 2 doz. at a time, on a plate of iron or copper, 12 in. long, 3 or 4 in. wide, and ⅛ in. thick. The blades are arranged close together on their backs and lean at an angle against each other. As they come down to the temper, they are picked out with small pliers and thrown into water if necessary; other blades are then thrust forward from the cooler parts of the plate to take their place. Axes, adzes, cold chisels, and other edge-tools, in which the total bulk is considerable compared with the part to be hardened, are partially dipped; afterwards let down by the heat of the remainder of the tool; and when the color indicative of the temper is attained, entirely quenched. With the view of removing the loose scales, some rub the objects hastily in dry salt before plunging them in the water, in order to give them a cleaner and brighter face.

TEMPERING SAWS. — A late improvement consists in tempering and straightening the saws at one operation. This is done by heating the saws to the proper degree, and then pressing them with a sudden and powerful stroke between two surfaces of cold iron. A drop press is employed for the purpose. The mechanism is quite simple and inexpensive. Its use effects an important economy in the manufacture of nearly all kinds of saws, and also improves their quality.

TEMPERING STEEL SPRINGS.—1. The steel should be that called "spring" for the large work; for small work, "double shear." After hardening in water as usual, or, as some prefer, in oil, dry the spring over the fire to get rid of its moisture, then smear it over with tallow or oil, hold it over the flame of the smith's forge, passing it to and fro, so that the whole of it will be equally heated, holding it there until the oil or tallow takes fire. Take the article out of the fire and let it burn a short time, then blow it out. The process may be repeated 2 or 3 times if the operator fancies that any portion of the spring has not been raised to the proper temperature. — 2. For tempering cast steel trap springs, all that is necessary is to heat them in the dark, just so that you can see that they are red; then cool them in lukewarm water. You can observe a lower degree of heat in the dark than by daylight, and the low heat and warm water give the desired temper.

TEMPERING VERY HARD.—Heat to a cherry red and plunge in mercury. As the vapor of mercury is deleterious it should be used with great care.

TESTING.—Good steel, with a white heat, will fall to pieces; with bright red heat will crumble under the hammer; with middling heat may be drawn to a needle point. To test hardening qualities, draw under a low heat to a gradually tapered square point and plunge into cold water; if the broken point will scratch glass, the quality is good. To test tenacity, a hardened piece will be driven into cast iron by a hardened hammer; if poor, will crumble; excellence will be in proportion to tenacity in a hard state. Soft steel of good quality gives a curved line fracture and uniform gray texture. Tool steel should be a dull silver color, uniform, and free from sparkling qualities. Aquafortis applied to the surface of steel, produces a black spot; on iron, the metal remains clean. The slightest vein of iron or steel can be detected this way.

TWIST DRILLS, To Forge. — It is necessary to forge a flat blade similar to a flat drill, and then twist this blade into the resemblance required; then, with a light hammer and careful blows, hammer the twisted edges so that they will be thicker than the central line of the tool. This will give greater strength and a better drill, and, to cut well, the central line or cutting point must be made quite thin. Be careful to get the same twist at the point of the drill as upon the body of the drill. The inexperienced often leave the point straight like a flat drill.

WEIGHT. — The following table gives the weight of 1 ft. in length of flat steel:

Size.	Thick ¼ In.	Thick ⅜ In.	Thick ½ In.	Thick ⅝ In.	Size.	Thick ¼ In.	Thick ⅜ In.	Thick ½ In.	Thick ⅝ In.
In.	Lbs.	Lbs.	Lbs.	Lbs.	In.	Lbs.	Lbs.	Lbs.	Lbs.
1	.852	1.27	1.70	2.13	2½	2.13	3.20	4.26	5.32
1⅛	.958	1.43	1.91	2.39	2⅝	2.34	3.51	4.98	5.85
1¼	1.06	1.59	2.13	2.66	3	2.55	3.83	5.11	6.39
1⅜	1.17	1.75	2.34	2.92	3½	2.77	4.15	5.53	6.92
1½	1.27	1.91	2.55	3.19	3½	2.98	4.47	5.98	7.45
1⅝	1.49	2.23	2.98	3.72	3⅝	3.19	4.79	6.38	7.98
2	1.70	2.55	3.40	4.26	4	3.40	5.10	6.80	8.52
2⅛	1.91	2.87	3.83	4.79					

WELDING CAST STEEL. — 1. Heat the steel,

carefully watching it, in a gentle fire, kept free from dirt, and use the following composition: 10 parts borax and 1 sal ammoniac; grind them together roughly and then fuse them in a metal pot over a clear fire; continue the heat until all spume has disappeared from the surface. When the liquid appears clear, pour out to cool and concrete; then grind to fine powder. This may be done by running it into a strong iron vessel; or, if in a smith's shop, into a hole in the swage; put in a piston, and use the sledge-hammer. Care should be exercised in hammering the splice. To use this composition, the steel to be welded is raised to a heat of a bright yellow; then dipped into the welding powder and again placed in the fire until it attains the same heat as before; it is then ready to be placed under the hammer. — 2. Borax, 10 parts; sal ammoniac, 2 parts; flour of sulphur, 1 part; grind or pound them roughly together; fuse them in a metal pot over a clear fire, continuing the heat until all scum has disappeared. Use as No. 1. — 3. Rock saltpetre, ¼ lb.; dissolve in ¼ lb. oil vitriol, and add it to 1 gal. water. After scarfing the steel, get it hot, and quench in the preparation. Then weld the same as a piece of iron, hammering it very quick with light blows. It answers the purpose better than borax; cork it in a bottle and it will keep for years. — 4. Borax, 15 parts; sal ammoniac, 2 parts; cyanide of potassium, 2 parts; dissolve all in water, and evaporate the water at a low temperature. — 5. Copperas, 2 oz.; saltpetre, 1 oz.; common salt, 6 oz.; black oxide of manganese, 1 oz.; prussiate of potash, 1 oz.; all pulverized and mixed with 3 lbs. nice welding sand, and use the same as sand. High-tempered steel can be welded with this at a lower heat than is required for borax. — 6. Pulverized borax, any quantity; slightly cover it with dragon's blood; heat the steel red hot; shake the borax over it; place it again in the fire till the borax smokes on the steel, which will be much below the ordinary welding heat, and then hammer it.

WELDING POWDERS. — Iron filings, 1,000 parts; borax, 500 parts; balsam of copaiva or other resinous oil, 50 parts; sal ammoniac, 75 parts; mix together, heat and pulverize. Weld at cherry red. — 2. Borax, 15 parts; sal ammoniac, 2 parts; cyanide of potassium, 2 parts; dissolved in water, and the water afterward evaporated at a low temperature. — 3. Borax, 1½ lbs.; sal ammoniac, ¾ lb.; prussiate of potassa, ¼ lb.; rosin, 1 oz.; alcohol and water, each 4 oz.; pulverize the borax, etc., fine, and slowly boil all the ingredients together in an iron kettle until the mass becomes a thick paste. Use as borax.

—o—

TIN.

CLEANING.—Acids should never be employed to clean tinware; they attack the metal and remove it from the iron. Rub first with rottenstone and sweet oil; then finish with whitening and a piece of soft leather. Pure tin should be cleaned in the same manner. In a dry atmosphere, tinware will remain bright for a long period, but is soon tarnished in moist air.

CRYSTALLINE SURFACE FOR FOIL.—Chloride tin, 2 parts; hot water, 4 parts; muriatic acid, 2 parts; nitric acid, 1 part; mix. The tin foil is dipped in this mixture and left until crystals appear. Small crystals are obtained when the solution is applied cold—large when used hot. The most beautiful specimens of this kind are produced with varnishes colored with the aniline dyes.

CRYSTALLIZATION. — A platinum capsule is covered with an outer coating of paraffine or wax, leaving the bottom uncovered. This capsule is set upon a plate of amalgamated zinc in a porcelain capsule. The platinum is then filled completely full of a dilute and not too acid solution of chloride of tin, while the porcelain is filled with water acidulated with 1-20 of hydrochloric acid, so that its surface comes in contact with the surface of the liquid in the platinum. A feeble electric current is set up, which reduces the salt of tin. The crystals after a few days are well developed; they are washed with water and dried quickly.

CRYSTALLIZED PLATE.—A variegated primrose appearance, produced upon the surface of tin-plate, by applying to it in a heated state some dilute nitro-muriatic acid for a few seconds, then washing it with water, drying, and coating it with lacquer. The figures are more or less diversified, according to the degree of heat, and relative dilution of the acid. Place the tin-plate, slightly heated, over a tub of water, and rub its surface with a sponge dipped in a liquor composed of 4 parts aquafortis, and 2 parts distilled water, holding 1 part of common salt or sal-ammoniac in solution. When the crystalline spangles are thoroughly brought out, the plate must be immersed in water, washed with a feather or a little cotton, taking care not to rub off the film of tin that forms the feathering, then dried with a low heat, and coated with a lacquer varnish; otherwise it loses its lustre. If the whole surface is not plunged at once in cold water, but is partially cooled by sprinkling water on it, the crystallization will be finely variegated with large and small figures. Similar results will be obtained by blowing cold air through a pipe on the tinned surface, while it is just passing from the fused to the solid state. In the above recipe, the aquafortis can be replaced by sulphuric acid.

CUTTINGS. — Cuttings of tin are roasted until the surface is covered with a brittle brownish crust, of which the upper surface is oxide of tin and the lower one magnetic oxide of iron. The scrap is then agitated in rubbing cylinders until the oxide is deposited as dust. The tin is easily obtained from the combined oxide, and has the advantage of being free from sulphur and arsenic; or the oxide of iron may be obtained by simply treating with sulphuric acid. The iron scrap can be made into good wrought

iron, or melted, but, having regard to its state of subdivision, its most advantageous use is for depositing copper.

DROSS.—Work necessitating the melting of large quantities of pig tin, causes much dross. This consists of a mixture of tin oxide and finely divided metal, usually calcined and sold in this condition as putty powder. The metal can be recovered from the dross by mixing the latter with $\frac{1}{3}$ its weight of fine coke or charcoal, and heating in large luted crucibles gradually to redness. The reduced metal remaining with the unconsumed carbon may be separated by pounding the mass and sifting out the carbonaceous matters, and remelting the granular metal at a low heat.

MENDING.—Take a small bottle, and fill it full of muriatic acid, after which put in all the chippings of zinc it will dissolve; then put in this mixture about the size of a pea of sal ammoniac, and fill up the bottle with water. Wet the place to be mended with this mixture; place a piece of zinc over the hole, and then apply the flame of a lamp or candle below it, which melts the solder on the tin, and causes the zinc to fasten.

RECOVERING.—Melt the metal, and while hot sprinkle sulphur over it; stir it up for a short time; this burns the other metals out of the tin, which may then be used for any purpose desired.

REMOVING FROM COPPER.—Immerse the articles in a solution of blue vitriol.

REMOVING FROM PLATES.—Boil the scraptin with soda lye in presence of litharge.

SEPARATING FROM LEAD.—If the lead and tin are in solution, precipitate the former by sulphuric acid, and the latter with sulphureted hydrogen gas. In an alloy the lead will dissolve in nitric acid, leaving the tin as an oxide.

SHEET METAL WORK, To Cut Out.—The illustrations given under this head show the shapes that dies should be made in order to stamp out plate to form the articles named. The table in the next column gives the sizes of tinware of different kinds.

Right-Angle Elbow.—Strike out the length and depth of the elbow, as shown in the illustration, drawing semicircles at the end. Then draw 7 horizontal lines as shown extending along the small figures. Divide the circumference or length into 16 equal parts by drawing 15 vertical lines as shown. Now draw a line from h to k and d; directly opposite draw another line along the letters $v\ r\ p$; for the top sweep set the

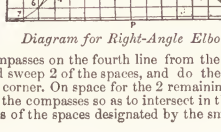


Diagram for Right-Angle Elbow.

compasses on the fourth line from the bottom, and sweep 2 of the spaces, and do the same at the corner. On space for the 2 remaining sweeps set the compasses so as to intersect in the 3 corners of the spaces designated by the small cross marks. The drawing does not include seams or laps; these must be added.

Utensils.		Diam. of Bot.	Diam. of Top.	Height.
		In.	In.	In.
Dippers	½ gal.	4	$6\frac{1}{2}$	4
"	1 pt.	$3\frac{3}{4}$	$4\frac{1}{4}$	$2\frac{3}{4}$
Coffee Pots	1 gal.	7	4	$8\frac{1}{2}$
" "	3 qts.	6	$3\frac{1}{4}$	$8\frac{1}{2}$
Pans	20 "	13	$19\frac{1}{2}$	8
	16 "	$11\frac{1}{2}$	18	$6\frac{1}{2}$
	14 "	$9\frac{1}{2}$	$15\frac{1}{2}$	$6\frac{1}{2}$
	10 "	11	$14\frac{3}{4}$	$4\frac{1}{2}$
	6 "	9	$12\frac{3}{4}$	4
	2 "	6	9	$3\frac{3}{4}$
	3 pts	$5\frac{3}{4}$	$8\frac{1}{2}$	$2\frac{3}{4}$
	1 pt.	4	$6\frac{1}{2}$	$2\frac{3}{4}$
Pie Pans		$7\frac{1}{2}$	9	$1\frac{3}{4}$
Large Wash Bowl		$5\frac{3}{4}$	11	5
Small Wash Bowl		$5\frac{1}{2}$	$9\frac{1}{2}$	5
Milk Strainer		$5\frac{1}{2}$	$9\frac{1}{2}$	$3\frac{1}{2}$
Pails and Dish Kettles	14 qts.	9	13	9
	10 "	7	$11\frac{1}{2}$	9
	6 "	$5\frac{1}{2}$	$9\frac{1}{4}$	$6\frac{1}{2}$
	2 "	4	$6\frac{1}{4}$	4
Colander		$5\frac{3}{4}$	11	5
Measures for Druggists, Beer, etc.	2 gals.	6	$10\frac{1}{2}$	$8\frac{3}{4}$
	1 "	$8\frac{3}{4}$	$8\frac{3}{4}$	$7\frac{1}{2}$
	½ "	$6\frac{3}{4}$	$3\frac{1}{4}$	6
	1 qt.	$5\frac{3}{4}$	$2\frac{1}{2}$	$4\frac{7}{8}$
	1 pt.	4	2	4
	½ "	$3\frac{3}{4}$	$1\frac{1}{4}$	$3\frac{1}{8}$
Measures of other forms	1 gal.	$6\frac{3}{4}$	$5\frac{1}{2}$	$9\frac{1}{2}$
	½ "	$4\frac{3}{4}$	$4\frac{3}{4}$	8
	1 qt.	4	$3\frac{1}{4}$	$5\frac{3}{4}$
	1 pt.	$3\frac{3}{4}$	$2\frac{1}{4}$	$4\frac{3}{4}$
	½ "	$2\frac{7}{8}$	$2\frac{3}{8}$	$3\frac{3}{4}$

TIN CANS, SIZE OF SHEET, FOR FROM 1 TO 100 GALLONS.

For 1 gal., 7 by 20 in.	For 25 gal. 30 by 56 in.
$3\frac{1}{2}$ " 10 " 28 "	40 " 36 " 63 "
5 " 12 " 40 "	50 " 40 " 70 "
6 " 14 " 40 "	75 " 40 " 84 "
10 " 20 " 42 "	100 " 40 " 98 "
15 " 30 " 42 "	

This includes all the laps, seams, etc., which will be found sufficiently correct for all practical purposes.

Elbows for Gutters for Eaves of Roofs.—Eave-troughs possess a form resembling the undivided $\frac{1}{2}$ of a pipe divided lengthwise; therefore, by describing $\frac{1}{2}$ of one end of the elbow of a pipe whose size is equal to the size of the gutter at the top, you have the requisite pattern; extra allowance to be made for bead.

Common Flaring Vessels.—Form a right-angled parallelogram, H K D V, H K; H K, equal to the circumference of the wide end of the diagram, and N P equal to its circumference at the indicated points, K D being the elevation; draw the right lines H N R and K P R; from R as a basis lay out arcs from H to K and N P, calculating proper allowance for backs. For a cone form a parallelogram as in the diagram;

the space from H to K equivalent to the diameter of the cone; K to D equal to the elevation; next draw lines from H and K to the centre of the line D V, and from this as a base or centre, describe a segment of a circle from H to K.

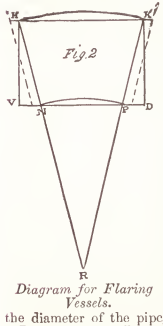


Diagram for Flaring Vessels.

Circular Elbow.—Lay out 2 curved lines, F I and G D, to suit the length of elbow; the space from F to G equivalent to the intended diameter of the pipe; lay off the circles, F D, G I, into as many divisions as desired; construct the parallelogram, *Fig. 4*, the length equivalent to the diameter of the pipe, the width equal to C B in *Fig. 3*; lay off a segment of a circle equal in diameter to the pipe, touching the point H; divide the segment into any desired number of equal divisions; draw lines across the dots parallel to V V; open the compasses $1\frac{1}{4}$ times the diameter of the pipe, and describe the line from V to the intersection of the lines, P P and R R; draw curvilinear lines to the crossings of the

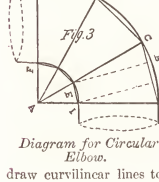


Diagram for Circular Elbow.

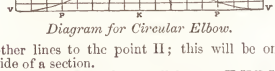


Diagram for Circular Elbow.

other lines to the point H; this will be one side of a section.

Ovals. — Make the parallelogram H K D V; H K equal to the long and K D to the short diameter; divide it into 4 equal parts by drawing the lines, P R and N N; mark the point L $\frac{1}{4}$ the distance from N to O; then describe the arcs, I S I, I S I, and from the line N N describe the segment I N I. To describe an egg-shaped oval with ends of unequal magnitude, construct the frustrum of a cone that will embrace the oval and proceed as in *Fig.*

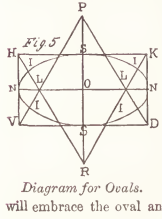


Diagram for Ovals.

5. For an oval flaring vessel in 4 sub-divisions, find the circumference of the arcs I S I and I N I for the bottom of the pieces; form a parallelogram the length of which shall be equal to the circumference of the top of either division, and operate as in *Fig. 2*. The same allowance must be accorded for flare on the side parts as on the ends, allowing for burrs and locks.

Heart.—Draw a straight line, H D K, equal to the breadth of the heart; lay off the segments H D and D K; then with the dividers extended from H to K, describe the arcs H to K and K V.

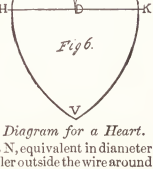


Diagram for a Heart.

Oval Wash Boiler Covers.—Describe the line V R equal in extension to half the length of the boiler; from the central point D, lay off the circle M R N, equivalent in diameter to the breadth of the boiler outside the wire around the rim; describe the line, H K, so as to cross the line V R, as shown in illustration; make V S $\frac{3}{8}$ in. high, more or less, as desired for the pitch of the cover; place the corner of the measuring square on the line H K, laying the flat part touching the point S; then describe the lines H N, H S, S K and K M; this, with the allowances for locks and edges, completes the cover.

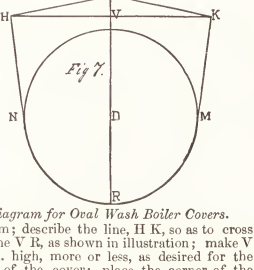


Diagram for Oval Wash Boiler Covers.

Can Tops and Bevel Covers. — Describe the circle K K K for the size of the can or cover; allow the space between K K K and D D D for edges to the same, and the distance between V V V and D D D for the flare; span the dividers from R to K and divide the curvilinear line V V V into 6 equal divisions; cut out the pieces, H H H, D D D, leaving edges

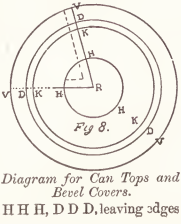


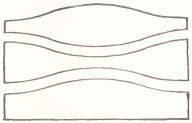
Diagram for Can Tops and Bevel Covers.


Powder Keg Tool.


Screw Top Tools.


Powder Flask Tool.


Dipper Handles.


Elbow Sections.


Scoop Band.


Measure Body.


Gravy Strainer Body.


Milk Pan Section.


Deep Bread Pan.


Dipper Bowl Section.


Oil Can Sections.


Scoop Body.


Scoop Handle.


Scoop Boss.


Coal Hod Back.


Square Powder Canister Tools.


Coffee Pot Boiler Handle


Dripping Pan Corner Notch.

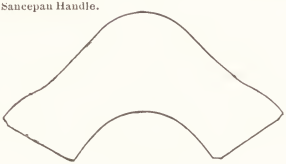

Saucepan Handle.


Dish Pan Handle.


Measure and Cup Handles.


Inside Boss for Handles.


Dust Pan.


Coal Hod Back.


Coal Hod Front.


Tea and Coffee Pot Spouts.


Coffee Pot Lips.


Funnel Body.


Fire Shovel.


Lard Pail Section.


Coffee Boiler Section.


Coffee Pot Section.

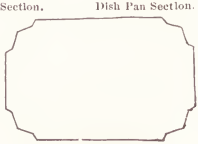

Dish Pan Section.


Large Wash Basin or Colander Body.


Spoon Blanks.


Scoop Back.


Coal Hod Rim and Handle.


Dripping Pan.

Shapes for Sheet Metal Utensils.

for locks parallel to H V. For the opening in the can head or top, describe the curvilinear line H H H, equal in magnitude to the circumference of the opening.

Patterns for the Envelope of a Cone. — Lay off the lines H N and K N; the space from H to K corresponding to the circumference of the cone at the largest end; H N equal to the sloping height; from N as a basis describe the segments H K, D D, V V, R R and P P; each of the parts between these segments will compose a section of the covering if allowance be made for the laps. To lay off the frustrum of a cone, see *Fig. 2.*

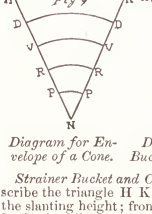


Diagram for Envelope of a Cone.

Diagram for Strainer Bucket and Coffee Pot Lips.

Strainer Bucket and Coffee Pot Lips. — Describe the triangle H K D, H K, equivalent to the slanting height; from D lay out the section, H K; describe the sections of the circles from K to D and H to D according to the dimensions of the vessel. In coffee pots, the section extending from H to K should be regulated according to the style in which it is to be constructed. In describing tea-kettle and tea-pot spouts proceed as in *Figs. 1* and *4.*

Lips for Measures. — Lay out a circle the dimensions of the top of the vessel; describe a line through the centre of the circle and divide it into 4 equal sections; span the compasses on the line ¼ the distance from the end, and describe a semi-circle touching the opposite end of the line; pass the compass the breadth of the lips desired, and lay out an arc until it approaches the semi-circle, which will allow the desired lip.

TINNING BRASS WIRE. — Have 2 baths, one containing the molten tin, kept at a proper temperature, the other a saturated solution of chloride of zinc. Immerse the coil of brass wire in a boiling solution of caustic potash, and remove it to a bobbin, having a fixed spindle and one movable end. Pass the wire by means of hard wood or brass deeply-grooved pulleys, so that it shall pass through the chloride of zinc bath into the molten tin; after immersion pass between the grooves of two pulleys, revolving in contact with each other, so that the grooves form a hole equal in size to the tinned wire; these will squeeze off superfluous metal; carry forward the end and attach to it a fresh bobbin, and wind off at a speed regulated by experience. The wire must be raised in temperature before it will take the tin, and properly cooled before it reaches the final bobbin, which can be effected by placing it at a proper distance from the tin bath.

TINNING, Cold. — Block tin dissolved in muriatic acid with a little mercury forms a good amalgam for cold tinning; or, 1 part of tin, 2 of zinc, 6 of quicksilver; mix tin and mercury together until they form a soft paste. Clean the metal to be tinned; rub it with a piece of cloth moistened with muriatic acid, and immediately apply a little of the amalgam to the surface, rubbing it in with the rag. The amalgam will adhere to the surface and tin it. Cast iron, wrought iron, steel, and copper may be tinned this way. Those who find it difficult to make soft solder adhere to iron with sal ammoniac, will find no difficulty if they first tin the surfaces in this manner, and then proceed as with ordinary tin plate.

TINNING COPPER. — 1. Wash the surface of the article to be tinned with sulphuric acid, and rub the surface well, so as to have it smooth and free of blackness caused by the acid; then sprinkle calcined and pulverized sal ammoniac upon the surface, holding it over a fire, when it will be sufficiently hot to melt a bar of solder which is to be rubbed over the surface. Any copper dish or vessel may be tinned in this way. —2. Boil 4½ lbs. cream of tartar, 3 gal. water, and 2½ lbs. grain-tin or tin shavings. After boiling a sufficient time, the article to be tinned is put therein, and the boiling continued, when the tin is precipitated in metallic form.

TINNING IRON ARTICLES. — 1. Articles of cast iron may be tinned by wrapping them loosely with zine wire and immersing in a solution of perchloride of tin in 10 parts soft water for 15 minutes. The castings must be well cleaned by pickling them in dilute sulphuric acid and scouring with sand and water or scratch brushing. Use the bath at ordinary temperatures and polish the goods with whiting and the brush. — 2. Clean the iron thoroughly by rubbing and dipping it in a bath of diluted sulphuric acid; after which dip the iron in a solution of 1 part sal ammoniac in 7 parts water. The tin used is alloyed with 6 oz. copper to every 200 lbs. tin. Experience teaches at what temperature the melted tin will attach itself to the cleaned cast iron. When too hot the tin will not adhere well. The articles to be tinned must be smooth, or the tinning will not succeed. To make the alloy with copper, it is best to melt the copper first with a few lbs. of the tin, so that experience will teach what temperature will be required to succeed with the balance. — 3. Cleanse the metal to be tinned, and rub with a coarse cloth, dipped in hydrochloric acid, and then rub on French putty with the same cloth. French putty is made by mixing tin filings with mercury.

TINNING INTERIOR OF LEAD PIPES. — Apply a flux of grease or muriate of zinc, or any other flux that will protect the lead from oxidation, and insure a perfect coating of tin, when the tin is poured through the pipe or the pipe dipped into the bath of tin. After the lead pipe has been made, place the same in a nearly vertical position, and pass down through the same a strong cord, to which a weight is attached to draw the cord through the pipe; and at or near the other end of the cord, a sponge or other

porous or elastic material is attached of a size to fill the pipe, 6 in. more or less. The sponge or porous wad being saturated with the flux, is drawn through the pipe, and by its length insures the covering of the entire inside surface of the inside of the pipe with the flux, so that the melted tin, subsequently applied, will adhere to all parts with uniformity and firmness.

TINNING SMALL ARTICLES. — The goods are to be cleaned; then an earthen pot is to be prepared. First a thin sheet of block tin is to be placed at the bottom, then a steam pipe is to be introduced nearly down to the same; next put in a layer of the goods, then a sheet of tin as before, next more goods, and so till it is filled. Then fill up with water till all are covered. Throw in some cream of tartar and turn on the steam just enough to keep boiling. After whitening, rinse in clear water, and pass through sawdust. In a small way, ordinary tinners' ware has been whitened by covering with tin foil, and boiling over the fire, filling up the water as it evaporates.

TIN PLATE. — Pure tin melts at 424° Fah., and when iron, cleansed from oxide and other impurities, and heated somewhat above this temperature, is plunged into the melted metal and allowed to remain there for a time it receives a coating of the white metal. The chief difficulty in this plating process is to get the surface clean. Clean the metal by boiling in strong potash water, rinsing, pickling in dilute sulphuric acid, and scouring with a stiff brush and fine sand. Pass through strong aqueous sal ammoniac solution, then plunge in hot oil (palm or tallow). When heated remove and dip in a pot of fused tin (grain tin) covered with tallow. When tinned, drain in oil pot and rub with a bunch of hemp. Clean and polish in hot sawdust. The plate may then be sorted and boxed; each box of I. C. plate containing 112 lbs. or 112 plates, the plates having a gauge of No. 30, and weighing 1 lb. each. I.X. brand weighs 140 lbs. to 112 sheets. In the trade the grade, weights, and sizes of the plates are indicated by certain marks, as shown in the following table:

NUMBER, WEIGHT, SIZE, LENGTH AND BREADTH OF TIN PLATES.

Brand Mark.	No. of Sheets in Box.	Length and Breadth.				Weight per Box.	
		In.		In.		Lbs.	
1 C	225	14	by	10		112	Each 1 X advances $1.75 to $2.
1 x	225	14	"	10		140	
1 xx	225	14	"	10		161	
1 xxx	225	14	"	10		182	
1 xxxx	225	14	"	10		203	
1 xxxxx	225	14	"	10		224	
1 xxxxxx	225	14	"	10		245	
D C	100	17	"	12½		108	
D x	100	17	"	12½		126	
D xx	100	17	"	12½		147	
D xxx	100	17	"	12½		168	
D xxxx	100	17	"	12½		189	
D xxxxx	100	17	"	12½		210	
D xxxxxx	100	17	"	12½		231	
S D C	200	15	"	11		167	
S D x	200	15	"	11		188	
S D xx	200	15	"	11		209	
S D xxx	200	15	"	11		230	
S D xxxx	200	15	"	11		251	
S D xxxxx	200	15	"	11		272	
S D xxxxxx	200	15	"	11		293	
TTT Taggers,	225	14	"	10		about 112	In addition a great variety of sizes are imported for special purposes.
1 C	225	12	"	12			
1 x	225	12	"	12			
1 xx	225	12	"	12			
1 xxx	225	12	"	12			
1 xxxx	225	12	"	12			
1 C	112	14	"	20			About same wt. per Box as the plates 14 to 10.
1 x	112	14	"	20			
1 xx	112	14	"	20			
1 xxx	112	14	"	20			
1 xxxx	112	14	"	20			
Leaded or Ternes, 1 C	112	14	"	20		112	*For Roofing.*
Leaded or Ternes, 1 x	112	14	"	20		140	*For Roofing.*

ZINC.

AMALGAMATING. — Put a little mercury on the zinc plate, and pour on it dilute sulphuric acid; then rub the mercury over the surface by means of a piece of linen.

BLACK COLORING. — Zinc may be given a fine black color by first cleaning it with sand and sulphuric acid and afterward immersing a moment in a solution composed of 4 parts each of sulphate of nickel and ammonia, and 40 parts water, acidulated with 1 part sulphuric acid; washing and drying it. The black coating adheres, and becomes a bronze color under the burnisher.

COATING WITH IRON. — The objects should first be plunged into a hot solution of 160 grammes ferrous sulphate and 90 grammes sal ammoniac in 2,500 cubic centimeters boiling water. After 2 minutes' exposure remove and brush off in water. This cleanses the surface. They are then again placed in the bath and heated, without brushing or washing, until the sal ammoniac fumes are gone; then washed, and this operation repeated 3 or 4 times, when a coating of iron will be formed on the zinc, which takes a fine polish under the brush.

COLORING. — The metal must be pure, also the materials of which the following bath is composed: Tartrate of copper, 30 parts; caustic potassa, 40 parts; distilled water, 400 parts. After being submitted 2 minutes to the action of this bath, the zinc takes a violet tint; after 3 minutes' immersion, it becomes a deep blue; in 4½ minutes, green; in 6½ minutes, golden yellow; and in 8½ minutes, purple.

DEPOSITING. — 1. Zinc is deposited by the wet way and by the battery. The dead lustre

color is a gray bluish-white. Precipitate a soluble zinc salt by ammonia; this precipitate redissolved in an excess of alkali gives a satisfactory bath; any kind of zinc salt may also be dissolved in cyanide of potassium or a soluble sulphite. These deposits are different as regards durability, from the so-called galvanizing, when cleansed iron is plunged into a bath of molten zinc, and is thus protected against oxidization for a long time, which is not the case with electro-deposited zinc. For depositing upon copper or brass, in the wet way, prepare finely-divided zinc, by pouring the molten metal into a previously strongly heated iron mortar, and stirring until nearly cold. The powdered zinc obtained is placed in a porcelain vessel, and to it is added a concentrated solution of sal ammoniac. This mixture is heated to boiling; and the copper or brass objects to be coated with zinc, previously cleansed, even with an acid, are then placed in a liquid where they obtain a brilliantly white adhering layer of zinc. — 2. Vessels of copper and brass may be covered with a firmly adherent layer of pure zinc, by boiling them in a solution of chloride of zinc, pure zinc turnings being at the same time present in considerable excess. The same object may be effected by means of zinc and a solution of chloride of ammonium or hydrate of potassium.

GRANULATING. — Fuse commercial zinc in a crucible; pour it in a thin stream into a bucket of cold water, and afterwards dry the zinc.

PAINTING. — A difficulty is often experienced in causing oil colors to adhere to sheet zinc. Their adhesion is insured by the employment of a mordant compounded as follows: 1 part chloride of copper, 1 part nitrate of copper, and 1 part sal ammoniac, are to be dissolved in 64 parts of water, to which add 1 part commercial hydrochloric acid. The sheets of zinc are brushed over with this liquid, which gives them a deep black color. In 12 to 24 hours they become dry, and to their then dirty gray surface a coat of any oil color will firmly affix itself. Sheets of zinc prepared in this way, and afterward painted, have been found to withstand all atmospheric changes.

PURIFICATION. — 1. Granulate zinc by melting it, and pouring it while hot into a deep vessel filled with water; place the granulated zinc in a Hessian crucible, in alternate layers, with ¼ its weight of nitre, with an excess of nitre at the top. Cover the crucible, and secure the lid; then apply heat. When deflagration takes place, remove from the fire, separate the dross, and run the zinc into an ingot mold. It is quite free from arsenic. — 2. Pure zinc may be obtained by precipitating its sulphate by an alkali, mixing the oxide produced with charcoal powdered, and exposing the mixture to a bright red heat in a covered crucible in which the pure metal will be found as a button at the bottom when cold.

REDUCING OXIDE OF ZINC. — The oxide may be put in quantities of 500 or 600 lbs. weight into a large pot over the fire; pour a sufficient quantity of muriatic acid over the top, to act as a flux, and the action of the fire will melt the dross, when the pure metal will be found at the bottom of the pot.

REMOVING ZINC COATINGS.—To remove the zinc coating from galvanized articles scour them with silicious sand well moistened with muriatic acid diluted with 3 volumes of soft water.

RIGIDITY OF PLATES. — It is now found practicable to relieve zinc plates or sheets of their rigidity, and facilitate the working of the same into the various forms desired. In the treatment of sheet zinc, with this in view, a bath of linseed oil is prepared, and into this the plates are plunged, these being subjected to the action of oil while in a state of ebullition for some 30 minutes according to thickness of the metal; the plates are then removed, and after the oil is drained from their surfaces they are cleaned and ready for the market. Plates which have passed through this process are represented to possess great ductility, and to be capable of receiving high polish; on this account they may be employed as a substitute for lead or pewter, at a great reduction of cost, in a variety of cases as the linings of sinks and cisterns, and the covering of counter and other surfaces requiring a metallic protection.

SOLDERING. —The parts to be soldered must be cleaned and bright; tin the copper soldering iron by rubbing it while hot in dry hydrochlorate of ammonia with a globule of solder. First wet the parts to be soldered with a solution of chloride of zinc. For zinc plates use the acid alone; next apply the solder, rubbing it with the iron till it unites with the metal. The solder for zinc is composed of 2 parts tin and 1 part lead.

WATCHMAKING AND JEWELRY.

GEMS.

REMARKS. — Gems must be cut and polished by an artisan called the lapidary. His work is performed by the friction of small metal or wooden wheels, which revolve with great rapidity, being frequently driven by the means of a small steam engine. For cutting all kinds of gems and stones, the wheels are made of iron and have a sharp edge, to which diamond or emery powder, moistened with water, is applied during the operation; but for polishing the same, wheels made of softer metal, or wood, are used, the edge of the wooden wheels being sometimes coated with buff-leather; but when the wheels are without a coating of leather, the gem is frequently held against the side instead of the edge. Gems and precious stones differ greatly in hardness and require a different mode of treatment accordingly, although the means used for cutting and polishing are the same in all cases. The softest substances to be cut are alabaster, moth-

er-of pearl, coral, malachite and glass; the emerald, agate, garnet, amethyst, opal, topaz, carbuncle, and many kinds of ornamental stones, are harder than those mentioned, but not so difficult to cut as the diamond, sapphire and ruby.

AGATE. To Convert into Onyx. — Place polished agates 1 week in a solution of iron in nitric acid one millimeter deep; treat those portions to be white with a solution of equal parts of carbonate and hydrate of potash; dry, and burn in an earthen pot until the color is obtained.

AMBER. — A well-known yellowish, semi-transparent, fossil resin; found in pieces on the sea coast, and dug up in diluvial soils; hard, brittle, tasteless, glossy; color yellowish; negatively electric by friction; smells agreeably if rubbed or heated; soluble in pure alkalies, and, without decomposition, in oil of vitriol, which then becomes purple; insoluble in essential and fixed oils without long digestion and heat; soluble in chloroform; melts at about 550° Fahr.; burns with a yellow flame, emitting a fragrant odor, and leaving a light and shiny coal. Amber may be known from mellite and copal, both of which are occasionally substituted for it, by the following characteristics: 1. Mellite is infusible by heat, and burns white; 2. A piece of copal, heated on the point of a knife, catches fire and runs into drops, which flatten as they fall; 3. Amber burns with spitting and frothing, and when its liquefied particles drop, they rebound from the plane on which they fall; 4. Neither mellite nor copal yields succinic acid by distillation; nor the agreeable odor of amber when burnt; nor do they become so readily electric by friction.

AMBER, To Mend. — Smear the parts to be united with linseed oil; hold the oiled part carefully over a small charcoal fire, a hot cinder, or a gas-light, being careful to cover up all the rest of the object loosely with paper; when the oiled parts have begun to be sticky, pinch or press them together, and hold them so till nearly cold. Only that part where the edges are to be united must be warmed, and with care, lest the form or polish of the other parts be disturbed; the part joined requires a little re-polishing.

AMBER, To Work. — Amber in the rough is first split and cut rudely into the shape required by a leaden wheel worked with emery powder, or by a bow-saw having a wire for the blade, tripoli or emery powder being used with it. The pieces are then smoothed with a piece of whetstone and water. The polishing is effected by friction with whiting and water, and, finally, with a little olive oil laid on and well rubbed with a piece of flannel, until the polish is complete. In this process the amber becomes highly electrical; as soon as this happens it must be laid aside to recover itself before the polishing is continued, otherwise the article will be apt to fly into pieces.

AMETHYST. — This precious stone is a variety of vitreous quartz, the color ranging from white to a deep purple. It is found in many parts of the world, and often in pieces of considerable size. The value of the pieces varies considerably, according to color and size. It is best set with diamonds or pearls, but by candle-light it becomes less lustrous, and often of a blackish hue. The use of it is chiefly in jewelry. The Oriental amethyst is more costly, and quite a different stone, being a ruby or sapphire of an amethyst color, harder, and more brilliant.

AMETHYST, Artificial. — 1. Paste or strass, 500 gr.; oxide of manganese, 3 gr.; oxide of cobalt, 24 gr. — 2. Strass, 4608 gr.; oxide of manganese, 36 gr.; oxide of cobalt, 2 gr. — 3. Strass, 9216 gr.; oxide of manganese, 15 to 24 gr.; oxide of cobalt, 1 gr.

AQUAMARINE. — The aquamarine and the beryl are by some treated as identical, because chemically similar; they are distinguished in commerce. The jewelers give the name of aquamarine to the green and blue varieties, while the yellow variety is called beryl. This stone has one admirable quality, which is, that it retains its brilliancy in artificial light. Brazil is the country from which most aquamarines are derived, ready cut. Three sorts of aquamarine are recognized: Aquamarine, pure light blue; Siberian aquamarine, light greenish blue, bright lustre, and faintly colored; aquamarine chrysolite, greenish yellow, sometimes yellowish green, with bright lustre.

AQUAMARINE, Artificial. — Strass, 4800 gr.; glass of antimony, 30 gr.; oxide of cobalt, 1½ gr.

AVENTURINE.—A vitreous variety of quartz, of a pearly-grey, brown, or reddish-brown color, and contains minute particles of mica, which give it a sparkling appearance; not very transparent, and not much used for jewelry; found in Europe and in Asia, and makes pretty cane-handles, snuff-boxes, and such like. One sort is more valuable, and owes its glittering appearance not to mica, but to small quartz crystals scattered through it, the color being a greenish-white, sometimes reddish-brown. Other substances are sold under the name, but while the effect is similar the composition is different, some being feldspar, and of little worth. The sunstone is a variety of aventurine; it is yellow, rare and beautiful.

AVENTURINE, Artificial. — 1. Strass, 500 gr.; scales of iron, 100 gr.; black oxide of copper, 50 gr.; fuse until the black oxide of copper is reduced to the reguline form, then allow the mass to cool slowly, so that the crystals of metal may be equally diffused through it. Has a golden iridescence. — 2. As the last, but substituting oxide of chromium for the protoxide of copper. Appears brown, filled with countless gold spangles; or, when mixed with white paste, of a greenish grey, filled with green spangles.

BERYL. — A beautiful mineral, which, in its richer forms, is classed with the gems; usually of a green color of various shades, passing into honey-yellow and sky-blue; allied in composition to the emerald; but occurs in larger crystals than that gem, and owes its color to oxide of iron instead of oxide of chromium.

BERYL, Artificial. — Strass, 3456 gr.; glass of antimony, 24 gr.; oxide of cobalt, 1½ gr.

CARBUNCLE. — Really a *Garnet*, which see.

CARNELIAN. — A variety of chalcedony; colors, red, yellow, and white, and one of the quartz group of precious stones; capable of a fine polish,

and specially adapted for seals, as it easily detaches itself from wax, and leaves a perfect impression. It is found in various countries, is engraved with facility, and is cheap.

CARNELIAN, Artificial. — *Red.* Strass, 7,000 gr.; glass of antimony, 3,500 gr.; calcined peroxide or iron, 875 gr.; binoxide of manganese, 75 gr. — *White.* Strass, 7,200 gr.; calcined bones, 250 gr.; washed yellow ochre, 65 gr.

CARNELIAN, To Cut. — Some specimens may be cut by means of a thin rotating iron disc with emery and water. Extremely hard specimens require diamond dust. It should be mixed with a little olive oil and applied sparingly to the edge of the disc. To cut plane surfaces and facets use a flat lead lap-wheel with emery and water. Polish with rotten stone and water applied to a pewter lap.

CAT'S-EYE. —A semi-transparent gem, a variety of chrysoberyl, and usually cut with a rounded top. The ray across the stone is often definite; color greenish yellow to black. Set in rings or pins they are handsome, and fine specimens bring a high price. The same name is given to a chalcedonic variety of quartz, of a yellowish-green, yellowish-brown, blackish, and hyacinth-red color. It has an opalescent lustre, usually translucent, and easily broken. The chrysoberyl cat's-eye is more beautiful and valuable, but the two are often confounded, as they are cut alike, and resemble each other.

CHALCEDONY. — One of the quartz group of precious stones, usually of a grayish color, but occurs of a pinkish, bluish, or milky-white tinge. The blue shade is called sapphirine. Some specimens are nearly opaque; others semi-transparent. It is found in various countries, and is suitable for seals. White chalcedony, with small red specks, is called St. Stephen's stone. With alternate stripes of white and gray it is called chalcedonyx. Another variety is the plasma, which is greenish, with minute spots of yellow and white, and is translucent.

CHRYSOBERYL. — A brilliant gem of various shades of yellow or white. One kind is known as the *Cat's-eye*, which see. The transparent yellow stones are cut as brilliants, and are almost as bright as diamonds.

CHRYSOLITE. — Transparent, lustrous, and of a greenish-gold color; when of a deep olive-green, it is called a peridot, and olivine when the green is somewhat in excess of the yellow; can be scratched by quartz; is not much used for fine jewelry, therefore cheap. No particular style is adhered to in the cutting.

CHRYSOLITE, Artificial. — Strass, 7,000 gr.; pure calcined sesquioxide of iron, 65 gr.

COLORING. — The coloring substances are the following oxides: Gold, for purple; silver, for yellowish green; copper, for bright green; iron, for pale red; cobalt, for blue; tin, for white; manganese, in small quantity to make the glass devoid of color; in a larger, to give it an amethyst color; in great quantity, to make it black and opaque; antimony, for reddish hyacinth color.

CORAL. — A calcareous deposit or secretion of several kinds of zoophytes, which assumes beautiful forms. In many parts of the ocean, especially in the Pacific, huge coral reefs testify to the work that is done by these little sea-builders. The carbonate of lime, of which the coral consists, is partly derived from calcareous springs at the bottom of the sea, and partly from the sea itself. The common red coral is obtained principally in the Mediterranean, where there are extensive coral fisheries. Black coral is highly prized.

CORAL, Artificial. — To 2 dr. vermilion add 1 oz. resin; melt together; have ready twigs peeled and dried, and paint them with this mixture while hot; then hold them over a gentle fire, turning them round till perfectly smooth. White coral may be made with white lead, and black with lampblack mixed with resin.

CORAL, To Bleach. — Immerse in a mixture composed of 1 part hydrochloric acid, and 30 parts water; and keep it in this liquid until it becomes white. It should then be taken out, washed well in cold water, and allowed to dry.

CORAL, To Close Cracks in. — Warm carefully, and with a pencil brush cover the crack with watch oil: when cool the seam will not show.

DIAMOND. — This gem derives its name from adamant, of which it is a corruption, and is so called on account of its hardness, for which, combined with its brilliancy, it surpasses all other precious stones. It consists of pure crystallized carbon, with an average specific gravity of 3.5. The primitive form of the crystal, and that into which it may be converted by cleavage, is the regular octahedron. The diamond is found of all colors—white, yellow, orange, red, pink, brown, green, blue, black, and opalescent. Of all the diamonds the white translucent stone that is free from flaw and perfectly cut is most valuable. Pink diamonds are rare, but bright yellow, brown and jet black may be easily found in the market. While a dull tint injures a white diamond, a marked color of red or green adds to its value. 9-10 of the blue diamonds are milky, while all the fine white stones have just a suggestion of blue in their composition.

DIAMOND, Artificial. — 1. Rock crystal, 1,600 gr.; borax, 560 gr.; carbonate of lead, 3,200 gr.; oxide of manganese, ½ to 1 gr.; powder each separately; mix together; fuse in a clean crucible; pour the melted mass into water; separate any reduced lead; again powder and remelt the mass. — 2. Pure silica, 150 gr.; pure litharge, 250 gr.; borax and nitre, each, 50 gr.; arsenious acid, 21 gr. — 3. Rock crystal, 4,056 gr.; minium, 6,300 gr.; potash, 2,154 gr.; borax, 276 gr.; arsenic, 12 gr. — 4. Rock crystal, 3,600 gr.; pure carbonate of lead, 8,508 gr.; potash, 1,260 gr.; borax, 360 gr. — 5. (*Yellow.*) Strass, 500 gr.; glass of antimony, 10 gr.

DIAMOND DUST. — Place a few small pieces of cheap diamond on a block of hard polished steel, in a suitable vessel and cover it with water to prevent it scattering; then place a flat steel punch on each piece, and strike the punch with a mallet with sufficient force to crush the diamond. When reduced fine the dust may be collected and dried for use; after drying, graduate for different purposes by mixing it with a little watch oil; when agitated, the finest par-

ticles float near the surface, whilst the coarse sink to the bottom; thus by decanting the oil in which the dust floats, as many grades of fineness as desired may be obtained. The dust may be separated from the oil by pouring on a piece of smooth clean paper; the paper will absorb the oil while the dust will remain on the surface; to prevent waste, leave it in the oil and use directly therefrom as required, or the oil may be washed out of the dust with alcohol.

DIAMOND FILES. — Shape your file of brass, and charge with diamond dust, as in case of the mill given below. Grade the dust in accordance with the coarse or fine character of the file desired.

DIAMOND MILL. — Make a brass chuck or wheel, suitable for use on a foot-lathe, with a flat even surface, or face of about 1½ or 2 in. in diameter; place a number of the coarsest pieces of diamond dust on different parts of its face, and with a smooth-faced steel hammer drive the pieces of dust all evenly into the brass nearly or quite level with the surface. The mill, thus prepared, is used for making pallet jewels or for grinding stone and glass of any kind. For polishing, use a bone or box-wood chuck or wheel, of similar form to the mill, and coat it slightly with the finest grade of diamond-dust and oil; with this a beautiful polish may be given to the hardest stone.

DIAMOND, To Cut. — Diamonds are cut in 4 shapes: Brilliant, rose, table and brilliolet. It is unnecessary to describe the two latter, as they have gone out of fashion and are now rarely seen. The rose diamond is flat on the under surface, and is cut into innumerable facets on the upper. It is the best form in which to cut diamonds of small depth. Rose diamonds give a larger display of surface brilliancy in proportion to their cost than brilliants. Brilliants have a top called a table; from this the jewel expands on innumerable facets, to an edge called the girdle; from thence it recedes again to a blunted point called the culet. Fixed laws govern the proportions of brilliants. A one-carat stone with a diameter on the girdle of ¼ in., should have a depth of rather over ⅛ in.; a two-carat stone, with a diameter on the girdle of nearly 5-16 in., should have a depth of nearly 3-16. Nothing but the diamond will cut the diamond. In order to cut a rough diamond into a brilliant it is set and soldered firmly into the end of a stick, and held against a wheel which revolves with great velocity and is armed with diamond dust. It may be split by a sharp blow from a chisel along the line of cleavage. But workmen are so apt, in performing this delicate operation, to ruin the gem, that it is seldom risked, and the slow but surer agency of the diamond-dust wheel is employed.

DIAMOND, To Test. — 1. Apply a file to the top or table, and to the bottom or culet. If the stone be genuine, the file may be applied for a month without leaving a mark. — 2. The true diamond will scratch the sapphire; nothing else will. — 3. The specific gravity of the diamond is 3°4′ to 3°6′.—4. If a person looks through a transparent stone at any small object, such as the point of a needle, or a little hole in a card, and sees two small points or two small holes, the stone is not a diamond. All white colorless gems, with the exception of the diamond, make the object examined appear double; double refraction, whenever exhibited by a stone, is conclusive proof that it is not a diamond.

EMERALD. — A stone of a bright, rich, deep-green color, occurring in hexagonal prisms, in granite, gneiss and mica rocks. It ranks next to the diamond and is a little less hard than beryl. The finest are brought from Peru, but fair varieties are found in Bavaria, Siberia, and India.

EMERALD, Artificial. — 1. Strass, 7000 gr.; carbonate of copper, 65 gr.; glass of antimony, 7 gr. — 2. Paste, 960 gr.; glass of antimony, 42 gr.; oxide of cobalt, 3½ gr. — 3. Paste, 4,608 gr.; green oxide of copper, 42 gr.; oxide of chrome, 2 gr. — 4. Paste, 9,612 gr.; acetate of copper, 72 gr.; peroxide of iron, 1½ gr.

FOILS. — These are thin leaves of polished metal, placed under precious stones and pastes, to heighten their brilliancy, or to vary the effect. Foils were formerly made of copper, tinned copper, tin, and silvered copper, but the last is the one wholly used for superior work. Foils are of two descriptions: White, for diamonds and mock diamonds, and colored for the colored gems. The latter are prepared by varnishing or lacquering the former. By their judicious use the color of a stone may often be modified and improved. Thus, by placing a yellow foil under a green stone that turns too much on the blue, or a red one under a stone turning too much on the crimson, the hues will be brightened and enriched. — *Amethyst.* Lake and Prussian blue, finely ground in pale drying oil. — *Blue.* Prussian blue ground with pale, quick-drying oil. Used to deepen the colorof sapphires. — *Crystal.* Made by coating a plate of copper with a layer of silver, and then rolling it into sheets in the flatting mill. The foil is then polished or covered with crystal varnish. The inside of the socket in which the stone or paste is to be set is covered with tin foil, with a little stiff gum or size; when dry, the surface is polished and the socket heated, and, while it is warm, filled with quicksilver; after repose 2 or 3 minutes the fluid metal is poured out, and the stone gently fitted in its place; lastly, the work is well fitted round the stone, to prevent the alloy being shaken out. The bottom of the stone is coated with a film of real silver, by precipitating it from a solution of the nitrate in spirit of ammonia, by means of the oils of cassia and cloves. This method increases the brilliancy of real and factitious gems, and the work is permanent. — *Garnet.* Dragon's blood dissolved in rectified spirit of wine. — *Green.* 1. Pale shellac, dissolved in alcohol (lacquer), and tinged green by dissolving verdigris or acetate of copper in it. — 2. From sesquiferrocyanide of iron and bichromate of potassa, each, ½ oz.; ground to an impalpable powder, first alone, and then with gum mastic (clean and also in fine powder), 2 oz.; a little pyroxilic spirit is next added, gradually, and the whole ground until the mass becomes homogeneous and of a fine transparent green. The beauty increases with grinding. The predominance of the bichromate turns it on the yellowish green;

that of the salt of iron on the bluish green. For use it is to be thinned with pyroxilic spirit. Used for emeralds. — *Red.* Carmine, dissolved in spirit of hartshorn, or in a weak solution of salt of tartar; and a little gum (dissolved) added. — *Ruby.* 1. Lake or carmine, ground in isinglass. — 2. Lake ground in shellac varnish. Both are used when the color turns on the purple. — 3. From bright lake ground in oil. Used when the color turns on the scarlet or orange. — *Yellow.* 1. Various shades of yellow may be produced by tinging a weak alcoholic solution of shellac or mastic, by digesting turmeric, annatto, saffron, or socotrine aloes in it. The former is the brightest and is used for topazes. — 2. Hay saffron digested in 5 or 6 times its weight of boiling water until the latter becomes sufficiently colored, and a little solution of gum or isinglass added to the filtered liquor. When dry, a coating of spirit varnish is applied.

GARNET. — This stone is of various kinds, which are extensively used in jewelry. They occur in many colors, black, brown, green, red, white and yellow, and may have a white streak. All are brilliant when cut and polished, but vary in transparency. The more important varieties are the almandine, cinnamon-stone or essonite, and the red garnets styled pyrope, Bohemian, and Syrian or Oriental. Carbuncles are garnets of a red color, and owe their name to their color, though it is only used of such as are cut with a rounded top and a flat or hollow base. Garnets are found in all quarters of the globe, and are cheap. Of the inferior varieties the following deserve to be named: The grossularite, greenish or black; the succinite, yellow; the colophonite, brown; the melanite, black; the leucite, white; the spessartine, brown; the uwarowite, with a bright green shade. Some of these are softer than the better kinds, but not so beautiful.

GARNET, Artificial.—1. Paste or strass, 1,200 gr.; glass of antimony, 580 gr.; purple of cassius and binoxide of manganese, each, 3 gr. — 2. Paste, 513 gr.; glass of antimony, 256 gr.; purple of cassius and oxide of manganese, each, 2 gr. — 3. Paste, 7,000 gr.; glass of antimony, 3,460 gr.; calcined peroxide of iron, 56 gr.

LAPIS LAZULI.—A beautiful stone of a rich blue color, often showing white or golden specks; found in Persia, China, etc., and of an inferior quality in Chili. When cut and polished, it is used for brooches, rings and studs, and for mosaic and costly articles of furniture. Ground to powder it makes ultramarine; for this it is now but little, if at all, employed, chemistry having provided a cheaper substitute. It occurs in masses and small crystals. It is opaque, and not being hard loses its polish when worn much.

LAPIS LAZULI, Artificial. — Paste, 7,000 gr.; calcined horn or bones, 570 gr.; oxides of cobalt and manganese, each, 24 gr. The golden veins are produced by painting them on the pieces with a mixture of gold powder, borax and gum water, and then gently heating them until the borax fluxes.

MOONSTONE.—A variety of feldspar with a reflection like that of the cat's-eye, and usually of a pearly white color. The best come chiefly from Ceylon, and are often cut into the form of heads and polished, or mounted in cheap jewelry with a rounded top. The moonstone is sometimes called selenite, Ceylon opal, or water opal. An opaque green variety from Siberia has the name of Amazon stone. Though once popular, the moonstone is now of trifling value.

OPAL.—One of the most beautiful of precious stones, and yet is nothing but quartz with an addition of 5 to 10 or even 13 per cent. of water. Its varieties include the "noble" or precious opal, the "fire," or reddish opal, the common opal, the semi-opal, the hydrophane or Mexican opal, cachoelong, opal jasper, wood opal, etc. These differ and are of unequal value and beauty. The precious opal is highly prized for its exquisite play of colors, a peculiarity scarcely perceptible in some sorts. Opals are easily broken; they are cut and polished for jewelry, and in that state have at various times been in demand. The hydrophane loses its beauty when exposed to water. Opals for jewelry are cut with a rounded top, and usually are oval in form.

OPAL, Artificial.—1. Strass, 960 gr.; calcined bones, 48 gr. — 2. Paste, 1 oz.; horn silver, 10 gr.; calcined magnetic ore, 2 gr.; absorbent earth (calcined bones), 26 gr.

PEARL. — The most beautiful and costly are obtained from the pearl oyster of the Indian Seas. The principal fisheries are on the coast of Ceylon, and at Olmutz in the Persian Gulf. An inferior description of pearl is procured from fresh water shell fish. Pearls are composed of membrane and carbonate of calcium, or substances similar to bladder and chalk in alternate layers. The cause of the production of pearls is curious and interesting. When any foreign body gains a permanent lodgment within the shells of any of the mollusca which are lined with pearly matter, or nacre, the pearly secretion of the animal, instead of being spread in layers on the inside of its habitation, is accumulated around the offending particles in concentric films of extreme tenuity, and more or less spherical, forming a pearl.

PEARL, Artificial. — Hollow globes of glass, coated internally with a substance which resembles the peculiar lustre of the native pearl. They are lighter and more brittle than real pearls, but sometimes the resemblance is exact. One sort of artificial pearl is solid, made of fish scales, and is more costly and less easily broken than false pearls of glass. The imitation of pearls is effected in other ways, but the above are said to be the most common.

PEARLS, To Clean. — Soak in hot water in which bran has been boiled with a little salts of tartar and alum, rubbing gently between the hands when the heat will admit of it. When the water is cold renew the application till any discoloration is removed; rinse in lukewarm water, and then lay on white paper in a dark place to cool.

RUBY.—The ruby is a gem of the class styled corundums. It is one of the most beautiful, and when of large size, good color and free from defects, is the most valuable of precious stones;

so that, weight for weight, a ruby may be worth more than a diamond. It and the sapphire are next in hardness to the diamond. The chief sources of it are Siam, Burmah and Ceylon. The color varies from light rose tint to deep carmine. The most prized are of the shade called "pigeon's blood," a pure, deep, rich red, without any admixture of blue or yellow. One variety with a peculiar reflection is called the star ruby. The form in which rubies are mostly cut is called half-brilliant, though stones of less value are often cut with a rounded top. Real rubies of small size have been produced by artificial means, but not large enough for jewelry.

RUBY, Artificial.—1. Paste, 45 parts; binoxide of manganese, 1 part. — 2. Paste, 1 lb.; purple of cassius, 3 dr. — 3. Paste, 2,880 parts; oxide of manganese, 72 parts. — 4. Topaz paste that has turned out opaque, 1 part; strass, 8 parts; fuse together for 30 hours; cool, and again fuse it in small pieces before the blowpipe. Very fine. — 5. Strass, 16 oz.; precipitate of cassius, peroxide of iron, golden sulphide of antimony, and manganese calcined with nitre, each, 168 gr.; rock crystal, 2 oz. or more. — 6. Paste and glass of antimony, each, 8 oz.; rock crystal, 1 oz.; purple of cassius, 1½ dr.; turns on the orange.

SAPPHIRE. — A gem of same nature and composition as the ruby, but different in color, and oftener found of a large size. Though usually blue its tint varies from white to black; the quality varies exceedingly. One variety is called the star sapphire from the peculiar radiation it exhibits. It would be difficult to give hints for the guidance of purchasers, who, in this case, must rely mainly upon the honor and experience of the dealer. Ordinary sapphires are cut with a flat top more or less resembling a brilliant, but star sapphires are rounded at the top. This gem is often imitated, or other and inferior stones are substituted for it.

SAPPHIRE, Artificial. — 1. Strass, 3,600 gr.; oxide of cobalt, 50 gr.; oxide of manganese, 11 gr. — 2. Paste, 4,608 gr.; oxide of cobalt, 68 gr.; fuse in a Hessian crucible for 30 hours. — 3. Paste, 8 oz.; oxide of cobalt, 49 gr.

TESTS. — The only tests applicable to gems and precious stones are the determination of their relative hardness and specific gravity. By the first test, pastes or factitious gems are readily detected, but owing to the difficulty of applying it ceases to be useful to persons unconnected with the trade. The determination of specific gravity is of more general application, as gems are dismounted when offered for sale, or are so set that they may be removed from their mountings without injury. To obtain the sp. gr. of a gem, weigh it first in air, then in water, and divide the weight in air by the difference between the two. The relative hardness of the different substances is measured by the power which they possess of cutting or scratching the other substances having a smaller number attached to them in the table. Thus, no gem but the diamond will scratch the ruby or the sapphire; and for the same reason a blue stone that will cut emerald or topaz, can be no other than the sapphire. The sp. gr. is ascertained in the usual manner, and will be found sufficiently indicative of the true nature of the stone when considered in connection with its other characteristics. The index of refraction is a key to the quality of the stone in the hands of those who are capable of determining it, and may be applied to either mounted or unmounted gems.

HARDNESS, SPECIFIC GRAVITY AND REFRACTIVE POWER OF PRINCIPAL GEMS AND PRECIOUS STONES, AND SOME MINERALS.

Name.	Relative Hardness.	Specific Gravity.	Index of Refraction.
Agate	12	2.6	
Amethyst (occidental)	11	2.7	
Calcareous spar	6	2.7	
Chalk	3	2.7	
Chrysolite	10	3.7	
Carnelian	11	2.7	
Crystal	11	2.6	
Diamond (bluish)	19	3.3	
" (cubic)	18	3.2	
" (from Ormus)	20	3.7	
" (pink)	19	3.4	
" (yellowish)	19	3.3	2.439
" (average colorless)	19to20	3.3 to 3.55	
Emerald	12	2.8	
Fluor Spar	7	3.5	1.434
Garnet	12	4.4	1.815
Glass	Various.	2.3 to 3.62	1.525 to 2.028
" (crystal or flint)		3.0 to 3.6	1.830 to 2.028
" (plate)		2.5 to 2.6	1.514 to 1.542
Gypsum	5	2.3	
Jasper (green)	11	2.7	
" (reddish yellow)	9	2.6	
Onyx	12	2.6	
Opal	10	2.6	
Quartz	10	2.7	1.548
Ruby	17	4.2	1.779
" (pale, from Brazil)	17	3.5	
" (spinelle)	13	3.4	1.764
Sapphire (deep blue)	16	3.8	1.794
" (paler)	17	3.8	
Sardonyx	12	2.6	
Schoerl	10	3.6	
Topaz	15	4.2	
" (Bohemian)	11	2.8	
" (whitish)	14	3.5	
Tourmaline	10	3.0	
Zeolite	8	2.1	
Zircon	—	—	1.961

TOPAZ.—A name commonly given to a hard and beautiful gem of various shades of yellow, but found of several colors. In Australia the green and yellow crystals are found; in Saxony the pale violet, and in Bohemia the sea-green variety. Brazil supplies red and other varieties, and large numbers are collected from Siberia, Ceylon, Peru, Asia Minor, Great Britain, Ireland, etc. Some are colorless. Topaz occurs occasionally in large masses. Pink specimens bring a good price, and like some other tints may be taken for different stones. The cairngorm is often sold for topaz, though inferior every way. It has been frequently imitated, and when genuine the color, if pink, is probably due to the skillful application of heat. The Oriental topaz, or yellow sapphire, is a variety of corundum. It is frequently mistaken for a yellow diamond, and is of little value in commerce; even jewelers frequently confound it with the ordinary topaz.

TOPAZ, Artificial.—1. Strass, 1,050 gr.; glass of antimony, 44 gr.; purple of cassius, 1 gr. — 2. Paste, 3,456 gr.; calcined peroxide of iron, 36 gr.

TURQUOISE.—This stone is extensively imitated, and the genuine is of different degrees of merit and value. The fine blue stones alone are of much worth. They are not found in crystals, but in small lumps of various sizes, and for jewelry are cut and polished with a rounded top. Persia is the source of the best, but inferior sorts occur in China, Thibet, Silesia, Saxony and near Mt. Sinai; these last are darker than the Persian, but are apt to lose color; they may be readily distinguished from real turquoise by the stratum, in most cases apparent at the back, being of a pale yellowish-red color instead of dark brown. The Persian turquoise may also change color, but if not brought into contact with acids, musk, camphor, or other scents, it retains its hue for years, turning at last to a green or a white.

TURQUOISE, Artificial. — Blue paste, 20 to 24 parts; calcined bones, 1 part. The substances employed should be free from impurities, especially of a mineral kind. The litharge, oxide of lead and carbonate of lead, must be free from oxide of tin, as the smallest part of that substance may impart a "milkiness" to the paste. All the ingredients must be separately reduced to powder, and, after being mixed, sifted through lawn. The fusion must be carefully conducted and continuous, and the melted mass allowed to cool slowly after having been left in the fire 24 to 30 hours. Hessian crucibles are preferred, and the heat of an ordinary pottery or porcelain kiln is sufficient in most cases; but a small wind furnace devoted to the purpose is more convenient. It is found that the more tranquil, continuous and uniform the fusion, the denser and clearer is the paste, and the greater its refractive power and beauty.

GOLD.

REMARKS. — Pure gold is too soft for practical purposes, therefore it is usually alloyed with copper or silver; the first alloy producing a reddish color, and the second pale yellow. Our gold coin contains 1-10 copper and silver, mostly copper. For jewelry, the alloy differs with the quantity, and it is estimated by carats. A carat is the 24th part of any given quantity. When gold is called 24 carats, it means that it is all gold; when 20 carats, that of every 24 parts, 20 are gold; 18 carats is the most common alloy used by jewelers, and keeps as well as pure gold; 12 carats is ½ gold, and is a low alloy, apt to tarnish easily, and lose lustre, requiring frequent cleaning. To find the number of carats of gold in an object, first weigh the gold and mix with 7 times its weight in silver. This alloy is beaten into thin leaves, and nitric acid added; this dissolves the silver and copper. The remainder (gold) is fused and weighed; by comparing the first and last weights the number of carats is found. This operation is repeated several times, and if any difference occurs in the result, all is done over again.

ALLOYS. — *Pale 18 k.* Fine gold, 1 oz., 12 gr.; fine silver, 3 dwt., 8 gr.; fine copper, 3 dwt., 8 gr. — *18 k. for Rings.* Gold coin, 19½ gr.; pure copper, 3 gr.; pure silver, 1½ gr. — *16 k.* 64 parts gold; 15 parts silver; 17 parts copper. — *14 k.* 140 parts gold; 40 parts silver; 60 parts copper. — *12 k* Gold coin, 25 gr.; pure copper 13½ gr.; pure silver; 7½ gr. — *10 k.* 100 parts gold, 60 parts silver, 80 parts copper. — *10 k.* Red gold: 100 parts gold, 50 parts silver, 90 parts copper. — *4 k.* Copper, 18 parts; gold 4 parts; silver, 2 parts. *Pale.* 1. Gold, 1 oz.; silver, 8 dwt.; copper, 3 dwt. — 2. Gold, 1 oz.; silver, 1 dwt., 20 grs.; copper, 1 dwt., 4 gr. — 3. *18 k.* Pale gold, 1 oz.; silver, 4 dwt.; copper, 2 dwt., 15 gr. — 4. *18 k.* Gold, 1 oz., 12 gr.; silver, 3 dwt., 8 gr.; copper, 3 dwt., 8 gr. — *Deeper Color.* 1. Gold, 1 oz.; silver, 1 dwt., 12 gr.; copper, 2 dwt., 12 gr. — 2. Gold, 1 oz.; silver, 9 dwt., 12 gr.; copper, 7 dwt., 12 gr. —3. Gold, 1 oz.; silver, 14 dwt.; copper, 8 dwt. — 4. Gold, 2 oz., 5 dwt.; silver, 1 oz., 6 dwt.; copper, 5 dwt.; pinbrass, 5 dwt. — 5. Gold, 1 oz.; silver, 12 dwt.; copper, 6 dwt.—*Transparent Enameling.* Gold, 1 oz.; silver, 14 dwt.; copper, 6 dwt. — *California.* Gold, 11 oz.; composition (made from silver, 15 oz., 12 dwt.; copper, 67 oz.; spelter, 11 oz., 15 oz., 10 dwt.—*Chain.* 1. Gold, 11 dwt., 6 gr.; silver, 2 dwt., 5 gr.; copper, 6 dwt., 13 gr.— 2. Gold, 1 oz.; silver, 9 dwt.; copper, 8 dwt. — *Best Pens.* Gold, 1 oz.; silver, 5 dwt.; copper, 7 dwt., 18 gr.; spelter, 1 dwt, 6 gr. — *Common Pens.* Gold, 1 oz.; silver, 2 oz.; copper, 1 oz. — *Red.* Copper, 66.67 parts; gold, 33.33 parts. — *Yellow.* Copper, 12.50 parts; silver, 37.50 parts; gold, 50 parts. — *Green.* Silver, 25 parts; gold, 75 parts.—*Gray.* Silver, 5.89 parts; gold, 88.23 parts; iron, 5.89 parts. — *Dentist's.* Silver, 8.34 parts; platinum, 66.67 parts; gold, 24.29 parts. — *English coin.* Copper, 8.34 parts; gold, 91.66 parts.

BRITTLE, To Make Strong. — Gold is sometimes brittle, probably due to phosphorus, not detected in the assay. The remedy is to pass chlorine gas through the molten gold, by which treatment gold otherwise unfit for certain kinds of work can be redeemed.

CLEANING. — 1. Wash with warm water, Castile soap, and 1 teaspoonful spirits of ammonia to 1 pt. water; rinse in alcohol, and dry in boxwood sawdust. — 2. To clean gold ornaments, mix jewelers' rouge with a little salad oil, and with a toothbrush rub the ornament till clean; then wash in warm soap and water with a brush and dry with wash leather. — 3. Dissolve sal ammoniac in urine; put the jewelry in it for a short time; then take out, and rub with chamois leather. — 4. Mix eau de Cologne and whiting to the consistency of cream; apply it to the article; brush it well in, and leave it to harden. Finally brush it off. — 5. To clean old work that is tarnished, heat the articles gently with a blowpipe, and then boil out in rather strong pickle of muriatic acid; it may be removed by boiling in chloride of lime and water in a pipkin, and touching the work at a lathe with a scratch-brush.

COLORING.—(*Dry Process.*) Polish the work well and for every 2 oz., take saltpetre, 8 oz.; alum, 4 oz.; salt, 4 oz.; melt together in a black lead pot, stirring with a thin iron bar. Use the fire on a forge and urge it well with the bellows. The polished work being well cleaned with soda, soap, and hot water, is dried in box sawdust, and afterwards covered with a thin layer of borax; annealed and boiled out, and again dried in box sawdust, and finally hung on platinum or silver wire. When the "color" in the pot assumes a brown yellow flame, the work is dipped in for 2 or 3 seconds, and quenched with hot water, diluted with muriatic acid. This ought to produce the desired color, but if it does not, repeat the process, previously drying the work before re-immersion. The color-pot must be emptied immediately upon the forge, so that it may be ready for future use. —2. (*Wet Process.*) For 5 oz. of work take saltpetre, 16 oz.; alum, 8 oz.; salt, 8 oz.; all pulverized, and muriatic acid, 2 oz.; dissolve the ingredients gradually in a black lead pot. When it boils up, add the acid, and stir the whole with a wooden spoon. Having annealed the work and made it clean, tie in small parcels with platinum or fine silver wire, and when the color boils up immerse it therein 4 minutes, moving it about; then take it out and rinse in boiling water; then immerse in the color 1½ minutes and rinse in fresh hot water. Now add 2 oz. fresh hot water to the color in the pot, which will cause it to sink. When it rises put in your work for 1 minute; rinsing in fresh hot water again, when it will begin to brighten. Now immerse ½ minute longer, and rinse for the last time in clean hot water, when it will appear of a beautiful color.

ENAMELING. — The basis of all enamels is a transparent and fusible glass called *frit*, *flux*, or *paste*, which readily receives a color on the addition of the metallic oxides. It is made as follows: Red lead, 16 parts; calcined borax, 3 parts; pounded flint glass, 12 parts; flints, 4 parts. Fuse in a Hessian crucible 12 hours, then pour it out into water, and reduce to powder in a biscuit-ware mortar. The following directions will show how the coloring preparations are made: *Black* enamels are made with peroxide of manganese, or protoxide of iron, to which more depth of color is given with a little cobalt.— *Violet* of a fine hue is made from peroxide of manganese, in small quantity, with saline or alkaline fluxes. — *Red.* Protoxide of copper; boil a solution of equal parts of sugar and acetate of copper in 4 parts water. The sugar takes possession of a portion of the cupreous oxide, and reduces it to the protoxide; when it may be precipitated in the form of a granular powder of a brilliant red. After about 2 hours moderate boiling, the liquid is set aside to settle, and decanted off the precipitate, which is washed and dried. By this pure oxide any tint may be obtained from red to orange by adding more or less peroxide of iron. The oxide and purple of Cassius are likewise employed to color red enamel. This composition resists a strong fire well. — *Green.* A mixture of yellow and blue, generally obtained direct from the oxide of copper, or with the oxide of chrome, which last will resist a strong heat. — *Yellow.* 1 part white oxide of antimony with from 1 to 3 parts white lead, 1 part alum, and 1 part sal ammoniac; each pulverized, then all exactly mixed, and exposed to a heat adequate to decompose the sal ammoniac. This operation is finished when the yellow color is well brought out. — *Blue.* Obtained from the oxide of cobalt, or some of its combinations, and it produces it with such intensity that only a very little can be used lest the shade should pass into black. — *White.* Prepared with a calcine formed of 2 parts tin and 1 part lead, calcined together; of this combined oxide, 1 part is melted with 2 parts fine crystal and a little manganese, all previously ground together. When fusion is complete, the vitreous matter is to be poured into clear water, and the frit dried and melted anew. Repeat pouring into water 3 or 4 times, to insure a combination. Screen the crucible from smoke and flame. The smallest portions of oxide of iron or copper admitted into this enamel will destroy its value. The artist prepares his enamel colors by pounding them in an agate mortar, with an agate pestle, and grinding them on an agate slab, with oil of lavender rendered viscid by exposure to the sun, in a shallow vessel, loosely covered with gauze or glass. He should have a stove, in which a moderate fire is kept up, for drying his work whenever the figures are finished; then passed through the muffle.

FUSING GOLD DUST. — Use a crucible as for melting brass; heat hot; add gold dust mixed with powdered borax; a scum or slag will arise on the top, which may be thickened by adding a little lime or bone ash. If the dust contains any of the more oxidizable metals, add a little nitre; skim off scum carefully; when melted, grasp the crucible with strong tongs and pour into cast iron molds, slightly greased. The slag and crucibles may be afterwards pulverized, and the auriferous matter recovered through cupellation by means of lead.

GILDING, By Dipping. — The composition and preparation of the bath are as follows: Distilled water, 17 pts.; pyrophosphate of potash, or soda, 28 oz.; hydrocyanic acid or ⅛ prussic acid, ¾ oz.; crystallized perchloride of gold, ⅔ oz. Put 17

pts. of distilled water in a porcelain vessel and add, by small portions and stirring with a glass rod, the pyrophosphate; heat, filter, and let it cool. The chloride of gold is prepared by introducing into a small glass flask pure gold finely laminated, ½ oz.; hydrochloric acid, pure, nearly 1 oz.; nitric acid, pure, ½ oz. The flask is slightly heated, effervescence and abundant nitrous vapors result, and in a few minutes the gold has disappeared, leaving a reddish-yellow liquor. The flask is then put upon a sheet of iron, with a hole in its centre, and supported by a tripod. The whole is heated by a spirit lamp to evaporate excess of acids, which may cause great irregularities in the working of the bath, and even prevent its action. The evaporation is finished when vapors escape from the flask, and when the liquid becomes oily and of a deep red. The flask is then removed from the fire by wooden pincers, and set to cool upon a ring of plaited straw. Well-prepared chloride of gold, when cold, forms a saffron-yellow crystalline mass; if red, it has been too much evaporated, and must be heated again after a small addition of the two acids. If it has passed to insoluble protochloride or metallic gold, the treatment must be begun again with the indicated mixture of pure nitric and hydrochloric acids. When cold and crystallized, dissolve it in the flask with a little distilled water, and filter into a clean bottle. Rinse the flask and filter with the unemployed water, so as to get all the gold. Pour the filtered solution of chloride of gold into the cooled one of pyrophosphate, and stir with a glass rod. Lastly, add the hydrocyanic acid, and heat the bath nearly to the boiling point for use. If the solution of pyrophosphate is still tepid, add the hydrocyanic acid before the chloride of gold. When the solutions are mixed in the cold, the liquor is yellow or greenish-yellow, but becomes colorless by the increase of temperature. If the liquor becomes currant-red or wine-lees violet, it is an indication that there is too little hydrocyanic acid; add it, drop by drop, until the liquor becomes colorless. Add prussic acid gradually to baths too rich in gold; correct excess of prussic acid with a small proportion of chloride of gold, until the gilding is of the proper shade. Thus prepared the bath will produce fine gilding upon clean articles, having passed through a very diluted solution of nitrate of binoxide of mercury, without which the deposit of gold is irregular, and will not cover the soldered portions. The articles are supported by a hook and agitated while in the bath. Gilders employ 3 baths in close proximity to each other, and heated upon the same furnace; the first bath is deprived of gold by a previous operation, and used for removing excess of acid; the second retains some gold, but not enough to give a rich gilding. The pieces passed through it begin to receive the deposit, which will be finished in thickness and shade in the third bath. A gas furnace is desirable for heating the baths, as the temperature can thereby be controlled. This method produces more gilding with a given quantity of gold, than one bath alone. The gilding is done in a few seconds; the finishing operations consist in rinsing in fresh water, drying in dry and warm saw-dust, and burnishing.

GILDING, By Diluted Bath. — Employed as a complement to the cleansing process, before a more resisting gilding, as its results have little durability. Water, 2 gals.; bicarbonate of potash, 7 oz.; caustic potash, 63 oz.; cyanide of potassium, 3 oz.; metallic gold to be transformed into chloride, ½ oz. Bring to the boiling point, maintain it at the proper strength by additions of gold and salts in the proportion of ½ oz. This bath will gild about 140 oz. of small jewelry with 1-30 oz. of gold, whereas a pyrophosphate bath gilds about 35 oz. of small articles with the 1-30 oz. of gold extracted from the liquor.

GILDING, By Stirring and Amalgam. — In the centre of a charcoal stove put a crucible holding a given quantity of pure and dry mercury; when the temperature has reached 212° Fahr. add ½ the weight of gold. Stir until it has acquired the consistency of butter; throw it into cold water, and keep it there for use. Cleanse the articles in aquafortis; put in a stoneware pan, and pour over them a diluted solution of nitrate of binoxide of mercury, moving the articles about. Add the amalgam; on stirring the articles this is spread all over them; then rinse in cold water, place in a large and deep copper ladle, perforated with numerous small holes, and having a long handle. Hold the ladle over a charcoal fire, and constantly stir to have the heat equal. The mercury of the amalgam is soon volatilized, and the gold remains adherent to the articles. If instead of a yellow gilding a red one be desired, pour upon the pieces, kept in the ladle and upon the fire, in a well mixed and fluid state, oil, 25 parts; yellow wax 25 parts; acetate of copper, 10 parts; red ochre, 40 parts; constantly agitated and allowed to burn out, then thrown into a diluted solution of sulphuric acid. This waxing is to be done after the complete volatilization of the mercury. When removed from the pickle, the gilding has a dull ochre appearance, and must be scratch-brushed. Small articles are brightened in a long narrow bag, where they are put with copper pearls, or the waste from these pearls, and wet with vinegar water; a to-and-fro motion is imparted to the bag, and the gilt articles and the copper granules polish each other. Rinse and dry in sawdust, and burnish if required.

GILDING, Cold, with the Rag.—Dissolve finely laminated pure gold in aqua regia made of nitric acid, 5 parts, sal ammoniac, 2 parts, and saltpetre, ½ part; heat upon a gentle fire; when the gold has disappeared, pour the cooled contents of the flask into a flat-bottomed stoneware pan; into this liquor place, one upon the other, in sufficient quantity, squares of linen cloth; strike them with a glass rod, that they may absorb the chloride of gold. Each square of cloth is taken out with wooden pincers; drained and spread for drying in a dark chamber. When nearly dry, each piece, supported upon glass rods, is placed on top of a charcoal fire, and soon takes fire. The combustion is aided by the saltpetre, and finished upon a marble slab. Grind the ashes with a muller and keep them between the folds of a parchment leaf, around which a

wet cloth has been folded; it is then ready. Mix it upon a slab with a few drops of water, and rub on the previously cleaned silver. The smooth surfaces are rubbed with the thumb, the fillets with a cork cut to the proper shape, and the corners or angles with a stick of soft wood, such as linden or poplar; then burnish; if a red shade be desired, add a little pure copper to the gold to be dissolved in aqua regia.

GILDING, Coloring.—If the gilding is dull and irregular in color, melt together in their water of crystallization, at about 212° Fahr., equal parts sulphate of iron, sulphate of zinc, sulphate of alumina and potash, and saltpetre. Cover the articles with the mixture and put them into a cylindrical and vertical grate. This is placed in the centre of a furnace, where the charcoal burns between the sides and the grate which holds the articles. When the moistened finger is presented to one piece, and a slight hissing sound is heard, the heat is sufficient. Put the articles rapidly into a very diluted solution of sulphuric acid, where the coating of salts is quickly dissolved; the articles present a uniform color. If the copper articles are not entirely gilt by the first operation, the portions ungilt will show red, and the articles must then be deprived of gold, cleansed and regilt. Sometimes, instead of this, the articles are placed for a few moments in the electro bath.

GILDING, Green and White.—For these shades add, drop by drop, until the desired shade is obtained, to the bath of double pyrophosphate of soda and gold, a solution of nitrate of silver, for which dissolve in 5 oz. distilled water, ½ oz. nitrate silver crystallized. Before gilding green or white, yellow gild the objects in the ordinary bath; then pass rapidly through the mercurial solution; lastly dip them into the gold bath holding the nitrate of silver. To maintain the constancy of the shade add a few drops of the silver solution when required.

GILDING SILVER, By Dipping.—The articles, previously cleansed and scratch-brushed, are boiled ½ hour in the gold bath of pyrophosphate, to which add a few drops of sulphurous acid, or preferably hydrocyanic acid, in excess of the quantity needed by the primitive bath. This is very fine, but without firmness. The deposit is rapid when the silver articles are stirred with a rod of copper, zinc or brass.

GILDING, With Bicarbonates.—The bicarbonate bath is prepared in a cast-iron kettle turned smooth inside, on the lathe, and gilt by the protracted ebullition of nearly spent gold baths. Water, 3½ gals.; bicarbonate of potash or soda, ½ oz.; pure metallic gold transformed into chloride, 4¼ oz.; the whole boiled 2 hours and fresh water added to replace that evaporated. A part of the gold in violet-black powder precipitates, requiring the cooling and decanting of the liquor; this is boiled, and the gilding proceeded with as in *Gilding by Dipping* (which see), except that the mercurial solution should be more diluted than for the baths of pyrophosphates. The operation is finished when about ½ the gold in the liquor is deposited.

GRAIN.—Cupelled gold, 1 part; silver, 3 parts; melted together, and poured in a small stream into water; the silver afterwards dissolved out by digestion in boiling nitric acid, and the grains, after being well washed in water, heated to redness in a crucible or cupel. Used to make preparations of gold.

IMITATION.—1. (*French or Oreide.*) 100 parts, by weight pure copper, 14 parts zinc or tin, 6 parts magnesia, 3 6-10 parts sal ammoniac, limestone and cream of tartar. The copper is melted, then the magnesia, sal ammoniac, limestone and cream of tartar in powder added separately and gradually; the mass stirred ½ hour; the zinc or tin dropped in piece by piece, and the stirring kept up till they melt; finally, the crucible is covered, the mass kept in fusion 35 minutes, the scum removed, and the metal poured into molds, when it is ready for use. The alloy is said to be fine grained and malleable, takes a high polish, and does not easily oxidize. — 2. Fuse together with saltpetre, sal ammoniac and powdered charcoal, 4 parts platina, 2½ parts pure copper, 1 part pure zinc, 2 parts block tin, and 1½ parts pure lead. — 3. 2 parts platina, 1 part silver, and 3 parts copper.

LACE.—The refiner first prepares a solid rod of silver 1 in. thick; then beats this rod, applies upon the surface a sheet of gold leaf, burnishes this down, and so on, till the gold is about a 100th part as thick as the silver; the rod is then made into fine wire, when it is passed through holes in a steel plate lessening step by step in diameter. The gold never deserts the silver, and maintains the same ratio. It has been calculated that the gold actually placed on the finest silver wire for gold lace is not more than ½ of 1,000,000th of an in. in thickness.

LEAF.—According to color, gold leaf is termed deep, medium, fine, red, pale red, deep orange, lemon, pale white, etc. Deep gold admits very little alloy, usually about 2½ parts silver and 2½ parts copper, making 5 in all. A medium kind is made of 42 parts pure gold, 12 parts silver, and 6 parts copper. The gold is first made into ingots, 1½x¾ in. and 3-16 in. thick; then passed between 2 polished steel rollers, until it becomes a long ribbon 1-800 in. thick; the ribbon being cut into in. sq. pieces, 150 of these are interleaved with thick paper and inclosed in a parchment case called a "kutch," which is subjected to a continued series of blows with a 16 lb. hammer. When each piece has been stretched out to 4 in. sq., the kutch is opened, the pieces are cut into 4 of 2 in. sq. each, and interleaved in a book of gold-beater's skin, called a "shoder," the 150 pieces being now 600. Another beating with a 9 lb. hammer spreads out these, and another cutting augments the number from 600 to 2,400. These are separated into 3 packets of 800 each, and each beaten in a book of gold-beater's skin, called a mold; this beating, lasting 4 hours, is done with a 7 lb. hammer. The leaves are then cut into 3¼ in. sq., which are interleaved in books and made up in packs. Leaf gold is the thinnest substance produced, being 1-280,000 of an in., a single grain covering 56 sq. in. Dentists' gold is thicker than ordinary leaf gold.

MELTING. — Prepare a good fire; heat the ingot in which you wish to cast the gold, a lit-

tle hotter than boiling water; next put the alloy in the crucible, add a small quantity pulverized borax, and leave on the fire until melted. Cast this in a clean ingot; after breaking the bar into fragments, return to the pot and remelt, not adding borax this time, but when the gold looks clear and smooth on the top, add for every 6 oz. a piece of saltpetre size of a pea; and in about a minute pour the gold. Keep up the heat after adding the saltpetre, and, previous to pouring the gold, pour a few drops of oil into the iron ingot. If the stock was clean the gold will roll well. Much depends on the first rolling of the stock; 18 carat should be subjected to a heavy strain; the first and second draughts, which imparts a grain to the stock; light draughts stretch the gold on the surface, and the middle portion remaining as cast, causes the gold to crack; many good bars having been condemned, when the trouble was in the rolling. After the 18 carat has been rolled to twice its original length, it must be annealed, then rolled to the size required. Proceed with melting 14 carat as described for 18 carat, giving it as heavy strains in the rolls, but not rolling so much before annealing as the 18 carat. The other carats do not require saltpetre to toughen; instead use a little sal ammoniac, and proceed as above. When annealing red gold, do not quench when red hot, but allow the gold to blacken before quenching, otherwise it will slit. Melt new alloys twice; treat solder the same way, to insure thorough admixture of the copper with the gold.

PLATING.—Cast the bar of gold to be plated the width desired and roll to $\frac{1}{8}$ in. in thickness. If silver, cast the bar same width as the gold and roll a little longer. Usually lower grade metal is 2 or 3 times the thickness of the better, therefore use as much as will make the proportion desired. Planish as nearly flat and straight as possible; then file one face of silver and one face of gold until bright. Previous to this roll a piece of plate solder thin, say 36 in. round size plate, and cut a strip a little wider and a little longer than the gold. Emery paper can be used to clean each side from dirt. Cover the surface with ground borax on each side; do the same on the bright faces of the gold and silver; place the solder between them, as meat in a sandwich. Have a piece of iron wire $\frac{3}{8}$ in. thick and 3 ft. long, place lengthwise on the gold and squeeze the whole tightly in a vice. Now bind with heavy binding wire every in. or so together. Make a charcoal fire in the forge, and build it so as to be like an oven and then solder; when the solder melts on each side the whole length, the thing is done; then roll as other stock. If you are making gold plating, 18 k. or 16 k. on 14 k. and 12 k., you must use gold solder, about 5 or 6 kts. less than the inferior gold. If gold on silver or composition, use one of the solders given in this department.

POLISHING POWDERS.—1. Rock alum burnt and finely powdered, 5 parts; levigated chalk, 1 part; mix; apply with a dry brush.—2. Sesquioxide of iron (iron rust), 70 per cent., and sal ammoniac, 20 per cent. To prepare it, protochloride of iron, obtained by dissolving iron in hydrochloric acid, is treated with liquid ammonia until a precipitate is no longer formed. The precipitate is collected in a filter, and dried at such a temperature that the adhering sal ammoniac shall not be volatilized. The protoxide of iron precipitate at first becomes charged with sesquioxide.

RECOVERING FROM GILT METAL.—Take a solution of borax water, apply to the gilt surface and sprinkle over it some finely powdered sulphur; make the article red hot, and quench it in water; then scrape off the gold, and recover it by means of lend.

RECOVERING GOLD LOST IN COLORING. — Dissolve a handful of sulphate of iron in boiling water; add this to the "color" water; it precipitates the small particles of gold; draw off the water, being careful not to disturb the sediment; now proceed to wash the sediment from all trace of acid with plenty of boiling water; it will require 3 or 4 separate washings, with sufficient time between each to allow the water to cool and the sediment to settle before pouring the water off; then dry in an iron vessel by the fire, and finally fuse in a covered skittle pot with a flux.

REDUCING 22 K. —

	Oz.	Dwt.	Gr.
1 oz., 22 k. to 21 k., add alloy			23
" " " " 20 " " "		2	
" " " " 19 " " "		3	4
" " " " 18 " " "		4	11
" " " " 17 " " "		5	21
" " " " 16 " " "		7	12
" " " " 15 " " "		9	08
" " " " 14 " " "		11	11
" " " " 13 " " "		13	20
" " " " 12 " " "		16	16
" " " " 11 " " "	1		
" " " " 10 " " "	1	4	
" " " " 9 " " "	1	8	22
" " " " 8 " " "	1	14	23
" " " " 7 " " "	2	2	20

REFINING. — 1. Melt in a small black lead crucible with about an equal weight of silver (or copper); pour in a thin stream into cold water (to granulate), and boil in pure nitric acid until action ceases. The gold will be found at the bottom. Decant the liquid, wash the residue, and fuse in a crucible. Precipitate the silver from the liquid by addition of hydrochloric acid; gather it on a filter; wash with hot water; mix with a quantity of dilute sulphuric acid (acid 1, water 5), and add a few strips of zinc. The zinc will dissolve, and the silver be reduced to metallic form. Wash, dry, and fuse the silver sponge. The copper may be obtained from the liquid by adding zinc. As the zinc dissolves the copper is deposited. — 2. To remove tin from the stock, previous to pouring the gold throw a small piece corrosive sublimate in the pot; stir with a long piece of pointed charcoal, and allow the pot to remain on the fire $\frac{1}{2}$ minute. This will take tin from the alloy; while the tin is in, the gold will not roll without cracking. To remove emery or steel filings from gold, add a small piece of glass gall, while melting; it will collect them in the flux.

— 3. To separate gold from silver; the alloy is to be melted and poured from a height into a vessel of cold water, to which rotary motion is communicated, reducing to a finely granulated condition. The metallic substance is then treated with nitric acid and gently heated. Nitrate of silver is produced, which can be reduced by any of the ordinary methods; while metallic gold remains as a black mud, which must be washed and melted.

SOLDERING. — 1. Use solder adapted to the work on hand; never soft solder on an article when it can be avoided, provided there is any great strain on the part broken, or it may require to be hard soldered; and there is scarcely any worse job than to hard solder work once soft soldered. Before commencing, remove the set; if it can not be done, bury the set and ring in a raw potato; if very delicate, cut a thin slice of the potato, and push the ring through far enough to allow the set enough projection to be covered by water (which is in a glass and the potato bound on top). Place a small piece of charcoal under the joint, if there is room enough; use plenty of borax, and heat gradually until pretty well forged; then place a brass pin across the joint to attract the solder; place enough solder on to make a firm joint, and fuse quickly. To prepare an article to be soldered make the broken parts bright and even so as to press against each other firmly, or hold in place by binding wire. In soldering rings, beware of the low carat gold or those filled with base metal fusible at a low temperature. The best way to mend the latter class is to place a thin band the size of the ring, to extend $\frac{1}{4}$ way on the inside of the ring, and fasten in with a liberal supply of soft solder, which may be dressed out so as not to show, and make a very respectable job. — 2. To hard solder solid gold set rings such as amethyst, cameo and garnet, use jewelers' solder with gold of a somewhat lower title than the article to be soldered, using borax, flux, and blowpipe, enveloping the other parts with tissue paper and whiteningor plaster Paris.

SOLDERS.—1. (*Easy Running.*)3 dwt. silver solder; 1 dwt. 12 k. gold; as much arsenic as can be held on a silver 5 cent piece.— 2. (*Soft.*) 4 parts gold, 1 part silver, and 1 part copper. It can be made softer by adding brass, but the solder is liable to oxidize.—3. (*Enameled Work.*) Gold, 1 oz.; silver, 1 oz.; copper, 10 dwt.; silver solder, 8 dwt., 8 gr.—4. (*For 22 k.*) Gold for 22 carats, 1 dwt.; silver, 2 gr.; copper, 1 gr.— 5. (*For 18 k.*) 14 gr. gold; 6 gr. silver; 4 gr. copper. — 6. (*For 18 k.*) Red gold to color; 14 gr. gold; 5 gr. silver; 5 gr. copper. — 7. (*For 16 k.*) 12 gr. gold; 7 gr. silver; 5 gr. copper. — 8. (*For 16 k.*) Red gold to color; 12 gr. gold; 7 gr. silver; 5 gr. copper. — 9. (*For 14 k.*) 10 gr. gold; 8 gr. silver; 6 gr. copper. — 10. (*For 14 k.*) Red gold to color; 10 gr. gold; 8 gr. silver; 6 gr. copper. — 11. (*For 7½ k.*) 7½ dwt. gold; 9$\frac{3}{4}$ dwt. silver; 6$\frac{3}{4}$ dwt. copper. To make this flow easily, add 15 gr. brass (second melting.) — 12. (*For 5 k.*) 5 dwt. gold; 13 dwt. silver; 6 dwt. copper; add 15 gr. brass (second melting.) — 13. (*For 3½ k.*) 1 dwt. gold; 1 dwt. copper; 1 dwt. brass; 4 dwt. silver coin; add the brass when it is melted a second time.

SOLDER, Soft, Removing.—1. Place the articles in a vessel containing muriatic acid, and allow them to remain in 2 hours; the acid should be warmed, say 90°. The articles require to be recolored or gilt afterward. — 2. Nitric acid dissolves solder without affecting the gold unless of inferior quality.

SOLVENT.—Mix equal quantities nitric and muriatic acids.

TESTING. — 1. A liquid for testing gold may be made with 2 oz. nitric acid, 4 dr. water, and 1 sc. muriatic acid, mixed together and kept for use in a stoppered glass bottle; the stopper should have a glass prong dipping into the mixture, so that when it is taken out the article to be tested may be touched by this prong with some of the liquid upon it. But before touching with the acid, a file should be drawn over some part of the article to make certain that it is not plated, and the liquid applied to the file marks; if the metal is base, the fact will be detected; the acid has no effect on gold. Qualities above 9 carat will stand this test. The acid would boil more or less green in inferior qualities; if alloyed with an extra quantity of silver, they will only partially stand this test, and the color of the gold would then be paler. — 2. A good test for gold is a piece of lunar caustic, fixed to a pointed piece of wood. Lightly wet the metal to be tested, and rub gently with the caustic. If gold the mark will be faint, but if an inferior metal, it will be black.

VALUE, Of Plate or Wire. —

8 k.....	$.40	per dwt.	17 k.....	$ .75	per dwt.
9 “.....	.44	“	18 “.....	.79	“
10 “.....	.47	“	19 “.....	.83	“
11 “.....	.51	“	20 “.....	.87	“
12 “.....	.55	“	21 “.....	.91	“
13 “.....	.59	“	22 “.....	.95	“
14 “.....	.63	“	23 “.....	.99	“
15 “.....	.67	“	24 “.....	1.03	“
16 “.....	.71	“			

WIRE, Proportions of Alloy in, from 1 oz. up to 21 oz. —

Fine Gold.			Fine Silver.			Fine Copper.			Total.		
Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.
0	5	21	0	6	6	0	6	21	1	0	0
0	11	18	0	14	12	0	13	18	2	0	0
0	17	15	1	1	18	1	0	15	3	0	0
1	15	6	2	3	12	2	1	6	6	0	0
2	12	21	3	5	6	2	1	21	9	0	0
3	10	12	4	7	0	4	2	12	12	0	0
4	8	3	5	8	18	5	3	3	15	0	0
5	4	18	6	10	12	6	3	18	18	0	0
6	3	8	7	12	6	2	4	9	21	0	0

SILVER.

ALLOYS. — Copper is the only less precious metal that alloys well with silver. Its addition is an improvement, rendering the silver finer in

appearance and more sonorous; it is astonishing to note the quantity that may be added without changing the appearance of the metal. An alloy of silver and copper in the proportion of 4-5 silver to 1-5 copper, is fully as white as silver pure. When the proportion of copper rises above 1-5 it has an influence on the color. American coin silver is 1-10 copper. The baser white metals cannot be alloyed with silver to any extent, as they impart too great brittleness. A small proportion of block tin converts it into bell metal. The following are some of the alloys of silver: 1. Silver, 11 oz., 2 dwt.; copper, 18 dwt. — 2. Silver, 1 oz.; copper, 1 dwt., 12 gr. — 3. Silver, 1 oz.; copper, 5 dwt. — 4. Pure silver, 1 oz.; copper, ½ oz.; brass, ⅜ oz.; bismuth, ½ oz.; clean salt, ⅜ oz.; white arsenic, ⅛ oz.; potash, ½ oz. Melt the silver, copper and brass first, then add the other articles in the order named. Sprinkle a little borax in the crucible while melting. — 5. (*For Plating.*) Silver. 1 oz.; copper, 10 dwt.—6. (*Common, for Chains.*) Silver, 6 oz.; copper, 4 oz. — 7. (*French Alloy.*) Silver, 20 parts; purified nickel, 28 parts; copper, 52 parts. Melt the copper and nickel in the granular state; then introduce the silver. The flux employed is charcoal and borax, in powder, and the ingots obtained are rendered malleable by annealing for a considerable time in powdered charcoal.

BURNISHING. — Polishing by removing the roughness upon the surface. This mode of polishing is expeditious, and gives great lustre. The form and construction of the burnisher is variable and must be adapted to the various kinds of work. In general it is only intended to efface inequalities. Whatever substance the burnisher is made of, is of little consequence provided it is a harder substance than the article operated on. To burnish silver, clean off any kind of dirt contracted while making, as that would spoil the burnishing. Take very fine pumice-stone powder, and with a brush, made wet in strong soapsuds, rub the work, even those parts which are to remain dull, which will receive a beautiful white appearance; wipe with an old linen cloth, and proceed to burnishing. The burnishers are of 2 kinds (steel and hard stone, curved or straight, rounded or pointed), and made to suit projecting parts or hollows. Stone burnishers are made of blood-stone, cut and rounded with the grindstone, or rubbed so that they present at the bottom a blunt edge or a rounded surface. These are polished with emery like steel burnishers, and are finished by rubbing upon leather covered with crocus martis. The stone is mounted in a wooden handle. The best bloodstones contain the most iron, and when polished present a steel color. Take hold of the tool near the stone, and lean hard with it on parts to be burnished, causing it to glide by a backward and forward movement without taking it off the piece. When requisite that the hand pass over a large surface at once without losing its point of support on the work-bench, in taking hold of the burnisher place it just underneath the little finger. During the process, moisten the tool with black soapsuds. The water causes it to glide easily, prevents heating and facilitates action. The black soap, containing more alkali than the common, acts with greater strength in cleansing away greasiness; it also detaches spots which spoil the beauty of the burnishing. In consequence of friction, the burnisher loses its bite, and slips over the surface as if it were oily; to restore its action, rub from time to time on the leather. The leather is fixed on a piece of hard wood, with shallow furrows along it. There are generally two leathers—one of sole leather, the other of buff leather. The first impregnated with oil and crocus martis, and used for blood-stone burnishers; the other has a little putty of tin in the furrows for rubbing steel burnishers. Bloodstone being hard, is used in preference to the steel burnisher. It is only on small articles and in difficult places, that steel burnishers are used. When the articles, on account of their minuteness, or from any cause, cannot be held in the hand, fix them in a frame on the bench; but manage the burnisher so as to leave untouched those parts of the work intended to remain dull. When, in burnishing plated or silver lined articles, there is any place where the precious metal is removed, restore it by silvering the places. The burnishing finished, remove the soapsuds which adhere to the work, by rubbing with old linen cloth. When there are a great number of small pieces to finish, throw them into soapsuds and dry afterwards with sawdust.

CLEANING.—When silver becomes tarnished from soldering, either of the following may be used: 1. Expose to a uniform heat, and boil in strong alum water. — 2. Immerse in a liquid made of ½ oz. cyanuret of potassa to 1 pt. rain water; then brush off with prepared chalk. (See receipts in HOUSEHOLD.)

COATING FOR SILVERWARE. — 1. The loss of silver from the action of sulphur compounds in the air, especially where gas is burned, is great. As a protection apply a coat of collodion as follows: Warm the articles and apply a thin coat diluted with alcohol, using a soft brush. — 2. Spirits wine, 1 pt., divided into 3 parts; mix 1 part with gum mastic in a bottle; 1 part spirits and ½ oz. sandarae in another bottle; and 1 part spirits and ½ oz. whitest gum Benjamin in another bottle; mix and temper to suit. If too thin, add mastic; if too soft, add sandarae or Benjamin. When used, warm the silver before the fire, and, with a flat camel's hair pencil stroke it over till no white streaks appear; this will preserve the silvering for years. (See *Metals, Polished, Varnish for*, in VARNISHES, JAPANS AND LACQUERS.)

FROSTING. — 1. Put 1 dr. sulphuric acid into 4 oz. rain water. Heat the solution and sink the silver in it till frosted, then wash clean and dry in sawdust. — 2. To frost polished silver, cyanide of potassium, 1 oz., dissolved in ½ pt. water. Do not hold the silver in the hand, but use pliers of lancewood or boxwood, and apply the mixture (violent poison) with a brush to the surface.

IMITATION. — 1. Combine by fusion 1 part pure copper, 24 parts block tin, 1½ parts pure antimony, ½ part pure bismuth and 2 parts clear glass. The glass may be omitted save in cases

where it is an object to have the metal sonorous. — 2. Pure copper, 750 parts; nickel, 140 parts; black oxide of cobalt, 20 parts; tin, in stick, 18 parts; zinc, 72 parts. — 3. (*Byzant.*) Melt 4 lbs. pure copper with 3 oz. tin. This closely resembles and rings like sterling silver, and is valuable for mountings, etc., where pure silver would be too expensive.

NIELLED. — A kind of inlaid enamel obtained by sulphuration of parts of a silver object. Instead of being direct, it is produced by inlaying the silver surface with a sulphide of the same metal prepared beforehand. For preparing the niel, heat a certain proportion of sulphur in a deep crucible; heat a certain quantity of silver, copper, and lead in another crucible, and when melted pour into the fused sulphur, which transforms these metals into sulphides; then add a little sal ammoniac; remove from the crucible and pulverize for use. First crucible—flowers of sulphur, 27 oz.; sal ammoniac, 2¾ oz. Second crucible, which after fusion is poured into the first—silver, ½ oz.; copper, 1½ oz.; lead, 2¾ oz. 1. After having reduced the niel to a fine powder, mix with a small proportion of a solution of sal ammoniac; hollow out the engraving upon a silver surface and cover the whole with the composition; then heat in a muffle until the composition solders to the metal. Uncover the pattern by a level polish, when the silver will appear as over a black ground. — 2. Engrave in relief a steel plate, and press it against the silver plate between two hard bodies. The copy is hollow and ready to receive the niel. A great many copies may be obtained from the same matrix.

OLD SILVERING, To Imitate. — To imitate silver productions, the ground work and hollow portions are covered with a blackish red earthy coat; the parts in relief remain with a bright lead lustre. Mix a thin paste of finely-powdered plumbago with essence of turpentine, to which add a small proportion of red ochre, to imitate the copper tinge of old silverware; smear over the articles. After drying, gently rub with a soft brush, and the reliefs are set off by cleaning with a rag dipped in spirits of wine. Old silver is easily removed and the brightness of the metal restored by a hot solution of caustic potash, cyanide of potassium, or benzole. To give old silver tinge to small articles such as buttons and rings, throw them into the above paste and rub in a bag with a large quantity of dry firwood sawdust until the desired shade is obtained.

ORNAMENTAL DESIGNS ON SILVER. — Select a smooth part of the silver and sketch on it the design with a sharp lead pencil; place the article in a gold solution with the battery in working order, and in a short time all the parts not sketched will be covered with gold. After cleansing the article, the black lead is easily removed by the fingers, and the silver ornament disclosed. A gold ornament may be produced by reversing the process.

OXIDIZED. — Ornaments to which this name is given have a surface of silver acted on by some chemical liquid. A solution of sal ammoniac will give a brownish tint; a better one is obtained by using equal parts sulphate of copper and sal ammoniac, dissolved in vinegar. A fine black tint may be produced by a slightly warm solution of sulphide of potassium. Solutions of the chlorides of platinum and gold are sometimes adopted.

PLATING. — File the parts to receive the plate smooth; apply over the surface muriate of zinc; hold this part over a dish containing hot soft solder, and with a swab apply the solder to the part to which it will adhere; brush off superfluous solder that the surface may be smooth; now take No. 2 fair silver plate, of the right size to cover the surface, and lay the plate upon it, and rub down smooth with a cloth moistened with oil; then, with a tinned soldering iron, pass slowly over the surface of the plate, which melts the solder underneath it, causing the plate to adhere firmly; then polish the surface and finish with buckskin.

REFINING. — 1. The impure metal is dissolved by nitric acid, and the solution being largely diluted with water, add to it an excess of a filtered solution of common salt. A white precipitate of chloride of silver is produced, which settles to the bottom of the vessel. All the silver salt is decomposed when the clear liquid is not rendered turbid by a further addition of common salt. The chloride of silver is collected and washed several times until the liquors are no longer colored brown by yellow prussiate of potassa; this is proof that the copper has been washed out. The washed chloride of silver is mixed with 2 or 3 times its weight of carbonate of soda; dried, and melted in a crucible; after cooling the metal is found at the bottom of the crucible. To granulate, the molten silver is poured from a height of about 3 ft. into water. — 2. The alloy of copper and silver is dissolved in nitric acid and the solution evaporated until the salts fuse. After cooling, the fused mass is gradually thrown into a red-hot crucible, when the nitric acid escapes, leaving the silver in a metallic state and the copper as oxide. The separation of the two is aided by adding dry borax. Silver is easily dissolved in pure nitric acid, but not so rapidly in one contaminated by chlorine or hydrochloric acid, which produces a coat of chloride of silver around the metal, and retards solution. Sulphuric acid combines with silver, and resulting salt is slightly soluble. Pure silver is employed for the preparation of the nitrate and other silver salts, and for soluble anode in silver baths.

SILVERING. — 1. Dissolve 2 oz. silver with 3 gr. corrosive sublimate; add tartaric acid, 4 lbs.; salt, 8 qts. — 2. Dissolve 1 oz. nitrate of silver in crystals in 12 oz. soft water; then dissolve in the water 2 oz. cyanuret of potash; shake together, and let stand till clear. Have ready ½ oz. vials; fill ⅓ full Paris white, or fine whiting; then fill the bottles with the liquor, and it is ready for use. The whiting helps to clean the articles and save the silver fluid. — 3. Dissolve 1 oz. silver in nitric acid; add a small quantity of salt; wash it and add sal ammoniac, or 6 oz. salt and white vitriol; also ½ oz. corrosive sublimate; rub together to a paste; rub the piece to be silvered with the paste; heat till the silver runs,

after which dip it in a weak vitriol pickle to clean it. — 4. Chloride of silver, 3 oz.; salt of tartar, 6 oz.; prepared chalk, 2 oz.; common salt, 3 oz.; mix well; dip a moist cork into this powder and rub the article to be silvered.

SOLDERS. — Silver solders are used for soldering silver work, gold, steel, and gun-metal. A neater seam is produced with the hard silver solders than with soft solders. — *Hard.* 1. 2 or 3 parts of good silver and 1 of ordinary brass pins or wire well melted, is a good jewelers' hard solder; but it must not be melted more than once. — 2. Hard silver solder composed of 4 parts fine silver and 1 of copper, made into an alloy and rolled into sheets, is difficult of fusion. These alloys are run into convenient bars or strips for use. — 3. (*White.*) Silver, 1 oz.; tin, 1 oz.—4. 16 dwt. silver coin; 3 dwt. brass; 1 dwt. copper. — *Soft.* A strong, easy-flowing white solder is composed of lead, 1 part; tin, 2 parts. When the lead is melted put in the tin; then throw in a small piece of rosin as a flux. In soldering fine work wet the parts with muriatic acid in which as much zinc has been dissolved as the acid will take up. It is cleaner than using Venice turpentine or rosin. (See *Soldering* in ALL METALS.)

TESTS. — 1. 12 grains nitrate silver, crystal; 7 drops nitric acid, pure; ½ oz. distilled water. A drop of the fluid on gold or silver will turn black on counterfeit; on genuine remain clear. — 2. Place a genuine coin in the mouth partly under the tongue, then place the suspected coin on the tongue permitting the outer edges of the two pieces to come in contact. If a counterfeit, a peculiar stinging sensation and a disagreeable taste is experienced, which does not occur if both pieces are genuine.

WHITENING. — 1. Adapted to treating silver filagree ornaments, rendering them dead white. If pewter is found in the articles, it should not be attempted. Pound together charcoal, 3 parts; nitre, 1 part; add water to form a paste. With a camel's hair brush give the article a thin coat of mixture; put it in a small annealing-pan, and submit to fire until red-hot; then withdraw it, let it stand a minute, and turn it out into a weak solution of sulphuric acid (1 part acid, 10 parts water) in the boiling-pan. Boil; pour off the acid; rinse; wash with warm water and soap, using a soft brush; dip in spirits of wine, and dry in boxwood sawdust. If spots remain, anneal without the mixture; boil out and wash as before. Burnish parts intended to be bright. Do not use the common American saltpetre; English nitre goes further and does the work more effectually. — 2. ½ dr. sulphuric acid to 4 oz. water makes a good solution for whitening silver articles.

SPECTACLES.

REMARKS. — The important parts of perfect spectacles are the sides, the nose-piece, and the lenses. The sides should be elastic and yet firm enough to hold the lenses correctly to their position before the eyes. The nose-piece should be of proper length and its curve of right depth, so that the centre of each lens shall be opposite the pupil of the eye. For reading-spectacles, the curve of the bridge should be deep, and the bridge at the curve bent out from the line of the lenses. For distant-sight, the curve of the bridge should be shallow and not bent forward from line of lenses. In order to bring the surface of the lenses at right angles to the axis of the eyes when the spectacles are on, set the sides at an angle with the line of the lenses. Cheap spectacles wear the eye and injure the optic nerve; the glasses are only pressed in a convex form, therefore not the same power all over the glass, and are full of bubbles. The important parts of an eye-glass are the form of the eye, the spring and the lens. The oval form is the best, as it is impossible with any other shape to have the centres of the lenses opposite the pupils of the eyes. Spectacle lenses are double convex or concave, periscopic-convex or concave, plano-cylindrical and sphero-cylindrical. They are made of crystal Brazilian quartz, commonly called pebbles, and flint glass. Pebble-lenses are extremely hard, do not scratch or break readily and bear a higher polish than glass; are more refractive and not so thick. Next to pebbles, fine white flint is a good material.

DEFECTIVE VISION. — The 5 most common causes of weak eyes and defective vision susceptible of relief and improvement by spectacles, are as follows: *Astigmatism.* A defect of vision arising from a want of conformity in the outer curve of the cornea, or front portion of the eyeball opposite the pupil, the cornea having form of a cylindrical curve. This defect exists at birth if discovered afterward, and is overcome by the use of a lens having a cylindrical form.—*Diplopia*, or *Double-Sight.* Caused by weakness of the muscles which move the eye from side to side. This can often be relieved by prismatic spectacles. — *Cataract.* A term used to denote gradual loss of sight, arising from the lens of the eye becoming turbid. At the proper time the lens is removed by an oculist, after which strong convex lenses will restore the vision. — *Hypermetropia.* This arises from a defectively constructed eye-ball; it is the reverse of myopia, being too short from the lens to the retina; consequently the rays of light from the distant objects are not sufficiently bent to come to a focus on the retina. The impression of the object formed on the retina is confused. Hypermetropia is a birth inheritance where it is found to exist in after years; old-sighted people are apt to become hypermetropic after 60. Hypermetropic eyes are generally small and deep sunken. Convex glasses are required for correcting the defect.—*Myopia*, or *Near-Sightedness.* A difficulty to see distant objects distinctly. It arises from a defectively constructed eye-ball; the distance from the lens to the retina at the back part of the eye being too great, the rays of light coming from a distant object are bent to a focus before reaching the retina, and form confused pictures. Myopia may exist at birth, or be contracted in youth, by long application to reading, writing, or sewing, particularly where the light is poor. Near-sighted eyes are generally prominent, and require concave lenses. — *Presbyopia.* "Old-sight" or

"far-sight;" a physiological defect depending upon the hardening of the lens of the eye, so that it can no longer change its shape to the same extent as formerly. This begins early and gradually increases, but in natural eyes causes no inconvenience until from the 40th to 45th year, when it will be found difficult in ordinary light to read diamond type nearer than 8 in. For comfortable use of the eyes by gas-light, a weak convex glass to assist the lenses of the eyes is necessary.

FOCAL DISTANCE OF LENSES, To Ascertain. — Place the end of a measure of 30 or 40 in. in length against a smooth wall in plain view of some well-defined object a few rods distant. Then place the edge of the lens on the measure, and move it backwards or forwards until a clear and distinct outline is produced on the ground against which your measure rests. This point will represent sufficiently near the exact focal distance of the lens, and correspond in in. with the number on all properly marked convex spectacles.

LENSES, To Polish when Scratched. — If the scratches are not deep, stretch a piece of silk over the face of the lens, and apply to it a ball of sealing wax warm enough to take the form of the lens when it is pressed on the silk. When the wax is cool, remove it and the silk together from the lens, and coat the silk with a paste of putty powder. Rub the face of the lens with the instrument thus made, giving it a gyratory motion. Keep the putty powder moist.

TIME-KEEPERS.

REMARKS. — When buying a watch, while adhering to taste and elegance, choose one thick enough. In a watch that is too thin or too little, the parts are feeble and have not space to work well. Avoid those that point the days of the month, and so forth. These pieces necessitate additional parts which encumber the limited space, though complicated watches, such as chronographs, repeaters, etc., are now brought to a high state of perfection at a correspondingly high cost. Do not be attracted by the supposed advantages of new escapements. In watches for ordinary purposes, the lever and the horizontal escapements generally give the best results. A watch bought for utility ought to be as plain as possible, which is a distinguishing characteristic of good quality. Having obtained a serviceable article, wind it up every day at the same hour. Avoid putting a watch on a marble slab or near anything cold. The sudden transition contracts the metal, and may cause the mainspring to break. The cold, also, coagulates the oil, and the wheel-work and the pivots working less freely affect the regularity of the time-keeper. When laying aside slope it on a watch-case so as to keep it in nearly the same position as it has in the pocket. Be sure that it rests on its case, as by suspending it free the action of the balance may cause oscillation, which may interfere with its running. To keep clean, see that the case fits firmly, and never put it in any pocket but one made of leather; pockets lined with cloth, cotton or calico, give off fluff, which enters most watches, even in the cases of those which shut firmly. The key should be small, in order that the resistance of the stop-work may be felt, so as to stop in time. The square of the key should correspond with that of the watch. If it be too large, it may cause the wind-up square to suffer from undue wear and tear, the rectifying of which is expensive. It is always better to move the hands forward to adjust the watch to correct time.

GLOSSARY OF TIME-KEEPER TERMS. —

ARBOR.—An axle which turns upon itself by means of its pivots. Some watchmakers apply the term only to the post on which the key is placed to wind the watch, and to the rod passing through the cannon.

ANCHOR. — A piece of the escapement used in clocks and lever watches.

ANCHOR ESCAPEMENT WATCH. — A detached lever.

BARREL. — That piece of the watch which contains the main spring.

BRIDGE. — A piece secured to the plate, in which a pivot works, as in the case of skeleton levers.

BALANCE. — A wheel which moves back and forth in obedience to the adverse action of the lever and hair spring.

BEAT. — Each "tick" of the watch.

CLICK. — A small lever which works into a ratchet and prevents the sudden recoil of the mainspring when the watch is wound up.

CENTRE WHEEL. — The large wheel immediately in the centre.

CHICK. — A small pin; usually those which hold the bridges in position.

CYLINDER. — The hollow piece which checks the onward motion of the scape-wheel in cylinder escapement watches.

CANNON. — The steel piece which comes up through the dial, and around which the hour wheel revolves. In English and American levers the minute hand is fastened upon it.

COMMON PINION. — The pinion at the lower end of the cannon, which moves the minute wheel.

COCK. — Bridge over the balance.

COLLET. — A small ring fitting on the balance staff or arbor, and holding the inside end of the hair-spring. The rings into which jewels are sometimes set are called collets.

DIAL. — The face of the watch or clock.

DIAL WHEELS. — Those working between the dial and pillar plate.

DEPTHING TOOL. — An instrument used for finding the proper location of pivot holes.

ESCAPEMENT. — Those pieces which work together and regulate the velocity of the time train.

FUSEE. — The cone-shaped wheel upon which the chain works.

FOURTH WHEEL. — The wheel which works into the scape-wheel.

FOURTH WHEEL SECOND. — A watch carrying a second hand on the pivot of its fourth wheel.

FORK. — That part of the lever into which the ruby pin plays.

FLY. — An arbor carrying two wings for the purpose of meeting with atmospheric resistance, thus regulating the motion of striking trains in clocks.

GUARD POINT. — The wedge-shaped elevation back of the fork in detached levers.

GEARING. — The action of the teeth of one wheel upon those of another wheel or pinion.

HOUR WHEEL. — The wheel working around the cannon, and upon which the hour hand is fastened.

INDEX. — Hand.

JEWEL. — The stone or glass settings against which the pivots work; also the settings in the pallets and the roller.

LEAVES. — Teeth or cogs of a pinion.

LEVER. — A horizontal bar upon which the pallets are secured, and which conducts the effect of the motive power from the train to the balance.

MINUTE WHEEL. — A name given to that dial wheel which is driven by the cannon pinion.

MOVEMENT. — The interior works of the clock or watch.

PALLETS. — The jeweled piece of the lever watch which works into the teeth of the scape-wheel.

PIVOT. — The end of an arbor turned very small to avoid friction.

PINION. — A small leaved wheel.

PILLARS. — Posts which in plate watches hold the plates the proper distance apart for the working of the train or trains between them.

PILLAR PLATE. — Usually the bottom plate of a watch; but European watchmakers call both pillar plates, distinguishing them as the upper and lower.

TIME-KEEPER TERMS, *Continued.*

PUTTING UP. — Setting the different parts of a clock or watch into their proper places.

PIVOT WOOD. — A tough wood employed in cleaning out pivot holes; sometimes called peg wood. A scape-wheel is sometimes called a ratchet in Europe.

RATCHET. — A steel wheel into which the click works.

RUBY-PIN. — A small glass or stone pin which works in connection with the lever.

ROLLER. — The circular plate into which the ruby-pin is set; often called the ruby-pin table.

STOP WORKS. — A mechanism to prevent the watch from being wound up too far.

STAFF. — A name applied to the balance arbor of lever watches as solo the arbor passing through the pallets.

SCAPE-WHEEL. — The last wheel of the train.

SECOND WATCHES. — Watch with a second hand.

SCRATCH BRUSH. — A brush made of fine brass wire.

TEETH. — Cogs by which the motion of one wheel is communicated to another.

TRAIN. — A collection of wheels so arranged that the moving power applied to the first wheel is communicated to them all.

THIRD WHEEL. — The wheel into whose pinion the centre wheel works.

TAKING DOWN. — Taking apart the different pieces of a clock or watch.

WHEEL BED. — A bed turned out in the plate of a watch to receive a wheel.

BEAT, To Put Watches in.—If a cylinder escapement or a detached lever, put the balance into a position; then turn the regulator to point directly to the pivot-hole of the pallet staff, if a lever, or of the scape-wheel, if a cylinder. Then lift out the balance with its bridge or clock; turn it over, and set the ruby-pin directly in line with the regulator, or the square cut of the cylinder at right angles with it; the watch will then be in perfect beat. If an American or an English lever, when the regulator is fixed upon the plate, proceed differently. Fix the balance into its place, cut off the connection of the train, if the mainspring is not entirely down, by slipping a fine broach into one of the wheels; look between the plates and ascertain how the lever stands. If the end farthest from the balance is equidistant between the 2 brass pins, it is all right; if not, change the hair-spring till it becomes so. If a duplex watch, see that the roller notch, when the balance is at rest, is exactly between the locking tooth and the line of centre; that is, a line drawn from the centre of the roller to the centre of the scape-wheel. The balance must start from its rest and move through an are of 10° before bringing the locking tooth into action.

BRUSHES, Cleaning.—Wash them in strong soda water; when the backs are wood, avoid that part as much as possible, for, being glued, the water will injure them.

BURNISHERS. — Burnishers which have become too smooth, may be improved with flour of emery. Melt a little beeswax on the face of the burnisher; its effect on brass or fine metals will equal the best buff. A small burnisher prepared in this way is the very thing to polish watch wheels; resting them on a piece of pith while polishing.

BUSHING. — The holes through which the great arbors, or winding axles, work, are the only ones that require bushing. When too much worn, the great wheel on the axle strikes too deeply into the pinions above it, and stops the clock. To remedy this, drive a steel punch into the plate above the axle hole, forcing the brass downward until the hole is reduced to its original size. Or solder a piece of brass upon the plate in a position to hold the axle down to its proper place.

CLEANING CLOCKS.—Take the clock to pieces; brush the wheels and pinions with a stiff brush; also the plates which the trains work; clean the pivots by turning in a piece of cotton cloth held tightly between the thumb and finger. The pivot holes in the plates are cleansed by turning a piece of wood in them, but a strip of cloth or a soft cord drawn tightly through them acts best. If 2 cords are used, the first slightly oiled, and the next dry, all the better. Do not use salt or acid; boiling the movement in water is foolishness.

CLEANING WATCHES. — Great care is necessary in taking the watch down, and separating its parts. First remove the hands carefully; next the movement from the case, and take off the dial and dial wheels; let down the mainspring by placing the bench-key upon the arbor or winding-post, and turn as if to wind until the click rests lightly on the ratchet; with screwdriver press the point of the click away from the teeth and ease down the springs; draw the pins and remove the bridges of the train, or the upper plate, as the ease may be; remove the balance with care to avoid injuring the hair-spring. The small post into which the hair-spring is fastened may be removed from the plate of most watches without unkeying the spring, by slipping a thin instrument, like the edge of a blade knife, under the corner of it and prying up; this will save trouble in not having the hair-spring to adjust when the balance is reset. If the watch has an upper plate, loosen the lever before entirely separating the plates; or it will hang and probably be broken; brush dust from the parts, and carefully examine with the eye-glass. The teeth of the wheels and leaves of the pinions should be perfect and smooth; the pivots all straight, round and polished; the holes through which they are to work not too large and not oval in shape; every jewel smooth and sound, and not loose. See that the escapement is not too deep or too shallow; that the lever or cylinder is perfect; that the wheels have play to avoid friction; that none of them work against the pillar plate; that the balance turns horizontally and does not rub; that the hair-spring is not bent or wrongly set so that the coils rub on each other or on the plate or on the balance; in short that everything is just as it should be. If otherwise, repair in accordance with judgment, after which clean as follows: Simply blow upon the plate or bridge to be cleaned, then use the brush with a little prepared chalk. The wheels and bridges should be held between the thumb and finger in a piece of soft paper, otherwise the oil from the skin will prevent their becoming clean. The pinions may be cleaned by sinking them several times into a piece of pith, and the holes by turning a nicely shaped piece of pivot wood into them, first dry and afterwards oiled a little with watch oil. When the holes pass through jewels work gently. Some employ the "chemical process" to clean, as follows: Remove the screws and steel parts; then dampen with a solution of oxalic acid and water; let it remain a few minutes, then immerse in a solution made

of ½ lb. cyanuret potassa to 1 gal. rain water; let remain about 5 minutes; then rinse well with clean water, after which dry in sawdust or with a brush and prepared chalk. This gives the work an excellent appearance.

DEMAGNETIZING. — A watch is formed of a case of gold or silver, and glass inclosing brass or nickel plates, between which are a number of steel arbors forming the axles and pinions of the brass wheels; also the spring of steel which uncoils itself; older watches have in addition a steel chain which uncoils from the fusee on to a brass barrel inclosing the mainspring; the hair-spring, parts of the balance wheel escapement, stem winding apparatus, etc., are also of steel; thus there is abundant material for magnetization. These are only moderately hard and easy to demagnetize. Some have their lengths at right angles to the plane of the watch, like the arbors; others, like the main and balance wheel springs and the nickel (nickel takes a magnetic charge, only feebler) plates inclosing the movements, have their greatest dimension in the plane of the watch. The position determines to a great extent the directions of their magnetic axes (imaginary lines joining the two poles of a magnet). The arbors have their magnetic axes in the direction of their lengths; plates are most likely to have theirs in the direction of one of their diameters. No matter in what direction, all these bodies may be demagnetized by properly oscillating the watch before the pole of a magnet. The watch is placed close to the magnetometer and with the centre of the thickness of the watch about on a level with the centre of the needle of the magnetometer, and with the line, connecting the centre of the watch, *C*, *Fig. 1*, and the centre of the needle, at right angles to the magnetic meridian, it is turned slowly around on its centre as an axis, and each hour on its dial is, in succession, brought opposite to the center, *C*, of the magnetic needle of the magnetometer. The following results of experiments will ensue: *N* and *S* indicate the kind of magnetic polarity at each hour, and the angles show the effect in angular deflection on bringing that hour of the dial opposite the centre of the magnetometer needle:

Hour.	Ang. of Deflection of Magnetometer.	Kind of Magnetism.
XII	20°	N.
I	5°	N.
II	18°	S.
III	72°	S.
IV	56°	S.
V	22°	S.
VI	5°	N.
VII	17°	N.
VIII	16°	N.
IX	16°	N.
X	20°	N.
XI	24°	N.

When the hour III is brought opposite the magnetometer needle the fusee axle and the centre of the semicircular steel catch of the inner cover of the works are presented to the magnetometer. The strong south magnetism of III is due to the magnetization of these bodies, which deflects the needle of the magnetometer 72°. The strong north magnetic action of XI is due to the magnetized main spring. We may now regard the watch as a magnet, having the form of a disc,

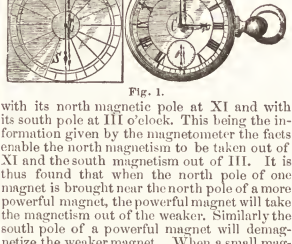


Fig. 1.

with its north magnetic pole at XI and with its south pole at III o'clock. This being the information given by the magnetometer the facts enable the north magnetism to be taken out of XI and the south magnetism out of III. It is thus found that when the north pole of one magnet is brought near the north pole of a more powerful magnet, the powerful magnet will take the magnetism out of the weaker. Similarly the south pole of a powerful magnet will demagnetize the weaker magnet. When a small magnet, made of steel not too hard, is vibrated around its centre in front of the pole of a powerful magnet, the small magnet is demagnetized. These facts show how to demagnetize the watch. XI is of the strongest north magnetism of any on the dial; therefore place this hour opposite the north pole of the rat-tail file magnet shown in *Fig.* 2. The centre of the watch, *C*, is placed so that the prolongation of the axes of the magnet (shown by the dotted line X X′) passes through it. The watch is now vibrated around an axis passing through *C* and at right angles to *X X*′. By this operation the watch is successively brought into the positions *A* and *B* of *Fig. 2*. After several vibrations of the watch before the north pole of the magnet, turn the hour III, of strong south polarity, opposite the south pole of the magnet, and vibrate the watch as in the previous experiment. By these vibrations the watch cuts across the lines of magnetic force, and any magnetism in it is thus taken out. After these operations performed on the hours XI and III, the watch is again examined before the magnetometer, and the following table gives the effect of the vibrations before the magnet:

Hour.	Ang. of Deflection of Magnetometer.	Kind of Magnetism.
XII	2°	N.
I	5°	N.
II	4°	N
III	0°	
IV	5°	S.
V	8°	S.
VI	2°	S.
VII	4°	N.
VIII	4°	N.
IX	2°	N.
X	1°	N.
XI	0°	

There is a great difference between the magnetometer deflections of the first table and those of the second. It is observed that the hours III and XI, which were respectively of strong south

and north magnetism in the first table, are in the second table marked 0°. This result being attained after a series of vibrations before the pole of the demagnetizing magnet, the magnetic condition of hours III and XI are tested. Sometimes the magnetism almost disappears, then changes, or rather is inverted, so that hour III has north instead of south polarity, and hour XI has south instead of north magnetism. When this happens present hour III before the north pole of the magnet and the hour XI before the south pole. After repeated trials hours III and XI can be demagnetized so that they produce no action whatever, or 0° on the needle of the magnetometer. The watch is again brought before the magnet, and its V o'clock vibrated before the south pole till this south magnetism disappears; in other words, produces no deflection on the needle of the magnetometer. An examination of the magnetism of the watch before the magnetometer gives the following results:

Hour.	Ang. of Deflection of Magnetometer.	Kind of Magnetism.
XII	1°	
I	0°	
II	0°	
III	0°	
IV	2½°	S.
V	2°	S.
VI	2°	N.
VII	6°	N.
VIII	5°	N.
IX	2°	N.
X	1°	S.
XI	2½°	S.

The hour VII was demagnetized of its 6° of north magnetism by vibrating this hour opposite the north pole of the demagnetizing magnet.

DIALS, Figures on Gold and Silver. — Hold a small piece of copper over a gas flame a few minutes till coated with soot; clear this off on to a piece of finely ground glass; add fat oil and a small quantity of oil of spike lavender, and grind up; then paint with a small camel's hair pencil.

DIALS, To Restore. — If the dial be painted, clean the figure with spirits of wine; heat to a bright red, and plunge into a strong solution of cyanide of potassium; then wash in soap and water and dry in box dust. Repeat if not a good color. India ink, ground with gum water, will do for the figures.

FROSTING WATCH MOVEMENTS. — Sink the part to be frosted for a short time in a compound of nitric acid, muriatic acid and table salt, 1 oz. each. On removing from the acid, place it in a shallow vessel containing sour beer sufficient to cover it; with a scratch brush scour, letting it remain under the beer during the operation; then wash off, first in pure water and then in alcohol. Gild or silver.

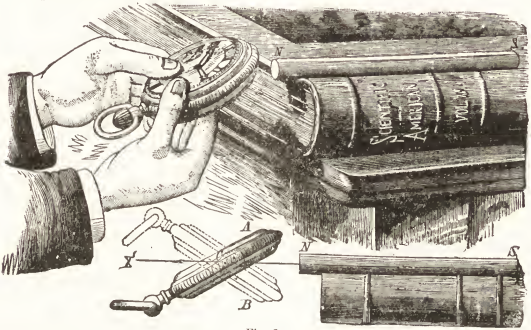
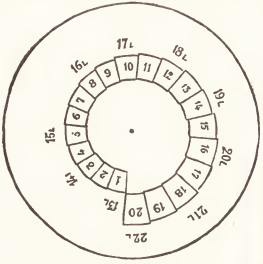


Fig. 2.

GAUGE. — As there is no recognized standard for length of watch hands, the accompanying gauge is given to supply this deficiency. It consists of a disc with graduated scale numbered from 1 to 20, in two snails from the centre, the inner snail for the hour, and the outer for the minute hand. The even numbers correspond with the hour and minute circles of dials of English movements of the sizes which those numbers indicate. The odd numbers are for intermediate sizes, dials with wide margins, such as crystal case or chonograph watches, or others in which the dial painter has not adopted the usual distances for the hour and minute circles. In such cases there cannot be exact correspondence between the numbers of the movements and those on the gauge. But these numbers may still be accepted, as well as many others, in the presence of these irregularities, being sufficient to meet all requirements. The figures 14L, 15L, etc., signify "lignes," showing where the signs are coincident with the dials of Swiss watches. This gauge enables watchmakers to have hands such lengths as they require, by the mention of the number on the gauge, without sending the dial, or marking off the lengths. It should be retained by dial painters to avoid deviation, not

only in the size of the minute circles, but the length of the hour figures. As movements are



Watch Gauge.

made to a recognized standard, the painting of dials should follow the same regularity, and if so, this gauge will supply a standard.

HAIR-SPRING, To Reduce. — 1. Effected by grinding the spring down. Remove the spring from the collet, and place it upon a piece of pivot wood cut to fit the centre coil. A piece of soft steel wire, flattened to pass between the coils and armed with pulverized oil-stone and oil, will serve as a grinder, and with it the strength of the spring will be reduced. The operations will be confined to the centre coil, for no other part of the spring will rest against the wood to enable you to grind it. — 2. Another and later process is to fit the collet (without removing the spring) upon a stick of pivot wood, and, with a little diluted nitric acid in a watch-glass, plunge the centre coils into it, keeping the other parts of the spring from contact by holding it in the shape of an inverted hoop-skirt, with tweezers. Expose a few seconds, governing the time by the degree of effect desired; then rinse, first with clean water, afterwards with alcohol. Dry in the sun, or with tissue paper.

HANDS, To Redden.—Mix to a paste over a lamp, 1 oz. carmine, 1 oz. chloride of silver, and ½ oz. tinners' Japan. Put some of the paste on the hands, and lay them face up on a sheet of copper, holding it over a spirit lamp till the color appears.

HANDS, To Reblack.—Use asphaltum varnish. One coat will make old rusty hands look as good as new.

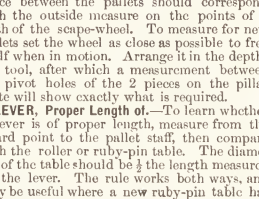
JEWELING. — The diamond broach, used in jeweling, is made as follows: Prepare a number of brass pins of size and form desired; stir the point of each separately into a medium grade of diamond dust (see *Diamond Dust* in GEMS) and oil until evenly covered; then place on a smooth stake or anvil, and with a light hammer go over the surface, driving the dust into the brass. In using broaches, press but lightly into the jewel hole, and turn the broach rapidly with the fingers. For polishing use a bone or ivory point, lightly coated with diamond dust and oil, and while using it with one hand accompany it with a slight oscillating motion of the other hand in which the jewel is held. This insures a more even polish, with less liability to press the jewel out of its place. (See *Diamond Files*, and *Diamond Mill*, in GEMS.)

LEVER ESCAPEMENT, To Change Depth of.— If operating on a fine watch, put a new staff into the lever, cutting its pivots a little to one side, just as far as is desired to change the escapement. The usual process with common watches is to knock out the staff and with a small file cut the hole oblong in a direction opposite to that in which you desire to move the pallets; then replace the staff, wedge it up to the required position, and secure by soft soldering. Where the staff is put in with a screw, take out the staff, pry the pallets from the lever, file the pinholes to slant in the direction you would move the pallets, without changing their size on the other side of the lever. Connect the pieces as they were before, and, with the lever resting on some solid substance, strike lightly with the hammer until the bending of the pins allows the pallets to pass into position.

LEVER PALLETS, Proper Size of.—The clear space between the pallets should correspond with the outside measure on the points of 3 teeth of the scape-wheel. To measure for new pallets set the wheel as close as possible to free itself when in motion. Arrange it in the depthing tool, after which a measurement between the pivot holes of the 2 pieces on the pillar plate will show exactly what is required.

LEVER, Proper Length of.—To learn whether a lever is of proper length, measure from the guard point to the pallet staff, then compare with the roller or ruby-pin table. The diameter of the table should be ½ the length measured on the lever. The rule works both ways, and may be useful where a new ruby-pin table has to be supplied.

MERIDIAN, To Find. — Set up a stick, *A B*,



Finding the Meridian.

and on its end fasten a piece of tin perforated with a hole. Let the string of a plumb bob hang through the centre of this hole, and thus get a point in the vertical marked *V* in the dia-

gram. About 9 A. M. mark the centre of the image of the hole at D, then with the line $A\,D$, as a radius, describe an arc of a circle; and when, in the afternoon, the image of the hole falls on this line, as at E mark, then the line $N\,S$, which bisects the angle $D\,A\,E$, is the true meridian.

MAIN SPRINGS. — When a main spring is cleaned, inexperienced workmen take hold of one end and pull the spring $\frac{1}{2}$ its length straight out; this will ultimately break the spring. If old oil is used, or of an inferior quality, the acid will eat into the spring and destroy it. The coil nearest the centre breaks first, and as it recoils it breaks every coil in the barrel, and sometimes each coil is broken twice.

OILING CLOCKS. — Only the pallets of the verge, the steel pin upon which the verge works, and the point where the loop of the verge wire works over the pendulum wire, should be oiled, and that lightly. Use the best watch oil.

OIL, Watchmakers'.—1. Take neat's-foot oil, and put into it some lead shavings in order to neutralize the acid in the oil; let this stand, the longer the better. Oil thus prepared never corrodes. — 2. Best olive oil; stir for some time with water kept at a boil; then, after separation, shake up in a bottle with a little fresh lime, and let it stand some weeks exposed to the sunlight and air, but protected from wet and dirt; when filtered it will be limpid. — 3. 1 qt. olive oil; put it into a cast-iron vessel capable of holding 2 qts.; place over a slow fire, keeping a thermometer suspended in it, and when the temperature rises to 220° check the heat so as not to exceed 230° nor descend below 212,° until the water and acetic acid are evaporated; the oil is then exposed to a temperature of 30° to 36° for 2 or 3 days; then filtered; lastly, the fluid portion must be filtered once or more through newly prepared animal charcoal, coarsely powdered, and placed on bibulous paper in a wire frame within a funnel, by which the oil is rendered colorless.

PENDULUM, Defect in.—Examine the pendulum wire at the point where the loop of the verge wire works over it; generally a small notch or rough place is found worn. Dress it out smooth, or the clock will not work well; this defect stops numbers of clocks.

PHOSPHORESCENT DIALS. — These are made of paper, or thin card-board covered with adhesive varnish or white wax mixed with turpentine, upon which is dusted powdered sulphide of barium. The sulphides of strontium and calcium possess the same property, but lose it more quickly. After the dial has remained in darkness some days it loses its phosphoreseence; this may be restored by exposure for an hour to sunlight, or by burning near the dial a few in. of magnesium wire.

PINIONS OR BEARINGS, To Preserve from Rust. — In ease of the lower centre bearing under the eannon pinion corroding, take the central wheel off; clean it thoroughly; if the pivot is scratched, polish, then make a little hollow in the top hole, put good fresh oil on it, and the pivot will not corrode for 2 or 3 years. The other pivots should be cleaned; if no dust gets in and no accident happens, the watch will run for years.

PINIONS, Rules for Finding Diameter, by Measuring Teeth of the Wheel that Match into it.—The term full, as used below, indicates full measure from outside to outside of the teeth named, and the term centre, the measure from centre of one tooth to centre of the other tooth named, inclusive. For diameter of a pinion of 15 leaves measure, with calipers, a shade less than 6 teeth of the wheel, full; for diameter of a pinion of 14 leaves measure, with calipers, a shade less than 6 teeth of the wheel, centre; for diameter of a pinion of 12 leaves measure, with calipers, 5 teeth of the wheel, centre; for diameter of a pinion of 10 leaves measure, with calipers, 4 teeth of the wheel, full; for diameter of a pinion of 9 leaves measure, with calipers, a little less than 4 teeth of the wheel, full; for diameter of a pinion of 8 leaves measure, with calipers, a little less than 4 teeth of the wheel, centre; for diametcr of a pinion of 7 leaves measure, with calipers, a little less than 3 teeth of the wheel, full; for diameter of a pinion of 6 leaves measure, with calipers, 3 teeth of the wheel, centre; for diameter of a pinion of 5 leaves measure, with calipers, 3 teeth of the wheel, centre. As a general rule, pinions that lead, as in the hour wheel, should be larger than those that drive, and pinions of clocks should be somewhat larger proportionally than those of watches. For diameter of a pinion of 4 leaves measure, with calipers, $\frac{1}{2}$ of one space over 2 teeth of the wheel, full.

PINIONS, Worn, to Remedy.—Turn the leaves or rollers so the worn places will be towards the arbor, and fasten them in that position. If they are rolling pinions, and cannot be secured otherwise, do it with a little soft solder.

PIVOT, Broken. — Drill into the end of the pinion or staff and having inserted a new pivot, turn it down to the proper proportions. This is not difficult when the piece to be drilled is not too hard, or when the temper may be slightly drawn without injury to other parts.

PIVOT FILES. — Dress up a piece of wood file-fashion 1 in. broad, and glue a piece of fine emery paper upon it. Shape the file then as you wish it, of the best cast steel, and before tempering pass emery paper heavily across it several times, diagonally. Temper by heating to a cherry red, and plunging into linseed oil. Old worn pivot files may be made new by this process. They dress a pivot more rapidly than any other file.

POISING WATCH BALANCE. — This may be done very accurately by scraping one arm of the calipers with a file when the balance is set in motion. This will cause the heaviest part to settle down with certainty, observing always that the pivots are nicely rounded and formed at the ends. In some cases it is necessary to put a balance out of poise to make the watch go equally in various positions. To make the watch gain, the balance should be heaviest on the lower side when hanging up; to make it lose, the reverse.

POLISHING BROACHES. — These are usually made of ivory, and used with diamond dust, loose, instead of having been driven in. Oil the broach lightly, dip it into the finest diamond dust, and proceed to work it into the jewel the same as you do the brass broach. Too many fail to attaeh sufficient importanee to the polishing

broach. The sluggish motion of watches is often attributable to rough jewels.

REGULATING. — Ascertain how many vibrations the watch beats in one minute, by counting every other vibration and comparing with a regulator. In general, Swiss watches beat 18,000 in 1 hour, or 300 in 1 minute; American watches, 16,200, or 270 per minute; English levers, 14,400, or 240 per minute. If there is any doubt count up leaves and teeth, and ascertain the number; but cases are scarce where watches beat odd numbers. Having found the number, examine the balance for 1 or 2 minutes, counting every vibration from right to left, and in the meantime examining the regulator to see when one minute is up. If the watch is well regulated, the number of vibrations must be exactly $\frac{1}{5}$ of the regular first number, viz., 150, 135, or 120, as only every other vibration has been recorded to facilitate observation. If not so, move the regulator, right or left, until a perfect coincidence comes. To pick up a new hair-spring, after having recorded the right number of beats—either by the old hair-spring or by the numbers of the train—lay first the spring with its centre well in the centre of the cock jewel, and having ascertained where the coil will enter between the pins of the regulator, note the place. Stick to the pivot of the balance a small round piece of beeswax; then stick it to the centre of the spring, to establish a temporary connection of the two pieces, and having pinched with the tweezers the hair-spring to the place indicated by the regulator pins, cause it to vibrate gently; then count the vibrations for one minute, and when you have a spring that will produce nearly the required number of beats, pin it to the collet, and cause it to vibrate, moving the tweezers forward and backward, until the right number of beats is produced; with another pair of tweezers, pinch the hair-spring $\frac{1}{8}$ in. back of the regulating point, to counterbalance the gain produced by the regulator pins, and bend slightly the wire, which is the place where the hair-spring must be pinned to the stud. Having trued up the spring, proceed to put the regulator to the right place. The balance must be made to vibrate on some hard and well polished substance to keep up the vibration to the standard of regular running. A little practice enables the watchmaker to change a hair-spring quick and without any trouble.

RUSTED SCREWS. To Remove. — When the screws have become rusty, they can only be removed by mechanical means, such as scouring with fine powder or with fine emery paper.

STRIKE, Correcting. — In putting up a clock be careful to get none of the striking train wheels in wrong. If this happen, pry the plates apart on the striking side, slip the pivots of the upper wheels out, and having disconnected them from the train, turn them part around and put them back. If still not right, repeat the experiment. A few efforts will get them working properly. The sound in cuckoo clocks is caused by a wire acting on a small bellows connected with 2 small pipes like organ pipes.

TIGHTENING A COMMON PINION ON CENTRE ARBOR.—Grasp the arbor lightly with a pair of cutting nippers, and by a single turn around the arbor cut or raise a small thread thereon.

TEETH, To Put in Wheels without Dovetailing or Soldering.—Drill a hole wider than the tooth, square through the plate below the base of the tooth; cut from the edge of the wheel square down to the hole drilled; flatten a piece of wire to fit snugly into the cut of the saw, and with a light hammer form a head on it like a pin; then press the pin into position in the wheel, the head filling the hole drilled through the plate and the end projecting out to form the tooth; then, with a sharp-pointed graver cut a small groove each side of the pin from the edge of the wheel down to the hole, and with a blow of the hammer spread the face of the pin to fill the grooves cut. Repeat the operation on the other side of the wheel, and finish in the usual way. The tooth will be found riveted and as strong as the original one, while in appearance it will be equal to the best dovetailing.

TEMPERING CASE SPRINGS.—Having fitted the spring into the case, temper hard by heating and plunging into water; polish the small end so as to see when the color changes; lay it on a piece of copper or brass plate, and hold the plate over a lamp with the blaze under the largest part of the spring. Watch the polished part of the steel, and when it turns blue remove the plate, letting all cool gradually. When cool, polish the end of the spring, place it on the plate and hold over the lamp. The third bluing of the polished end will leave the spring in temper.

TEMPERING CLICKS, RATCHETS, Etc. — Clicks, ratchets or other steel articles, requiring a similar hardness, should be tempered by heating to a cherry red and plunging into mercurial ointment. No other mode will combine such toughness and hardness.

TEMPERING STAFFS, CYLINDERS OR PINIONS. Without Springing.—Prepare the articles as in the preceding process, using a steel plug. Having heated the key-pipe to a cherry red, plunge into water; polish the end of the steel plug, place the key upon a plate of brass or copper, and hold it over the lamp with the blaze under the pipe till the polished part becomes blue; cool gradually, then polish again. Blue and cool a second time, and the work is done.

TEMPER. To Draw from Small Articles.—Hold the part with a pair of tweezers, and with your blowpipe direct the flame till sufficient heat is communicated to the article to produce the desired effect.

TIME, To Prevent Losing.—Pin the pendulum spring into the stud, so that the part of the eye immediately emerging from the collet and the centre of the collet are in a line, pinned in, in equal terms, as it is called. Bring the watch to time by adding to or taking from the balance, and poise it; try the watch with the 12 up for 2 hours, then with the 6 up for 2 hours, then lying down for the same time; the trials described will be sufficient if the watch has seconds; keep the curb pin close to allow the spring only a little play; the vibration of the balance should be $1\frac{3}{4}$ turn or $1\frac{1}{2}$ lying.

INVASION OF THE GOTHS AND VANDALS.

PAINTING AND PAPER-HANGING.

BRONZING AND GILDING.

REMARKS.—Bronzing, in the narrower sense, includes only those manipulations whereby the appearance of bronze is imparted to the surface of an article of metal, wood, plaster, etc., by covering it with a metal. But the meaning of the word has been extended to include every process whereby a metallic appearance is imparted to any non-metallic object, or the bright surface of a metal is covered with a thin, dull coating of brown, reddish, or even black color, to protect it from change. In the former kind of bronzing, finely divided metal is dusted upon the object after it has been painted with oil varnish and is almost dry, the surface being then burnished with hard tools; in the latter kind, several methods are employed. For the first kind of bronzing, different metallic or dust bronzes are employed; these are pulverized metallic alloys, much used to cover wooden, plaster, and metallic articles, on account of their beautiful color and lustre. They are made from the scraps and waste of real or imitation gold or silver leaf and other alloys, beaten thin, mixed with honey or gum solution, and rubbed upon marble slabs. On a large scale metal foil, greased with olive oil, is rubbed through wire sieves by means of wire brushes, and pulverized in steel mortars, then polished with revolving brushes. In some cases a bronze appearance is produced by the use of chemicals applied to the surface; receipts of this kind will be found in METAL WORKING. The commonest bronze colors are real gold leaf, mosaic gold, real silver leaf, imitation silver leaf, mosaic silver, steel, copper bronze, bronze colored bronze or bronze powder, the greenish copper bronze, brownish gold bronze, gold colored copper bronze, blue bronze, and some alloys of bronze metal. Gilding is usually performed by applying size to the object to be gilded, then laying gold leaf on this. The necessary materials to be used are a cushion, knife, and tip, a large, short and thick camel's hair brush, cotton-wool, and oil and japanners' size. There are 13 varieties of tint, ranging from a deep orange red down to a white approximating silver. The cushion is a piece of wood about 8 in. by 5, covered first with baize, and then with buff leather tightly stitched. At one end there is a raised edge of parchment, which turns partly round the sides, to prevent the leaves being blown away. Underneath, the cushion has 2, and sometimes 3 small loops of leather, one for inserting the thumb to hold it by, the other for sticking the knife and camel's hair brush in. The knife for cutting the leaf has a long flexible blade, set in a light handle like a palette-knife. The knife must be kept bright. The tip is a large flat brush for taking up and placing the gold leaf.

BRASS, Bronze for. — *Black.* Lampblack, a thimbleful; put it on flat stone; add 4 or 5 spots of gold size; mix with a palette-knife; make it as thick as putty; well mix. The less gold size the better, so that the lampblack sticks together; if too much be added, the effect will be a bright black and not a dead black; now add turpentine, twice its own volume, to the whole; mix with a camel's hair brush, and apply to the brass.

BRIGHTENING GILDING.—Alum and common salt, of each, 1 oz.; purified nitre, 2 oz.; water, ¼ pt. Used to impart a rich color to gold surfaces, principally trinkets. It should not be too long continued, as it dissolves a small portion of the gold. For common use, dilute with water.

GOLD COLORED BRONZE.—1. Verdigris, 8 oz.; tutty powder, 4 oz.; borax and nitre, of each, 2 oz.; bichloride of mercury, ½ oz.; make into a paste with oil and fuse together. — 2. Gold bronze for furniture is a mixture of copal varnish, made with gold colored bronze powder (bisulphate of tin). — 3. Gold bronze is used on carriage parts for striping and ornamenting, using the same size as that used for gold leaf. For taking up and applying the bronze, take a piece of plush or velvet and make a pounce bag by tying up a wad of cotton, rubbing the bronze gently over the size. To vary the appearance, a mixture of copper, gold, and silver bronze may be applied. For fancy work in bronze, cut out any desired pattern on thin sheet brass, pasteboard, or paper; and apply it to any nearly dry varnished surface; rub the bronze on through the apertures in the pattern.

GRECIAN GILDING.—In this variety sal ammoniac and corrosive sublimate, equal parts, are dissolved in nitric acid, and a solution of gold made with this menstruum; after slight concentration the liquid is applied to the surface of silver, which becomes black, but on being heated exhibits a rich gilded surface.

GREEN BRONZE.—Bluish-green bronze for ornamental articles is made of any metal, first covered with a varnish made of ground tin or bronze powder, rubbed up with honey in gum water; then wash with a mixture composed of sal ammoniac, ½ oz., common salt, ½ oz., and 1 oz. spirits hartshorn in 1 pt. vinegar. After applying the mixture, leave for a day or two in the sun, and, if necessary, add a second coat. This is a good way to renovate old gas fixtures.

IRON BRONZE.—Ivory black, 1 oz.; chrome yellow, 1 oz.; chrome green, 2 lbs.; mix with raw linseed oil; add a little japan to it, and you have a very nice bronze green. Gold bronze may be put on prominent parts, as on tips or edges of iron railings, where the paint is not quite dry. Use a piece of velvet to rub on the bronze.

JAPANNERS' GILDING.—The surface is covered with oil size, thinned with spirits turpentine, and gold, in powder, is gently dabbed on with a puff of wash leather; this gives the appearance of frosted gold. A coating of varnish is next given, followed by exposure to a gentle heat in the stove.

PAINT, Gilding on.—The paint must first be dry. The letters must be written on the paint with gold size, and allowed to get a little dry. Now press the gold leaf on the size, and rub it down with a piece of cotton-wool. If by accident there is more than one thickness of gold it will appear dull.

PICTURE FRAMES, To Gild.—The ornaments being adjusted and allowed time to harden on the frame, the first step taken by the gilder is to wash them, together with the frame, from the adherent oil and dust; when dry, apply a uniform coat of thin white to the frame, and, after drying, fill all holes and defective parts with the stopping; when this becomes hard, go over every part of the work and bring it to smoothness with fine glass paper. Now dust off the work and apply the clay; allow it to dry, and rub smooth with fine glass paper. A coat of clear cole is now applied, consisting of parchment size diluted to a thin consistency with water. Apply 2 coats of this size in a warm condition. It prevents absorption of the succeeding coat of oil size. The gilder prepares the oil size (boiled linseed oil and ochre well ground together) by bringing it to a creamy consistency, and purifies it by straining through a clean rag held under pressure, squeezing out the size. This preparation is spread evenly over the prepared surface, and allowed to stand until it becomes tacky, when the knife, cushion and gold leaf are brought into requisition, and the leaf applied with the tip to the entire surface covered with size. This process requires care; the gilder blows the gold leaf out on the cushion with his breath, and divides it with his knife to cover the different parts of the work. The leaf is dabbed down with a dabber of cotton-wool, and finished with a badger. The frame, being now covered, is brushed off to clear it from the gold particles adhering, and is finished by applying the finish-size evenly with a hog's-hair brush over the work. The finish consists of a somewhat weak, clear size, which may be tempered with a little ormolu to impart a finer color to the gold. (See *Varnish for Gilding.*)

PLASTER OF PARIS, To Bronze.—Lay the figure over with isinglass size, until it holds out, or without any part of its surface becoming dry; then, with a brush, termed by painters a sash tool, go over the whole, to remove any of the size that may lodge on the delicate parts. When dry, take a little thin oil gold size, and with as much as just damps the brush, go over the figure, allowing no more to remain than causes it to shine. Set in a dry place free from smoke, and in 48 hours the figure is prepared to receive the bronze. After having touched over the whole figure with the bronze powder, let it stand another day, and then with a soft, dry brush rub off all the loose powder, particularly from the points, or more prominent parts of the figure.

POWDERS, For Bronzing and Gilding.—1. Pure gold, 5 dr.; pure copper, 1 dr.; aqua regia, 10 oz.; dissolve; moisten clean linen rags with the solution; dry them, and burn them to ashes. The latter contain the gold in a state of minute division, and must then be carefully collected.—2. Put into an earthen mortar some gold leaf, with a little honey or thick gum water, and grind the mixture till the leaf is reduced to minute particles. When done, a little warm water will wash out the honey or gum, leaving the gold behind in a powdered state.—3. Dissolve the pure gold, or the leaf, in nitro-muriatic acid; then precipitate it by a piece of copper, or by a solution of sulphate of iron. The precipitate, if by copper, must be digested in distilled vinegar, and then washed by pouring water over it repeatedly, and dried. This precipitate will be in the form of fine powder; it works better and is more easily burnished than leaf ground with honey.—4. (*Brownish Gold.*) This is made from clean iron filings, by moistening repeatedly with a little water and exposing them to the air, then boiling several times and drying in the sun or on a stove. It forms a rust brown powder, which becomes more intensely red if some nitric acid is added in the last boiling; it is elutriated to separate any metallic particles, and dried. By mixing this powder with imitation gold bronze, mosaic gold, copper bronze, and greenish bronze, separately or together, the most varied and different shades of bronze color can be obtained.—5. (*Gold Imitation.*) Made, like the real gold bronze, from the waste of beating of the so-called Dutch leaf, by triturating with a solution of gum, washing in water, and drying quickly, then rubbing again to increase the lustre. The color depends upon the proportion of copper to zinc; if the former predominates, it is redder; if the latter, yellower; so that the deepest red consists of pure copper; the bright yellow of 83 parts copper and 17 of zinc; the orange red of 99 parts copper and 1 of zinc. The violet and green shades are obtained by heating with a greasy substance (oil, wax,

or paraffine), which produces a sort of patina.

SIGNS. To Gild.—The following method is for working in the open air, when the process with the cushion is rendered difficult if there is much wind to blow. Take a sheet of tissue paper and rub it over on one side only with a piece of white wax. This should be rubbed briskly over the surface of the paper, which should be placed on something flat, so that the wax is spread evenly. The paper thus rubbed will possess a sticky quality, scarcely perceptible to the touch, but sufficient to cause the leaf to adhere. After a whole sheet of paper has been waxed, it should be cut into squares a little larger than the leaves of the book of gold. The gold-leaf book must be opened and the waxed side of the tissue paper gently pressed upon the gold leaf with the hand. On removing the paper the gold leaf will be found attached to it. The tissue paper may be used over and over again. It is supposed that the letters to be gilded have been written in the most suitable material, and that they are ready to receive the gold leaf. Take up the tissue paper and place it with the gilded side to the letters, and, having rubbed the back lightly with the hand, the gold will come off the paper and adhere firmly to the mordant with which the lettering has been written. By this method little gold is wasted, as, the tissue paper being semi-transparent, the gold leaf shows through it, and the operator can see where any portion adheres to the paper, and can place it on such portions of the work as it will best fit without an undue number of joinings; though by this process, if the gold leaf is good, not the slightest trace of joining is discernible. The gold leaf should be gently dabbed over with a pad of cotton-wool, which will smooth the gilt, and remove superfluous pieces of leaf. As a newly-painted surface is sticky, if the gold leaf were to be applied to it, it would adhere to parts of the ground color where the size had not touched and where the golu was not required; it is needful, before letters or parts to be gilded are marked out, that the painted surface should be dabbed lightly with dry whiting; but care should be taken that loose particles are dusted off by the application of a silk handkerchief. If the ground is a dark one, this pouncing will so far lighten it, that the gilder will be able to distinguish any lines he may make with size, as the size will restore the ground to its original color. But if the ground is a light one, the pouncing will not have this effect, and it is necessary to mix some kind of color with the size to enable the gilder to make certain that he has covered the portion to be gilded. For pouncing, put some powdered whiting in a linen bag, tied tightly, and gently dab the parts to be pounced. The whiting is removed from the ground after the gold leaf is applied, by means of a damp chamois. The sizes used for gilding are of different kinds. Picture-frame gilders use gilders' size, made of fat oil, in which yellow ochre has been ground. This is a good material for the sign-writer, but is too thick for general adoption, especially in cold weather. In hot weather, it is not so thick, and may be used with advantage. The gold leaf must not be applied to this size for at least 24 hours after its application, and it will remain tacky for 2 or 3 days. When gilding has to be finished rapidly, japanners' gold size is employed. The gold leaf may be laid on this in ½ hour after its application. Sometimes the gilder is compelled to prepare his work and put on the leaf a few minutes afterwards; in this case, gold size is used. But if an interval of a few hours is no object, it is customary to add oil varnish to the gold size, regulating quantity according to time at disposal. Linseed oil should not be mixed with gold size to retard its drying properties, because it is apt to destroy the adhesiveness of the size, and to sweat and discolor the leaf. A few drops boiled oil may be added to the size occasionally, but varnish is preferable to oils. (See *Gilding on Glass*, in SIGNS.)

SIZING.—1. Put 12 gals. linseed oil into the iron set-pot; boil 2 hours; then gradually introduce 12 lbs. litharge; continue the boiling moderately for 6 hours; let it remain until next morning, then bring to a simmer, and run in 10 lbs. gum animeand 2 gals. oil. When these 2 runs of gum are poured into the iron pot, put in 7 lbs. Burgundy pitch, which soon melts; continue the boiling, and keep ladling it down; boil it moderately, and, when right, mix it with 30 gals. turpentine, or more if needed; this should be left a little thicker than japanners' gold size, as it is used for paper-stainers to lay their flock on, and ought to dry slowly in 1 hour. — 2. (*Birmingham.*) Good drying oil, 1 lb.; pure gum anime, powdered, 4 oz.; bring the oil almost to the boiling point in a covered metal pot; add gum cautiously to the oil, stirring to dissolve completely; boil to a tarry consistency and strain through silk into a warm bottle with a wide mouth; keep corked; use as required, thinning with turpentine. — 3. Yellow ochre, 1 part; copal varnish, 2 parts; linseed oil, 3 parts; turpentine, 4 parts; boiled oil, 5 parts; mix. The ochre must be in the state of the finest powder, and ground with a little of the oil before mixing. — 4. Heat raw linseed oil in a pan till it emits a black smoke; set it on fire, and, after burning a few minutes, cover the pan to put out the blaze; pour the oil while warm into a bottle in which pulverized red lead and litharge have been introduced; stand the bottle in a warm place for 2 weeks, shaking often. It will then be ready to decant and bottle. — 5. To ½ lb. parchment shavings or cuttings white leather, add 3 qts. water; boil till reduced to ½ the quantity; then take it off the fire, and strain it through a sieve; be careful in the boiling to keep it stirred, and do not let it burn. — 6. (*Japanners' Gold.*) Gum ammoniac, 1 lb.; boiled oil, 8 oz.; spirits turpentine, 12 oz.; melt the gum; then add the oil, and lastly the spirits turpentine.

SOLUTIONS FOR GILDING.—1. (*Elkington's Liquid Gilding.*) Fine gold, 5 oz. (troy); nitro-muriatic acid, 52 oz. (avoirdupois); dissolve by heat, and continue the heat until red or yellow vapors cease to be evolved; decant the clear liquid into a suitable vessel; add distilled water, 4 gals., pure bicarbonate of potassa, 20 lbs., and boil for 2 hours. The nitro-muriatic acid is made with pure nitric acid, 21 oz.; pure muriatic acid,

17 oz., and distilled water, 14 oz.—2. Silks, satins, woolens, ivory, bone, etc., may be readily gilded by immersing them in a solution of neutral terchloride of gold (1 of the salt, and 3 to 6 of water), and then exposing them to the action of hydrogen gas. The latter part of the process may readily be performed by pouring some dilute sulphuric acid on zinc or iron filings, in a wide-mouthed bottle, and placing it under a jar or similar vessel, inverted, at the top of which the articles to be gilded are suspended. Flowers, or other ornamental designs, may be produced by painting them on the surface with a camel's hair pencil dipped in the solution. The design, after a few minutes' exposure to the hydrogen, shines with all the splendor of the purest gold, and will not tarnish on exposure to the air, or in washing. — 3. (See *Gold Colored Bronze*, 2.)

STEEL, Polished, Bronze for. — To 1 pt. methylated spirits add 4 oz. gum-shellac and ½ oz. gum benzoin; put the bottle in a warm place, shaking it occasionally. When dissolved, decant the liquid and keep for fine work. Strain the residue through a fine cloth. Take ½ lb. powdered bronze green, varying to suit the taste with lampblack, red ochre, or yellow ochre. Take as much varnish and bronze powder as required, and lay it on the article, which must be thoroughly clean and slightly warm. Add another coat, if necessary. Touch up with gold powder according to taste, and varnish over all.

VARNISH, For Gilding.—Cheap bronzes and gilding with alloys may be kept from tarnishing by covering with either of the following: 1. Beeswax, 4 oz.; verdigris and sulphate of copper, of each, 1 oz. — 2. Beeswax, 4 oz.; verdigris, red ochre and alum, of each, 1 oz.; mix. Used to give a red color to water gilding.

WATER GILDING.—Will not bear being wetted, and is only fit for work kept in-doors. The wood is first covered with 4 or 5 coats whiting and size; and, that the gilding be perfect, it is necessary there should be a sufficient body of whiting. When these are dry, they are laid over with a coat of gold size, made of Armenian bole, a little wax, and some parchment size. When the size is dry, a portion of the surface is wetted with clear water and a soft brush, and a leaf of gold is applied, so as to almost float on the water, when it instantly settles down and adheres to the size; great care must be taken not to suffer any of the water to come over the gold, or a stain will be produced. When the whole is covered with gold leaf, the effect is what is called matt, or dead gold, and is the natural color of gold not burnished. Parts required to be burnished are rubbed with a burnishing tool of agate. Ornaments executed partly matt and partly burnished, have a very rich effect, which is seen in most picture frames. Frames executed in water gilding are sometimes required to be regilt; this cannot be done without taking off the whole of the whiting, and commencing the process again, which is expensive. When this is done, the frames may be either regilt in the water or in the oil manner; and as the last is much the cheapest, it is sometimes preferred, although it cannot be burnished.

WOOD, To Bronze.—1. Pipeclay, 2 oz.; Prussian blue, patent yellow, raw umber, lampblack, of each, 1 oz.; grind separately with water on a stone, and as much of them as will make a good color put into a small vessel ⅔ full of size. The wood, having been previously cleaned and smoothed, and coated with a mixture of clean size and lampblack, receives a new coating twice successively with the above compound, having allowed the first to dry. Afterwards the bronze powder is to be laid on with a pencil, and the whole burnished, observing to repair the parts which may be injured by this operation; next, the work must be coated over with a thin layer of Castile soap (which will take the glare off the burnishing), and afterwards carefully rubbed with a woolen cloth. The superfluous powder may be rubbed off when dry. — 2. The wood is first covered with a uniform coating of glue or drying oil, and, when nearly dry, the bronze powder, contained in a small bag, is dusted over it. The surface of the objects is afterwards rubbed with a piece of moist rag. Or the bronze powder may be previously mixed with drying oil, and applied with a brush.

YELLOW AND LIGHT RED BRONZE.—Copper bronze powder, 1 oz.; mix with japanners' gold size, adding turpentine during its use to keep it the consistency of cream; mix with a palette-knife on glass; if made too thin, it is liable to be removed by the brush as fast as put on. Apply with a soft brush.

CALCIMINING AND WHITENING.

REMARKS.—All processes under this class may be regarded as water colors, as distinguished from the usual oil-mixed colors of painting proper. *Whitewashing* is the first and crudest process, in which only quick lime slaked in water, with perhaps the addition of a little salt, are used. *Whitening*, depending on whiting as a covering agent, with glue or other sizing to increase adhesion, is a finer process, and usually the last finishing coat over whitewash, with a little ultramarine added to give it a blue cast; this color disappears in drying, leaving a perfect white. *Calcimining* is, simply stated, colors of any desired hue added to whitening. If the ceiling and walls are new, there will be nothing further required than a coat of good Paris white, with sufficient glue-size added to bind it, provided the finishing plaster was good; but if inferior and porous, it will require a preparation of strong size, soft soap, and a handful of plaster Paris. For old ceilings and walls, all the previous whiting, etc., must be washed off with an old whitewash brush and hot water, and allowed to dry before re-whitening. When this is done, if they are porous and soak in the moisture very quickly, they must be prepared with

a mixture of lime, 1 handful; whiting, the same; glue, ½ lb.; soft-soap, ½ lb.; and if smoky or damp, about 2 oz. alum, to make a pail ¾ full. When this is dry, they are ready for the finish. Use the preparation thin. Before putting on the whiting, shut doors and windows; take a sweep right across the room, and continue till finished. When finished, the doors and windows can be opened, as the sooner they dry the more even it will look.

CEILINGS AND WALLS.—1. Take 4 oz. glue; soak the same in 1 qt. warm water from 15 to 24 hours; add 1 pt. water; then place the vessel, either tin or thin metal, containing the glue, in a kettle of hot water over the fire, the glue being stirred until melted and quite clear; then put 5 or 6 lbs. powdered Paris white into a large pail, and add hot water sufficient to make the mixture of the consisteney of cream. Then mix the glue water with the same, stirring constantly, after which paint the walls with the mixture with a whitewash brush. — 2. Take clean lumps of well-burnt lime; slake in hot water in a small tub, and cover to keep in steam. Then pass through a fine sieve in fluid form, to obtain the flour of lime; add ¼ lb. whiting or burnt alum, 2 lbs. sugar, and 3 pts. rice flour made into a thin and well boiled paste, and 1 lb. glue dissolved over a slow fire. It is more brilliant than plaster Paris, and will last a long time. It should be put on warm with a paint brush. — 3. 10 lbs. whiting, dissolved in hot or boiling water; ¼ lb. glue put to soak over night in 1 pt. water; it may now be melted on a stove, stirring it frequently. 2 oz. ultramarine blue; 1 oz. Venetian red; mix separately with cold or soft water, and strain each in separate vessels. The whiting may now be stirred well; if too thick, add more hot water, and strain through a sieve into a good sized pot. — 4. 1 dozen balls of good whiting, 2 lbs. size, and 1 oz. celestial or ultramarine blue; this will cover 12 sq. yds. Mixing: Take the whiting and break up in just enough water that you can work it about in a bucket with a stout stick. Next, take a saucepan, about 3 qts., and put a pt. water in and boil; take off the fire, and drop the size into it, and let it stand upon the stove until melted. When warm, pour into the whiting, and keep stirring it. Mix the blue with a flat stick upon a slate or board, and add until it becomes of the shade required. Lime that will produce a fast lime wash is burnt in the bottom of brick kilns, the bricks upon the top, and fired with heath, fir loppings, coal, wood, ferns, and gorse. The sand from the bricks, the chalk and the potash from the wood combined, cover the chalk or lime with a silicate soluble in water. To use this, get it fresh burnt, break it up, and pour boiling water upon it; it subsides into a beautiful cream-like consistence. This, owing to the soluble silicate in it, must be used and made fresh. It is fast, and frequently presents a glazed surface, and, if not put on too thick, is very durable. A pk. of lime will do about 20 sq. yds.; this is merely lime—the fresher the better. Slake it. Make it of the proper consistence, and add to every bucket 1 gill turps and linseed oil, mixed. Some use tallow; some size. — 5. Take 12 lbs. whiting (in large balls), break them up in a pail, and cover with water to soak. During this time melt over a slow fire 4 lbs. common size, and, at the same time, with a palette-knife, rub up fine a dessertspoonful of blue-black with water to a fine paste; then pour the water off the top of the whiting, and with a stick stir in the black; when mixed, stir in the melted size and strain. When cold, it is fit for use. If the jelly is too stiff for use, beat it and add a little cold water. Commence whitewashing over the window, and so work from the light; lay off the work into that done, and not all in one direction, as in painting.

CELLARS AND OUT-BUILDINGS. — 1. Put ½ bush. lime into a clean water-tight barrel, and pour over it boiling water to cover it 4 to 5 in. deep, stirring briskly until the lime is slaked; after slaking, add water gradually, stirring until thin enough to use; then add 1 lb. salt and 2 lbs. sulphate of zinc; this will cause the wash to harden, and prevent cracking or rubbing off. — 2. Water lime, 1 pk.; freshly slaked lime, 1 pk.; yellow ochre, in powder, 4 lbs.; burnt umber, 4 lbs.; dissolve in hot water, and apply with brush. —3. Take 1 bush. lime, and slake it with cold water; when slaked, add to it 20 lbs. Spanish whiting, 17 lbs. salt, and 12 lbs. sugar. Strain through a wire sieve, and it will be fit for use after reducing with cold water. This is intended for the outside of buildings, or where it is exposed to the weather. To give a good color, 3 coats are necessary on brick, and 2 on wood. It may be laid on similar to whitewash. Each coat must have time to dry, before the next is applied. — 4. Skim-milk, 2 qts.; fresh slaked lime, 8 oz.; linseed oil 6, oz.; white Burgundy pitch, 2 oz.; Spanish white, 3 lbs. The lime to be slaked in water, exposed to the air, mixed in ¼ the milk; the oil, in which the pitch is previously dissolved, to be added a little at a time; then the rest of the milk, and afterwards the Spanish white. This is sufficient for 27 sq. yds., 2 coats. — 5. Take 11 lbs. unslaked lime and 1 gal. boiling water, and stir into a thick pudding; then add 2 gals. boiled linseed oil and ½ lb. white potash, dissolved in 1 pt. boiling water; mix thoroughly, and if the oil and potash do not unite, add a little more potash-water; there must be enough to cut the oil, but no more. It will look thicker than paint, but will spread easily, and wear well, and has all the appearance of a superior paint, while its cost is less than ½. For barns, out-houses, fences, etc., it is unequaled.— 6. Well burned quicklime, ½ bush.; salt, 1 qt.; rice flour, and glue, ½ lb. each; water-glass (syrupy solution), 1½ pts.; water, q.s. Soften the glue over night in cold water, then dissolve it in a small quantity of boiling water. Make the flour into a paste with a little hot water, and add it to the glue solution; dilute the water-glass with boiling water, and add the salt; slake the lime with boiling water; then stir in the other materials with enough hot water to reduce to a consistence for use; stir together, cover, and let it stand several hours before using. When wanted for use make hot. — 7. Take ½ bush. nice unslaked lime; slake with boiling water; cover during the process; strain through a sieve or strainer, and add to it 1 pk. salt previously dissolved in warm water; 3 lbs. ground rice, boiled to a thin paste;

½ lb. powdered Spanish whiting, and 1 lb. clean glue, previously dissolved by soaking, and then hang it over a slow fire in a small kettle within a larger one filled with water; add 5 gals. hot water to the mixture; stir well and let stand for a few days covered from dust. It should be put on hot, and for this purpose it can be kept in a kettle on a portable furnace. Fine or coarse brushes may be used, according to the neatness of the job required. It answers as well as oil paint for wood, brick or stone, and is cheaper. It retains its brilliancy for years. Buildings or fences covered with it will take a much longer time to burn than if they were painted with oil paint. Coloring matter may be put in and made of any shade desired.

COLORINGS FOR WALLS.—Distemper color of any tint may be made by using ochre, chrome, Dutch pink, raw sienna for yellows and buff; Venetian red, burnt sienna, Indian red, or purple brown, for reds; celestial blue, ultramarine or indigo, for blues; red and blue for purple, gray or lavender; red lead and chrome, for orange; Brunswick green for greens. *Blue.* Boil slowly for 3 hours 1 lb. blue vitriol and ½ lb. best whiting in 3 qts. water; stir frequently while boiling, and also on taking it off the fire. When quite cold, pour off the blue liquid; mix the cake of color with good size, and use in the same manner as whitewash, for walls or ceilings. — *Lavender.* Make a light blue, and tint it slightly with vermilion. — *Lilac.* Add to the calcimine, 2 parts Prussian blue and 1 part vermilion, stirring thoroughly, and taking care to avoid too high a color. — *Pink.* 1. Take 1 lb. madder, and soak over night in a brass or copper kettle; set it on the fire and let it come to a boil. — 2. 2 oz. cochineal; steep in warm water 2 hours; add to it ½ oz. cream tartar. Put as much or as little of this decoction in whitewash as will make the desired shade. — *Rose.* 3 parts vermilion and 1 part red lead, added in small quantities until a delicate shade is produced. —*Straw.* Chrome yellow, with a touch of Spanish brown.

RED WASH, For Bricks. — Red ochre, 5 lbs.; water-glass, ½ lb.; dissolve the latter in boiling water and add the ochre to form a thin wash. Apply with a stiff brush while hot. — 2. To remove the green that gathers on bricks, pour over them boiling water in which any vegetables, not greasy, have been boiled; repeat for a few days, and the green will disappear. For the red wash, melt 1 oz. glue in 1 gal. water; while hot, add a piece of alum the size of an egg, ½ lb. Venetian red, and 1 lb. Spanish brown; if too light, add more red and brown; if too dark, water.

FIRE-PROOFING.

REMARKS.—The woods least inflammable are beech, oak, American elm, plane tree, and other non-resinous woods. Nothing has yet been discovered which will render wood or any vegetable fibre entirely fire-proof. There are washes and solutions that will render them uninflammable, but when exposed to great heat, the fibre will be consumed.

FENCES, Wash for. — 1 qt. fine sand, 1 part sifted wood ashes, and 3 parts lime ground with oil; mix together. Apply the first coat thin, the other thick. This adheres to planks so strongly as to resist an iron tool or fire, and is impenetrable by water.

SHINGLE ROOFS, Wash for.—Lime, salt, and fine sand or wood-ashes, put on like whitewash, renders a shingle roof 50-fold more safe against fire from falling cinders. It has a preserving influence against the weather; the older the shingles, the more benefit derived. The application of the wash restores their original form, closing the space between the shingles, and the lime and sand, and, by filling up the cracks, prevents warping. By adding lampblack, the wash may be made the color of old shingles, and thus the glare of a whitewashed roof is removed.

WOOD WORK. — 1. Apply hot glue water as long as it is absorbed into the pores of the wood; then apply a thick coat of boiled glue, and, while fresh, dust over with a powder composed of 1 part sulphur, 1 part ochre of clay, and 6 parts ferrous sulphate. — 2. A wash made of skim milk and water brine will render wood uninflammable. — 3. Paint twice with a hot saturated solution of 1 part green vitriol and 3 parts alum. When dry, paint with a weak solution of green vitriol in which pipe clay has been mixed to the consistence of paint. — 4. Boards become almost incombustible when painted with a diluted solution of silicate of soda, which is usually sold as a thick fluid, like honey. This may be thinned with water, 6 to 7 times its own bulk. The water must be soft. Apply the solution warm; in about 24 hours apply a second coat, and perhaps a third. Use a new brush, and wash in clean water after using or it will get too soft; avoid grease on the boards before painting them. This is for inside work only. — 5. Soak the wood in a strong solution of alum and sulphate of copper; about 1 lb. alum and 1 lb. sulphate of copper for 100 gals. water. These substances are dissolved in a small quantity hot water; then mixed with the water in the vessel in which the wood is to be steeped. The timber can be kept under the liquor by stones. All that is required is a water-tight vessel, sufficient to hold enough liquor to cover the timber, which should steep 4 or 5 days; then take out and let it dry before using — 6. 5 parts alum, 7 parts rye meal paste and 3 parts finely divided clay. — 7. 2½ parts sal ammoniac, 1 part sulphate of zinc, 2 parts joiner's glue, 20 parts zinc white, and 30 parts water. This will prevent wood from bursting into a flame when ignited, and delay its destruction when a fire is raging. — 8. The following may be used as a fire-proof wash for inside work: 20 lbs. pulverized glass, 20 lbs. pulverized porcelain, 20 lbs. stone in powder, 10 lbs. calcined lime, and 30 lbs. silicate of soda. The solid elements, having been powdered fine and sifted, are moistened and mixed with the silicate of soda. This yields a syrupy mass for painting either

alone or mixed with color. The lime gives unctuosity to the mass for whitewashing, and its combination with the silicate of soda serves to bind the materials together. The proportions of the different elements may be changed, save that of the silicate; these elements may even be replaced one by another; but always preserve the lime. Instead of the silicate of soda, soluble glass of potash may be used, but the former is less expensive. The coating is applied as other paints, uniformly over the surface. The first coat hardens immediately, and a second one may be applied 6 hours afterwards; two are sufficient.— 9. Asbestos paint makes a fire-proof wash for inside work. It is prepared by grinding and regrinding asbestos in water, potash, or soda aluminate, and potash or soda silicate. When it is to be exposed to the weather, it must be combined with oil, driers and gummy matters, and in some cases with zinc oxide or baryte.—10. Wood can be rendered fire-proof by first drying it, and then coating it with common whitewash. If the wood is not thoroughly dry, the whitewash shells off. It is a difficult matter to burn wood plastered over with whiting or lime wash. — 11. Commercial tungstate of soda, 1 lb.; phosphate of soda, ½ lb.; water, 2 gals.; dissolve. Apply boiling hot.

GRAINING.

BIRD'S-EYE MAPLE. — 1. Graining color: Equal parts of raw sienna and burnt umber mixed in ale, of two thicknesses. First lay on a coat of the thin mixture; then, with a smaller brush, put in the darker shades; mottle and soften with a badger-hair brush. The eye is imitated by dabbing the color, while still wet, with the fingers. When dry, put on the top grain in prominent places, and shade the eyes with a little burnt sienna. Some grainers use brushes called maple eye-dotters, instead of the fingers, for the eyes. Various forms of brushes are used for mottling; some consist of short camel's hair closely set, while, to give the wavy appearance, hog's hair mottlers are used, with long hairs, against which the fingers are pressed as the brush is drawn over the work, causing a variety of curves. The lines to imitate the heart of the wood are put in with a small brush, and the outer lines parallel to the heart are formed with the overgraining brush. Overgraining brushes for maple consist of small sable brushes mounted a little distance from each other in a frame.—2. Grind equal parts of raw and burnt sienna in water and ale. Coat the work with this color; then rub down with a long piece of buff leather, cut straight at the edge and pressed against the work. Proceed for the imitation of the eyes and heart of the wood as before directed.—3. For outside work grind the raw and burnt sienna with a little of the patent driers, and then with boiled oil; lay on an even coat, and rub down with buff leather; soften, and when dry put on a top grain of burnt umber and raw sienna ground in ale.

BLACK AND GOLD MARBLE.—1. Ground, deep ivory black. Put on veins of white lead, yellow ochre, and burnt and raw sienna, with a camel's hair brush. The spaces between the veins must be glazed with a thin coat of grey or white, over which p ss a few white veins. The veins may also be put on with gold leaf. —2. Have a yellow ground, streaked with broad ribbons of black, in which fine veins are obtained by drawing a sharp piece of wood along them while wet, so as to expose the yellow beneath.

BLACK AND WHITE MARBLE.—White ground, and with dark veins, put on with a marbling crayon, and softened while the ground is wet. Or, when the ground is dry, cover it with a thin coat of white lead, and put the veins in with a camel's hair pencil; blend while wet.

BLACK WALNUT.—The ground should be of drab, made of lead, yellow ochre, Venetian red and black. The grain color is burnt umber. Dampen the work with the grain color. Spread on the grain color with a brush; blend crosswise. Wipe out the light parts with a cloth. Blend till soft. Put in the blazes up through the centre with the blaze stick. Blend down the crude roughness of this lengthwise. When dry, rub off with a soft cloth the rough particles.

BLUE AND GOLD MARBLE.—Ground, a light blue; when dry, take blue with a small piece of white lead and some Prussian blue, and dab on in patches, leaving portions of the ground to show between; blend together with a softener; next put on white veins in every direction, leaving large spaces to be filled up with a pale yellow or gold paint; finish with fine, white, irregular threads.

DOVE-COLORED MARBLE. — Ground, lead color, of which give 2 or 3 coats. If the work is new, let it dry hard; rub smooth with fine glass paper after each coat, and do not rub the paint off the sharp edges of the wood. For marbling, take lead color, such as used for the ground; thin it with turpentine, and rub a light coat over a small part of the work; and with a whitish color form the small specks or fossil remains. Proceed, piece by piece, till the whole surface is covered, being careful to paint but a small part of the ground at once, so that the colors may have time to blend while wet, otherwise the work will appear harsh; then, with a small sash tool, put in faint, broad veins, of the thin ground color, and numerous fine veins over the whole surface of the work, crossing in every direction; then make the color lighter, by adding white lead, and, with a feather, pass over the broad veins in the same direction, forming streams of threads. With thin white, and with a camel's hair pencil, go partly over the same vein with short, thick touches, then with a fine striping pencil. When the work is hard, it should be smoothed with very fine glass paper before being varnished. The first layer of veins should be faint; for, as the lighter shades are put on, the former veins will appear sunk, which will give a good effect.

GRANITE.—1. Gray ground, with white and

black spots. — 2. Venetian and white for the ground, with white, black and vermilion spots. The spots are put on in several ways: A sponge may be charged with the marbling color and dabbed on the work, or a common brush may be struck against a stick held at a little distance from the work, so as to throw off blots and spots of color.

HAIR WOOD. — For ground color, take white lead and thin it with turpentine, and slightly stain it with equal quantities Prussian blue and lampblack. For graining color, grind in ale a mixture of Prussian blue and raw sienna; when the ground is dry spread a transparent coat of the graining color on the surface of the work, and soften; then, with the cork, mottle by rubbing it to and fro across the work, to form the fine long grain or mottle; when this is done, soften and top grain in wavy but perpendicular directions; varnish when dry.

ITALIAN MARBLE.—Ground, a light buff. For marbling, mix stiff in boiled oil, white lead, ochre and a little vermilion; grind burnt sienna very fine in boiled oil, and put it into another vessel; mix pure white stiff in oil, and keep this separate. Thin these colors with turpentine, and have a brush for each. Take the buff brush moderately full of color, and dab it on in patches, varying as much as possible; take another brush and fill in the spaces between with sienna. With a softener blend the edges, making them as soft as possible; draw a few thin, white veins over the work with a hair pencil; run in a few thin lines of sienna, and soften.

JASPER. — Mix the ground the same as for mahogony, with red lead, Venetian red and a little chrome yellow, thinned with equal parts oil and turpentine; lake or vermilion may be substituted for Venetian red, if a brilliant tint is desired. While the ground is wet, dab on spots of white; soften with a softening brush. Other colors may be applied in the same manner. When dry, put on the veins with a camel's hair brush.

MAHOGANY.—1. Vandyke brown and a little crimson lake, ground in ale, laid on, allowed to dry, and then smoothed, forms the ground. Then lay on a second thicker coat; soften with a badger brush; take out the lights while it is wet, and imitate the feathery appearance of mahogany heart; soften, and top grain with Vandyke brown, laid on with an overgraining brush of flat hog's hair, combed into detached tufts. In softening be careful not to disturb the under color.— 2. Grind burnt sienna and Vandyke brown in ale; lay on a coat; mottle with a camel's hair mottler, and soften; when dry, overgrain as above. — 3. (*Mottled.*) The ground is prepared with the best Venetian red, red lead, and a small portion of white lead. The graining colors are burnt sienna, ground in ale, with a small portion of Vandyke brown, sufficient to take away the fiery appearance of the sienna. Cover the surface to be grained; soften with the badger hair brush, and, while wet, take a mottling roller and go over the lights a second time, in order to give a variety of shade; then blend the whole of the work with the badger softener; put the top grain on with the same color; when the work has become thoroughly dry, varnish.

OAK. — *Dark.* 1. Raw sienna, burnt umber, white lead, and Venetian red. — 2. Yellow ochre, Venetian red, and white-lead. — 3. (*Pollard.*) The ground color is prepared with a mixture of chrome yellow, vermilion, and white lead, to a rich light buff. The graining colors are Vandyke brown and small portions of raw and burnt sienna and lake ground in ale or beer; fill a large tool with color, spread over the surface to be grained, and soften with badger-hair brush; take a moistened sponge between the thumb and finger, and dapple round and round in kind of knots; soften lightly; then draw a softener from one set of knots to the other while wet, to form a multiplicity of grains, and finish the knots with a hair pencil, in some places in thicker clusters than others; when dry, put the top grain on in a variety of directions, and varnish with turps and gold size; then glaze up with Vandyke and strong ale. To finish, varnish with copal.

PORPHYRY.—1. Ground, purple-brown and rose-pink. Grind vermilion and white lead separately in turpentine, and add a little gold size to each color to bind it; more turpentine must be added before the color is applied; when the ground is dry, fill a large brush with vermilion, squeeze out nearly all the color by scraping the brush on the edge of the palette-knife; hold a rod in the left hand, strike the handle of the brush against it, so as to throw small red spots on to the work till the surface is covered; make the color lighter by adding white lead, and use as before; then with clear, thin white throw on very fine spots, and when dry put in a few white veins across the work. This marble may be imitated in distemper in precisely the same manner as in oil. — 2. The ground in Venetian red, with a little vermilion and white. For marbling, add a little more white to the ground color, and sprinkle over the first coat. When dry, repeat the splashing with a mixture of Venetian red and vermilion, and then with white in very fine spots; form opaque white veins across the work, and transparent threads in various directions. This must be done when the work is dry, with a sable pencil, and the threads drawn with a feather. For each separate color use a different brush.

RED MARBLE. — For the ground, put on a white, tinged with lake or vermilion; then apply deep rich reds in patches, filling up the intermediate spaces with brown and white, mixed in oil; then blend; if in quick drying colors, use about ½ turps and gold size. When dry, varnish, and while the varnish is wet, put in a multitude of the fine white threads, crossing the work in all directions, as the wet varnish brings the pencil to a fine point.

ROSEWOOD. — 1. Mix vermilion and a small quantity of white lead for the ground; take rose pink, tinged with lampblack or Vandyke brown, and grind fine in oil; then take a flat graining brush, with the hairs cut away at unequal distances, and cut down the grain as if wending round a knot. When nearly dry, take a graining comb that is used for oak and draw down the grain; this will give it the appearance of na-

ture. When dry, varnish. — 2. The ground color is prepared with vermilion and small quantities of white lead and crimson lake. When the ground is dry and made smooth, take Vandyke brown, ground in oil, and with a small tool spread the color over the surface, forming knots. Before the work is dry, take a piece of leather and strike out the light veins, having previously prepared the darkest tint of Vandyke brown, or gum asphaltum; immediately take the flat graining brush with few hairs in it, draw the grain over the work and soften. When varnished, the imitation will be excellent. — 3. Mix Venetian red, white lead powder, vermilion and common size, which, when cold, must be like a trembling jelly. With this paint the work twice over. When the ground is dry, take lampblack, finely ground in beer, and beat the white of an egg into it; take the flat graining brush, dip in the black, and put on the grain. When dry, stain the first coat of varnish with rose pink, ground in turpentine, and finish the work by giving it a coat of clear varnish.

SATINWOOD.—This ground is prepared with white lead, stone ochre, and small quantities chrome yellow and burnt sienna. The graining color is $\frac{1}{4}$ raw sienna and whiting, ground in pale ale, very thin. Spread the color over the surface to be grained. While wet, soften and have ready a mottling brush, in order to take out the lights; blend the whole with a badger's hair brush. When the work is dry, take the flat brush, and with the same color put on the top again. When dry, varnish.

SIENNA MARBLE. — 1. Ground ochre and white lead. Use burnt and raw sienna, white, black, and a little lake for marbling. These colors should be laid on as a transparent glaze, and marked and softened while wet. The colors should be properly softened with a badger brush. — 2. Ground raw sienna or yellow ochre. When dry, mix raw sienna with white lead; have ready also some white paint; put in broad transparent tints of white and yellow, and while wet blend with a softener. Mix Venetian red and a little black, and put in some broad veins in the same direction as the patchy tints run; for the darker veins, take a mixture of Venetian red, lake and black, and draw them over the first layer of veins with a feather in fine threads, running to a centre, and in transparent veins in different directions. Mix some Prussian blue and lake, and put in the darkest and finest veins over those before laid on. Put in a few touches of burnt sienna between the fine veins which are formed into small masses. All the colors should be ground in spirits turpentine, and mixed with sufficient gold size to bind them.

VERDE ANTIQUE MARBLE.—If the work is new lay on a coat of dark lead oil color; when dry, smooth with glass paper, and lay on a coat of black paint; when this is dry, mix white lead with water and a little beer; lay this on in large streaks; fill up the spaces left with veins of lampblack, finely ground in beer, thus covering the surface of the work. While wet, soften with a badger hair brush, to cause the veins to run into one another. On the darkest parts lay dabs of white, carelessly applied, to imitate fossils, and dab the light parts of the work with the black color for the same purpose. With a thin, flat graining brush, dipped in the white, form small veins over the black; a few dark blue wavy veins may also be put on. When dry, glaze with a thin coat of raw sienna and Prussian blue ground in spirits turpentine and mixed in copal varnish. A little emerald green added here and there heightens the effect.

YEW.—The ground is a reddish buff. For the graining color grind in ale equal portions Vandyke brown and burnt sienna, with a small quantity raw sienna. When the ground is dry, spread the surface even with the color, and soften; then with a piece of cork with a sharp edge, rub the work cross and cross to form the fine grain. When dry, dip the tip of the fingers in the graining color to form the eyes or knots, and put in the small touches with a camel's hair pencil. When dry, put on the top grain, and when this is dry, varnish.

PAINTS.

PIGMENTS.

THE term pigments is applied to coloring matters which are mixed in a powdery form with oil or other vehicle for the purposes of painting.

GRINDING.—When a color mill is not used, a marble, or other smooth slab, and a muller are necessary. The purity of colors sold ready ground are not always to be depended upon. Some colors, as lakes and Prussian blue, will not keep long after grinding. The slab for grinding on is of porphyry, marble or granite, about 2 ft. sq., hard and close grained. The muller is a hard stone, in shape like a sugar loaf, and in size not larger than to be well grasped by both hands; it should be perfectly flat and smooth on the face. A large palette-knife is used to gather the color when ground. All substances used for painting in oil must be ground with a portion of the oil, previous to mixing them with the whole quantity. They must first be pounded in a mortar, passed through a sieve, and then mixed with linseed oil sufficient to just saturate them only; a quantity of this mixture, of the size of an egg, is then taken on the end of the knife and deposited on the centre of the slab; the muller is then placed upon it, moved round about and to and fro in all directions, bearing a little weight on it; this process is continued until the mass is ground to the smoothness of butter. Occasionally gather the color from the outer parts of the slab and from the edges of the muller with the knife, and put in the centre of the stone to regrind. When sufficiently ground, remove the color, and proceed with a fresh quantity. It is not well to have much color on the stone at one time; it makes

it laborious, and will take a longer time to grind.

LAKES.—1. (*Carthamine, or Safflower.*) Wash safflower till the water comes off colorless; mix it with water holding 15 per cent. carbonate of soda in solution, so as to form a thick paste; leave it for several hours; then press out the red liquid, and nearly neutralize it with acetic acid; then put cotton into it, and add successive small portions of acetic acid, to prevent the liquid becoming alkaline. In 24 hours take out the cotton, wash it, and digest ½ hour in water holding 5 per cent. crystallized carbonate of soda in solution. On removing the cotton, supersaturate the liquid with citric acid, and collect the precipitate, which must be repeatedly washed in cold water. For pink saucers the liquor is allowed to deposit in the saucers. Mixed with scrapings of French chalk it constitutes rouge.—2. (*Orange.*) Take of the best Spanish annatto, 4 oz.; pearlash, ¾ lb.; water, 1 gal.; boil ½ hour; strain; precipitate with alum, 1 lb., dissolved in water, 1 gal.; observing not to add the latter solution when it ceases to produce an effervescence or a precipitate; strain, and dry the sediment in small squares, lozenges, or drops.—3. (*Red.*) Take pearlash, 1 lb.; clean shreds scarlet cloth, 3½ lbs.; water, 5 gals.; boil till the cloth is discolored; filter the decoction, and precipitate with a solution of alum, as before.—*Yellow.* 1. Boil French berries, quercitron bark, or turmeric, 1 lb., and salt of tartar, 1 oz., in water, 1 gal., until reduced ½; then strain the decoction and precipitate with a solution of alum.—2. Boil 1 lb. of the dye-stuff with alum, ½ lb.; water, 1 gal.; as before, and precipitate the decoction with a solution of carbonate of potash. *Madder.* 1. Crop madder, 2 oz.; tie in a cloth; beat well in 1 pt. water in a stone mortar, and repeat the process with about 5 pts. fresh water until it ceases to yield color; boil the mixed liquor in an earthen vessel; pour it into a large basin, and add 1 oz. alum, previously dissolved in 1 pt. boiling water; stir well, pouring in gradually a strong solution of carbonate of potassa or oil of tartar, 1½ oz.; let stand until cold, then pour off the yellow liquor from the top; drain; agitate the residuum with boiling water in separate quantities, 1 qt.; decant, drain, and dry; product, ½ oz.—2. Add a little solution of acetate of lead to a decoction of madder, to throw down the brown coloring matter; filter; add a solution of tin or alum; precipitate with a solution of carbonate of soda or of potassa; proceed as before.—3. Ground madder, 2 lbs.; water, 1 gal.; macerate with agitation for 10 minutes; strain off the water, and press the remainder dry; repeat the process a second and third time; then add to the mixed liquors, alum, ½ lb., dissolved in water, 3 qts.; and heat in a water bath for 3 or 4 hours, adding water as it evaporates; next filter, first through flannel, and, when cold, through paper; then add a solution of carbonate of potassa as long as a precipitate falls, which must be washed until the water comes off colorless; and lastly dried. If the alkali be added in 3 successive doses, 3 different lakes will be obtained, successively diminishing in beauty.

MIXING COLORS.—The following is a good table for mixing different colors to produce a variety of the most common and useful shades:

Brown,	mix together	Venetian red and lamp black.
Buff,	"	white, yellow ochre, red.
Chestnut,	"	red, black, yellow.
Chocolate,	"	raw umber, red, black.
Claret,	"	red, umber, black.
Copper,	"	red, yellow, black.
Cream,	"	same as buff, with more white.
Dove,	"	white, vermilion, blue, yellow.
Drab,	"	white, yel. ochre, red, black.
Fawn,	"	white, yellow, red.
Flesh,	"	white, yel. ochre, vermillion.
Freestone,	"	red, black, yel. ochre, vermil.
French Gray,	"	white, Prussian blue, lake.
Gray,	"	white lead, black.
Green, dark,	"	lamp black, chrome green.
Green, pea,	"	white lead, yellow, red.
Gold,	"	white, stone ochre, red.
Green bronze,	"	chrome green, black, yellow.
Lead,	"	white lead, black.
Lemon,	"	white, chrome yellow.
Limestone,	"	white, yel. ochre, black, red.
Olive,	"	yellow, blue, black, white.
Orange,	"	yellow, red.
Peach,	"	white, vermilion.
Pearl,	"	white, black, blue.
Purple,	"	violet, more red and white.
Red,	"	white lead, vermilion, scarlet lake, Venetian red, red lead, or burnt ochre.
Rose,	"	white, madder lake.
Salmon,	"	wht. lead, blue, yellow, red.
Sandstone,	"	white, yel. ochre, black, red.
Snuff,	"	yellow, Vandyke brown.
Stone,	"	white lead, spruce ochre.
Straw,	"	white lead, yellow.
Violet,	"	red, blue, white.

OILS.

BLEACHING.—Pour linseed oil 1 in. deep into a shallow earthen vessel; then pour in 6 in. water; cover with a fine cloth, and let stand in the sun for a few weeks, until thick, when it should be poured into a vial and submitted to a gentle heat; after which the clear is to be poured off and strained through a flannel cloth.

BOILED AND DRYING.—1. Linseed oil is mixed with powdered litharge and heated until thick. A pale drying oil is obtained by mixing with linseed oil sufficient dry sulphate of lead to form a milky liquid, and shaking it repeatedly for some days, letting it stand exposed to the light; when clear, pour off from the dregs. The sulphate of lead, when washed from the mucilage, may be used again. Or it may be prepared as follows: 1 lb. acetate of lead dissolved in ½ gal. rain water, and 1 lb. powdered litharge added; the mixture is exposed to a moderate heat and stirred till no particles of litharge can be seen. A white deposit is formed, which may be left in the liquid or separated by filtration; 20 lbs. linseed oil, in which 1 lb. levigated litharge has been diffused, are gradually added to the lead solution, previously diluted with an equal bulk of water; the mixture frequently stirred, and left to clear itself in a warm place. To obtain it bright, filter through coarse paper; and bleach by exposure to the sun. The lead solution which subsides from the mixture, may be filtered and used again, after dissolving it in 1 lb. litharge as before. The oxide of lead contained in the oil may be removed from it by agitating it with diluted sulphuric acid, and letting it settle.—2. (*Fet.*) 8 lbs. nut oil or linseed oil; 1 oz. white lead, slightly calcined; 1 oz. yellow acetate of lead, also calcined; 1 oz. sulphate of zinc; 12 oz. litharge, and a head of garlic, or a small onion. When dry substances

are pulverized, mix them with the garlic and oil over a fire sufficient to cause a slight ebullition; continue it till the oil assumes a reddish color and the garlic becomes brown. A pellicle will soon form on the oil indicating that the operation is complete. Take from the fire, and the pellicle, being precipitated by rest, will carry with it all the unctuous parts of the oil. When the oil becomes clear, separate it from the deposit, and put it into wide-mouthed bottles, where it will clarify and improve in quality. — 3. (*Fat.*) 1½ oz. litharge, ⅜ oz. sulphate of zinc, and 16 oz. linseed or nut oil. The operation must be conducted as in the preceding case. The choice of the oil is not a matter of indifference. If it be destined for painting articles exposed to the external air, or for delicate painting, nut oil or poppy oil will be requisite. Linseed oil is used for coarse painting, and that sheltered from the rain and sun.—4. (*Fat.*) A drying quality may be communicated to oil by treating, in a heat capable of maintaining a slight ebullition, linseed or nut oil, to each lb. of which is added 3 oz. litharge, reduced to powder. — 5. 2 lbs. nut oil, 3 lbs. water, and 2 oz. sulphate of zinc. Mix, and subject to a slight ebullition till little water remains. Decant the oil and separate the water by means of a funnel. The oil remains nebulous for some time; after which it becomes clear and seems to be very little colored. — 6. (*Poppy.*) Into 3 lbs. pure water, put 1 oz. sulphate of zinc; and mix the whole with 2 lbs. oil of pinks, or poppy oil. Expose this mixture in an earthen vessel capable of standing fire sufficient to maintain a slight ebullition. When ⅓ or ⅜ of the water has evaporated, pour the whole into a jar, and leave it at rest till the oil becomes clear; decant the clear part by means of a glass funnel, the beak of which is stopped with cork. When the separation of the oil from the water is effected, remove the stopper and supply its place with the forefinger, applied so as to suffer the water to escape, and to retain the oil. Poppy oil, prepared in this manner, becomes limpid and colorless. — 7. (*Resinous.*) Take 10 lbs. drying nut oil, if the paint is for external use, or 10 lbs. drying linseed oil, if for internal articles; 3 lbs. resin, and 6 oz. turpentine. Cause the resin to dissolve in the oil by means of gentle heat. When dissolved and incorporated with the oil, add the turpentine; leave the varnish at rest to deposit resin and other impurities; then preserve it in wide-mouthed bottles. It must be used fresh. If this resinous oil assumes too much consistence, dilute it with essence, if for articles sheltered from the sun, or with oil of poppies.

LINSEED OIL, To Clarify.—1. Heat in a copper boiler 50 gals. linseed oil to 280° Fahr.; add 2½ lbs. calcined white vitriol, and keep the oil at the above temperature ½ hour; remove it from the fire, and in 24 hours decant the clear oil. It should stand a few weeks before it is used. — 2. In 236 gals. oil pour 6 lbs. oil of vitriol; stir together for 3 hours; then add 6 lbs. fullers' earth, well mixed with 14 lbs. hot lime, and stir for 3 hours; put the oil into a copper boiler, with an equal quantity of water, and boil for 3 hours; then extinguish the fire; when the materials are cold draw off the water, and let the oil stand for a few weeks before using.

Mixed Colors.

ANTI-CORROSIVE PAINT.—Take equal parts by weight of whiting and white lead, with ½ the quantity fine sand, gravel or road-dust, and sufficient coloring matter. This mixture is made in water, and can be used as a water color; but it is more durable to dry it in cakes after mixing, and then use it as an oil paint by grinding in linseed oil. The preparation of oil for this purpose is 12 parts by weight of linseed oil, 1 part boiled linseed oil, and 3 parts sulphate of lime, mixed; 1 gal. of this oil to 7 lbs. powder.

BLUE.—Blue black, ½ cwt.; whiting, 1 cwt.; road-dust, 2 cwt.; blue, ½ cwt.; lime water, 12 gals.; factitious linseed oil to grind.

BROWN.—Venetian red, or Spanish brown, 1 cwt.; road-dust, 3 cwt.; common soot, 28 lbs.; limewater, 15 gals.; factitious linseed oil to grind.

COVERING, Quantities Required for.—

1 gal. priming color will cover 50 square yards.

"	white zine	"	50 "
"	white paint	"	44 "
"	lead color	"	50 "
"	black paint	"	50 "
"	stone color	"	44 "
"	yellow paint	"	44 "
"	blue color	"	45 "
"	green paint	"	45 "
"	bright emer. green	"	25 "
"	bronze green	"	45 "

CREAM.—*1st Coat:* White lead, in oil, 66.66 parts; French yellow, 3.33 parts; Japan varnish, 1.33 parts; raw oil, 28 parts; spirits turpentine, 2.25 parts. *2d Coat:* White lead, in oil, 70 parts; French yellow, 3.33 parts; Japan varnish, 1.33 parts; raw oil, 24.5 parts; spirits turpentine, 2.25 parts. 1 sq. yd. of new brick work requires for 1st coat .75 lb.; 2d coat, .3 lb.

DRAB.—1. White lead with a little Prussian blue and French yellow, linseed oil and turps. — 2. White lead with a little Prussian blue and lampblack, linseed oil and turps.

FLEXIBLE.—Cut soap into slices, and to every ¾ lb. add 2 qts. boiling water; and while hot mix with 62 lbs. oil paint. Excellent for canvas.

GREEN.—1. Lime water, 6 gals.; whiting and road-dust, of each, 1 cwt.; blue black, 30 lbs.; yellow ochre, 28 lbs.; wet blue (previously ground in prepared residue oil), 20 lbs.; grind together. For use, thin with equal parts prepared residue oil and linseed oil. — 2. Yellow ochre and wet blue, of each, 1 cwt.; road-dust, 1½ cwt.; blue black, 10 lbs.; lime water, 6 gals.; prepared fish oil, 4 gals.; prepared residue and linseed oils, of each, 7½ gals. — 3. (*Pea.*) Take 1 lb. genuine mineral green, 1 lb. precipitate of copper, 1½ lbs. blue verditer, 3 lbs. white lead, 3 oz. sugar of lead, and 3 oz. burnt white vitriol; mix these in linseed oil; grind fine. It will produce a bright mineral pea green paint, preserve a blue tint and keep any length of time in any climate, by putting water over it. To use for house or ship painting, take 1 lb. of the green paint with some pale boiled oil; mix together;

this will produce a strong pea green paint. The tint may be altered by adding a proportionate quantity of white lead to the green, ground in linseed oil, and thinned with spirits turpentine for use. It may also be used for Venetian window blinds, by adding white lead and mixing the color with boiled oil. For all the aforesaid preparations it will retain a blue tint.

LEAD COLOR.—Whiting, 1 cwt.; blue black, 7 lbs.; white lead, ground in oil, 28 lbs.; road-dust, 56 lbs.; lime water, 5 gals.; prepared residue oil, 2½ gals.

METALLIC PAINT.—Break common resin into dust or small pieces, and then dissolve in benzoline or turpentine until the solution acquires the consistency of syrup; or equal parts of each of the above spirits or hydrocarbons, and any other hydrocarbon that will dry and combine with drying oils, can be used instead of benzoline or turpentine. When the solution is complete, it is gradually added to oxide of zinc, which has previously been made into a paste with boiled linseed oil, until the whole mixture acquires the consistency of paint suitable for use; a white paint is thus produced of a durable and glossy character. Other pigments, such as sulphate of barytes, oxide of iron, Brunswick green, or red lead, can be added to make any desired color of paint. One great advantage of its use, it is said, is its effectual resistance to heat and moisture. It never blisters or cracks even under the hottest sun or in the most inclement weather.

MILK. — For painting in rooms, where the smell of oil or turpentine would be objectionable, a preparation may be made as follows: Take 8 oz. freshly slaked lime and mix it in an earthen vessel with 3 qts. skimmed sweet milk; in another vessel mix 3¾ lbs. Paris white with 3 pts. milk; when these mixtures are well stirred up put them together, and add 6 oz. linseed oil; mix these well, and it will be ready for use. This preparation is equal to oil paint, and is excellent for walls and ceilings. Any shade may be made by the addition of dry pigments thoroughly mixed.

MIXING.—Before the colors which have been ground can be applied to the work they must be rendered fluid by linseed oil or spirits of turpentine, or certain proportions of both. When a tinted color is required to be mixed, a small quantity of the proper tint should be first mixed on the palette to serve as a guide to mix the whole. With the ground white lead there should first be mixed a portion of oil, and then the tinting color added as ascertained by the pattern on the palette. When these are mixed and matched to the proper tint, the remaining portion of the oil or turpentine is to be added; this is better than putting in all the oil at once; it should then be strained through fine canvas, and be of the consistence of cream. If too thick, the work will have a cloudy appearance; if too thin, it will run, or will require a greater number of coats to cover the ground, and to render the work solid. The straining ought not to be neglected when the appearance of the work is studied. The following table gives the proportions, by weight, used in mixing pigments:

100 parts	white lead.....	require	12 parts oil.
"	zinc white	"	14 "
"	green chrome.....	"	15 "
"	chrome yellow...	"	19 "
"	vermilion.....	"	25 "
"	light red	"	31 "
"	madder lake.....	"	62 "
"	yellow ochre.....	"	66 "
"	light ochre	"	72 "
"	camel's brown.....	"	75 "
"	brown manganese	"	87 "
"	terre verte	"	100 "
"	Parisian blue	"	106 "
"	burnt terre verte	"	112 "
"	Berlin blue.....	"	112 "
"	ivory black	"	112 "
"	cobalt.....	"	125 "
"	Florentine brown	"	150 "
"	burnt terre sienna	"	181 "
"	raw	"	140 "

OUTSIDE WORK, Durable Paint for.—1. Take some charcoal, and pulverize it fine, add sufficient litharge as a drier, and levigate with linseed oil; a good black paint is produced, to which, if yellow ochre is added, an excellent green will ensue, which is preferable to the bright green used by painters for garden work, and does not fade in the sun. — 2. For weather-worn weather-boarding, take ½ common whiting and ½ white lead; throw in small portions red lead and chrome yellow to overcome the blackness of the wood, or add umber for a drab color. Fresh paint is always best. Where persons wish to do their own painting, it is sometimes best to buy the paint dry. Take a board with a smooth surface, find a muller 3 in. in diameter at one end, and conveniently shaped to hold with both hands, and you can mix up the paint readily. Use flaxseed oil; a little turpentine will make the paint flow freely from the brush. Small portions of Venetian red and lampblack will do for a dark color.

PAINTS WITHOUT OIL. — Any color desired may be added to the following: 1. 1 oz. borax; 2 oz. shellac; 1 pt. water; boil a few minutes, and stir with a piece of wood. — 2. 1 oz. liquid ammonia; 2 oz. shellac; 1 pt. water; add more or less shellac, as may be required. — 3. Break an egg into a dish and beat slightly; use the white only, if for white paint; then stir in coloring matter to suit. Red lead makes a good red paint. To thin it, use skim milk. Eggs that are a little old will do. — 4. Slake stone lime with boiling water in a tub, to keep in the steam; then pass 6 qts. through a sieve; to this add 1 qt. coarse salt and 1 gal. water; boil the mixture and skim it clear. To every 5 gals. add 1 lb. alum and ½ lb. copperas, and by slow degrees ¾ lb. potash and 4 qts. sifted ashes or fine sand. — 5. (*Pink.*) Take Brazil wood, 1 lb.; boil 2 hours, having 1 gal. water at the end; strain it, and boil alum, 1 lb., in the water until dissolved; when cool, add muriate of tin, ¾ oz. Now take Paris white, 12½ lbs.; moisten up to a salvy consistence, and, when the first is cool, stir them together; let stand 24 hours. — 6. (*Reddish Brown.*) The wood is first washed with a solution of 1 lb. cupric sulphate in 1 gal. water, and then with ½ lb. potassium ferrocyanide, dis-

solved in 1 gal. water; the resulting brown cupric ferrocyanide withstands the weather, and is not attacked by insects. It may be covered, if desired, with a coat of linseed oil varnish.

PHOSPHORESCENT. — 1. Heat strontium theo-sulphate 15 minutes over a Bunsen lamp, and then 5 minutes over a blast lamp. — 2. Heat equal parts of strontium carbonate and lac sulphuris gently 5 minutes, then strongly 25 minutes over a Bunsen lamp; then over a blast lamp, 5 minutes. — 3. Precipitate strong aqueous solution of strontium chloride by means of sulphuric acid; dry the precipitate, and heat it to redness for some time in a current of hydrogen; then over a Bunsen lamp for 10 minutes, and 20 minutes over a blast lamp. Mix any of the above with pure melted paraffin for use as a paint, and expose for a time to sunlight. The 2 former yield a greenish phosphorescence in the dark, the latter a bluish light. — 4. Take oyster shells, and clean them with warm water; put them into the fire ½ hour, then take them out; when cold, pound fine and take away any gray parts; put the powder into a crucible, in alternate layers with flowers of sulphur; put on the lid, and cement with sand, made into a stiff paste with beer; when dry, put into the fire, and bake 1 hour; wait until cold before opening the lid. The product ought to be white. Separate all gray parts. Make a sifter in the following manner: Take a jam pot; put a piece of fine muslin loosely across it; tie round with string; put the powder into the top, and rake about with a bit of stick until only the coarse remains. Open the pot, and you will find a very fine powder. Mix into a thin paint with gum water. Two thin applications are better than one thick one.

REDDISH-BROWN.—1. (*Dark.*) For common purposes. Mix Venetian red in boiled oil, with a little red lead and litharge, to give a drying quality. — 2. (*Lighter.*) Mix equal parts Venetian red and red lead in boiled oil and turps.— 3. (*Imitation Vermilion.*) Grind together in oil red lead and rose pink. — 4. (*Deep Red.*) Mix in oil, vermilion, with a dust of Venetian red or red lead.

STEEL.—Mix ceruse, Prussian blue, fine lac and vermilion, with oil and turps.

STONE.—Lime water, 4 gals.; whiting, 1 cwt.; white lead, ground in oil, 28 lbs.; road-dust, 56 lbs.; prepared fish, linseed, and prepared residue oils, of each, 3 gals.

STRAW.—A mixture of chrome yellow, white lead, oil and turps.

WHITE. — 1. The white destined for varnish or oil, requires a metallic oxide, which gives a body to the color. Take ceruse; reduce to powder; grind it with oil of pinks, and ¾ oz. sulphate of zinc for each lb. oil. Apply the second coat without the sulphate of zinc, and let dry; cover the whole with a stratum of sandarac varnish. This color is durable and brilliant. Boiled linseed oil may be employed instead of oil of pinks, but the color will injure the purity of white.— 2. Pure white oxide of lead, ground with a little essence, added to oil of pinks, and mixed with gallipot varnish. The color may be mixed with essence diluted with oil, and without varnish, which is reserved for the two last coatings. If for a lively white, heighten with a little Prussian blue or indigo, or prepared black; the latter gives it a gray cast. Pure white lead is reserved for valuable articles. If a durable white is required, grind with a little essence, and mix it with sandarac varnish.

YELLOW. For Floors. — White lead and linseed oil, mixed with some French yellow and a little chrome yellow to brighten it, and some red lead, burnt white vitriol and litharge added, to give it a drying quality. Mix with equal parts boiled oil and turpentine, and use thin.

PAINTING.

CARRIAGE.

CARRIAGE painting should be conducted in a room where dust can be entirely excluded, and where ready means of ventilation are always at hand.

COATS.—For the priming coat use white lead mixed in prepared raw oil and ⅛ part turpentine, with a shade of lampblack if the carriage is to be a dark color. The less paint used in priming the better, taking care not to leave it thick upon the edges or mouldings, but going well over cracks, cheeks and screw heads, so that they have at least one coat over the surface which is to be puttied up. After the priming has been 4 days drying, and then sand papered, give another coat of the same paint used for priming with a little drier, and ¼ as much turpentine as oil. Be careful with the second coat, to lay it equally over every part, and, when dry, rub down with finer sand paper than the last, being careful to make the surface smooth. Now give the third coat (after dusting off), putting on the paint not too lavishly, but rub it out well. The next step, after the coat dries, is to rub it down with pumice stone, first rubbing the pumice flat upon a stone before using it. In rubbing down, use plenty of water, supplied from a sponge in the left hand. Be cautious to avoid cutting through, and feel the parts frequently to ascertain when smooth, then with a sponge wash off, and with wash leather dry it off clean.

COLORS.—*Blue* (*Ultramarine*). For ground color grind Prussian blue in oil, and add to white lead as much of the blue as will make it sufficiently dark to form a ground for the ultramarine blue; 2 coats will be required. When dry, grind some best ultramarine with varnish; add enough to body flowing varnish to impart the right color; 2 coats will be necessary; use sugar of lead as a drier. Before giving the second coat rub down with ground pumice and water, using a cloth; the next coat will flow better for this treatment. After a few days rub again; wash, and dry with chamois skin, when the work

will be ready for picking out and striping. — *Brown* (*Oxford*). A little chrome yellow, India red b st ochre, white lead, burnt umber, just white enough to be seen; yellow is the leading color; red to warm it, and umber to impart the brown shade. — *Carmine.* For fire engines. For a ground use the best vermilion, then add pure carmine, ground in a little drying oil. to the body flowing varnish, and apply 2 coats carefully. This extends the color, so that 1 oz. will suffice for a carriage or machine.—*Drab.* White and raw umber form a cool drab, which may be varied with chrome or red. — *Fawn.* Use yellow, red, a little black, a little terre de sienna or burnt umber may be added to obtain the right shade. — *Green* (*Chrome*). Grind greens in Japan, or use greens composed of chrome yellow and Prussian blue. In laying the finishing coat of any compound green on coach bodies, it is necessary that the color be worked full, and laid off smooth and light, by working the brush from top to bottom; otherwise compound green colors will appear shaded, and if highly varnished the shades will be conspicuous. Several greens, from the nature of their parts, will cause the varnish, however good and old, to ferment and fall into pin-holes. — *Lakes.* Vermilion and rose pink, in oil, for first coat. When dry, give another light coat, previously rubbing down with ground pumice and water. For a rich, light claret, be sparing of rose pink in the ground color; for dark claret, use more. For darker shades use more rose pink in the ground color, then use best crimson lake, same way as for light claret; 2 coats will do. For a purple shade of claret use vermilion, rose pink, and a spice of ultramarine blue for a ground color; then add proper quantity of ground purple lake to body flowing varnish, and apply 2 coats. — *Olive Shades.* Take deep chrome yellow and powdered drop black; mix in a pot with drying Japan and a little turpentine; grind together; be sure that the color is right; if wished lighter, add more chrome yellow; if darker, more drop black; grade the color to a proper thickness, and apply at once; 2 coats required. — *Plum.* Drop black and vermilion makes a good color at a cheap rate. — *Yellow.* When a coach is to be painted pale yellow, take 3 lbs. dry white lead, 1 lb. whiting, ½ lb. litharge, ½ lb. pale spruce oehre; all dried; grind with 3 parts raw oil and 1 part turpentine; add gold size, to make it dry, firm and hard; as soon as dry, sand paper and putty up the work with hard putty; then prepare a sufficient quantity of the above colors; apply 3 coats, rubbing down with care; after these apply a fourth, and, if necessary, a fifth coat, made of 3 lbs. dry white lead, ½ lb. dry spruce ochre, ½ lb. pumice stone, ground with 3 parts raw oil and 2 parts turpentine, adding a little pale gold size to dry it firm. When dry and rubbed down, apply the finishing coat, pale patent yellow, ground in 4 parts prepared oil and 1 part turpentine. 1 coat looks more clear and bright than 2. The above being a mineral metallic color, is compact and durable, and will dry harder as well as support varnishing and polishing better than other colors.

HEARSE BODY, To Paint White. —To paint white, oil should be discarded after priming, and in the priming it is not advisable to use all oil in the lead; ½ oil and ½ turpentine, with a small quantity of driers, is preferable. Litharge is safest for under coats. After the body is primed, allow it to stand the usual time, and second coat with the same color. When dry, putty with white lead putty, made with rubbing varnish; glaze or sheet all over as smooth as possible, and if necessary putty all screw holes and other bad places the second time. To make filling for white work, mix same as ordinarily, using all dry lead; apply this rather stouter than English or other powdered material. Rub carefully with pumice, which will give you a white ground; when rubbing, keep pumice stone clean, to avoid scratches; also, wash clean, particularly in corners. The job is now ready for color. Mix the color from best grade of white, hard drying body varnish into a thick paste and reduce with turpentine. Half elastic brushes are best, as the color would be apt to curl under camel's hair blenders. Apply 2 coats, and add more drying varnish to whatever color is left. Let this stand until dry; then rub down with pumice, and apply second coat with more hard drying added. Each coat of rubbing should have some of the white added. Place 4 coats on, and on the last coat, instead of using fine finishing varnish, use same as under coats and polish on it. Polishing a body is tedious, and a large number of painters know little about it. When the last rubbing coat is on, let it stand for 2 weeks, and rub with fine pumice, being careful not to rub through; wash clean, and chamois dry. Next rub with rotten stone and sweet oil, with a piece of clean chamois, leaning very heavy, but be careful not to heat the varnish; should the varnish become warm under the rag, stop until cooled. When the rubbing is finished, sprinkle flour over, and it will remove any oil or moisture; the flour can be taken off by using a camel's hair duster. After dusting, take a silk handkerchief and rub lightly. If properly cared for, this body will outwear some of the best oil-coated jobs, with no risk of it turning yellow; and it seldom cracks, unless sufficient time is not allowed between the coats.

IRON WORK. — The iron work of a carriage should have 2 coats of oil lead color; sand paper well; give 1 coat more; after which give 1 coat best oil black, 2 coats black Japan, a slight rubbing, and a flowing coat of varnish.

PICKING OUT, or STRIPING.—Care is required to carry a steady hand, so that the lines may be drawn equidistant and neat. For fine lines grind the color in drying oil. Japan color will do for broad or coarse lines on a blue ground. If with heavy wheels, draw lines with Frankfort black, Japan mixed color, from ¾ in. to 1 in. broad, on all parts of wheels, springs, spokes, hubs, etc.; then draw fine lines of light orange or light primrose color about ⅜ or ¼ in. from the broad black line, with 1 fine line around the edges of the black nuts and bolt heads. On superior work, pure white, gold or deep orange lines may be drawn down the middle of the black lines, producing a fine effect. On greens pick out with black; if a light green,

black lines will be sufficient; if desired better, run up the centre of the black lines with white; on dark green pick out with black, running fine lines on each side of the black ⅜ in. off the black; this also sets off a bright green to advantage. On clarets pick out with black, with vermilion, or rich orange fine side lines, or light orange side lines with vermilion line run up the centre of the black; or light gold line up the centre of 1 large black line. On Oxford brown pick out with black, and fine line with vermilion or medium tint of chrome yellow with a slight tint of red in it; or part the black line with white down the centre. On fawn colors pick out with broad black, fine line with white on each edge, or brown drab shade. On Japan or plum browns, vermilion line has the best appearance. On olives or Quaker greens pick out with black, with white for fine lines, or orange or light green. On drabs pick out with black, fine line with vermilion or high colored orange, or white centre line for extra finish. On purple pick out with black, and fine line with a bright tint of orange or vermilion.

POLISHING AND VARNISHING.—Good coach bodies are seldom polished with less than 5 or 6 coats of varnish. Decorations, heraldic devices, and so on, should have 2 coats of varnish. Work to be finished with 1 coat of varnish ought to be laid on full and flowing; but if 2 coats are intended, the first coat should be laid on sparingly; the second applied the third day after; and, where a third is applied, the second coat ought previously to be rubbed down to nearly a dead flat with ground pumice dust and water. If it is to be afterwards polished, let it stand 14 days; then take fine pumice dust, sifted through fine silk or muslin; wet the work with a brush and clean water; have ready some pieces white woolen cloth folded; dip a piece into water and then in the pumice dust; rub down the work from top to bottom, bearing steadily, but lightly, rubbing all alike, because on that depends the beauty of the polishing; wash off with a sponge and water during the polishing, until, with the palm of the hand rubbed 2 or 3 times in the same place, the work shows polish; then, with a bit of flannel dipped in refined linseed oil, rub the work over, and afterwards clean it off with a piece of fine leather dipped in fine dried flour. When cleared of oil, a piece of flannel, dipped in dry flour and rubbed over it, will give it lustre. Varnishing must be conducted in a warm atmosphere of equable temperature; it is a good plan to have a stove in the room. Coach painters are aware that some copal varnishes answer very well upon one coach body, but when applied upon another sink in dead, fall into pinholes, and are at a loss how to account for such failures. When any piece of work is painted with a hard, heavy, compact, metallic or mineral color, such as white lead, patent yellow, etc., the grounds appear firm, close and solid; and almost any copal varnish will look well, stand polishing well and sooner than on other grounds; it will last, however, but a short time, for if the varnish is deficient in gumminess, the metallic color will imbibe the virtue of the varnish and cause it to decay. The same varnish applied upon green grounds will sink in sleepy or dead, not having a sufficient oily and gumimy body. For hard, compact, solid grounds a strong, gummy, tough, but flowing varnish should be used; and for soft, absorbent grounds, such as compound greens, lakes, browns, drabs, a soft, strong, oily, free flowing varnish. Copal varnishes, abounding with oil and gum, are fittest for coach work, as they possess toughness and durability; yet they are slower in drying, and must stand some time before polishing; brittle varnishes dry firm and hard, bear polishing soon, but afterwards crack and fade. Coach painters ought to use the best polishing body copal for bodies, and even for carriage work, where the colors are pale and delicate, or at least lay the last coat with body varnish. Where the work is dark, there is no occasion to fear using a middling dark carriage varnish. Amber varnish is used for varnishing black grounds, or black Japan; it is easy to lay on.

REPAINTING.—Previous to repainting or re-varnishing old coach work, first wash the work clean; rub down the surface with a wet cloth and ground pumice powder, until it appears quite dead, or without gloss. The work should then be washed and dried with wash leather, after which it is fit to receive paint or varnish. Should the surface be clear from grease, no paint or varnish will adhere on the old surface without its having been first rubbed down with pumice powder and water. Paint or varnish will then adhere to the old ground, and can be worked and extended with the brush, without the color "cissing," as it is termed. Varnish is apt to ciss on old work, if the second coat is not applied as soon as ever the first coat is hard enough to bear varnishing.

House.

REMARKS. — The best time for painting the exterior of buildings, is late in autumn, or during winter. Paint then employed, will endure twice as long, as it dries slowly, becomes hard, and is not easily affected by weather or beating storms. Before commencing, the surface must be perfectly dry. Use paints containing oil and turpentine. The gloss will be less as the proportion of oil is lessened. Paints require more driers in cold than in hot weather. Successive coats should have a day intervene between them. Dark colors should have a glossy finish. The paint must be well mixed, both before and during the work; if neglected, the ingredients settle, leaving oil and turpentine on the surface. Before painting inside, clean the work, removing all projections or spots with the stopping knife and duster; then cover over the knots with red lead knotting. If the knots are very bad they must be cut out. After knotting comes priming or first coat. This should preferably be of some soft pigment, yellow ochre being most highly valued. The priming establishes a good foundation for subsequent coats, and its color is immaterial, except for white, for which all coats should be white. When the priming is dry, all nail-holes and defects are to be puttied; then

proceed to the next coat; when dry, those places are to be stopped which were omitted in the last coat; and proceed according to the number of coats to be given. The second color for new work is made up chiefly with oil, as it best stops the suction of the wood; but second color for old work is made up chiefly with turpentine, because oil color would not dry or adhere so well. The color should be spread evenly; and, to effect this, as soon as a convenient quantity is covered, the brush should be passed over it in a direction contrary to that in which it is finally to be laid off; this is called crossing. After crossing, lay off carefully in a direction contrary to the crossing, but with the grain of the wood, taking care that none of the cross marks be left visible. The criterion of good work is that the paint be laid on evenly, and the brush marks be not observed. In laying off, the brush should be laid into work already done, that joining may not be perceived. Every coat should be allowed to dry, and all dust removed. Priming for new work is made of white lead, with driers, and a little red lead to harden. It is thinned well with oil, as new wood and plaster suck it in fast. It is a practice to save the oil coats by giving the new work a coat of size, called clear cole; but where durability is consulted this should not be done. The size stops the suction of wood or plaster, but prevents the oil paint from adhering, causing it to peel off. Clear cole is sometimes used on old greasy work on which oil paint would not dry.

HOUSE, Old, Paint for.—Take 3 gals. water and 1 pt. flaxseed; boil ½ hour; take it off, and add water to make 4 gals.; let it settle; pour off the water into a pail, and put in enough Spanish white to make it as thick as whitewash; then add ½ pt. linsced oil; stir well, and apply with a brush. If the whiting does not mix readily, add more water. Flaxseed, having the nature of oil, is better than glue, and will not wash off as readily.

KNOTS, To Kill.—1. Take a hot iron and press it against the knot, by which means the pitch may be extracted; after which use glue size and red lead. — 2. Gum shellac, mixed with red lead, or gutta-percha dissolved in ether. But, if the work is a fine one, after removing the iron, scrape the pitch off with a knife, after which size the knot with oil size, and then lay on it a leaf of gold or silver, and give it 2 coats.

LAPS.—Laps are the joining of 2 applications, or the edges of the stretch coming together and forming 2 coats wherever the lap is made. This should be avoided, because it presents disfigurement, and will remain a long time. It is best to prime but a few boards, or a narrow space across the building at a time, or, if working on ladders, and it is not easy to move often, the lap may be avoided by rubbing out properly at the edges.

PAINT, Old, To Remove. — 1. Moisten the paint well with naphtha, repenting as often as necessary. As soon as the paint becomes soft, remove by means of a rag, aided by a scratch knife and stiff brush, moistened with naphtha. — 2. Slake 3 lbs. stone quicklime in water, and add 1 lb. pearlash, making the whole the consistence of paint. Lay over the old work with a brush, and let it remain 12 to 14 hours, when the paint can be easily scraped off. — 3. Dissolve 1 lb. potash in 3 pts. water over the fire; then add yellow ochre or some common dry paint, until it is as thick as rough stuff; spread this over the old paint, and after a little it will come off easily; then wash the wood with soap and water to remove all the potash; dry off and sand paper; then give a coat of clean, raw oil. — 4. Use the special gasoline lamp to soften the old coats, which are then easily scraped off. So much heat must not be applied as will burn the wood.

PLASTER, To Paint. — If there should be cracks in the plastering, and the wash be sound around the cracks, plaster Paris is best to fill them with, as it hardens quickly, and leaves the surface level. If the plaster Paris sets before it can be worked, wet with vinegar. If cracks be filled with putty, and the walls be painted in gloss color, the streaks of putty are apt to be flat (no gloss), and if painted in flat color, the streaks will have a gloss. These streaks spoil the beauty of the work, but do not affect its durability. When filled with plaster Paris the reversion of gloss never appears. If the cracks be only in the wash, it is loosening, and will soon scale, and all attempts to fasten it will be total loss. If it be loose enough, scrape the wall, taking care not to injure the original wall. If not loose enough, let it alone until it is. If the wash be thin, solid and even, it can be painted to look and wear well. When the surface is lumpy, rub off with sandstone. After a wall has been prepared, as in either of the above cases, size with 2 coats glue size (3 oz. glue to 1 gal. water). Be sure the glue is dissolved before using. Let the first coat dry before the second is put on. 5 coats will be requisite to paint plaster well; but where it is not of a very absorbent nature 4 will answer. The first is white lead, diluted with linseed oil to a thin consistency, so that the plaster may be saturated; and into this is put a small quantity of litharge to insure drying. In painting quick plaster, the oil in this coat is absorbed, hardening it to the extent of about ½ in. inwards. When this is the case, the second coat should be thin, that the plaster may be saturated; after this give 3 coats. The second coat will be found to be partially absorbed, and it is therefore requisite to make the third coat thicker, adding a little spirits turpentine, and such coloring pigments as may bring it near to the tint of which the apartment is to be when finished. The fourth coat should be as thick as can be used, and diluted with equal parts oil and spirits turpentine. The color ought to be several shades darker than that intended for finishing, and the dry ingredient sugar of lead instead of litharge. These coats ought to be laid on with care, and each lightly rubbed with sand paper before the application of the other. The finishing coat is next applied. It ought to be of pure white lead, ground as already described, and diluted entirely with spirits turpentine, and should appear, when mixed, a few shades lighter than the pattern chosen for the wall, as it darkens in drying. The drying ingredient

should be a small portion of japanner's gold size. This coat must be applied with care and dispatch, as the spirits of turpentine evaporate rapidly, and, if touched with the brush after that takes place, which is in little more than 1 minute, an indelible glossy mark will be left. The time that each of the coats will take to dry sufficiently to receive the next, depends upon the weather, the quantity of driers used, and the atmosphere in the apartment. The first coat ought to stand a few days before applying the second; the second a little longer; and the third (unless in 4 coat work) should have still longer time. But the coat immediately before the finishing coat ought not to stand above 2 days, as the beauty of the work will depend on the latter dying into and uniting with the former.

ROOFS. — 1. There is no better paint for tin roofs than common Spanish brown, Venetian red, and yellow ochre, mixed with equal parts pure raw linseed oil and good fish oil. — 2. 10 lbs. red oxide iron ; ½ gal. raw linseed oil ; ¼ pt. Japan. This is the best known reliable red roof paint for tin and iron. For shingle roofs the color can be shaded down by a little black or other suitable pigment.

OTHER OBJECTS.

BANNERS. — Lay out the letters accurately with a crayon, then saturate the cloth with water to render the painting easy. On large work a stencil may be found useful. Take a piece of tin, lay the straight edge to the mark, brush over with a sash tool, and by this means a very clean edged letter will be made. Use stiff bristle pencils in painting on canvas.

BLACKBOARDS.—1. Place ½ lb. lampblack on a flat piece of tin or iron on a fire until it becomes red; take it off, and leave it until cool, when it must be crushed with the blade of a knife on a flat board quite fine; then take ½ pt. spirits turpentine; mix both together, and apply with a size brush. If the board is new, give it 1 or 2 coats lampblack (not burnt, but mixed with boiled oil), adding ½ lb. patent driers. After the board is dry, apply the burnt lampblack and turpentine. The preparation must be laid on quickly. — 2. Take ½ lb. logwood and sufficient boiling water to cover it; allow it to stand 24 hours; strain, and apply the solution boiling, if possible twice, allowing the board to dry in the interval; then dissolve ½ lb. copperas in 1 pt. boiling water, and apply it boiling, once or twice, according to the degree of blackness obtained. Before using it, rub it over well with rushes, straw, ferns, or shoemakers' heel ball. It may be a little difficult to rub the chalk off at first, but after a fortnight's use that will disappear. Use prepared chalk, which writes well.

GLASS.—Take some good, clear rosin; melt it in an iron pot; when melted let it cool, and before it begins to harden pour in oil of turpentine sufficient to keep it liquid when cold. In order to paint with it, use with colors ground with oil.

GLASS, Ground, To Imitate. — 1. Grind and mix white lead in ¾ boiled oil and ¼ spirits turpentine, and to give the mixture a drying quality, add sufficient burnt white vitriol and sugar of lead. The color must be thin, and put on the glass with a large size paint brush evenly. When a number of panes are painted, take a dry duster, quite new, and dab the ends of the bristles on the glass in quick succession, till it has a uniform appearance. Repeat till the work appears soft, and it will look like ground glass. When the glass requires fresh painting, get the old coat off first by using strong pearlash water. — 2. Spirits of salts, 2 oz.; oil of vitriol, 2 oz.; sulphate of copper, 1 oz.; gum Arabic, 1 oz.; mix all well, and dab on the glass with a brush. — 3. Dab the squares regularly over with putty; when dry, go over them again; the imitation will be complete. — 4. After applying a coat of white paint to the surface, take a bunch of cotton; wrap it in a piece of muslin cloth, and with this dab the paint evenly.

IRON.—1. Take sufficient quantity common litharge, and place it over a fire in a shovel; when warm, scatter over it a little flour of brimstone, which will convert it into a blackish color, and which, when ground in oil, makes a good dark lead color. It dries quickly, gets hard, and resists the weather better than any lead color. — 2. Good varnish, ½ gal.; boiled linseed oil, ½ gal.; add red lead sufficient to bring it to the consistency of paint. Apply with a brush. Applicable to any kind of iron exposed to weather.

METALS IN SALT WATER. — Red lead, 55 parts; quicksilver, 30 parts; thick turpentine, 7 parts; mix with boiled linseed oil to a proper consistency. The quicksilver must be thoroughly amalgamated with the turpentine by grinding, and this mixture must be ground with red lead and more boiled oil. As little oil as is necessary to make the paint lay well must be used. To make the paint adhere more firmly, a previous coat of oxide of iron paint may be used.

TOOLS.—White lead, ground in oil, mingled with Prussian blue, similarly prepared to give the proper shade, and finally mixed with a little carriage varnish, is an excellent and durable paint for farm machinery and tools.

WATERPROOFING, Hot, for Metals.—Prepare the metal by cleaning it with turpentine or benzine; then apply 2 thin coats of a mixture of white lead, spirits of turpentine and carriage varnish, and follow at once with a thick coat of carriage varnish and white lead.

WINDOW SHADES, Transparent Painting on. —The muslin is spread on a frame and secured with tacks; then sized with a mixture of fine flour paste, white glue and white bar soap; the soap renders the muslin pliable. A thin coat is applied, which is nearly invisible when dry. A coat of pure linseed oil, diluted with spirits turpentine, is then applied to the whole or part; lay it on quickly and smoothly to insure a transparent surface. The colors used are ivory black, ultramarine, Paris green, sienna, umber, verdigris, asphaltum, etc. The design is drawn with a small pencil with black or umber, after which the colors may be applied, more or less diluted, as more or less transparency is desired. In general, the brightest colors should be applied first, and the darker shades over them. The colors must be laid evenly, with soft brushes, and if any

part be made too dark, scrape off with a stick before the color gets too dry. The best designs consist of landscape views. Stencils will be useful in this work, in making corners of stripes for borders.

WIRE WORK. — Boil good linseed oil with as much litharge as will make it of the consistency to be laid on with a brush; add lampblack at the rate of 1 part to every 10 by weight of the litharge; boil 3 hours over a gentle fire. The first coat should be thinner than the following coats.

Putty.

GLAZIER'S.—Glaziers' putty is made of whiting and oil. The whiting should be in the form of a very dry fine powder; it should be specially dried for the purpose, and passed through a sieve of 45 holes to the in., and then be mixed with as much raw linseed oil as will form it into stiff paste; this, after being well kneaded, should be left for 12 hours, and worked up in small pieces till quite smooth. It should be kept in a glazed pan and covered with a wet cloth. If putty should become hard and dry, it can be restored by heating it and then working it up again while hot.

INDESTRUCTIBLE, or FRENCH.—Boil 4 lbs. brown umber in 7 lbs. linseed oil for 2 hours; stir in 2 oz. of wax; take from the fire and mix in 5½ lbs. chalk and 11 lbs. white lead, incorporate thoroughly. The latter operation is essential.

POLISHER'S.—1. A crude peroxide of tin, obtained by exposing metallic tin in a reverberatory furnace, and raking off the dross as it forms; this is afterwards calcined until it becomes whitish, and is then reduced to powder.— 2. Another method is to melt tin with rather more than an equal weight of lead, and then to rapidly raise the heat so as to render the mixed metal red hot, when the tin will be immediately flung out in the state of putty or peroxide. The products of both the above processes are very hard, and are used for polishing glass and Japan work, and to color opaque white enamel. — 3. For use on carriages, mix dry white lead with Japan and rubbing varnish, equal parts, to the proper consistency, beating it with a small mallet to bruise the lumps. Keep it, when not in use, in water, to prevent it drying.

REMOVING. — 1. Take 1 lb. American pearlash and 3 lbs. quicklime. After slaking the lime in water add the pearlash, and let the mixture be made of a consistence about the same as that of paint. When required for use apply it to both sides of the glass, and let it remain in contact with the putty for 12 hours; after which the putty will have become so softened that the glass may be removed from the frame without any difficulty. — 2. Run a red hot iron over it, and it will peel off easily. — 3. To remove old putty from broken windows, dip a small brush in nitric or muriatic acid, and with it anoint or paint over the dry putty that adheres to the broken glass and frames of your windows; after an hour's interval the putty will become so soft that it can be removed without any difficulty.

WOOD-WORKER'S.—1. Glue, 14 lbs.; resin, 7 lbs.; linseed oil, 2½ pts.; water, 5 pts. (more or less); whiting, q. s.; ½ lb. pitch is sometimes added; melt the resin; add the oil (hot); soften the glue in cold water; then dissolve it in hot water; add the glue to the oil and resin; beat together; add enough warm whiting to make a stiff dough. Oil the mold with sweet oil, and mold by pressure. The dough will not keep; it soon hardens, so that it should be prepared only as required. — 2. Put any quantity of fine sawdust of the same kind of wood into an earthen pan, and pour on it boiling water; stir it well, and let it remain for a week or 10 days, occasionally stirring it; then boil it for some time, and it will be of the consistence of pulp or paste; put it into a coarse cloth, and squeeze all the moisture from it. Keep for use, and, when wanted, mix a sufficient quantity of thin glue to make it into a paste; rub it well into the cracks, or fill up the holes in the work with it. When quite hard and dry, clean the work off, and, if carefully done, you will scarcely discern the imperfection. —3. Slaked lime, 1 part; rye meal, 2 parts; made into a paste with a sufficient quantity of linseed oil. — 4. Glue, 1 part, dissolved in water, 16 parts; when almost cold, sawdust and prepared chalk may be stirred in to the required consistence. — 5. Oil varnish thickened with a mixture of equal parts white lead, red lead, litharge and chalk.

Signs.

REMARKS.—Introduce into the sign a curved line or two, or section of a circle; it is pleasing, and relieves the stiffness of straight lines. The space between each letter in the same line must be equal. Each line of letters must begin and end at an equal distance from the side of the board. Never begin or end a line of letters with such words as *and, to, for, with,* etc., but let them come in between the lines of large letters. Always make important words, such as the name, business, etc., the largest, most distinct, and easily read. Never make any 2 main lines, that are near to each other in the sign, of the same length.

CHANGEABLE. — Make a wooden sign in the usual manner, having a projecting molding around it. Now cut thin grooves into the molding 1 in. apart, allowing each cut to reach the surface of the sign. In each of those grooves insert strips of tin 1 in. wide, and long enough to reach quite across the sign board. When all are fitted, take out the tin strips, and placing them edge to edge on a level table, paint any desired words on their united surface; when dry, reverse them and paint other words on the opposite side. Now finish your lettering as usual on the wooden sign board, and when dry, insert the painted tin strips in correct order in the grooves. This will present 3 signs in one, as viewed from different positions.

COLORS FOR GROUND AND LETTERS.—Mix the colors for writing in boiled oil, and use for a drier gold size. 1. On an oak ground, ornamental letters, in ultamarine blue, filled in with

gold and silver leaf, blocked up and shaded with burnt sienna. — 2. Gold letters on a white marble ground, blocked up and shaded with a transparent brown and burnt sienna. — 3. On glass, gold letters, shaded with burnt sienna. — 4. On glass, gold letters, shaded black, on scarlet or chocolate ground. — 5. On rich, blue ground, gold letters, double shaded, black and white.— 6. White letters on a blue ground, shaded with black, look very well.—7. On a purple ground, pink letters shaded with white. —8. Mix ultramarine and vermilion for a ground color; letters, white shaded with a light gray. — 9. Vermilion ground, chrome yellow, stained with vermilion and lake, for the letters, shaded black.

GILDING ON GLASS. — The gold used is the ordinary gold leaf. Procure some fine isinglass, and place about as much in a tea-cup as will cover a dime piece, and then pour on it about ½ a cupful of boiling water; before the water is cold add about as much spirits of wine as there is water in the cup; then strain through a clean silk handkerchief, and the mordant is ready for use. The design must first be set out on a sheet of white paper, and painted with Brunswick black, so that it can be seen on the reverse side. This paper, with the writing reversed, should be fixed at the edges or corners to the glass, the writing appearing backwards. The glass having been thoroughly cleansed and rubbed with a silk handkerchief, the gilding may be commenced, the gold leaf being laid on the reverse side to that to which the paper is attached. The mordant is put on with a large soft camel's hair pencil, and the gold leaf is lifted from the cushion and placed on the mordant with a tip, after having been cut to the required dimensions. If the line of writing is less than 3 in. in height, it is advisable to gild the whole line, without paying any regard to the shapes of the letters, so that when the line is finished it will be a solid piece of gilding about the same height and length as the letters. The first piece of gold leaf should be placed at the beginning of the line, which is the top of the glass, and each succeeding piece below it, the different pieces just overlapping each other. If the pieces of gold do not meet, the interstices will probably show when the work is completed, and will prevent the uniformity of burnish. For letters larger than 3 in. in height, the gilding may be made to cover each letter, leaving the spaces between untouched. As soon as this part of the gilding has been completed it should be left to dry in a warm room, or placed before the fire, in which case it will be dry in a few minutes. When the gilding is perfectly dry and bright, it should be rubbed over gently with a piece of cotton wool. After the gilding has been treated as described, a flat soft camel's-hair brush charged with the isinglass size should be passed lightly over the work. To complete the burnish of the gold hot water is poured over the gilding, and this washes out any little specks which may appear on the front of the gold, enhancing its brilliancy considerably. The hotter the water poured over the work, the brighter the gilding becomes, but care must be taken. A second layer of gold leaf over the first is necessary to insure a satisfactory result. The second coat of gold is put on with the isinglass sized as the first; and as it dries, the gilding viewed from the front of the glass will present a rich and finished appearance; the loose pieces of gold should be removed as after the first coat, by means of cotton wool gently rubbed over the work; another coat of size made hot may now be applied, and the gilding is ready to be written upon. Leave the gilding on for a day or two before writing upon it, because the isinglass does not get thoroughly hard, though to all appearance it is perfectly dry in an hour or two. There are several ways of transferring the outline of the writing to the gold. The most expeditious method is to rub some dry whiting over the front side of the writing, on the paper, place this over the gilding, face downwards, then go over the outline of the letters with a pointed stick or hard pencil. On removing the paper, it will be found that where the letters have been traced, the whiting has marked the gold. Having an outline of the writing or design, paint the letters with a sable writing pencil, and the ordinary Japan black used by coach painters. If on turning the glass round it should be seen that the Japan black deadens the gilding, or is perceptible in any way on the front of the glass, another coat of size should be passed over the gold to prevent the black from coming through the gold leaf. When the Japan black is hard, the superfluous gold must be washed off with a sponge and warm water. When the Japan is dry, the edges of the letters may be cut sharp and true by passing a small chisel along a straight edge, so as to trim the writing and make the tops and bottoms perfectly regular. All the straight lines of the letters may be thus trimmed, but the curved ones must be perfected with a writing pencil. The softened colored thicknesses added to the letters are painted with the ordinary oil colors thinned with boiled oil and turpentine, the latter being used sparingly. Three or more tints are generally mixed on the palette, with a separate pencil to each, and these are softened with a larger sable pencil, and the outer edges are cut up with a pointed stick guided by a straight edge, while the color is wet, and the superfluous color is wiped off with a piece of rag. By this means a sharpness of outline is obtained which the most skilful writer would fail to get by the mere use of the pencil. The shadow is put on as soon as the thickness is dry, and not being softened down, quick drying colors may be employed. (See *Signs, To Gild*, in BRONZING AND GILDING.)

ORNAMENTAL DESIGNS ON GLASS. — In making scrolls, eagles, etc., on glass, some painters put on the outlines and shades first, and then the gold leaf over all; another good way is to scratch the shades on the gold leaf after it is dry, and put the colors on the back of the gold. Silver leaf may be used in the same manner as gold, but it will not wear as well. A very pretty letter may be made by incorporating silver with gold; take paper and cut any fancy design to fit the parts of the letter; stick it on the size before laying the leaf, allowing it to dry and wash off as before; then with a penknife raise

the paper figure, and the exact shape of the figure will be found cut out of the gold letter; clean off; apply more size and lay silver leaf to cover the vacant spots; wash off when dry.

SMALTS, To Use.—For a gold lettered sign, lay out on a lead color or white surface the line of letters, and roughly size the shape of each letter with fat oil size. This must be allowed 12 hours to get tacky and ready for gilding. After the gold leaf is laid and perfectly dry, mix up (for blue smalts) Prussian blue and keg lead with oil, adding a little drier. Outline carefully around the letters, and fill up all the outside with blue paint; then with a small sieve sift on the smalts, allowing the sign to lay horizontally. Cover every part with plenty of smalts, and allow it to remain unmolested until the paint is dry. Then shake off all the surplus smalts and the work is done.

TINSELED LETTERS ON GLASS. — Paint ground work, on the glass, any desired color, but be careful to leave the lettering or design naked; after it is dry, take any of the fancy colored copper or tin foils, crumple them in the hand and apply over the black lettering, etc., after partially straightening them out.

PAPER-HANGING.

COLORS.—Paper having a variety of colors should be rejected. Have regard to the uses of each apartment. The drawing-room should be light and cheerful; the parlor warm and comfortable; and the bed-rooms cool and quiet, with neat patterns. The creamy, olive and fulvous tints, are suitable for the latter. Brilliant green, containing arsenic, and some kinds of glossy white, oxide of lead, should be avoided, as they have a pernicious influence on health. It is well, in selecting papers, to take into consideration what adornments in the shape of pictures, etc., are to be disposed on the walls; gilt frames show best on a dark ground, and dark frames, such as black walnut, etc., on a light ground. Pale tints will be found best. Rooms hung with scarlet are dismal and oppressive; they require also to be illuminated at an earlier hour in the evening than lighter colors.

DADOS, FRIEZES, ETC. — A dado, or frieze, tends to shorten the height of a room, and should not be used when the ceiling is low. In spacious rooms, with high ceilings, they may sometimes be used with elegant effect. A narrow molding of wood can be fixed along the upper edge of the dado, 3 or 4 ft. from the floor, and stained, painted or gilded; or a border of some decided pattern looks well, especially in gold on a dark ground. The dado should be of a plain color, without decoration, and darker than the space above it. The frieze may be ornamented with patterns, arabesques, or figures. In some of the higher priced, the ground of the frieze is of gold, and figures employed in various avocations are placed upon it. Below the frieze, and separating it from the general surface of the wall, it is not unusual to have a narrow band, bearing mottoes or maxims.

DESIGNS. — Large, showy figures are not in good taste; no furniture will show to advantage with such patterns, and the size of the room is diminished thereby. Nothing should be chosen that appears extravagant or unnatural; choose simple designs, never such as are capable of distortion into unpleasant things. Diaper patterns are to be recommended. The division of the diaper should not be too large, especially for bedrooms. Strong figures have the effect of killing pictures or any ornament placed on the wall. In proportion to the absence of pictures, walls require a strong and elaborated treatment. Where large figures are adopted, they should be interlaced, and the colors blended so as to soften the design.

LINING.—Lining paper is to be recommended as a ground for delicate paper hangings; it adds a soft effect, an evenness, to a wall, and absorbs paste quicker. It is to be had in large rolls. Hang without lapping.

MEASURING PAPER. — English papers are printed in pieces of 12 yds. in length, and 1 ft. 8 in. wide; hence 1 yd. in length contains 5 ft. superficial; therefore, any number of superficial ft. divided by 60 (the length 36 ft. $\times$ 1 ft., 8 in.) will give the number of pieces wanted. American papers are 8 yds. long, and 1 ft., 6 in. wide; therefore, if the number of ft. contained in a room be divided by 4.6, it will show the number of yds., or by 36, it will show the number of pieces of paper required. French papers are 1 ft., 6 in. wide, and contain 9 yds.; therefore, if the number of ft. required to be covered be known, divide by 4.6 for the number of yds., and by 41.6 for the number of pieces.

PAPER, Old, To Remove.—Take a whitewash brush and a pail of water; wash the wall all over, and the paper can be torn off in sheets. Care must be taken not to break the surface of the ground, lest there be a ridge that will show badly if the new paper has a light ground; if it is dark and the pattern is in arabesque, it will not show.

PASTING.—Lay the breadths carefully on the table, and bring the first piece just to the edge; have the paste pail and brush at the right hand, and take a brush full of paste, and begin from left to right; double over the paper and pass to the left and finish, and double the balance; fold the longest part to commence with at the right top, to have the breadth plumb and match the pattern. With borders it is well to paste double and cut after pasting.

REPAPERING. — When repapering, the old paper should be torn or scraped from the walls, as it has absorbed exhalations and gathered smoke and dust till it is very foul. If the paper around the bottom of a room has become soiled, it can be fixed so as to look nicely, as well as form a fashionable dado, by getting a striped paper which harmonizes; if of a panel design, all the prettier. Cut it out in points around the top of the panels, and fit it as high as the back of an ordinary chair. When buying wall paper, get an extra roll to repair damages at any time.

POLISHING.

CARVINGS.—Dissolve 2 oz. seed-lac and 2 oz. white resin, in 1 pt. spirits wine. This varnish must be laid on warm, and if the work is warmed also, so much the better; moisture and dampness must be avoided. The carved parts of cabinet work are polished thus: Varnish with common wood varnish, and having dressed them off where necessary with emery paper, apply the polish used for the other parts of the work.

CLOCK CASES. — Copal varnish, 2 lbs.; linseed oil varnish, ½ oz.; mix well, shake often, and place in a warm spot. The wood is prepared with a thin coat of glue water, and rubbed with fine pumice stone. In light colored wood, a light pigment, such as chalk, is added to the glue water; in dark wood, a dark pigment. The articles are varnished with the mixture, and, after drying, rubbed with a solution of wax in ether, thereby receiving a high polish.

COPAL. — Melt with gentle heat finely-powdered gum copal, 4 parts; gum camphor, 1 part; with ether to form a semi-fluid mass, and then digest with a sufficient quantity of alcohol.

DINING-TABLE.—1 pt. linseed oil; 2 oz. black resin; 2 oz. spirits nitre; 4 oz. distilled vinegar; 1 oz. spirits salts; and 2 oz. butter of antimony. The tables are to be washed on alternate days; first day with boiling water; second day with the polishing liquid; third day with cold vinegar. The tables assume a lustrous appearance; hot dishes placed upon them without a mat will have no effect upon them, and any liquid spilt, will, if wiped dry, leave no mark.

FRENCH POLISH. — Shellac, 3 parts; gum mastic, 1 part; gum sandarac, 1 part; spirits wine, 40 parts; the mastic and sandarac must first be dissolved in spirits wine, and then the shellac; to do this put them into a bottle loosely corked, and place it in a vessel of water, heated to a little below 173° Fahr., until solution is effected; the clear solution may be poured off into another bottle for use.

HORN AND TORTOISE-SHELL.—A very perfect surface is given by scraping; the scraper may be made of a razor blade, the edge of which should be rubbed upon an oil-stone, holding the blade nearly upright, so as to form an edge like a currier's knife, and which may be sharpened by burnishing. When scraped, polish. To effect this, first rub with a buff, made of woolen cloth, perfectly free from grease; the cloth may be fixed upon a stick, to use by hand.

ITALIAN.—To produce the Italian polish, first saturate the surface well with olive oil, and then apply a solution of gum Arabic dissolved in spirits wine; the length of time for saturation will depend upon the state and kind of wood; so with the proportions of gum and spirits wine. Gum will not dissolve in alcohol or spirits wine; therefore pound it small and add as little boiling water as possible to dissolve it. When the gum is dissolved and cold, add to it spirits wine; but, as the polish should be applied hot, put the solution in a bottle corked loosely, and immerse the bottle in a pot or saucepan, placed over the fire, till it is hot; be careful that the bottle be placed upon a plate, or on a wisp of hay in the water, or it will burst. This way of warming is much the same as that practiced by carpenters to warm glue, and prevents the spirit evaporating. Let this application and the subsequent friction take place in a warm room; the proportions of the gum and alcohol being adapted to the climate and the height of the polish required.

IVORY OR BONE. — These admit of being turned very smooth, or, when filed, may afterwards be scraped, so as to present a good surface. Rub first with fine sand paper, and then with a piece of wet linen cloth dipped in powdered pumice stone; this will give a fine surface, and the polish may be produced by fine whiting, applied by a piece of cloth wetted in soap suds. Care must be taken in this, and in every instance where articles of different fineness are successively used, that previous to applying a finer, every particle of the coarser material be removed, and that the rags be clean and free from grit.

PLASTER CASTS. — 1. Put into 4 lbs. clear water 1 oz. pure curd soap, grated and dissolved in a well-glazed earthen vessel; then add 1 oz. white beeswax, cut into thin slices; when the whole is incorporated, it is fit for use. Having dried the figure before the fire, suspend it by a twine and dip it once in the varnish; upon taking it out, the moisture will appear to have been absorbed in 2 minutes; stir the mixture and dip a second time; this generally suffices. Cover from the dust 1 week; then with soft muslin rag or cotton wool, rub the figure gently, when a brilliant gloss will be produced. — 2. Take skimmed milk, and with a camel's hair pencil lay over the model till it will imbibe no more. Shake or blow off any that remains, and lay the figure in a place free from dust; when dry, it will look like polished marble. If the milk is not carefully skimmed, it will not answer. — 3. Fuse ½ oz. tin with the same quantity bismuth, in a crucible; when melted, add ½ oz. mercury; when combined, take from the fire and cool; this substance, mixed with white of egg, forms a beautiful varnish for plaster casts. — 4. Stearine and Venetian soap, each 2 parts; pearlash, 1 part; the stearine and soap cut small, and mixed with 30 parts solution caustic potash; boil ½ hour, stirring; add the pearlash dissolved in a little rain water, and boil a few minutes; stir until cold, and mix with more lye until it is quite liquid; keep covered up; remove all dust and stains from the plaster, and apply the wash as long as it is absorbed; when dry, rub with a soft leather. Should the surface not shine, apply another coat. This composition may be preserved for years. — 5. Coat with melted white wax, and place them before a fire till the wax is absorbed; polish by friction. — 6. First make smooth and free from grit with sand paper; oil with linseed oil; when dry, French polish in the usual way. If a bust, or anything similar, is required to be white, make smooth size with white size, and varnish with white hard varnish.

RUBBER, Hard. — Remove scratches with a

smooth wet water of Ayr stone, and then polish in the lathe with fine pumice and a stiff brush; after washing the pumice off, polish it with whiting and a soft brush.

WAINSCOT. — Take as much beeswax as required; place it in a glazed earthen pan; add as much spirits wine as will cover it, and let it dissolve without heat; add either one ingredient as is required, to reduce it to the consistence of butter; when this mixture is well rubbed into the grain of the wood, and cleaned off with clean linen, it gives a good gloss to the work.

WALNUT, Dark. — To produce a dark, dead, smooth surface, pulverize asphaltum; place it in a jar; pour over it twice its bulk of turpentine or benzole; put in a warm place, and shake from time to time; when dissolved, strain it, and apply it to the wood with a cloth or stiff brush. If it should make too dark a stain, thin it with turpentine or benzole. This will dry in a few hours. To bring out the grain more, apply a mixture of boiled oil and turpentine; this is better than oil alone; put no oil with the asphaltum mixture. When the oil is dry, the wood can be polished with the following: Shellac varnish, of the usual consistency, 2 parts; boiled oil, 1 part; shake well before using; apply it to the wood by putting a few drops on a cloth and rubbing for a few moments. This polish works well on old varnished furniture.

WHITE.—To make this splendid polish, grind dry zinc white with white varnish, which affords a glossy finish, to be laid on after the second coat. A more perfect surface may be obtained by covering the second coat with several other coats of hard drying paint, mixed with turpentine, Japan and litharge; then rubbing with pumice stone, followed by a coat of polish white, and finished with a flow coat of white varnish, containing a little zinc white. Although this requires more time and trouble, the result will compensate. When the last coat is to be glossy the previous coat must be flat or dead, and a flat coat for finishing should be preceded by a somewhat glossy coat.

WOODS.—1. The wood is first well smoothed with fine sand-paper, then covered with a thin coating of size from transparent glue, or thin shellac, to prevent the varnish from sinking into the wood. When dry, pour some varnish into a saucer; take a fine camel's hair brush, and commence to varnish at one corner, gradually spreading over the whole surface. Take care that there is not too much varnish on the brush, otherwise an even surface cannot be obtained. The first coating must be allowed to dry, which will take 2 or 3 hours; then sand-paper the surface smooth. This done, with great care spread the next coat of varnish, always using sand-paper when the surface does not turn out smooth. The whole, when dry, may be rubbed well with a piece of worn woolen till bright and smooth. —2. To French polish, make the wood smooth; then pour some prepared polish into a saucer, and some linseed oil into another; take some pieces of woolen rag, and roll them up into a ball, covering them with a piece of linen drawn tightly over; the rags inside should first be saturated with the polish, and the whole should be taken in the fingers of the right hand in such a way that the linen may be drawn tightly over, and may present to the wood a smooth, rounded surface. Polish with free, circular strokes, and gradually traverse the whole surface; apply now and then a drop of polish and a drop of oil to the surface of the rubber. When the grain of the wood disappears, allow it to stand 1 hour, or until hard, and then sand-paper the whole; repeat the polishing until smooth. If dull patches appear, they may be removed by a few drops of spirits wine on a new rubber. — 3. Dissolve, by heat, so much beeswax in spirits turpentine, that when cold it shall be thick as honey. This may be applied to furniture or to work running in the lathe, by means of a piece of clean cloth, and as much as possible should then be rubbed off by means of a clean flannel. Beeswax alone is often used; upon furniture it must be melted by means of a warm flat-iron; but it may be applied to work in the lathe, by holding the wax against it until a portion of it adheres; a piece of woolen cloth should then be held upon it, and the lathe turned quickly, so as to melt the wax; the superfluous portion may be removed by a small piece of wood, when a light touch with a clean part of the cloth will give it a gloss. A good polish may be given to mahogany by rubbing it with linseed oil, and then holding against it a cloth dipped in fine brick dust. — 4. (*Dark.*) Seed-lac, 1 oz.; gum guaiacum, dragon's blood, and gum mastic, of each, 2 dr.; put in a bottle with 1 pt. spirits wine; cork close; expose to a moderate heat till dissolved; strain into a bottle for use, with ¼ gill linseed oil; shake together. — 5. Take a piece of smooth pumice stone and water and pass repeatedly over the work till the rising of the grain is cut down; then take powdered tripoli and boiled linseed oil, and polish bright.

STAINING.

REMARKS.—In making the preparations for staining, it is of importance to powder all the dry stuffs previous to dissolving or maccrating, and to purify all the liquids by filtration before use. Their coloring powers should be carefully tested before using, and the absorbent properties of the materials to be stained should be also tested. It will be better to coat twice or three times with a weak stain, than only once with a very strong one; by adopting the first mode, a particular tint may be effected, but, by pursuing the latter course, an irremediable discolorization may result. Coarse pieces of carving, spongy end and cross-grained woods, should be prepared for the stain by putting on a thin layer of varnish, letting it dry, and then sand-papering it completely off. Fine work requires to be oiled and slightly rubbed with the finest sand-

paper. Thus prepared, the fibre will take the stain regularly and retain smoothness. When stain is put on with a flat hog's hair tool, it is softened by a moderate application of a badger hair softener; the steel comb is used for streaking artificial oak, and the mottler is used for variegating and uniting the shades and tints of mahogany. Flannels and sponges are often worked with instead of brushes, but the implements most serviceable for veining or ingraining purposes, are small badger sash tools and sable pencils.

BILLIARD BALLS. — *Black.* 1. Use nitrate of silver, dissolved in water, and expose the pieces to strong sunlight. — 2. Steep for several days in a decoction of 2 lbs. logwood, 1 lb. galls, and then for a few hours in acetate of iron. — *Blue.* 1. Stain them green, and then immerse in a hot solution of pearlash. — 2. Boil in logwood decoction and then in an aqueous solution of copper sulphate. — 3. Steep them in a weak solution of sulphate of indigo, to which a little tartaric acid has been added. The coal tar colors, though brilliant, are apt to fade. — *Green.* Steep in a solution of verdigris, to which a little nitric acid has been added, or in a solution of distilled verdigris in acetic acid. Sal ammoniac is sometimes added to this solution. Do not use metallic vessels.—*Purple.* Steep in a weak aqueous solution of terchloride of gold, or boil for some time in a strong aqueous solution of logwood extract, and then add 4 oz. alum to the gal. of solution, and continue boiling until the ivory is sufficiently colored. — *Red.* Soak the pieces for a few minutes in weak nitric acid, and then in a strong decoction of cochineal in ammonia water.— *Yellow.* 1. Steep 24 hours in a solution of lead acetate, and, after drying, in a solution of potassium bichromate. —2. Steep the pieces in a saturated solution of orpiment (sulphide of arsenic) in strong ammonia, and dry. The depth of color depends upon the degree of concentration of the solution.

BLACK.—1. Boil ½ lb. chip logwood in 2 qts. water; add 1 oz. pearlash, and apply it hot to the work with a brush; then take ½ lb. logwood, boil it as before in 2 qts. water, and add ½ oz. verdigris and ½ oz. copperas; strain; put in ½ lb. rusty steel filings; with this go over the work a second time. — 2. (*Ebony Imitation.*) Mix up a strong stain of copperas and logwood; to this add powdered nut-gall; stain with this solution; dry rub down well; oil; then use French polish, made tolerably dark with indigo, or finely powdered stone blue.

BLACK WALNUT. — 1. ¼ lb. asphaltum, ½ lb. common beeswax, and 1 gal. turpentine; if the mixture is found too thin, add more beeswax; if too light in color, add more asphaltum; a very little will make a great difference in the shade; varnishing is not necessary. A good stain for pine. — 2. Take 1 gal. very thin sized shellac; add 1 lb. dry burnt umber; 1 lb. dry burnt sienna; ¼ lb. lampblack; put these into a jug, and shake frequently till mixed; apply 1 coat with a brush; when dry, sand-paper with fine paper, and apply 1 coat shellac varnish. A good imitation of solid walnut; it may be used on pine and white wood.

BLUE.—1. Into a clean glass bottle put 1 lb. oil vitriol and 4 oz. best indigo, pounded in a mortar; take care to set the bottle in a basin or earthen glazed pan, as it will ferment; put the veneers into a copper or stone trough; fill it with rather more than ½ water, and add as much of the vitriol and indigo as will make a fine blue; let the veneers remain till the dye has struck through. The color will be improved if the solution of indigo in vitriol be kept a few weeks before using. The color strikes better if the veneers are boiled in plain water, remaining a few hours thereafter to dry, previous to immersing in the dye. — 2. Dissolve copper filings in aquafortis; brush the wood with it, and then go over the work with a hot solution of pearlash (2 oz. to 1 pt. water) till it assumes a blue color. — 3. Boil 2 oz. indigo, 2 lbs. wood, and 1 oz. alum, in 1 gal. water; brush well till thoroughly stained. — 4. Throw pieces of quicklime into soft water; stir well; when settled, strain; then to every gal. add 10 to 12 oz. best turnsole; put the whole into a copper with the veneers, which should be of white holly, prepared by boiling in water; then let them simmer gently in the color, but not boil, as that would injure the color.

BROWN.—1. Boil ½ lb. Vandyke brown and 2 oz. carbonate soda in 12 oz. water, and add ½ oz. bichromate of potassa; or use a weak aqueous solution of permanganate of potassa in water. Remove the varnish first with sand-paper, and varnish after staining. — 2. (*Light Reddish.*) Boil ½ lb. madder and ¼ lb. fustic to 1 gal. water; brush the work, when boiling hot, until properly stained. — 3. Hold the work to the fire, to receive gentle warmth; then take aquafortis, and, with a feather, pass it over the work till it changes to a fine brown (keeping it near the fire); it may then be varnished or polished. — 4. Paint the wood with a solution, made by boiling 1 pt. catechu with 30 pts. water and a little soda; dry, and then paint with a solution of bichromate of potash, 1 pt.; water, 30 pts. By a little difference in the treatment and by varying the strength of the solutions, various shades may be given to these materials. The colors will be permanent and will tend to preserve the wood.

FLOORS.—1. The cheapest stain of any color is made with aniline colors, dissolved in hot water; some of these will fade, but yellow, red and brown, especially when covered with a coat of linseed oil, will last a long time. Any shade can be obtained by mixing. — 2. Put 1 oz. Vandyke brown in oil; 3 oz. pearlash and 2 dr. dragon's blood into an earthenware pan; pour on the mixture 1 qt. boiling water, and stir with a piece of wood; use hot or cold; smooth the boards with a plane, and sand-paper; fill the cracks with plaster Paris, and use the brush, not across the boards, but lengthwise, and coat only a small space at a time; when quite dry, size the floor with glue size, made by boiling glue in water, and brushing it into the boards hot. When dry, sand-paper smooth and varnish with brown, hard varnish. — 3. To strong lye of wood ashes, add enough copperas for the required oak shade; put on with a mop, and varnish. — 4. A kitchen floor may be stained of an

agreeable color by coating it with a mixture of 5 lbs. French ochre, ¼ lb. glue, and 1 gal. hot water; put on hot; when dry, cover with 2 coats boiled linseed oil. The floor should be made smooth before colored. For colors not given here, see other receipts in this department for staining in imitation of different woods.

GREEN.—Dissolve 4 oz. best verdigris, and ½ oz. each sap green and indigo, in 3 pts. best vinegar; put in the veneers and gently boil till the color has penetrated. The hue of the green may be varied by altering the proportion of the ingredients; unless wanted for a particular purpose, leave out the sap green, as it is a vegetable color, and apt to change when exposed to the air.

HORN.—(See same in VEGETABLE DYES.)

IVORY.—(See same in VEGETABLE DYES.)

MAHOGANY. — 1. Break 2 oz. dragon's blood in pieces, and put in 1 qt. rectified spirits wine; let the bottle stand in a warm place, and shake it frequently; use when dissolved; applied to common wood it will be an excellent imitation of mahogany. — 2. Take nitric acid, dilute with 10 parts water, and wash the wood with it. — 3. (*On Beech.*) Pulverized dragon's blood, 2 oz.; rectified spirits wine, 1 qt. — 4. (*On Maple.*) Dragon's blood, ½ oz.; alkanet, ½ oz.; aloes, 1 dr.; spirits wine, 16 oz.; apply it with a sponge or a brush. — 5. Boil ½ lb. madder and 2 oz. logwood chips in 1 gal. water; brush over while hot; when dry, go over the whole with pearlash solution, 2 dr. to the qt.

MUSICAL INSTRUMENTS.—*Black.* In general, when black is required in musical instruments, it is produced by japanning; the work is well prepared with size and lampblack; apply black Japan; after which varnish and polish. A black stain is sometimes required for finger-boards, bridges and flutes. The wood ought to be either pear, apple or boxwood; the latter is preferable; and if it be rubbed over, when dry, with a rag or flannel, dipped in hot oil, it will give it a gloss equal to ebony.—*Blue.* Into 1 lb. oil vitriol, in a clean glass vial, put 4 oz. indigo, and proceed as directed in dyeing purple. — *Crimson.* Boil 1 lb. good Brazil dust in 3 qts. water, 1 hour; strain, and add ½ oz. cochineal; boil it again gently ½ hour, and it will be fit for use. If more of a scarlet tint is desired, boil ½ oz. saffron in 1 qt. water 1 hour, and pass over the work previous to the red stain. — *Green.* 3 pts. strong vinegar; 4 oz. verdigris, pounded fine; ½ oz., each, sap green and indigo. *Purple.* 1 lb. good chip logwood; 3 qts. water; boil well 1 hour; then add 4 oz. pearlash and 2 oz. indigo, pounded. — *Yellow.* A small piece of aloes, put into the varnish, will have all the desired effect.

OAK.—1. Wash the wood carefully in a solution of copperas, dissolved in strong lye, in the proportion of 1 lb. copperas to 1 gal. lye. When the wood is dry after saturation, oil it, and it will look fresh for a year or two, when it can be re-stained and again oiled. When not subjected to hard usage, the color may remain undimmed for years by oiling occasionally. The color may be put on with a short bristle brush, or the hands, being protected with thick buckskin gloves, the wash may be applied with a cloth, which will saturate the wood evenly. It will blister the hands if not protected. — 2. Prepare the wood with a solution of 1 oz. catechu, boiled in 1½ pts. water; when dry, brush over a solution of bichromate of potash, 1 oz. to 1½ pts. water. By varying the proportions, different shades may be had. — 3. Grind Vandyke and whiting in turpentine; add a bit of common soap to make it stand the comb, and thin with boiled oil.

PURPLE.—To 2 lbs. chip logwood and ½ lb. Brazil dust, add 4 gals. water, and after putting in the veneers boil 3 hours; then add 6 oz. pearlash and 2 oz. alum; let them boil 2 or 3 hours every day till the color has struck through. The Brazil dust makes the purple of a redder cast; it may be omitted if a bluish purple is required. — 2. Boil 2 lbs. logwood chips or powder, in 4 gals. water, with the veneers; after the color has well struck in, add by degrees, vitriolated indigo, till the purple is of the shade required, which may be known by trying it with a piece of paper; then boil 1 hour, and keep the liquid in a milkwarm state till the color has penetrated the veneer. This will produce a brilliant purple, not so likely to fade as the foregoing. — 3. Chipped logwood, 1 lb.; water, 3 qts.; pearlash, 4 oz.; powdered indigo, 2 oz.; boil the logwood in the water, ½ hour; add the pearlash and indigo, and when dissolved, it will give a beautiful purple.

RED.—1. Put 1 oz. potash in 1 qt. water, with red sanders, 1½ oz.; extract the color from the wood and strain; then add gum shellac, ½ lb.; dissolve it by a brisk fire. Used upon logwood stain for rosewood imitation. — 2. (*Bright.*) To 2 lbs. genuine Brazil dust, add 4 gals. water; put in as many veneers as the liquor will cover; boil 3 hours; then add 2 oz., each, alum and aquafortis, and keep it lukewarm till it has struck through. — 3. Take 1 lb. Brazil wood to 1 gal. water; boil 3 hours with 1 oz. pearlash; brush it hot on the wood, and while hot brush the wood with a solution made with 2 oz. alum in 1 qt. water. — 4. An infusion of Brazil wood in stale urine, in the proportion of 1 lb. to 1 gal. for wood; to be laid on when boiling hot, and laid over with alum water before it dries. — 5. Archil will produce a good stain, when used cold; if, after 1 or 2 coats, and when they are almost dry, it is brushed over with a hot solution of pearlash in water, it will improve the color. — 6. (*Cherry.*) Rain water, 2 qts.; annatto, 4 oz.; boil in a copper kettle till the annatto is dissolved; then put in a piece of potash size of a walnut; keep it on the fire ½ hour longer, and then bottle for use.

ROSEWOOD. — 1. 1 gal. alcohol; 1 lb., each, red sanders, dragon's blood, and extract logwood; ½ lb. shellac; put the mixture into a jug; steep it till it obtains full strength; strain, and it will be ready for use; apply with a brush, giving 1, 2 or more coats, according to depth of color desired; then give 1 or more coats varnish. This stain is suitable for cane, willow or reed work, and produces a good imitation of rosewood. — 2. Take alcohol, 1 gal.; camwood, 2 oz.; set them in a warm place 24 hours; then add extract logwood, 3 oz., and aquafortis, 1 oz.;

when dissolved it is ready; it makes a bright ground like the most beautiful rosewood. Give 1 or 2 more coats, as desired.

SATINWOOD. — 1. Take white for the first coating, light blue for the second, and dark blue or dark green for the third. — 2. Alcohol, 2 pts.; powdered gamboge, 3 oz.; ground turmeric, 6 oz.; steep to obtain full strength, and strain through muslin; apply 2 coats with a fine sponge; sand-paper, when dry, and varnish or French polish.

YELLOW.—To every gal. water necessary to cover the veneers, add 1 lb. French berries; boil till the color has penetrated; add to the infusion of French berries the following liquid, and let the veneers remain for 2 or 3 hours, and the color will be very bright: Reduce 4 lbs. barberry root to dust, by sawing; put into a copper or brass trough; add 4 oz. turmeric and 4 gals. water; then put in as many white holly veneers as the liquor will cover; boil 3 hours, often turning them; when cool, add 2 oz. aquafortis, and the dye will strike through sooner.

VARNISHES, JAPANS AND LACQUERS.

REMARKS.—*Japanning* is the art of covering paper, wood, or metal, with a coating of hard, brilliant and durable varnish. The surface is colored or painted with devices, etc., as desired; next, covered with a highly transparent varnish (amber or copal); then dried at a high temperature (135° to 165° Fahr.), and, lastly, polished. Wood and paper are first sized, polished and varnished. For plain surfaces, asphaltum varnish, or Japan is used. *Lacquering* is by a solution of shellac in alcohol, tinged with saffron, annatto, aloes, or other coloring substances. It is sometimes applied to wood, but usually to metals to impart a golden color. This is done in 2 ways, called cold lacquering and hot lacquering. By the former, a little lacquer is taken on a camel's hair varnish brush, and laid evenly over the work, which is then placed in an oven or on a hot stove; the heat continued a minute or two to set the lacquer, and the work is finished. Care must be taken not to have the work too hot nor yet too cold, or the lacquer will not thoroughly set. By the second method, the work is heated, first, to about the heat of a flat iron as used by a laundress, and the lacquer quickly brushed over it in this state; the work then subjected to the oven for a minute afterwards, or not, as the operator sees fit. The article, if small, requires this, having parted with most of its heat during lacquering; if heavy, it retains sufficient heat to perfect the process. The greatest difficulty is to know the exact degree of heat, which cannot be attained except by experience, so different is the nature of the materials, the quality of different lacquers, and the effect to be produced. *Varnish* is a solution of a resin in oil of turpentine, wood-naphtha, spirits of wine, or some other solvent, which, on evaporating, leaves the resin behind in a thin, transparent, highly polished film. The resins most employed in making varnishes, are copal, mastic, demar, sandarac, cowrie, lac, amber, and occasionally elemi and anime. The solvents used are oil of turpentine, spirits of wine, wood-spirit, methylated spirit, and lighter portions of the coal and petroleum oils. In manufacturing varnishes, if too much spirit is used, they crack in drying. To remedy this, oil of turpentine and linseed or poppy oil are added, to prevent hasty evaporation.

AMBER VARNISH, Pale.—1 Amber, pale and transparent, 6 lbs.; fuse; add hot clarified linseed oil, 2 gals.; boil till it strings strongly; cool a little, and add oil turpentine, 4 gals. Pale as copal varnish; soon becomes hard, and is the most durable of oil varnishes, but requires time before fit for polishing. When wanted to dry quickly, drying oil may be substituted for linseed, or driers may be added during the boiling. — 2. Amber, 1 lb.; melt; add Scio turpentine, ½ lb.; transparent white resin, 2 oz.; hot linseed oil, 1 pt.; and afterwards oil turpentine sufficient, as above. Very tough. — 3. Very pale, transparent amber, 4 oz.; clarified linseed oil and oil of turpentine, of each, 1 pt.. — 4. Fuse 6 lb. very pale clear amber, and add 2 gals. hot clarified oil; boil until it strings strong; remove from the fire and stir in 4 gals. oil of turpentine; allow plenty of time before polishing. Amber varnish is suited for all purposes where a hard and durable varnish is required. The pale is superior to copal, and is often mixed with the latter to increase its hardness and durability.

ANTI-RUST VARNISH, For Iron and Steel.—Resin, 120 parts; sandarac, 180 parts; gum lac, 60 parts; essence of turpentine, 120 parts; rectified alcohol, 180 parts. Pound the first 3 ingredients; digest them by regular heat until melted; add the turpentine gradually; after solution has taken place, add the alcohol, and filter through fine cloth; keep in well-stoppered bottles.

ASPHALT VARNISH.—Boil coal tar until it shows a disposition to harden on cooling; this can be ascertained by rubbing a little on a piece of metal; then add 20 per cent. of lump asphalt, stirring it with the boiling tar until the lumps are melted; then let it cool, and keep for use. A very bright varnish for sheet metals, and is cheap and durable.

BALLOON VARNISH.—Take india-rubber and dissolve it in 5 times its weight of spirits turpentine, keeping them some time together; then boil 1 part of this solution with 8 parts boiled linseed oil a few minutes; strain. Apply warm.

BASKET VARNISH.—Take sealing wax, of the color desired; to every 2 oz. add 1 oz. spirit of wine; pound the wax fine; sift till fine; put it into a vial with spirits wine; shake; let it stand near the fire 48 hours, shaking often; then, with a little brush, rub the baskets all over with it; let them dry, and do them over a second time.

BESSEMER'S VARNISH. — 8 lbs. copal; 2½ gals. drying oil; 25 gals. oil of turpentine. They are made into a varnish nearly as directed for

Cabinet Varnish (which see), and afterwards mixed with 1 gal. slaked lime; then left 3 days to settle. The clear portion is then drawn off, and 5 parts varnish mixed with 4 parts bronze powder.

BLACK JAPAN.—1. Amber, 12 oz.; asphaltum, purified, 2 oz.; boiled oil, ½ pt.; resin, 2 oz.; oil of turpentine, 16 oz. Fuse the gum, resin and asphaltum; add the hot oil; stir well, and when cooling add the turpentine. — 2. Asphaltum, 1 lb.; balsam of capivi, 1 lb.; oil of turpentine, q. s. The asphaltum is melted over a fire, and the balsam, previously heated, is mixed in with it; the mixture is then removed from the fire and mixed with the turpentine. — 3. Moisten good lampblack with oil of turpentine, and grind it very fine; then add sufficient ordinary copal varnish, and rub well together.

BLACK ROSEWOOD JAPAN.—The work must be grounded black, after which grind some red lead, mixed up as before directed, which lay on with a flat, stiff brush in imitation of the streaks in the wood; then take a small quantity of lake, ground fine, and mix it with brown spirit varnish, observing to have no more color than will tinge the varnish; if too red, add a little umber ground fine, and pass over the whole of the work intended to imitate black rosewood. If well done, when it is varnished and polished, it will scarcely be known from rosewood. Instead of umber, Vandyke brown may be used; it is more transparent than umber.

BLACK VARNISH.—1. (*For Iron.*) Mix with a small quantity of oil of turpentine, drop by drop, oil of vitriol, until it forms a syrupy precipitate which no longer increases in bulk; the mass is then poured over with water, stirred well, the water removed, and repeated as often as it shows a trace of acid on litmus paper; the remaining precipitate is then strained dry, and when required for use, a portion of it is placed on the iron (stove, etc.), and the stove heated and the powder burned; if too thick a layer, it must be thinned, and spread out with more turpentine, so as to give a uniform coating to the metallic surface; the residue left after burning, is then rubbed in with a rag dipped in flaxseed oil until the proper polish is acquired. — 2. (*Aniline.*) Dissolve 6¾ dr., avoirdupois, of aniline blue, 1¾ dr. fuchsine, and 4½ dr. naphthaline yellow, in 1 qt. alcohol; the whole is then dissolved by agitation in less than 12 hours; 1 application renders an object ebony black; the varnish can be filtered, and will never deposit afterwards. — 3. (*For Coal Buckets.*) Asphaltum, 1 lb.; lampblack, ¾ lb.; resin, ½ lb.; spirits turpentine, 1 qt. Dissolve the asphaltum and resin in the turpentine; then rub up the lampblack with linseed oil to a paste, and mix with the others. Apply with a brush.

BLUE JAPAN.—Blue Japan grounds may be formed of bright Prussian blue. Mix with shellac varnish, and bring to a polish with 5 or 6 coats of varnish of seed-lac. The varnish is apt to give a greenish tinge to the blue; when a light blue is desired, use the purest varnish.

BRASS, Lacquer for. — 1. Turmeric, 1 oz.; saffron and annatto, each, ½ oz.; rectified spirits, 1 pt. Digest at a gentle heat for several days; strain through coarse linen; bottle and add 3 oz. coarsely pulverized seed-lac; place in a moderate heat, and shake occasionally till dissolved. — 2. Alcohol, 12 gal.; seed-lac, 9 lbs.; turmeric, 1 lb. to 1 gal. of the above mixture; Spanish saffron, 4 oz.; the saffron is to be added for bronze work. — 3. (*Gold Colored.*) Alcohol, 36 oz.; seed-lac, 6 oz.; amber, 2 oz.; gum gutta, 2 oz.; red sandal wood, 24 gr.; dragon's blood, 60 gr.; oriental saffron, 36 gr.; pulverized glass, 4 oz. — 4. (*Red.*) Alcohol, 8 gals.; dragon's blood, 4 lbs.; Spanish annatto, 12 lbs.; gum sandarac, 13 lbs.; turpentine, 1 gal.

BROWN LACQUER, For Copper Bronze.—2½ oz. shellac; 2 qts. wine spirit; 2 oz. gum sandarac; ½ oz. gum elimi; mix, and keep warm until solution is effected; then strain, and color with dragon's blood and aniline brown to suit.

BRUSHES, Varnish, Care of.—Suspend them by the handles in a tightly covered can, keeping the points ½ in. from the bottom and apart from each other. The can should be filled with slowly drying varnish up to 1-16 in. above the bristles; and the can kept in a close cupboard. As wiping a brush on a sharp edge will ruin it, the top of the can should have a wire soldered along the edge of the tin, and turned over. Finishing brushes should not be cleansed in turpentine. When taken from the can prepare them for use by working them out in varnish, and before replacing, clean the handles and binding with turpentine.

CABINET VARNISH.—Fuse 7 lbs. fine African gum copal; when it runs freely, pour into it ½ gal. clarified linseed oil; when clear, remove from the fire, and mix 3 gals. spirits turpentine with it, and strain. If properly boiled, it will dry in 10 minutes; if boiled too much, it will not mix with the turpentine. Used by japanners, cabinet and coach makers.

CANADA VARNISH.—Clear balsam of Canada, 4 oz.; camphene, 8 oz.; warm gently, and shake together till dissolved. For maps, drawings, etc., they are first sized over with a solution of isinglass, taking care that every part is covered; when dry, the varnish is brushed over it.

CARRIAGE JAPAN.—40 gals. raw linseed oil; 40 lbs. litharge; 20 lbs. red lead; 10 lbs. black oxide manganese; 2 lbs. white gum shellac; set the oil over the fire, and bring to the boiling point; add by degrees litharge and red lead alternately and slowly; add the gum, and when melted put in the manganese, and keep the whole in rapid motion from the time the oil is at 200° Fahr. until the making is finished; when cool enough to bear the finger in a moment, add from 20 to 30 gals. spirits turpentine.

CARRIAGE VARNISH.—1. 8 lbs. second sorted African copal; 2½ gals. clarified oil; boil till very stringy. ¼ lb. dried copperas; ¼ lb. litharge; 5½ gals. turpentine; strained. 8 lbs. second sorted gum anime; 2½ gals. clarified oil; ¼ lb. dried sugar of lead; ¼ lb. litharge; 5½ gals. turpentine; mix with the first while hot. This varnish will dry hard if well boiled, in 4 hours in summer and 6 in winter. It is used for wheels, springs, and carriage parts of coaches, chaises, etc.; it is used by house painters and decorators, because of its drying quality and strong gloss.

— 2. 8 lbs. second sorted gum anime; 2¾ gals. fine clarified oil; 5½ gals. turpentine; ½ lb. litharge; ¼ lb. dried sugar of lead; ½ lb. dried copperas; boiled and mixed as before. When three runs are poured into the boiling pot, the driers put in, and well boiled, this varnish will dry hard in 4 hours in winter, and in 2 in summer. Used for varnishing dark carriage work or black Japan, and by house painters for dark work.

CHINESE LACQUER.—Chinese lacquer work is done over tin-foil, and consists of a mixture of 2 parts of copal and 1 of shellac, melted together; when fluid, add 2 parts boiled linseed oil, and, when taken from the fire, add gradually 10 parts oil of turpentine. If color is required, gum gutta (or gamboge), dissolved in oil of turpentine, yields yellow; and dragon's blood, dissolved in the same liquid, yields red.

CHINESE VARNISH. — 1. Mix 3 parts fresh blood, deprived of its fibrin by beating with twigs or broom straws, 4 parts slaked lime, and a little alum. Use at once. It is said that baskets coated with it are rendered water and oil tight, and that pasteboard to which it has been applied, becomes as hard as wood. — 2 Mastic and sandarac, of each, 2 oz.; rectified spirit, 1 pt. Close the matrass with bladder, with a pin hole for the escape of vapor; heat to boiling in a sand or water bath, and when dissolved strain through linen.

COLORLESS VARNISH. — 1. Dissolve 2½ oz. shellac in 1 pt. rectified spirits wine; boil for a few minutes with 5 oz. well-burnt and recently heated animal charcoal; filter a small portion, and if not colorless add more charcoal. When all color is removed, press the liquor through a piece of silk, and filter through blotting paper. This varnish should be used in a temperature of at least 60° Fahr., perfectly free from dust. It dries in a few minutes, and is not liable afterward to chill or bloom. It is particularly applicable to drawings and prints that have been sized, and may be advantageously used upon oil paintings that are thoroughly hard and dry, as it brings out the colors with the purest effect. This quality prevents it from obscuring gilding, and renders it valuable for all kinds of leather, as it does not yield to the warmth of the hand, and resists damp. Its useful applications are numerous, indeed to all the purposes of the best hard spirit varnishes. — 2. A common lac varnish may be made by digesting 4 oz. clear grained lac in 1 pt. spirits wine in a wide mouthed bottle, keeping in a warm place for 2 or 3 days, and occasionally shaking it. When dissolved, strain through flannel into another bottle for use.

COLORINGS.—*Blue.* Indigo, Prussian blue, blue verditer, or ultramarine. All these must be powdered fine. — *Green.* Verdigris, crystallized verdigris, compound green (a mixture of yellow and blue). The first 2 require a mixture of white in proper proportions, from ½ to ⅔, according to tint. The white used is ceruse, or the white oxide of lead, or Spanish white. — *Pearl Gray.* White and black; white and blue; for example, ceruse and lampblack, ceruse and indigo; mix with the varnish, according to tint required. — *Red.* 1. Vermilion, red oxide of lead (minium), red ochre, or Prussian red, etc. — 2. Dragon's blood, brick red, or Venetian red, etc. — *Violet.* Vermilion, blue, white, in proportion as required to color the varnish. — *White.* 4 oz. copal; ½ oz. camphor; 3 oz. white drying oil; 2 oz. essential oil of turpentine. Reduce the copal to powder; mix the camphor and drying oil; then heat it on a slow fire; add the turpentine, and strain.—*Yellow.* Yellow oxide of lead of Naples and Montpellier, reduced to impalpable powder. These yellows are hurt by the contact of iron and steel; in mixing them up, a horn spatula, with a glass mortar and pestle must be used. Gum gutta, yellow ochre, or Dutch pink, is used, according to the nature and tone of the color to be imitated.

COPAL JAPAN. — Copal varnish is one of the finest for japanning purposes. It can be dissolved by linseed oil, rendered dry by adding quicklime at a heat less than will boil the oil by it. This solution, with a little turpentine added, forms a transparent varnish, which, properly applied and dried, is hard and durable. Used for snuff-boxes, tea boards, etc. It preserves paintings, reflecting light more uniformly. It is good for metals. Each coat of varnish must be dried in the oven. It can be colored; alcohol varnish will mix with any coloring matter. For white japans or varnishes, fine chalk or white lead is used as a basis, and the varnish coated over it.

COPAL VARNISH. — 1. Gum copal, 8 lbs.; linseed oil, 2 gals.; sugar of lead, ½ lb.; turpentine, 3½ gals. Boil till stringy. — 2. Gum copal, 8 lbs.; oil, 2½ gals.; sulphate of iron, ¼ lb.; turpentine, 5½ gals. Good for house and sign painting. In making the above, melt the gum in a small quantity of boiling oil, and pour gradually into the kettle containing the other oil, while boiling. When done, and cool enough not to ignite the turpentine, add it. — 3. Fuse 8 parts fine African copal, and add 2 gals. clarified oil. Boil slowly 4 or 5 hours, until stringy; then mix with 3½ gals. turpentine. — 4. (*Transparent Green.*) A transparent green varnish is made by taking a small quantity of Chinese blue, with about twice the amount finely powdered chromate of potash; stir these in copal varnish, thinned with turpentine; thoroughly grind this mixture, intimately incorporating the ingredients; otherwise it will not be transparent. A preponderance of chromate of potash gives a yellowish shade, and a deficiency increases the amount of blue. Thus colored, it produces a striking effect in japanned goods, paper hangings, etc., and can be made very cheaply.

DEMAR VARNISH. — Gum demar, 10 parts; gum sandarac, 5 parts; gum mastic, 1 part; digest at a low heat, occasionally shaking with spirits turpentine, 20 parts; finally, add more spirits turpentine, to give the consistency of syrup.

FLEXIBLE VARNISH. — This is used for balloons, gas bags, etc. 1. India-rubber (cut small), 1½ oz.; chloroform, ether (washed), or bisulphuret of carbon, 1 pt. Digest in the cold until solution is complete. Dries soon as laid on. Pure gutta percha may be substituted for india-rubber.—2. India-rubber, 1 oz.; drying oil, 1 qt. Dissolve by heat. Very tough; dries in 48

hours. — 3. Linseed oil, 1 gal.; dried white copperas and sugar of lead, of each, 3 oz.; litharge, 8 oz. Boil with constant agitation, until it strings; then cool slowly and decant the clear portion. If too thick, thin with quick-drying linseed oil.

FURNITURE VARNISH. — 1. Shellac, 1½ lbs.; naphtha, 1 gal. Dissolve, and it is ready without filtering. — 2. Shellac, 12 oz.; copal, 3 oz. Dissolve in 1 gal. naphtha. — 3. Shellac, 1½ lbs.; seed-lac and sandarac, of each, 4 oz.; mastic, 2 oz.; rectified spirit, 1 gal.; dissolve. — 4. Shellac, 2 lbs.; benzoin, 4 oz.; spirit, 1 gal. — 5. Shellac, 10 oz.; seed-lac, sandarac and copal varnish, of each, 6 oz.; benzoin, 3 oz.; naphtha, 1 gal. To darken, use benzoin and dragon's blood; turmeric and other coloring matters are also added; to make it lighter, use bleached lac, though some add oxalic acid to the ingredients. It is insoluble in spirit or naphtha. For ordinary purposes the first form is best, while its appearance is equal to any other.

GILT ARTICLES. Varnish for.—Gum lac, gamboge, dragon's blood and annatto, of each, 125 parts; saffron, 32 parts. Dissolve each resin in 1,000 parts, by measure, of absolute alcohol; 2 separate mixtures must be made with the dragon's blood and annatto, in 1,000 parts such alcohol; and a proper proportion of each added with the gamboge to the varnish, according to the shade required.

GLASS VARNISH. — Fuse together 15 parts powdered quartz or of fine sand, 10 parts potash, and 1 of charcoal; pulverize the mass and expose it for some days to the air; treat the whole with cold water, which removes the foreign salts, etc.; boil the residue in 5 parts water until it dissolves. It is permanent in the air, and not dissolved by cold water. Used to protect wood, etc., from fire.

GLASS, Varnish for.—1. Wax, 1 oz.; mastic, ½ oz.; asphaltum, ¼ oz.; turpentine, ½ dr. — 2. Mastic, 15 parts; turpentine, 7 parts; oil of spike, 4 parts.

GOLD LACQUER. — 1. Put into a clean, 4 gal. tin, 1 lb. ground turmeric, 1½ oz. gamboge, 3½ lbs. powdered gum sandarac, ¾ lb. shellac, and 2 gals. spirits wine. When shaken, dissolved and strained, add 1 pt. turpentine varnish, well mixed. — 2. 3 parts seed-lac; ½ part old varnish; 10 parts oil turpentine. This lacquer would require no coloring; but the precautions to a successful working would be those that have to be observed with all solid lac varnishes. — 3. (*Deep Colored.*) Best alcohol, 40 oz.; Spanish annatto, 8 gr.; turmeric, 2 dr.; shellac, ½ oz.; red sanders, 12 gr.; when dissolved, add spirits turpentine, 30 drops.

GOLD VARNISH. — 1. Turmeric, 1 dr.; gamboge, 1 dr.; oil turpentine, 2 pts.; shellac, 5 oz.; sandarac, 5 oz.; dragon's blood, 7 dr.; thin mastic varnish, 8 oz. Digest with agitation 14 days in a warm place; then set aside to fine, and pour off the clear. —2. Dutch leaf, 1 part; gamboge, 4 parts; gum dragon, 4 parts; proof spirit, 18 parts. Macerate 12 hours; then grind.

GRATES, Varnish for.—Melt 4 lbs. common asphaltum; add 2 pts. linseed oil and 1 gal. oil turpentine. If too thick, add more turpentine.

GRECIAN VARNISH.—3 oz. balsam fir; 2 oz. alcohol; 1 oz. spirits turpentine. Mix together.

GREEN LACQUER. — Add to pale lacquer, when mixing, 6 oz. turmeric and 1 oz. gum gamboge.

GUN-BARREL VARNISH. — Shellac, 1½ oz.; dragon's blood, 3 dr.; rectified spirit, 1 qt. Applied after the barrels are browned.

INDIA-RUBBER VARNISH. — 1. 2 oz. india-rubber, finely divided; phee in a vial, and digest in a sand-bath with ¼ lb. camphene and ½ oz. naphtha. When dissolved, add 1 oz. copal varnish, which renders it more durable. — 2. Digest in a wide mouthed glass bottle, 2 oz. india-rubber, in shavings, with 1 lb. oil turpentine, during 2 days, without shaking; then stir with a wooden spatula. Add another lb. oil turpentine, and digest with agitation until dissolved. Mix 1½ lbs. of this solution with 2 lbs. white copal oil varnish, and 1½ lbs. boiled linseed oil. Shake and digest in a sand-bath until united into a good varnish. — 3. 4 oz. india-rubber, in shavings; dissolve in a covered jar, by means of a sand-bath, in 2 lbs. crude benzole; and then mix with 4 lbs. hot linseed oil varnish and ½ lb. oil turpentine. Dries well.

IRON, Varnish for.—1. Take oil of turpentine and drop into it, drop by drop, commercial oil of vitriol; the acid will cause a dark, syrupy precipitate in the oil of turpentine. Keep adding drops of vitriol until the precipitate ceases; then pour out the liquid and wash the syrupy mass with water, and it is ready. Heat the iron to be varnished to a gentle heat; apply the syrupy product, and allow it to dry. — 2. Asphaltum, 8 lbs.; melt in an iron kettle, slowly adding boiled linseed oil, 5 gals., litharge, 1 lb., and sulphate of zinc, ½ lb., continuing to boil 3 hours; then add dark gum amber, 1½ lbs.; boil 2 hours longer; when cool, reduce to a proper consistence to apply with a brush, with spirits turpentine. — 3. Dissolve in about 2 lbs. tar oil, ½ lb. asphaltum and a like quantity pounded resin; mix hot in an iron kettle, care being taken to prevent any contact with the flame. When cold it is ready. Used for out-door wood and iron work.

LINSEED OIL VARNISH.—Pour 25 lbs. pure linseed oil into an enameled iron pot which holds about 40 lbs. weight; then place on a moderately strong charcoal fire, and heat the oil ½ hour to boiling point; in the mean time rub 4 oz. pure oxide of manganese in linseed oil; put this mass into a small vessel provided with a spout, and pour in drops into the boiling linseed oil, while being gently stirred with a wooden spatula. During effervescenee of the oil, the dropping in of the manganese must stop. As soon as the oil has settled, the dropping in is continued to the last. The vessel is washed out with linseed oil, which is poured into the boiling oil. The varnish is now boiled slowly 1 hour; but if stronger varnish is desired, boil ½ hour, or 1 hour longer. When removed from the fire, cover with a clean plate, and let rest 24 hours; then carefully pour off into clean vessels; the sediment and other residue are used for the preparation of ordinary ground colors. The varnish, when poured into glass bottles, can then be

bleached by exposure to the sun and moon. Moonlight bleaches quicker than sunlight. The bleached is used only for the finest white oil and lac colors, and for dissolving fine copal lacs, as well as a drying medium for fine oil colors.

MAHOGANY VARNISH. — Gum anime, 8 lbs.; clarified oil, 3 gals.; litharge and powdered dry sugar of lead, of each, ½ lb. Proceed as for body varnish, and thin with oil turpentine, 5 gals., or a sufficient quantity.

MASTIC VARNISH.—1. Pale and picked gum mastic, 5 lbs.; glass (pounded small, washed and dried), 3 lbs.; finest newly rectified oil turpentine (lukewarm), 2 gals.; put them into a clean 4 gal. tin bottle or can, bung down, and keep rolling it backwards and forwards smartly on a counter or other solid place, 4 hours; when the gum is dissolved, the varnish may be decanted, strained through muslin into another bottle, and allowed to settle; if the solution is still incomplete, the agitation must be continued longer, or gentle warmth applied. Very fine. — 2. Mastic, 4 lbs.; oil turpentine, 2 gals.; dissolve with heat. Used for pictures, etc.; when good, it is tough, brilliant and colorless; it improves by age, and should never be used before 12 mos. old. Should it get "chilled," add 1 lb. well-washed silicious sand, made moderately hot, to each gal.; agitate 5 minutes and let it settle.

METAL, Polished, Varnish for. — 1. Bleached shellac, pounded; place in a bottle of alcohol until some shellac remains undissolved; agitate often, and let it stand; pour off the clear. This forms the varnish. Warm the metal surface and coat with a camel's hair brush. If not transparent, warm the varnished surface before a fire until it becomes clear. Common orange shellac answers, and for large surfaces even better, as it is more soluble than bleached, and coats more perfectly, but care must be taken not to use the varnish insufficiently diluted. — 2. Digest 1 part bruised copal in 2 parts absolute alcohol; but, as this varnish dries too quickly, it is preferable to take 1 part copal, 1 part oil rosemary, and 2 or 3 parts absolute alcohol. This gives a varnish limpid as water. It should be applied hot, and when dry it will be found hard and durable. — 3. Mix equal quantities Canada balsam with clear spirits turpentine, until of the consistency of varnish, which can be determined by constantly shaking and allowing to settle. This may be applied without warming varnish or metal.

OAK VARNISH. — 1. Clear pale resin, 3½ lbs.; oil of turpentine, 1 gal.; dissolve. — 2. Clear Venice turpentine, 4 lbs.; oil of turpentine, 5 lbs.; mix. Both are good common varnishes.

PAINTINGS, METAL, ETC., Lacquer for. — 1. Seed-lac, 8 oz.; alcohol, 1 qt. Digest in a close vessel, in a warm situation, 3 or 4 days; decant and strain. — 2. Substitute lac bleached by chlorine for seed-lac. Both are tough, hard and durable; the last almost colorless.

PURPLE GROUND JAPAN.—Made by a mixture of lake and Prussian blue or carmine, or, for an inferior color, vermilion. When the ground is laid on and dried, a fine coat of pure boiled nut oil, laid on and dried, is a good method to have the Japan not liable to crack; a better plan is to use this oil in the varnish given, the first coat, after the ground is laid on, and which should contain considerable pure turpentine. Where oil is used for any purpose for varnish, it is the better if turpentine is mixed with it. Turpentine enables oils to mix with either alcohol or water. Alkalies have this property, also.

RAISED FIGURES, On Japan Work.—Prepare a mixture of whiting and size (some prefer the whites of eggs), to the consistency to flow freely from a pencil, the hairs of which must be rather long. Begin with a figure, or other part; do not do too much at a time; trace the outline with a free hand; then take a stick pointed at the end, dip it in the composition, and fill up the inside outline; continue to put more of the mixture on till it is raised sufficiently above the surface; let it get dry; then polish with a small camel's hair pencil and clean water, so as to make it smooth and level. Care must be taken that the composition is not too thin, or it will spread beyond the bounds of the outline, but just so thick as to drop from the stick. Some mix with the whiting flake white or dry white lead. This is an improvement for particular work.

RED GROUND JAPAN. — The base of this ground must be made with madder lake, ground with oil of turpentine; this forms the first ground; when dry, a second coat must be applied, composed of lake and white copal varnish; and the last with a coat of a mixture of copal and turpentine varnish mixed with lake. Vermilion or carmine can be used for red Japan instead of lake.

SCARLET JAPAN.—Ground vermilion may be used, but, being glaring, it must be covered with rose pink or lake, which have a good effect. For a bright crimson ground, safflower or Indian lake should be used, dissolved in the alcohol of which the varnish is made. In place of this lake, carmine may be used. The top coat of varnish must be made of white seed-lac, and as many coats given as may be thought proper.

SHELLAC VARNISH. — 1 part gum shellac, dissolved in 3 to 4 parts alcohol of 92 per cent., mixed with 1 part water; filtered, pressed, and the solution distilled until the alcohol is evaporated. The gum precipitated from this solution is dried on a water bath and dissolved in double its weight of alcohol of 96 to 98 per cent.

SILVER VARNISH. — Gum elemi, 30 parts; white amber, 45 parts; charcoal, 30 parts; spirits turpentine, 375 parts. Used in a heated state, the metal to which it is applied being heated.

STOVE VARNISH.—Melt ½ lb. asphaltum, and add to it ½ pt. linseed oil, and 1 pt. turpentine; this will be enough for 4 grates. If too thick as it gets to the bottom, add more turpentine. It is for black stoves, which must be washed clean of dirt and black lead, and when dry apply the varnish with a brush.

TAR VARNISH.—1. (*For Iron.*) Place a convenient quantity coal tar in small retorts, and heat until the oil commences to distil over; then let the retorts cool somewhat; when they are opened and a proportionate quantity of heavy oil of tar added, and the mixture well stirred; then pour the mixture out, and the operation is

complete. Made in this way it is preferable to tar, and dries in from 24 to 48 hours. By incorporating naphtha of the lowest quality (to do which the mass must be warm) with the material made with light oil instead of heavy oil, a varnish may be obtained which will dry in 1 hour or less. — 2. Tar, 2 gals.; tallow, 1 lb.; melt; then add ground ochre, 7 lbs.; spirits of turpentine, 6 lbs.; mix well. By regulating the quantity of ochre, a very excellent chocolate paint for rough out-door work will be produced.

TEA-TRAYS, Japan for.—First clean them with soap and water and rotten stone; dry by wiping and exposure to the fire; then get good copal varnish; mix it with bronze powder, and apply with a brush to the denuded parts; then set the tray in an oven at a heat of 212° to 300° till the varnish is dry; 2 coats will make it like new.

TIN, Japan for.—Draw letters on paper to suit the piece of tin, having first cleaned it with diluted alcohol and a piece of cotton. Take whiting and rub it over the back of the paper upon which your design is made, and lay it upon the japanned tin; next place a weight upon the 4 corners of the paper; then, with a pointed piece of hard wood, trace the design, bearing upon the paper with the point hard enough to cause the whiting on the under side of the paper to adhere to the tin; after going over the whole you will have transferred the design in fine outline to the tin. Size with oil size, and when dry enough for gilding lay on the gold leaf and dab it down; brush off the loose gold with a flat camel's hair brush.

TIN, Lacquer for. — Put 3 oz. seed-lac, 2 dr. dragon's blood, and 1 oz. turmeric powder, into 1 pt. well rectified spirits; let the whole remain 14 days, but agitate once a day; when combined, strain through muslin. It is brushed over tinware intended to imitate brass.

TORTOISE-SHELL JAPAN.—Prepared by taking good linseed oil, 1 gal. and umber ½ lb; boil together until the oil becomes brown and thick; strain through a cloth, and boil again until of the consistence of pitch, when it is fit for use. Clean the copper or iron plate or vessel that is to be japanned, and lay vermilion, mixed with shellac varnish or with drying oil diluted with turpentine, thinly on the places intended to imitate the clean parts of the tortoise-shell. When the vermilion is dry, brush over the whole with the above varnish diluted with turpentine; and when set, put into a stove to undergo a strong heat for a long time; even 2 weeks will not hurt it. This is the ground for snuff-boxes and tea boards, and the grounds can be decorated with all kinds of paintings that fancy may suggest; and finish in an annealing oven.

TURPENTINE VARNISH.—Put 1 pt. turpentine into a bottle, with ½ lb. white rosin in powder; dissolve in a gentle heat, by placing the bottle in an iron pot surrounded by dry sand, over a moderate fire.

TRANSPARENT JAPAN.—1. Oil turpentine, 4 oz.; oil lavender, 3 oz.; camphor, ½ dr.; copal, 1 oz.; dissolve. Used to Japan tin, but quick copal varnish is mostly used instead. — 2. Copal varnish, 35 parts; camphor, 1 part; boiled oil, 2 parts; mix.

VIOLIN VARNISH.—1. Rectified spirits wine, ½ gal.; add 6 oz. gum sandarac, 3 oz. gum mastic, and ½ pt. turpentine varnish; put the above in a tin can by the stove, frequently shaking till dissolved; strain, and keep for use. If you find it harder than you wish, thin with turpentine varnish.—2. Heat together at a low temperature, 2 qts. alcohol, ½ pt. turpentine varnish, and 1 lb. clean gum mastic; when the latter is dissolved, strain through a cloth. — 3. Coarsely powdered copal and glass, of each, 4 oz.; alcohol, 64 per cent., 1 pt.; camphor, ½ oz. Heat the mixture with frequent stirring in a water bath, until solution is complete; when cold decant the clear portion.

WAINSCOT VARNISH. — 8 lbs. second sorted gum anime; 3 gals. clarified oil; ¼ lb., each, litharge, dried copperas, and dried sugar of lead; 6½ gals. turpentine. Boil until it strings; then mix and strain. Where large quantities are required, boil off the 3 runs in the boiling pot. Used by house painters, grainers, builders and japanners; it will dry in 2 hours in summer and in 4 in winter.

WAX VARNISH.—1. Take of pure white wax, 1 lb.; melt with gentle heat; add of warm rectified spirit, sp. gr. .83, 1 pt.; mix, and pour the liquid out upon a cold slab; grind to a smooth paste, adding more spirit as required; put the paste into a marble mortar, make an emulsion with water, 3½ pts., gradually added, and strain through muslin. Used as a varnish for paintings; when dry, a hot iron is passed over it, so as to fuse it and render it transparent; when cold, it is polished with a clean linen cloth. The most protective of all varnishes. — 2. Wax, 5 oz.; oil of turpentine, 1 qt.; dissolve. Used for furniture.

WHITE GROUND JAPAN. — Flake white, or white lead, washed and ground up with ½ of its weight of starch, and dried; temper properly for spreading with mastic varnish. Lay on the body to be japanned; then varnish with 5 or 6 coats of the following: Seed-lac, 2 oz.; gum anime, 3 oz.; reduce the gums to a coarse powder; dissolve in 1 qt. spirits wine; strain off the clear. The seed-lac will give a slight tinge to this composition, but it cannot be omitted where the varnish is wanted to be hard, though where a softer will answer the end the proportion may be diminished, and a little crude turpentine added to the gum anime to take off the brittleness.

WHITE VARNISH.—1. Gum sandarac, 3 oz.; mastic, in drops, 1 oz.; gum elemi, ½ oz.; oil of spike lavender, ½ oz. Put into 1 pt. vial, and fill up with best spirits wine; let it stand in a rather warm place till the gums are dissolved; then pour off into a clean vial, and it is ready. — 2. (*Imitation Ivory.*) Take ½ oz. isinglass, boiled gently in ½ pt. water till dissolved; then strain, and add flake white powder till it becomes as white as cream. Give the box or carved wood 3 or 4 coats, letting each dry before the other is put on; then smooth it with a damp rag. It has the appearance of ivory. If, when mixed, it looks too white, a few grains of carmine will give it a pink look, or use chrome yellow; either of these colors improve it.

WATER-PROOFING.

AWNINGS.—Awnings can be rendered water-proof by plunging the fabric into a solution containing 20 per cent. of soap, and afterwards into another solution containing the same percentage of sulphate of copper. Wash, and the operation is finished.

CANVAS.—1. The oiled water-proof is usually prepared by saturating the dry fabric with a varnish prepared as follows: Boiled linseed oil, 100 parts; wax, 15 parts; litharge, 3 parts; oil of turpentine, q. s. The oil is heated so as to melt the wax, which, with the litharge, is then incorporated with it, and the mixture thinned with turpentine. — 2. 3 baths are prepared in separate vats, standing side by side. The first is made by dissolving simple sulphate of alumina (the commercial concentrated alum cake), in 10 times its weight of cold water. For the second, make a solution of equal parts of resin and palm soaps, in 30 times their weight of boiling water. The third bath consists of water only. Soak the fabric thoroughly in the alum bath; next pass through the soap bath, still hot, and finally rinse in the water bath. — 3. Saturate the fibres with soap, by boiling in strong soapsuds of Castile or curd soap; press out the excess of liquid, and steep 24 hours in a strong aqueous solution of alum; rinse in water, and repeat, if necessary. — 4. 9½ gals. linseed oil; 1 lb. litharge; 1 lb. umber; boil together 24 hours; may be colored with any paint; lay on with a brush.

PACKING PAPER.—Cover the paper with a resinous liquid; then paint with a solution of glue and soot, as, without this, the paper will later show blotches; when this has dried, the water-proof coat is applied. Put 2½ oz. powdered shellac in 2 pts. water; bring to a boil gradually, and add ½ oz. powdered borax; while hot, any mineral color may be added, such as lump-black, yellow ochre, red ochre, iron blue, or burnt umber. The liquid is now left to cool, when it is ready for use. The operation is performed with a brush.

TEXTILE FABRICS.—1. Soap, 2 oz.; glue, 4 oz.; water, 1 gal. Soften the glue in cold water, and dissolve it with the soap in the water by aid of heat and agitation. The cloth is filled with this solution by boiling it in the liquid several hours, depending on the kind of fibre and thickness of the cloth. When saturated, the excess of liquid is wrung out and the cloth exposed to the air until nearly dry; then digested 5 to 12 hours in the following solution: Alum, 13 oz.; salt, 15 oz.; water, 1 gal. It is finally wrung out, rinsed in clean water, and dried at a temperature of about 80° Fahr. — 2. Moisten the cloth on the wrong side with a weak solution of isinglass; when dry, apply an infusion of nut-galls. — 3. Apply a solution of india-rubber, dissolved in oil of turpentine; then lay on a coat of another india-rubber varnish, made drying by the addition of driers. — 4. 1 lb. sugar of lead; 1 lb. alum; pound separately, and mix in a basin; pour 2 qts. boiling water on the mixture; let it stand 6 hours, and then bottle for use. Apply to the cloth with a sponge or soft brush on a table till well saturated; then iron it and hang up to dry. — 5. Take 3 lbs. alum, and dissolve it in water, and to it add 1 lb. acetate of lead, previously dissolved; let this stand till clear; then pour off the solution on to 1 lb. glue, previously dissolved in water; heat up to 185°, and place the cloth in for ½ hour; take it out and place in running water; afterwards dry. — 6. Boil together 2 lbs. turpentine, 1 lb. litharge in powder, and 2 to 3 lbs. linseed oil; put on the cloth with a brush and dry in the sun. — 7. The following is for linen, hemp, and cotton fabrics: 1 lb. white soap is dissolved in 13 gals. water, which must be heated without raising it to a boil; 2½ lbs. alum are dissolved in a similar quantity of water; to this solution 2½ oz. gelatine are added, previously dissolved in water; lastly, the solution of soap is mixed with that of alum. Enter the goods and distribute them in the warm (but not boiling) liquid; when impregnated, hang them up by one end, and allow the water to drain off. — 8. Cloth coated with linseed oil, to which a little wax and litharge have been added, will be water-proof.

UMBRELLAS. — Dry first in a warm place; then apply a coat or two of a solution of 100 parts paraffine and 5 to 10 parts beeswax in 500 parts benzine.

WALLS, Concrete.—Boil linseed oil 2 or more hours, until it forms, on cooling, a tough, viscid mass. If, while hot, or thinned a little with benzine, this is painted over walls, the composition will form a water-proof coating. In boiling the oil, take care that the fumes do not take fire; but if they do, put a sheet iron, or tin, or a thick wet mat, or piece of carpet over the pot, to shut out the air and extinguish the flames; on no account throw in water; be provided and ready for the emergency.

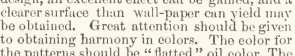
WALL DECORATION.

DISTEMPER.—Colors are said to be in distemper when mixed with size or gum and not with oil. Painting in distemper is sometimes identified with fresco painting, but there is a difference. Fresco painting is executed upon a damp surface and distemper on a dry one. Since colors prepared with size soon dry or set, the work requires rapid execution; and since they may be seriously injured by damp and other causes, varnish the work if its durability is important. Distemper colors are applied to plaster, and, to a large extent, to wood and other

materials. It is cheaper than oil, looks well, and, if protected, lasts long. The process for a wall or ceiling coated with plaster is this: Put some whiting into water, and when well saturated pour the clear water off. Grind separately in water a little indigo or ivory black, and mix it with the whiting. Then stir in strong warm size; strain while warm and put in a cool place; when it becomes a jelly it will be fit for use. If too much size is employed the color may peel off; for a first coat the mixture must be moderately strong. The plaster must be clean before covered. A second coat must be applied to finish the operation. The colors, previously ground in water, should be cautiously mixed, and the shade tested by drying a little on a shingle or white paper; if too dark, add more whiting; if too light, more color. Now add enough melted glue to fix the color hard, so as not to rise or wash up with your second coat, and test on paper or wood also. For *Yellow*, chrome yellow or different tints may be used. *Buff* or *Drab* can be got by a mixture of yellow ochre, red, blue, or black, and sometimes umber. Buff or drab colors may be produced by yellow ochre, chrome yellow, or raw sienna, intermixed with Turkey umber. For *Green*, mineral or Paris green are first class. Any good chrome green will suit. For *Blue*, use cobalt ultramarine blue, Prussian blue and verditer. For *Gray*, a composition of white, blue, red and black. For *Red*, vermilion, Indian red, Venetian red, lake, carmine. For *Pink* or *Rose* tints, a mixture of red with white; if not wanted bright, use Indian red; if a rich color is desired, use carmine, lake, Venetian red, or vermilion. For *Black*, blue black and the Frankfort, or pure ivory black. For *Browns for shading, etc.*, burnt sienna, burnt ochre, purple brown, colcother, burnt umber, Vandyke brown. *French size, for Gilding Ornaments, Ceilings, etc.*: Mix thick glue to the proper consistence with a little pure honey; this imparts a beautiful color to the gold, and gives a splendid effect to the work. Previous to using the distemper colors, give the walls and ceilings, if new and clean, a good coat of paint, which should be mixed about $\frac{2}{3}$ turpentine and $\frac{1}{3}$ linseed oil, using as much Japan dryer as will dry it hard; be careful of adding too much oil, as it will spoil the subsequent work. When distemper is applied to wood, it will bear almost any of the common varnishes; and when quite dry, a coat of linseed oil will render it almost equal to ordinary oil paint.

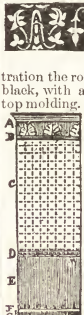
FRESCO.—This method of painting is confined to decorating walls of buildings, and is executed by incorporating the colors with the still moist plaster, or gesso. The pigments are mineral or vitreous. While the ground is being prepared, a drawing on paper is made of the subject, executed with a correct outline and with the wished-for effect properly shown. When the finished drawing is made the size of the painting, it is executed in black and white with ink or crayons; but it is necessary to have a study of the subject is colors, and this is done on a small scale. The pigments used are mostly minerals, ground and applied with pure water. With the surface of the wall still wet, but firm and smooth, the tracing is laid over the portion prepared, and the lines of the drawing slightly indented on the plaster with a blunt point; or the lines have small holes in them pierced at intervals, and the design, thus pricked, is laid upon the ground and dusted with a pounce-bag containing fine dry powder, and the outline repeated on the ground by the dots of powder. When the intonaco has become firm enough to bear the pressure of the finger the first washes of color may be put on. If the painting is to be large, only sufficient plaster is put on to serve for the part which can be accomplished in the time at the disposal of the painter, and this portion should end at the edges of some bold outline, as flowing drapery, a pillar, etc. A difficulty with fresco painting is that the colors become lighter after the plaster dries. This can be avoided by putting a touch of color upon a piece of umber, which instantly dries and shows the color as it will be after the intonaco dries.

STENCILING.—This is produced by applying color with a brush over a plate of zinc or piece of stout card-board on which the design has been cut out. When the ground color is judiciously chosen, and the patterns for "wall powderings," as they are termed, are of satisfactory design, an excellent effect can be gained, and a clearer surface than wall-paper can yield may be obtained. Great attention should be given to obtaining harmony in colors. The color for the patterns should be "flatted" oil color. The patterns should be of a diaper character, of which examples are here given. In the illus-



Stencil Patterns.

tration the room has a shirting-board, painted black, with a narrow gold line run along the top molding. The dado, 4 ft. high from the floor, is dark olive or sage color, with a border of small gold bead at the top; above, to within 18 in. of the ceiling, the wall is stained with a dull orange yellow, powdered with rosettes of olive. The frieze may consist of some conventional figure or floral pattern in sea green, white and deep red, with a few black lines; and if there is any cornice above, it may be lightly picked out in the primary colors or heightened with gold. Here *A* is the cornice; *B*, frieze; *C*, represents the filling in; *D*, shows the border; *E*, is the dado; *F*, gold molding; *G H*, skirting-board. A purple design on a citrine ground, or russet figures on an apple green, would also be in harmony.



Wall Decoration.

Stencil Corner.

PROF. SLICK DISCOVERS A STRONG SOAP.

SOAP AND CANDLES.

CANDLES.

CANDLES are either dipped, molded or rolled. The cheaper sorts of tallow candles are formed by the first process, and wax candles by the last; all the other kinds are molded.

ADAMANTINE, From Tallow.—Melt together 10 oz. mutton tallow; camphor, ¼ oz.; beeswax, 4 oz.; alum, 2 oz.

BLEACHING WAX.—Stakes or posts are driven into the ground, and 2 ft. from the ground bagclothes are stretched over them, or table-like frames are made from strips of cloth stretched over the frames in the same manner as a sacking-bottom is stretched over a bedstead, care being taken to fasten the ends of the cords to the posts sufficiently firm to prevent loosening. The wax ribbons are spread upon the cloth in a thin layer. It is important that the sun's rays may have full play upon the exposed wax, but at the same time protected from winds. The ribboned wax is daily turned over, in order that fresh portions may be affected by the sun; and should it not be sufficiently moistened by the dew or rain, soft water is poured over it. When not gradually becoming whiter, but continuing yellow upon the fracture, it is remelted, ribboned, and again bleached. The continuence of the bleaching varies, depending upon the weather; often one exposure to the sun and air suffices to bleach it. Four weeks are generally sufficient. The bleached wax is finally fused into cakes or blocks, previously moistening the molds. As fast as the wax congeals, the cakes are thrown into a tub of clean, cold water, and then taken out and spread upon a packthread sieve for draining. Eventually, they are dried and packed in boxes for the market, the loss being from 2 to 8 per cent.

BLEACHING AND CLEARING TALLOW.—Dissolve alum, 5 lbs., in water, 10 gals., by boiling; and when dissolved, add tallow, 20 lbs.; continue boiling for an hour, stirring and skimming; when cool, strain through thick muslin; then set aside to harden; when taken from the water, lay it by for a short time to drip.

BOUGIES.—Melt slowly over a moderate fire, in a well-tinned copper kettle, 70 lbs. pure spermaceti; then add piecemeal and during constant stirring, 30 lbs. best white wax. By increasing the wax to 50 lbs., the resulting product is much more diaphanous; however, the bougies molded of this mixture are not as durable as candles made exclusively of wax. They are tinted in different colors. For red, carmine or Brazil wood, together with alum, are used. Yellow is given with gamboge, blue with indigo, and green with a mixture of yellow and blue. Sometimes the bougies are perfumed with essences, so that in burning they may give an agreeable odor.

COMPOSITE.—Melt together, over a water bath, 100 parts stearic acid, and 10 to 11 parts bleached beeswax; to insure success, the mixture must remain over the bath 20 to 30 minutes, without being stirred. At the end of that time the fire is to be extinguished, and the fluid allowed to cool until a pellicle is formed on the surface, when it is cast direct into the molds, heated to the same temperature, with the precaution of avoiding stirring the mixture, which would cause opaqueness.

DIPPED CANDLES.—These candles are made by stringing a number of wicks upon a rod, and dipping them in melted tallow repeatedly. The clarified and remelted tallow is poured into a tightly joined walnut or cherry trough, 3 ft. long, by 2 ft. wide, and 10 to 12 in wide at the top, gradually diminishing to 3 or 4 in. at the bottom. A handle is fixed on each end for easy removal, and when not in use closed with a cover. The operator commences by stringing 16 to 18 wicks at equal intervals on a thin wooden rod, 2½ ft. long, and sharpened at the ends; then takes 10 or 12 such rods and dips the wicks rapidly into the fluid tallow in a vertical direction. This tallow should be liquid, so that the wicks may be soaked uniformly, after which the rods are rested on the ledges of the trough, when, if any wicks be matted together, they are separated, and the rods so placed on a frame, having several cross-pieces, that the uncongealed tallow from the wicks may drop down; while this is going on, which continues until the tallow is solidified, the operator is preparing another

batch of rods. The fat in the trough, meanwhile, is so far cooled that in immersing the first dip again, a thicker layer will adhere to the wicks. When the tallow solidifies at the sides of the vessel, the temperature is the most convenient for the object in view. It is sometimes necessary to stir the ingredients to produce a uniform admixture, and in such cases much care should be taken, so that no settlings be mingled with the mass, while, by the addition of hot tallow, any desired temperature may be obtained. The tallow on the wicks between each dipping becomes so gradually hardened that, at the third or fourth immersion, new layers solidify; as a natural consequence of dipping, the lower ends of the wicks become thicker than the upper, to remedy which the lower ends are again put into the melted fat for a few minutes, when the heat diminishes their dimensions. The dipping is continued until the candles acquire the requisite thickness. The conical spire at the upper end is formed by immersing deeper at the last dip, and if, eventually, the candles are too thick at the lower end, they are held over a slightly heated folded copper sheet, so that the fat may melt, but not be wasted.

HARDENING TALLOW.—To 1 lb. tallow, take ½ lb. common rosin; melt them together, and mold the usual way. This will give a candle of superior lighting power, and as hard as a wax candle; a vast improvement on the common tallow candle in all respects, except color.

IMITATION WAX. — 1. Throw quicklime into melted mutton suet; the lime will fall to the bottom, and carry along with it all the dirt of the suet, so as to leave it as pure and fine as wax itself. — 2. One lb. alum dissolved in warm water to each 5 lbs. tallow; melt the tallow; add the alum water; let the water pass off in steam; run into molds. This will make the candles hard and look like wax.

LARD.—Dissolve ½ lb. alum and ½ lb. saltpetre in ½ pt. water on a slow fire; then take 3 lbs. lard, cut into small pieces, and put into the pot with this solution, stirring constantly over a moderate fire, until the lard is dissolved; then let it simmer until all steam ceases, and remove at once from the fire. If you leave it too long it will get discolored. These candles are harder and better than tallow.

MOLDED CANDLES. — For molding, besides the common metal molds (a mixture of tin and lead), molds of glass are sometimes used. The former are slightly tapering tubes, varying in length and dimensions according to the size of the candle to be manufactured, and, when required, are arranged in regularly perforated wooden frames or stands, with the smaller end downwards, forming the upper or pointed part of the candle. At this smaller end, the wick, previously saturated in melted fat, is inserted, filling the aperture, and, passing up the centre, is fastened perpendicularly at the upper end of the tube, to which is attached a movable cover. The melted fat is then poured in, generally with a small can, but a tinned iron syphon is better. It is requisite that the tallow should completely fill the mold, remain uncracked on cooling, and be easily removable from the molds. This can only be obtained when the fat at the sides cools more quickly than that in the interior, and when the whole candle is rapidly cooled. A cool season is far better; but a certain condition of the tallow, namely, that which it possesses at a temperature very near its melting point, is absolutely necessary. Candle-makers recognize the proper consistence of the tallow for molding by the appearance of a scum upon the surface, which forms in hot weather between 111° and 119° Fahr., in mild weather at 108°, and in cold about 104°. The tallow is usually melted by itself; sometimes, however, over a solution of alum. The candles are easily removed from the mold the day after casting, to be cut and trimmed at the base. Molding by hand is a tedious operation, and only practiced in the small factories; in extensive establisments, where economy of time and labor is a consideration, machinery is employed.

ROLLED, or WAX CANDLES.—Made either by pouring melted wax over the wicks, or by applying the wax in a soft state with the hands, and afterwards rolling it smooth with a roller of polished boxwood, upon a table formed of polished walnut. They are then cut and trimmed. The first part of this process is conducted over cisterns of melted wax, and the wicks are strung upon an iron hoop suspended from the ceiling.

SPERMACETI.—This is usually mixed with 3 per cent. wax or paraffine, to destroy its crystalline structure; it is molded in the usual way with plaited wicks that require no snuffing.

STEARINE. — Made of the stearine of stearic acid, obtained from tallow, in the same way as other mold candles. They furnish a superior light, and burn a long time.

TALLOW.—First, the fat is chopped; cutting machines are often used similar to the straw-cutting table; sometimes a thin, sharp-edged mince hatchet is employed, about 2½ ft. long, held with both hands, and the fat, spread on a beech block, is chopped into pieces in all directions. A third instrument is a kind of stamp trough, with a muller, having a sharp blade in the form of an *S*. A more desirable instrument is the ordinary rotary sausage cutter. The fat is then placed in caldrons, made of cast iron and heated by open fire. These caldrons are covered with movable tin plate hoods, so adjusted that, by means of pulleys, ropes and counter weights, they can be raised or lowered, while, at the same time, they serve to carry off offensive vapors. Water is sometimes mixed with the fat in the caldrons, and is beneficial when the fat has been long kept during summer, and thereby lost moisture by evaporation. By gradually raising the temperature in the pan, the fat runs from the cells, and the whole is kept boiling 1 to 1½ hours. During the operation of melting and boiling, the ingredients must be stirred, in order to keep the fat and cracklings in agitation; otherwise pieces of unmelted suet, coming in contact with the sides or bottom, would scorch and acquire a brownish tint, of which the whole melting would necessarily partake. Scorched tallow is not readily whitened. For separating the melted fat from the cracklings, it is ladled off from the caldron into a willow basket, or a copper box, perforated

at the bottom with small holes, set over large copper coolers, and allowed to remain undisturbed till all foreign matters have settled. Before it congeals, it should be transferred into wooden pails. This operation is continued as long as the cracklings yield fat; and during the process the heat maintained at a moderate temperature, to avoid scorching. When the cracklings begin to harden, they acquire a darkish tint, and hence are said to be browning. They are then pressed, and the fat thus obtained possesses somewhat of the brown color of the cracklings, but not so much as to render it unfit for use as soap stock; it may be mixed with that which has spontaneously separated while heating.

TALLOW, To Deodorize.—Mix 14½ lbs. freshly melted fat with 5 dr. table salt and 15 gr. powdered alum; heat until a scum forms, which is to be separated; when the fat has cooled, it is washed with water to remove the salt, and then heated gently until the water is evaporated.

TAPERS. — These are of various degrees of thickness, not made of pure wax, but of wax (usually vegetable wax) and tallow, the latter being added to give flexibility. When required to be colored, resin and turpentine are added to the tallow.

WICKS. — The wicks of tallow candles are made of the rovings of Turkey skein cotton, 4 or more of which, according to the intended thickness of the wick, are wound on a reel, from which they are again run off and cut into proper lengths. Latterly, wicks of best candles have been made so that they do not require snuffing. This is effected by causing the wick to bend over, and its end to fall outside the flame, where it is exposed to the oxygen of the air. This bending over is variously brought about, by twisting the wick with one strand shorter than the rest, which, being slightly stretched during molding, contracts again and bends the wick when the fat melts; and by plaiting the cotton into a flat wick, which naturally takes the required curve; such a wick is generally dipped in a solution of borax, which preserves it from being acted upon by the flame except at its extreme point at the edge of the flame. A very fine wire is sometimes included in the plaited wick. The wicks of candles should be free from inequalities, as well as from adhering particles of cotton, the presence of all of which are the cause of guttering. The finer the thread of which wick is composed, the more complete will be the combustion. Unless the above precautions are attended to, in selecting the wick, it will not be entirely consumed.

SOAP.

REMARKS.—All soap is a compound in definite proportions of some oil, fat or resin, with a saponifying base, which must be alkaline if intended for cleansing purposes. Fats are composed of a solid substance, called *stearine*, and a liquid one called *oleine*. When either of these is boiled with a strong solution of caustic potash or soda, a remarkable change takes place, called *saponification*. The product is a viscid, homogeneous and transparent mass, soluble in warm water, and partially so in cold, but insoluble in saline solutions. The basis of scented or toilet soaps is good soap of the ordinary kinds, either soft or hard, which is remelted and perfumed. The soaps are first reduced to shavings; these are put in a copper pan with a water bath; if the soaps are new they will melt on application of heat; but, if they are old, a little water is added; when the fusion is complete, some perfume, and, if required, some coloring matter, are added, and the soap is then poured into molds. Cheap scented soaps contain a very large proportion of yellow soap or of common curd.

INGREDIENTS.

BEEF TALLOW.—This is mostly used; it has a yellow tint, due to coloring matter, separable by several washings in hot water; firm, brittle, but not so white as mutton suet. That rendered by steam is generally the whitest.

BONE FAT.—Bones contain about 5 per cent. of fat, brownish white in color, and of an oily consistency. Only fresh bones are adapted for the extraction of fat. They are generally split up lengthwise by a hatchet, boiled in water, by means of which the fat is extracted, decanted, and filtered. For purifying bone fat, melt the fat and a small quantity of saltpetre together, and afterwards add sufficient sulphuric acid to decompose the latter. The mass scums much, becomes of a light yellow color, loses its noxious smell, and furnishes a fat well adapted for soaps.

COCOANUT OIL. — Six fatty acids have been discovered in the cocoa butter; most of which being solids accounts for the great firmness of the soaps it forms. This fat is also remarkable as uniting with soda lyes in any proportion, without separating from them. Owing to this property, this fat is used in large quantities for the making of filled soaps. It is very slow to unite with lye by itself; it is, therefore, usually applied in combination with tallow or palm oil, increasing their emollient properties, and also giving to the tallow soaps a brilliant whiteness.

FISH OIL.—Fish oil is used as a burning fluid, for making soft soaps, and for adulterating other oils.

GREASE, To Preserve. — Boil all the scraps, rinds, and bones, in a weak lye, and the purer grease in clear water; let the mixture cool, take off the cake of grease, and strain it; it is well to do this occasionally, as you save it; for when kept a long time, impure grease becomes offensive. Dry off all the water before laying away.

HORSE FAT.—The soap made from horse fat, after several successive boilings, is white and firm; but, owing to its peculiar odor, it can only be employed in the preparation of palm and rosin soaps.

LARD.—Lard is an excellent material for soap

manufacturers; it forms a white, sweet, and pure soap. For the purpose of rendering it more frothing, it is saponified either with tallow or cocoanut oil.

LYE. — 1. The potash lye is used for making soft soap, and in domestic practice is generally obtained by filtering water through a mixture of 19 parts hard wood ashes and 1 of freshly slaked lime. — 2. When wood ashes cannot conveniently be had, it is usual for soap manufacturers to use equal quantities of freshly slaked lime, and sal soda, soda ash or caustic soda, using water enough to give the lye sufficient strength to support a fresh egg. It must be strong. The solution can be effected by heat, or stirring, finally drawing off, or baling out the liquid clear of sediment, previously throwing in salt and giving time for sediment to settle. 1 ton of yellow soap will require about 1,000 lbs. tallow and 350 lbs. resin, with lye sufficient. The same quantity of white soap will require nearly 1,300 lbs. tallow, boiling in every case with the proper quantity of lye, until it forms a perfectly homogeneous mass by a perfect blending of the component parts; when it is poured out into suitable frames to harden. It is afterwards cut up into bars by means of wires to which handles are attached, and then piled to dry.

MUTTON TALLOW.—This, saponified with soda lye, yields a beautiful white soap, but being rich in stearine it is liable to become too hard. In order to obtain a more unctuous product, it is mixed with 20 per cent. of lard or cocoanut oil, whereby a superior soap is obtained.

OLIVE OIL. — There are 3 kinds, namely, the virgin oil, obtained by a gentle pressure of the fruit; a second kind, gained by submitting them to the action of hot water and pressing them between metallic plates previously heated; and the third, an inferior kind, is the product of this residuum when boiled in water. Only the two latter serve in the manufacture of soaps; they yield an excellent soap, esteemed for its agreeable odor. It is extensively used by soap manufacturers in Marseilles and for Windsor soap.

PALM OIL.—This is of an orange color, and when not rancid, of a violet odor. Palm oil is employed both in the bleached and in the natural state. Bleached, it produces a soap of beautiful whiteness, and rich with the characteristic odor of the oil.

POPPY OIL. — Is whitish yellow, of an almond taste, and is especially used for the manufacture of soft soaps; in France it is employed with tallow for the manufacture of an imitation Marseilles soap.

SODA. — Soda is of more importance to the manufacturer of soap than potash, because he could not make hard soap without it. The amount of native soda is decreasing and inadequate to supply the demand. A small quantity is produced by the incineration of certain plants, but the largest portion now used is acquired from the transformation of salt. The best quality of native soda is generally imported from Spain and the Levant, and known as barilla. It contains from 15 to 30 per cent. of carbonate with a little sulphuret, and is mixed with sulphate and muriate of soda. It is considered superior to the artificial, as the hard soap made with it is found to be less brittle and more plastic.

SODA ASH.—The method of manufacturing soda ash is based upon the preparation of sulphate of soda from salt, its transformation into crude carbonate of soda, designated black ash, and the purification of the crude soda by lixiviation, evaporation, and calcination. The product obtained is white ash, or soda ash.

SODA, Caustic.—This can be purchased either as a solid or a liquid. In the latter state it is called concentrated lye, and soapmakers find it a convenient commodity, as it saves the trouble of preparing it. A certain weight of caustic soda represents a larger amount of soda combining with the fats than the ordinary soda. Both red and white are of equal value, for when the red caustic soda is dissolved, the coloring matter generally settles at the bottom, and liquid becomes clear.

SPERM OIL.—Found in commerce bleached and unbleached, the latter having a brownish appearance and disagreeable odor. It is easily saponified, and the resulting soap is readily soluble in water.

Laundry Soaps.

CALIFORNIA.—For large bars of yellow soap. 2 lbs. sal soda; 3 oz. borax; 1 oz. liquid ammonia; shave the soap in thin slices; put into 8 qts. rain-water; when the soap is nearly dissolved, add the borax and sal soda; stir till all is melted; pour it into a large tub or shallow pan; when nearly cool add the ammonia slowly, mixing it well; let stand a day or two; then cut into bars, and dry in a warm place. Excellent for all household purposes.

CHEMICAL.—1. Pour 12 qts. soft boiling water on 5 lbs. unslacked lime, then dissolve 5 lbs. washing soda in 12 qts. soft boiling water; mix the two together and let them remain so 12 to 24 hours, for chemicalizing; now pour off the clear liquid, being careful not to disturb the sediment; add to the liquid 3 lbs. clarified grease and 4 oz. rosin; boil together 1 hour; pour out to cool, and cut in bars. — 2. Powdered Fuller's earth, ½ oz.; just moisten with spirits turpentine; add salts tartar, ½ oz.; best potash, ½ oz.; work the whole into a paste with a little soap. Excellent for removing grease spots.

ENGLISH BAR.—6 gals. soft water; 6 lbs. good stone lime; 20 lbs. sal soda; 4 oz. borax; 15 lbs. fat (tallow is best); 10 lbs. pulverized rosin, and 4 oz. beeswax; put the water in a kettle on the fire; when nearly boiling add the lime and soda; when these are dissolved, add the borax; boil gently; stir until dissolved, then add the fat, rosin, and beeswax; boil gently until it shows flaky on the stick, then pour into molds.

ERASIVE.—1. A genuine erasive soap that will remove grease and stains from clothing, is made as follows: 2 lbs. good Castile soap; ½ lb. carbonate of potash, dissolved in ½ pt. hot water; cut the soap in thin slices; boil with potash until it is thick enough to mold in cakes; add alcohol, ½ oz.; camphor, ½ oz.; hartshorn, ½ oz.; color with ½ oz. pulverized charcoal. — 2. Take 6

lbs. good white soap, 1 ox-gall, and the whites of 4 eggs; put them into a mortar with 2 lbs. calcined and powdered alum; grind together thoroughly, and put the mortar in a damp place for 24 hours. By that time the mixture should be a thick paste, which must be worked into cakes. If at the end of 24 hours it is not a thick paste, put it in a dry place until it has hardened; then cut anew and grind again in the mortar.

EXCELLENT HOUSEHOLD.—1. When the boiling lye will strip a feather clean, put in 2 gals. lye, 1½ lbs. clean grease; boil it (trying whether it has enough of grease with a feather), until it becomes thick; then throw in 1 pt. salt and 5 lbs. borax, to 4 gals. soap; boil it awhile longer; and set it off to cool; when hard, cut in bars, scrape off the sediment from the bottom, and put it on a shelf to drain. The lye, etc., at the bottom of the kettle answers for rough scouring, but it is more useful on the garden. — 2. Take 3 lbs. unslacked lime, 6 lbs. washing soda, 4 pailfuls soft water, boiling hot, turned over the soda and lime; let it stand over night. In the morning pour it off; then put in 6 lbs. tallow and boil 1½ hours, stirring occasionally; then put in 1 pailful cold water and boil ½ hour; then put in two handfuls salt, and let it stand until cold; cut into bars and dry. — 3. Take 5 lbs. Castile soap, cut fine; 1 pt. alcohol; 1 pt. soft water; 2 oz. aquafortis; 1½ oz. lampblack; 2 oz. saltpeter; 3 oz. potash; 1 oz. camphor, and 4 oz. cinnamon, in powder; first dissolve the soap, potash, and salpeter by boiling; then add the other articles, and continue to stir until it cools; then pour into a box and let it stand 24 hours and cut into cakes. — 4. Dissolve ½ pt. washing soda; put in 2 lbs. good hard soap; cut in slices, and boil until a mass is formed; then add ½ oz. each alcohol, camphor, ether and liquid ammonia, and mold into cakes. — 5. For 4 lbs. tallow, oil, or lard, take 2 lbs. soda, 1 lb. unslaked lime, ½ oz. beeswax, ½ oz. rosin, ½ teaspoonful borax; put the lime and soda in a vessel with 6 qts. water; stir well, and allow the liquid to settle till clear; then pour off and strain the clear lye, and pour into the lime and soda 1 gal. water; when clear, strain into another vessel; melt the grease, and when it is boiling, pour in the weak lye, a cupful at a time, till the whole is saponified; continue to boil, and add the strong lye till the whole is in; keep boiling and stirring till so thick that the spoon will stand without holding; now add the rosin and borax pulverized; stir them in well and pour the soap into a mold, cut to suit when cold. — 6. To make matchless soap, take 1 gal. soft soap, to which add 1 gill common salt, and boil 1 hour; when cold, separate the lye from the crude; add to the crude 2 lbs. sal soda, and boil in 2 gals. soft water till dissolved. — 7. Take 3½ lbs. good soft soap; 2 lbs. sal soda; 1 oz. borax; ½ ounce hartshorn, and ½ lb. rosin; dissolve in 11 qts. water, and boil 20 minutes.

GALL.—Gall soap, excellent for washing silks and ribbons, may be made by heating 1 lb. cocoanut oil at 60° F., into which ½ lb. caustic soda is gradually stirred; then add ½ lb. Venice turpentine, previously warmed in another vessel. The kettle is allowed to stand 4 hours, subject to a gentle heat, after which the fire is increased until the contents are clear. 1 lb. ox gall, followed by 2 lbs. Castile soap, is then mixed in, and the whole allowed to cool, when it may be cut into cakes.

LARD.—Sal soda and lard, each, 6 lbs.; stone lime, 3 lbs.; soft water, 4 gals. Dissolve the lime and soda in the water by boiling and stirring; settle and pour off; then return to the kettle (brass or copper) and add the lard; boil till it becomes soap; then pour into a dish or molds; and when cold, cut into bars.

TURPENTINE. — Cut up 1½ lbs. brown soap, and melt it in 3½ qts. water; then put it in a stone pot, and add 1½ tablespoonfuls spirits turpentine and 3 of alcohol.

YELLOW.—Common yellow soap consists of soda, with oil or fat, and resin. Resin is a feeble acid, capable of combining with alkali, but neutralizing it less completely than oil, so that the soap formed is too powerfully alkaline. But when resin is worked with an equal proportion of oil, it makes an excellent soap for many purposes. The following is a good receipt: Tallow and sal soda, of each, 112 lbs.; resin, 56 lbs.; stone lime, 28 lbs.; palm oil, 8 oz.; soft water, 28 gals. Pour soda, lime and water into a kettle and boil, stirring well; then let it settle, and pour off the lye. In another kettle melt the tallow, resin and palm oil, having it hot, the lye being also boiling hot; mix all together, stirring well, and the work is done.

Soft Soaps.

BROWN COUNTRY.—10 lbs. potash of a gray or dark chocolate color; pure rendered tallow or grease, 12 lbs.; dark resin, 12 lbs.; place the potash in an iron kettle, add 4 or 5 gals. boiling water, and boil till the potash is dissolved; if it should attempt to boil over, add a little cold water; let it stand a few hours to settle; then drain off the clear lye and add more cold water to the sediment, and drain off as before; repeat, if necessary, to obtain all the strength. Now add the lye, tallow, and resin together, and boil gently till the tallow is saponified, which is known when the soap becomes clear like honey; now add 12 to 15 gals. water, and set aside for use.

COLD. — Take from 20 to 30 lbs. strained grease to 1 bbl.; the lye or potash must be strong enough to bear up an egg, so as to leave a spot as big as a dime piece clear. Heat the grease very hot, turn it into the barrel, and fill up gradually with strong lye. If only 20 lbs. of grease are used, it must not all bear up an egg; but if made strong, it must be reduced when you use it, by adding an equal quantity boiling water, when it will be as thick as before.

EXCELLENT HOUSEHOLD. — 1. Put 1½ pails lye, that will bear up an egg, in the soap barrel, and add 8 lbs. melted grease, free from sediment; thin with weak lye as it is obtained from the leach; stir occasionally. It should thicken and be ready for use in 2 or 3 days, providing the weather is warm, or the barrel stands in a warm place. — 2. ¾ lb. washing soda and 1 lb. brown soap (cut in small pieces); put into a large stone

jar on the back of the range, when not very hot, and pour over it 1 pailful cold water; stir once in a while, and when dissolved put it away to cool. It forms a sort of jelly, and is excellent to remove grease on floors or shelves. — 3. To 20 lbs. clear grease, take 17 lbs. pure white potash in fine lumps, and place it in the bottom of the soap barrel, which must be water tight and well hooped. Boil the grease and pour it hot on the potash; then add 2 pailfuls boiling hot water; dissolve 1 lb. borax in 2 qts. boiling hot water, and stir well. Next morning add 2 pails cold water, and stir ½ hour; continue this, till a barrel containing 36 gals. is filled. In 1 week it will be fit for use. The borax can be turned into the grease while boiling, and also 1 lb. resin. Soap made in this manner always comes, and will last twice as long as that bought. Grease must be free from scraps, ham rinds, bones, etc. The soap will be like jelly. — 4. Dissolve 1 lb. concentrated lye in 8 gals. water; boil it with 4 lbs. clear soap fat, and when the grease is all cut set it away to cool; add 1 gal. hot water to this and stir well; in the course of a few hours put in another gal., and continue adding water until the soap is of the desired consistency. To make hard soap of this, stir in common salt; but an easier way would be to substitute washing soda for a portion of the potash, and use some lime with it. — 5. Take 6 gals. soft water; add 3 lbs. best hard soap (cut fine); 1 lb. sal soda; 4 tablespoonfuls hartshorn; boil till dissolved; pour into vessels, and when cold it is fit for use. This makes 50 lbs. fine jelly soap.

LARD.—Potash, 6 lbs.; lard, 4 lbs.; resin, ¼ lb. Beat up the resin; mix all together, and set aside for 5 days; then put the whole into a 10 gal. cask of water, and stir twice a day, for 10 days, when it is ready for use.

Toilet Soaps.

ALMOND. — Oil of almonds, 7 lbs.; soda, 1½ lbs.; water sufficient. The soda must be rendered caustic before adding it to the oil, and heat then applied. An easy way of preparing the soda is to treat it in solution with powdered quicklime.

ANTIMONIAL.—Prepared by dissolving 1 part golden sulphuret of antimony in 2 parts of a saturated solution of caustic potash, to this add of Castile soap, in powder, 4 parts; triturate till the whole assumes a proper consistency.

BOUQUET. — 1. White curd soap, finest, 17½ lbs.; olive oil soap, 2½ lbs.; oil of bergamot, 1 oz.; oils of cassia, cloves, sassafras and thyme, of each, 1½ dr.; oil of neroli, 1 dr.; brown ochre, levigated, 2 oz. Proceed as for almond soap. It may be varied by substituting oil of lavender for the neroli. — 2. White curd soap, 20 lbs.; oil of bergamot, 2½ oz.; oil of cloves, ½ dr.; oil of neroli, ½ dr.; oil of sassafras, ½ dr.; oil of thyme, ½ dr. Colored with 2½ oz. brown ochre. — 3. Good tallow soap, 30 lbs.; essence of bergamot, 4 oz.; oils of cloves, sassafras and thyme, each, 1 oz.; color, brown ochre, 7 oz. — 4. (*Palmer's.*) White Castile soap, 10 lbs.; oil of lavender (English), 2 dr.; oil of citronella, 2½ dr.; oils of lemon and bergamot, of each, 4 dr.; palm oil, 2 lbs. Melt the soap and palm oil together by a gentle heat, and, when nearly cold, add the perfumes, previously dissolved in sufficient alcohol.

CAMPHOR.—Curd soap, 28 lbs.; otto of rosemary, 1½ lbs.; reduce the camphor to powder; add 1 oz. almond oil; then sift it; when the soap is melted and ready to turn out, add the camphor and rosemary.

CAMPHOR SAVONETTE. — Spermaceti, 2 oz.; camphor, powdered, with the addition of a little spirits, 1 oz.; white curd soap, melted with a little water, 24 oz.; amalgamate with a gentle heat, and mold into balls.

CARBOLIC ACID.—Take freshly prepared cocoanut oil soap, 75 parts, and fuse; then add a solution of alcohol, 5 parts; carbolic acid, 3 parts; caustic potassa, 1 part; oil of lemon, 1 part; mix with stirring; to be poured into molds.

CASTILE. — 1. Made like almond soap, only using olive oil. It is mottled by adding a solution of sulphate of iron while in the liquid state. — 2. Boil common soft soap in lamp oil, 3½ hours.

CINNAMON. — Tallow soap, 14 lbs.; palm oil soap, 7 lbs.; oil of cinnamon (cassia), 3 oz.; oil of sassafras and essence of bergamot, of each, ½ oz.; levigated yellow ochre, ½ lb.

COCOANUT OIL. — Put 50 lbs. cocoanut oil and 50 lbs. caustic soda lye, of 27° Baume, into a soap kettle; boil and mix for 1 or 2 hours until the paste thickens; then diminish the heat, but continue stirring till the cooling paste assumes a white, half solid mass; then transfer quickly to the frames.

COLORING. — For coloring ordinary fancy soaps, mineral colors are employed; for superior toilet and transparent soaps, organic pigments are used. Generally, the red coloring matter is derived from vermillion or chrome red, the violet from fuchsine solved in glycerine, the red-brown and brown from cumarel and the various kinds of umber. For green, chrome green is used; a beautiful vegetable green is obtained by stirring in the soap, saponified with 7 to 10 per cent. of palm oil, some smalts or ultramarine. For blue, smalts or ultramarine. Yellow is obtained by mixing palm butter with the fat to be saponified. For black, common lampblack is used. Fine toilet soaps and transparent soaps may be colored as follows: For red color, tincture of dragon's blood or liquid carmine. Rose, tincture of carthamine or of archil. Yellow and orange, tincture of annatto or saffron. Blue and violet, tincture of litmus, or of alkanet-root, or soluble Prussian blue, basic, or a very little indigo in impalpable powder. Green, a mixture of blue and yellow.

CREAM WASH BALLS. — White curd soap, 7 lbs.; powdered starch, 1 lb.; water, or rose water, q.s. Beat the whole together, and form into balls.

ENGLISH BATH. — Tallow oil, 4 lbs.; palm oil, 4 lbs.; cocoanut oil, 2 lbs.; alcohol, 4 pts.; soda lye, at 36°, 5 lbs.; oil of sassafras, ½ oz.; oil of peppermint, ½ oz.; oil of lemon, ½ oz.; oil of cinnamon, ½ oz.; oil of lavender, ½ oz.; mix, and proceed as in the directions for *Transparent Soap*, omitting the glycerine.

FLOATING.—Fine soda oil soap (in shavings), 9 parts; water, 1 part; put them in a clean copper; place it in a water bath; melt; then agitate the mixture until its volume is doubled, or until it becomes wholly composed of froth; then pour it out to cool, and cut into cakes.

GLYCERINE.—1. Take toilet soap; slice and melt with gentle heat, and add to 1 lb. soap 1 oz. pure glycerine; when sufficiently cool make into balls. — 2. Take 100 parts oleine of commerce (winter strained lard oil will answer), and add 314 parts heavy glycerine; heat to 50°, and then add 56 parts aqueous solution of caustic potassa, sp. gr. 1.34, and stir the mixture well. This soap exhibits the consistency of honey, in which state it remains.

GLYCERINE BALLS.—To any recently made toilet soap, sliced, and melted by a gentle heat, without water, if possible, add glycerine, 1 oz. to the lb.; thoroughly incorporate by stirring until the mass has cooled considerably, when it should be made into balls.

HONEY. — Cut 2 lbs. common bar soap into shavings, and put in a tin pail, with barely hot water enough to cover. Place the pail in a kettle of boiling water, and when its contents are melted, stir thoroughly, and add ½ lb., each, of honey, almond oil and powdered borax; mix together, by stirring, for 10 minutes; then add oil of cinnamon or bergamot, a few drops, or any scent preferred. Mix well, and turn the soap into a deep dish to cool; then cut into squares. It can be made into sand soap balls by adding equal quantities of white sand and Indian meal, until it is so stiff that you can roll it in the hands. There is no soap that will whiten the hands like this. — 2. Some of the finer kinds are made of olive oil soap and palm oil soap, of each, 1 part; white curd soap, 3 parts; deepened in color, while in a liquid state, with a little palm oil or annatto, and scented with 1 to 1½ oz. essential oils to each ½ lb., or 1 to 1½ lbs. to each cwt.

IODINE. — Make a solution of 1 part iodine of potassium in 3 parts water; to this add of pounded Castile soap, 16 parts; melt in a porcelain vessel, by the aid of a water bath.

LAVENDER. — The basis of Windsor soap, scented with oil of lavender, 1 to 1½ fl. oz. per 7 lbs., supported with a little oil of bergamot and the essences of musk and ambergris. It is often colored with a little tincture of litmus, or corresponding mineral pigments.

LEMON WASH BALLS.—Cut 6 lbs. soap into small pieces; melt in 1 pt. water in which 6 lemons have been boiled. When melted, withdraw the soap from the fire, and add 3 lbs. powdered starch, and a little essence of lemon; knead into a paste and form into balls.

MARBLED BALLS. — 1. Take 10 lbs. white oil soap and 10 lbs. Joppa soap; cut into small square pieces, which set to dry for 3 days; the oil soap, particularly, must be thus dried. — 2. Scrape, very fine, 5 lbs. oil soap, which dry for 1 day in the open air; mix it well in the shaving box with 5 lbs. powder, and add 1½ oz. best vermilion; in mixing, place pieces of soap and colored powder in layers in the box; making in all 5 alternate layers of each. When a layer of each has been laid in the box, sprinkle 1 pt. rose water over the cut soap; for, if it be much combined with the powder, it will become lumpy and hard, and consequently spoil the wash balls. The same quantity of water is to be used for moistening each of the other soap layers. Next, mix 1 pt. thin starch, which has been well boiled in ½ pt. rain water, with ½ pt. rose water, and distribute it, equally well mixed, among the mass, by turning it over repeatedly, and then press it down close with the hands. If a piece be now cut from the mass, the operator will perceive whether the marbling is sufficiently good; and, if so, he may proceed immediately to form his wash balls.

MARINE.—This is made by substituting cocoanut oil for fats and oils used in the manufacture of common soap. It has the advantage of forming a lather with salt water.

MERCURIAL.—Beat into a homogeneous mass in a Wedgewood mortar, Castile soap, 1 lb.; protochloride of mercury, ½ oz., dissolved in 4 oz. alcohol.

MUSK. — Take of good tallow soap, 15 lbs.; palm oil soap, 10 lbs.; powder of cloves, pale roses and gilliflower, of each 2½ oz.; essence of bergamot and essence of musk, each, 1½ oz.; brown ochre, or Spanish brown, 4 oz.

MYRTLE.—Dissolve 4½ lbs. white potash in 10 qts. water; then mix with it 20 lbs. myrtle wax, or bayberry tallow; boil over a slow fire till it becomes soap; then add 1 teacupful cold water, and let it boil 10 minutes; at the end of that time turn it into tin molds or pans, and let it remain 8 or 10 days to dry; then turn the cakes out of the molds. If the soap is to be scented, stir in just before pouring. This kind of soap is an excellent one for shaving with, and also for chapped hands. It will be fit for use in 20 to 30 days after made; becomes better with age.

OATMEAL.—Make a saturated solution of borax (the pulverized is best); cut into it bits of fancy, Castile or glycerine soaps; let the mixture boil until the soap is dissolved; make it as thick as cream, by boiling, or by adding more, if too thick; then stir into the mass oatmeal enough to make a soft paste. Stir until it cools and hardens. A little sulphur, also pulverized camphor of sulphur, may be mingled with the meal. While warm and soft place in a box, so that, when hard, it may be turned out and cut into squares. This soap softens the skin.

OPODELDOC.—1. Rectified spirit, 1 qt.; Castile soap, 5 oz.; camphor, 2½ oz.; oil of rosemary, 2½ dr.; oil of origanum, 5 dr.; solution of weak ammonia, 4 oz.; digest till dissolved, and pour while warm into wide mouthed bottles.—2. Rectified spirit, 8 pts.; white soap, 20 oz.; camphor, 8 oz.; water of ammonia, 4 oz.; oil of rosemary, 1 oz.; oil of horsemint, 1 oz.. Dissolve the soap in the spirit by a gentle heat, and add the other ingredients; bottle while warm.

ORANGE-FLOWER. — 1. Like rose soap, but using pure neroli, supported with a dash of the essences of ambergris and Portugal, instead of otto of roses, as scent. The French orange flower soap is scented with equal parts of neroli and geranium. — 2. Tallow and palm oil soap, to which add essence of orange flowers, 7½ oz.;

ambergris, 7½ oz.; color, chrome yellow, 8 oz.; red lead, 2 oz.

PALM OIL.—Palm oil is seldom used alone as a saponaceous fat, but is employed in conjunction with other fats and with resin; this latter being saponified separately and mixed afterwards.—1. 15 lbs. palm oil, 10 lbs. tallow, and 1 lb. resin. —2. 15 lbs. palm oil, 25 lbs. tallow, and 10 lbs. resin. — 3. 45 lbs. palm oil, and 5 lbs. cocoanut oil. — 4. 3 lbs. palm oil, 11 lbs. lard, 1 lb. cocoanut oil, and 1 lb. clarified resin.

PERFUMING.—Perfuming is generally done when the paste is in the frame, as, if added in the pan when the soap is hot, most of the essential oils would be volatilized. It is best to mix the colors and the perfumes together with some alcohol or glycerine, and stir in well.

PRIMROSE.—This has usually a similar basis to honey soap, faintly scented with mixed oils, similar to those used as cowslip perfume, and colored pale yellow, or greenish yellow.

ROSE.—1. Palm oil soap, in shavings, 3 lbs.; finest white curd soap, in shavings, 2 lbs.; soft water, ½ pt.; melt together in a bright copper pan, set in a water bath; add levigated vermilion, ¼ oz.; and when the mixture has cooled a little, stir in finest otto of roses, 2 dr.; oil of bergamot, 1½ dr.; oil of cinnamon, oil of cloves, of each, ¾ dr.; oil of rose geranium, ½ dr.; mix well, and pour the mass into an open bottomed wooden frame, set on a polished marble slab. Sometimes it is colored with tincture of dragon's blood, or of archil, instead of with vermilion. —2. White curd soap, 20 lbs.; essence of rose, 1½ oz.; oil of cloves, ½ dr.; oil of cinnamon, ½ dr.; oil of bergamot, 1 dr.; oil of neroli, ½ dr.; colored with 2 oz. vermilion.

SAND.—Prepared soap, 8 lbs.; marine soap, 7 lbs.; sifted silver sand, 25 lbs.; oils of French lavender, thyme, caraway and cassia, of each, 2 oz. Mix the usual way.

SHAVING.—1. Take 4 lbs. white bar soap, 1 qt. rain water, ½ pt. beef gall, and 1 gill spirits turpentine; put the whole over the fire, and boil until dissolved, stirring meanwhile. — 2. A nice soap for shaving may be made by mixing ¼ lb. Castile soap, 1 cake old Windsor soap, 1 gill each of lavender and Cologne waters, and a little alcohol; boil all together until mixed. — 3. Good white soap (in thin shavings), 3 lbs.; palm soap, 1 lb.; soft water, ¾ lb.; soda, 1 oz. Melt carefully over a slow fire in an earthen vessel, then add oil of lavender, 60 drops; oil of lemon, 40 drops; bergamot, 50 drops. Mix well, and make it into forms.—4. Take 3 lbs. white bar soap, 1 lb. Castile soap, 1 qt. rain water, ½ pt. beef's gall, 1 gill spirits turpentine. Cut the soap into thin slices, and boil 5 minutes after the soap is dissolved, stir while boiling; scent with oil of rose or almonds. To color it, use ½ oz. vermilion.

SULPHUR.—White Castile soap, ½ lb.; flowers of sulphur, 1 oz.; alcohol, 1 oz.; oil of cloves, ½ dr.; oil of lavender, 1 dr. Mix; beat the whole to a smooth mass in a mortar.

TRANSPARENT.—Slice 6 lbs. nice yellow bar soap into shavings; put into a brass, tin or copper kettle, with alcohol, ½ gal., heating gradually over a slow fire, stirring till dissolved; then add 1 oz. sassafras essence, and stir until mixed; now pour into pans about 1½ in. deep, and when cold cut into square bars.

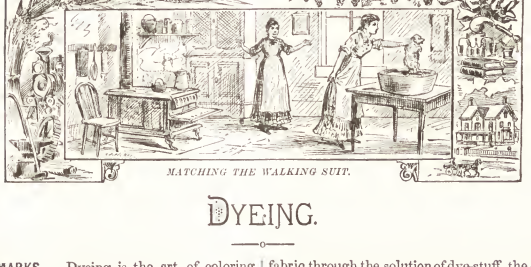
VARIEGATED.—Soft water, 3 qts.; nice white bar soap, 3 lbs.; sal soda, 2 oz.; Chinese vermilion and Chinese blue, of each, about 7 gr.; oil sassafras, ½ oz. Shave the soap in thin slices and add it to the water as it begins to boil; when dissolved, set it off the fire; take out 1 cup soap and stir in the vermilion; take out another cup soap and stir in the blue; then pour in the contents of the first cup, giving 2 or 3 turns only with a stirring stick; then add the other cupful in the same way; then pour into molds, or into a proper box, and, when cold, cut into bars; it will present a beautiful streaked appearance.

VIOLET.—1. Any white toilet soap, strongly scented with essence of orris root, either colored, or not, with tincture of litmus, or a little levigated smalts, ultramarine or indigo. — 2. White curd soap, 3 lbs.; olive oil soap, 1 lb.; palm oil soap, 3 lbs.; melted together, and further scented with a little essence of orris root, which is best added cold; and colored, or not, at will. Very fragrant, but does not take color very well.

WHALE OIL. — Render common lye caustic, by boiling it at full strength with quicklime; then take the caustic lye and boil it with as much whale oil foot as it will saponify; pour into molds, and when cold it will become tolerably hard. Whale oil foot is the sediment produced in refining whale oil. This soap is especially valuable for the destruction of small vermin, insects, etc. A solution of it in water may be applied to plants afflicted with lice, etc.

WHITE.—1. 10 lbs. soap grease (refined tallow is best), boiled in lye made of 5 lbs. soda; ½ as much fresh lime, boiled ½ hour in 7 gals. water. When the lye is cold, it is drained from the soda and lime and boiled with the grease 1 hour, until clear, then poured into a tub to cool. The soap floats on the top, and may be cut into bars. — 2. To 15 lbs. lard or tallow, made hot, add slowly 6 gals. hot lye, or solution of potash that will bear up an egg high enough to leave a piece as large as a dime bare. Take out a little and cool it. If no grease rises, it is done. If any grease appears, add lye, and boil till no grease rises. Add 3 qts. fine salt, and boil again. If this does not harden on cooling, add more salt. If it is to be perfumed, melt it next day; add the perfume, and run it in molds, or cut into cakes. — 3. Fresh slaked lime, sal soda, and tallow, of each 2 lbs.; dissolve the soda in 1 gal. boiling soft water; now mix in the lime; stir occasionally for a few hours; let it settle; pour off the clear liquor, and boil the tallow therein until dissolved; cool in a flat box; then cut into bars or cakes. Stir in the perfume when cool.

WINDSOR.—*Brown.* Prepared soap, 40 lbs.; burnt umber, 4 oz.; English vermilion, 1 oz.; lampblack, ½ oz.; oils of cinnamon and bergamot, each, 2 oz.; oils of thyme, peppermint, caraway and cloves, each, 1½ oz.; lavender, 2 oz. Mix according to the usual way. — *White.* Curd soap, 50 lbs.; marine soap, 10 lbs.; oil soap, 14 lbs.; oils of cassia and cloves, each, 2 oz.; oil of caraway, 4 oz.; oil of thyme, 3½ oz.; rosemary, 4 oz. Mix in the usual way.



MATCHING THE WALKING SUIT.

DYEING.

REMARKS. — Dyeing is the art of coloring articles, generally textile fabrics, with solutions of coloring matters or dye-stuffs. Those which impart their tints without the intervention of other substances, are called "substantive colors;" while those which require such aid are called "adjective colors." The different materials take dyes in different proportions; thus silk and wool take the coal-tar dyes perfectly, but cotton requires the intervention of a mineral or animal mordant. Wool takes the coloring matters of most dye-stuffs so that the deepest tints can be produced. Silk and cotton are dyed with greater difficulty, while linen shows still less disposition to take dyes. The operations which take place in dyeing are "mordanting," "ageing," "dunging," "dyeing," and "clearing." Some of these processes, however, are not needed with aniline dyes, on wool and silk goods, as this class of dye-stuffs acts more directly on the fibre than do those of vegetable extraction. But, before them, all grease and oil must be removed from the goods. Woolen and silk garments, before dyeing, should be washed in soap and water, and rinsed in clean rain water. Grease spots must be removed. (For other hints see RENOVATING in HOUSEHOLD.) Usually then the first thing to be done is to mordant, or subject the fabric to the action of a substance which, having a twofold attraction for organic fibres and coloring matter, serves as a bond of union, and gives fixity to dyes. After the fabric has been mordanted, it is hung up in a room through which steam and air pass, by which the union between the fibre and the mordant is quickened. This exposure to moist air is the step to which the term ageing is applied. The cloth is then dunged, to remove superfluous mordant not absorbed. This was formerly effected by passing the fibre through a mixture of cow-dung and water; but this has been superseded in a measure by dung substitutes, the principal of which are arsenic, arseniate and silicate of soda, phosphate of lime and caustic soda. Dunging is one of the most important processes in dyeing, care being taken to keep the dunging-liquor at a proper strength and temperature. The next process, dyeing, is effected by running the fabric through the solution of dye-stuff, the color being modified by the mordant used. When the fabric has received the color, it is washed in a solution of soap to which a little alkali has been added; then boiled in water with or without the addition of a solution of tin or other brightening substance. It is then said to be "fast." The water in which fabrics are worked and the dye-stuff dissolved, is called a "bath." The amount of water used should simply be enough to cover the goods, and should be clean and soft. All the dye will go to the goods if they are left in long enough. Ordinary water may be improved by the following process: To 4 pails water add 1 qt. wheat bran. Tie the bran loosely in a thin, coarse bag. Before the water heats, squeeze the bran until the water is white, and when it boils take off the scum. Do not use too much water, or the dye will be wasted. Keep the goods in a large enough kettle and with water sufficient to cover them. Earthen or enameled vessels are much the best for most of the dyes, as copper, iron and brass affect some colors. Whatever is used must be perfectly clean. It is always best to rip apart old garments, and iron out flat all the folds at the old seams; but heavy garments can be dyed whole, if preferred. It is well to wet the goods with hot water before entering the bath. After stirring the bath well and being sure the color has been dissolved, enter the goods, with a clean stick in each hand, slowly and as open as possible; lift and stir frequently. To know when the right shade has been reached, try first some small pieces of similar fabric, and test according to directions before proceeding. The shade can be told approximately by floating a corner of the goods on the top of cold water. It will appear under water of the same shade as it will when dry. It is important to remember that a color to be dyed over must be lighter than the color wanted. It is impossible to dye a dark garment light. And the original color may be expected to affect the new so much that such dyes must be selected as will combine with the shade to produce the color wanted. Thus, violet over rusty black will produce "seal brown." Woolens, to avoid shrinking, after dyeing, should be rinsed out in water

of the same temperature as the bath, and dried in the shade, occasionally stretching in all directions. After dyeing, silk should be dried by pressing between two cloths. After hanging in the shade, and while still damp, press by placing a fine cloth over them, and iron dry with a moderately warm flat iron. Silk ribbons can be dried by firmly winding around a bottle of hot water and leaving in a warm place. Silks and fine goods should be tenderly handled, to avoid injury. If silks are limpsy, and need stiffening, rinse in water, containing a little dissolved white glue, ½ oz. to 1 gal. After dyeing velvets, press between 2 cloths, to remove all water; make ready a hot flat iron, fixed firmly, face upward; press the back of the velvet on the iron, and, as the steam comes through, raise the pile with a soft brush, and lay it in the right direction. An easier way is to similarly use a hot stove pipe, after cleaning it thoroughly. Rumpled, creased and fretted velvets can thus be made even. Feathers should be cleaned by soaking in soap suds 15 minutes; then, after drawing between the thumb and forefinger a few times, rinse in warm water. After dyeing, rinse in cold water, and press between 2 cloths to remove water. Hold before a fire, shaking lightly, until nearly dry, and curl by drawing 3 or 4 sprigs at a time between the thumb and back of the scissors. Be cautious with other colors than black, not to get too much dye into the bath. The best colors are produced by adding the color slowly. If too deep, a portion may be discharged by washing in hot suds. When goods are of mixed materials, dye by the receipt for each fabric, to be sure of a fast color. But only ½ the amount of dye need be used for each material in the goods. Dye the wool or silk first; then dye for cotton; the water should never rise above lukewarm in the bath for cotton; and let the goods stay in the cold dye over night with all colors except black. In accommodation to the requirements of dyers, many of the following receipts are calculated for large quantities of goods, but to make them adapted for the use of private families they are given in even quantities, so that it is easy to ascertain the quantity of materials required for dyeing, when once the weight of the goods is known; the quantity of materials used being reduced in proportion to the smaller quantity of goods. Calico printing is allied to the art of dyeing, but as it is done in great factories, and never at home or on a small scale, it will not be included in this work. The process is as follows: The pieces, before printing, are perfectly bleached. After the "colors" have been printed on, the next step is ageing; the goods are laid in bundles upon sparred floors. The temperature is 80° Fahr. Ageing may last 2 to 3 days; its object is decomposition of the acetates of alumina and iron in the mordants, so that either the bases or hydrated subsalts are left attached to the fibre. The next step is dunging, which is the removal of the thickeners. The process was formerly performed with cow dung, but now superseded by double phosphate of soda and lime, arsenite and arseniate of soda, and silicate of soda. The pieces are passed through warm solutions of these substances. This is often performed twice, the first being called fly-dunging, and the next second dunging. When silicate of soda is used, the goods pass through 2 cisterns, heated to 122° Fahr., or higher, containing 738 gals. water and 19 gals. silicate of soda at 14° Tw., if the goods have been mordanted for brown and red, black and red, brown only, red only, and rose on a white ground. But if mordanted for black only, purple only, or purple and black, the proportion of silicate of soda is reduced to 13½ gal. at the same strength. The next step is dyeing with artificial alizarine, or anthrapurpurine. The color is now permanently attached to the mordanted portions; but the whites are stained or soiled, and the pieces are therefore submitted to the clearing process, consisting of successive treatments with soap lye. A common treatment is 2 soapings at a boil, each time for ½ hour, with ¼ to ½ lb. soap. The pieces are washed in clean water after soaping. The quality of the soap is of importance; it should be neutral, and is made from palm oil. Freedom from akalinity is important for madder purples. Grass-bleaching is used in the clearing process for chintzes, cretonnes, etc., to render the shades more transparent. By a discharge, is understood a mixture which, if printed upon cloth previously dyed some uniform color, such as Turkey red, vat blue, aniline black, etc., destroys such ground color, leaving a design which may be white, black, yellow green, etc. The term "discharge style," is more especially applied to patterns of this nature obtained upon a Turkey-red. The new coal-tar dyes will be treated of separately, under the head of ANILINE DYES, while the older processes will be found under VEGETABLE DYES.

ANILINE DYES.

REMARKS.—No mordant is usually necessary for these colors when used on silk or woolen; the proper quantity of clear liquid is mixed with slightly warm water, the scum skimmed off, and the goods entered and worked until the shade is obtained. For dyeing on cotton, the cloth is steeped in sumac or tannic acid dyed in the color, and fixed by tin; or the cloth may be sumaced and mordanted as usual with tin, and then dyed. *Directions for Solutions:* Fuchsine, violet, soluble blue, alkali blue, dissolve in considerable water; 1 lb. to 200 or 300 lbs. water. Methyl and malachite green are first made into a paste by mixing with cold water; then gradually add hot water, 1 lb. to 100 lbs. Eosine, erythrosine, phloxin, rose bengale, 1 lb. to 25 lbs. water. Orange, claret red, fast scarlets for wool, 1 lb. to 15 lbs. boiling water.

BLACK.—SILK OR COTTON. 1. Water 20 to 30 parts; chlorate of potassa, sal ammoniac, chloride of copper, aniline, and hydrochloric acid, of each, 1 part, previously mixed together. The

fabric is dried in ageing rooms at a low temperature for 24 hours, and washed afterwards. — — 2. (*Vanadium.*) Water, 35 fl. oz.; muriate of aniline, 2⅜ oz.; chlorate of potash, 1¼ to 1⅜ oz.; chloride of vanadium, 1½ gr. Steep the fabric, freed from fatty matter, uniformly in the mixture, and hang in well-aired oxidizing chambers, kept at 59° to 68° Fahr.; then raise to 95° until the goods are dry. If the black has the desired tone, they are taken through a beck of bichromate of potash, 150 gr. to 35 fl. oz. water; dried again, and washed with soap and water. If the black is not intense enough, the goods, after drying and washing, but before the chroming, may be steeped once or twice more in the beck, ageing after each immersion. The chrome counteracts the greenish tint of aniline black. For cotton, the quantity of the salt of aniline may be diminished, and for wool may be doubled.

BLUE.—Wool. 1. Prepare bath with ½ lb. soda ash, and add solution of 3½ oz. alkaline blue; boil, refreshen, enter wool, and dye 1 hour without allowing to boil; lift, and rinse carefully; put in fresh bath containing 1¼ lbs. sulphuric acid; rinse and dry. — 2. For 100 lbs. Dissolve 1¼ lbs. aniline blue in 3 qts. hot alcohol; filter, and add it to a bath of 130° Fahr.; also, 10 lbs. Glauber salts, and 5 lbs. acetic acid. Enter goods and handle well for 20 minutes; next, heat slowly to 200° Fahr.; add 5 lbs. sulphuric acid, diluted with water; boil 20 minutes longer; then rinse and dry. If the aniline be added in 2 or 3 proportions during the process, it will facilitate evenness of color. — 3. (*Navy.*) 1st bath, for 100 lbs.: 3 lbs. Guernsey blue; 5 lbs. borax. Enter wool at 120° Fahr.; raise to boiling, while turning, for about 40 minutes; take out; let cool, and wash. 2d bath, containing oil vitriol: Enter wool to raise the color. As the first bath cannot be exhausted, retain the liquor; and for further operations 2 lbs. Guernsey blue, instead of 3 lbs., are sufficient for navy blue. — 4. For 100 lbs. 1st operation: Bath containing 2 to 5 lbs. sal soda, or 1½ to 2 lbs. borax; 1 lb. Nicholson blue, less or more, according to shade. Enter goods at 100° Fahr.; time, 45 to 60 minutes; take out, let cool, and wash well. 2d operation: Raise color in a bath acidulated with oil vitriol; temperature, 100° to 150° Fahr. — Silk. For 11 lbs., add to a water bath 17½ oz. sulphuric acid and 3½ oz. solution white soap; stir well, and dye at 158° Fahr. with 1¾ oz. aniline blue, added in 4 portions; wash, brighten with vitriol sours, and rinse. — Cotton. 1. For pure blue, prepare the goods for fuelsine, and dye like violets. For a greenish and dark blue, dye in a bath of prussiate of potash and sulphuric acid, as mentioned in the receipt for dyeing cotton with blue violet. For very dark shades, place the goods subsequently into a new tepid bath, containing 4 oz. perchloride of tin for every 20 lbs. goods. — 2. 5 lbs. alum; 2½ lbs. Glauber salt; dissolved color. Enter yarn at 100° Fahr.; give 4 turns; raise temperature to 180°, and turn to shade.

BROWN. — 1. Dissolve 1 lb. brown in 2 gals. spirit specific gravity .82; add sufficient to the bath, and immerse fabric. No mordant is required. — (*Bismarck.*) Mix 1 lb. Bismarck dye, 5 lbs. water, and 12 oz. sulphuric acid. This dissolves in hot water, and may be used directly for dyeing. For wool, acidulate bath with sulphuric acid, add sulphate of soda, immerse the fabric, and add color by small portions, keeping temperature below 212° Fahr. Various shades may be produced by combining the color with indigo paste or picric acid. Cotton must first be mordanted with sumac and acetate of alumina, and the bath be below 100° Fahr.

CRIMSON. — 1. Obtained by use of aniline yellow and magenta; dip first in aniline yellow; then pass through a bath of magenta till desired shade is obtained. — 2. Dissolve crimson aniline, and dye same as with aniline red.

FEATHERS.—May be dyed by immersion for 2 or 3 minutes in a bath of any aniline color.

GREEN.—Wool. 1. 2 lbs. alum; ¼ lb. tartar; 5 lbs. Glauber salt; 3 oz. picric acid; 12 lbs. indigo extract; dissolve. Enter yarn at 190° Fahr.; give 3 turns; boil up; after ½ hour, raise and add ½ oz. acid green aniline; re-enter and give 5 turns. — 2. For 100 lbs. 8 oz. or more (according to shade) of malachite green are dissolved as directed under solution in *Remarks.* The dissolved dye is added to a bath containing 8 oz. bicarbonate soda, or sal soda. Enter goods at 100° Fahr.; put on steam; turn to boiling; give 7 turns after 1 hour's boiling; take out, let cool, wash in cold water, and raise with 2 turns in a bath containing 2 to 3 lbs. oil of vitriol. — Silk. Dissolve 1 lb. iodine or night green in 1 gal. alcohol; then mix with 2 gal. water, containing 1 oz. sulphuric acid. — Cotton. 1. Methyl green, 11 lbs. Dissolve in boiling water 7 1-10 oz. tanning lay the cotton over night in the hot solution; wring out; dye in cold water with solution of color according to shade; wring out, and dry in the dark without washing. — 2. For 22 lbs. For lighter shades, bleach and work in warm soap beck, to remove chlorine. Enter into a boiling lye of curd soap, and wash out in cold water. Make a cold dye beck with 3 parts color to 100 parts cotton; give 5 to 6 turns, and let steep over night; dry the next morning; if the shade is not enough, take through tanning beck, and dye again.

HORN. — This may be dyed any color, in a hot or spirituous solution of the aniline dyes.

ORANGE.—Wool. Wash the wool well; bring bath to near boiling point; add dissolved dye gradually, and it will readily go on the fibre. — Silk. Add to the water bath (100° Fahr.), a solution of Castile soap; take the silk through it, raise temperature to 130°; then add dissolved orange to bath, heating gradually; when silk has taken color, add to bath a little sulphuric acid, which sets it; then handle quick, heating the bath to 170°. Wash well after dyeing. —Cotton. For 60 lbs. Boil 3 lbs. tannic acid, and add to warm water; work the yarns 5 turns and wring; add 3 qts. nitro-muriate of tin to enough cold water, and mordant in the mixture; wash well in cold water, with a little soap in the last water; dissolve 12 oz. aniline orange, and add the solution to warm water; give 5 turns, wash and stove dry.

PANSY.—Old Mixed Silks. Boil out 25 dr. sumac in water; strain, and steep goods overnight in the clear, hot liquid; take out next

morning, squeeze, and dye in solution of methyl violet.

PINK.—Cotton Yarn. Dissolve 5 lbs. Glauber salt; 5 oz. erythrosine. Enter yarn at 120° Fahr.; raise to 140°, and turn to shade. It is advisable to use the required aniline in 2 portions—½ to begin, and balance when finishing.

PURPLE.—Acidulate bath by sulphuric acid, or use sulphate of soda; both these render the shade bluish; dye at 212° Fahr. To give a fair middle shade to 10 lbs. wool, a quantity of solution equal to ½ to ¾ oz. solid dye will be required. The color of the dyed fabric is improved by washing in soap and water, and then passing through a bath soured by sulphuric acid.—Silk or Cotton. Prepare the goods for fuchsine as directed for wool under *Red*, and turn them over a few times in a tepid solution of 2½ oz. crystallized perchloride of tin for every 10 lbs. goods; remove the latter; add violet solution as the shade requires; dye for ½ hour; wring well, and dry. Washing in a solution of alum and starch will render the color more solid.

RED.—Wool. (*Fuchsine* or *Magenta.*) Place fuchsine crystals in a stone jar; pour upon each part 100 parts boiling water, and stir until dissolved; set aside to cool and filter. For 100 lbs. woolen goods (flannels, yarns, etc.), 5 oz. fuchsine will give a fair middle shade. For use, a quantity of water, which more than covers the goods, is heated to 170° Fahr., and as much of dissolved dye added as will produce the shade. Place the goods in the bath; stir well, and remove in ½ hour; then free from water by an ordinary clothes wringer. The same bath may be used a whole day by adding more fuchsine solution; but do not keep it over night. — Silk. Prepare the silk by washing it in a solution of Castile soap; dye in a lukewarm bath, adding the dissolved fuchsine gradually; silk will take the color readily. To intensify the brilliancy, wash the silk in a bath slightly soured by sulphuric acid, or, better, tartaric acid, after dyeing. If goods or ribbons require stiffening, put them through a bath containing a little gelatine or gum Arabic. — Cotton. 1. For 10 lbs. Make a decoction of 1 lb. sumac in sufficient water, in which the goods are left 2 hours, turned a few times, then wrung out, and dyed in a tepid fuchsine bath, like woolen goods; time for dyeing, ½ hour. — 2. A bright red may be produced on cotton goods by the following process: For every 5 lbs. goods, dissolve ½ oz. soap in hot water; let solution down to 90° Fahr., then add 2½ oz. olive oil. Stir this mixture, and put into tepid water, in which the goods should remain 5 minutes, turned 5 or 6 times, then removed and wrung out. Next, for every 5 lbs. goods, a bath of ¼ lb. sumac should be prepared, in which the goods are turned 5 or 6 times, then removed, and 1 oz. tin crystals added. The goods are returned, turned a few times, wrung out, and finished in a tepid water bath, in which fuchsine is dissolved to give the desired shade.

SCARLET.—For 40 lbs. Dissolve 5 lbs. white vitriol at 180° Fahr.; place goods in this bath for 10 minutes; then add color, prepared by boiling for few a minutes 1 lb. aniline scarlet in 3 gals. water, stirring continually; filter the solution before added to bath; the goods remain in the latter 15 minutes, then boiled another ½ hour in the same bath after the addition of sal ammoniac. The more added, the deeper the shade.

VIOLET.—Same as for *Purple.*

YELLOW.—This is slightly soluble in water, and may be used directly for preparation of bath dye; but it is best to dissolve 1 lb. of dye in 2 gals, alcohol. Temperature of bath under 200° Fahr. The color is improved by a trace of sulphuric acid. — 2. Dissolve, by boiling in water. For dyeing silk, add to bath acetic or sulphuric acid in small quantity, and dye at 170° Fahr. For wool dye same way, but add oxalic or sulphuric acid. If aniline yellow is shaded off with fuchsine, every shade from orange to scarlet may be obtained.

Vegetable Dyes.

ARTIFICIAL FLOWERS. — In dyeing artificial flowers the color is usually applied with the fingers, muslin, or paper; but the flowers may be simply dipped in the solution. *Blue.* Sulphate of indigo in solution. — *Green.* Solution of distilled verdigris.—*Lilac.* Liquid archil.—*Red.* —Carmine dissolved in carbonate of potash, or in spirits of hartshorn. — *Violet.* Liquid archil mixed with a little salt of tartar. — *Yellow.* Tincture of turmeric.

BLACK.—Wool. 1. For 50 lbs. 20 lbs. logwood; 7 lbs. yellow wood; 6 lbs. sumac; 2½ lbs. tartar. Boil in this bath for 2 hours; re-place the evaporated water, and wet the wool, continually shaking it, with a solution of 2½ lbs. sulphate of iron and 1½ lbs. sulphate of copper; boil 1 hour. For bluish black, wet the wool as above, soon as lukewarm, with 2 lbs. sal ammoniac, and then rinse and dry well. For deep black, substitute for ammoniac 1½ lbs. bichromate of potash; dissolve it in boiling water, and boil for ½ hour. — 2. For 5 lbs. Take 6 oz. blue vitriol and boil a few minutes; dip the goods ¾ hour, airing often; take out the goods and make a dye with 3 lbs. logwood; boil ½ hour; dip ¾ hour; air the goods, and dip ¾ hour more; wash in strong suds. This will neither crock nor fade. — 3. For 10 lbs. Bichromate of potash, 4 oz.; ground argal, 3 oz.; boil together, and put in the wool; stir well, and let it remain in dye 4 hours. Then take out and rinse slightly in clear water; then make a new dye, into which put logwood, 3½ lbs. Boil 1 hour, and add chamber-lye, 1 pt., and let the wool lie in all night. Wash in clear water. — Silk. 1. A bath of nut-galls is given for 12 to 36 hours, occasionally working the goods therein; next take out, rinse and air; then pass for a few minutes through a bath containing sulphate of iron; drain, rinse, and air. The steep in the nut-gall bath may be

repeated, if necessary, followed as before, by the iron bath, previously replenished with a little fresh copperas. The quantity of galls for 1 lb. silk varies from ½ to ¾ lb.; that of the copperas (for the first bath), from 3 to 4 oz.—2. For 5 lbs. Turn the goods for an hour through a mordant formed of 1 lb. copperas and 2 oz. nitrate of iron, with sufficient water; after rinsing in cold water and airing, work them for 1 hour in a decoction of 5 lbs. logwood and 1 lb. fustic; then lift from the bath, add 2 oz. copperas, reimmerse, and work 10 to 15 minutes longer; lastly, rinse, air and finish. A full deep black. —Cotton. 1. For 40 lbs. Sumac, 30 lbs.; boil ¾ hour; let goods steep over night; immerse them in lime water 40 minutes; remove and allow them to drip ¾ hour; now add coppers, 4 lbs., to the sumac liquor, and dip one hour more; next work them through lime water for 20 minutes; make a new dye of logwood, 20 lbs; boil 2½ hours; enter goods 3 hours; then add bichromate of potash, 1 lb., to the new dye, and dip one hour more; work in clean cold water and dry out of the sun. — 2. To each lb. of cloth, 1 oz. extract logwood and ½ oz. blue vitriol; put the cloth in an iron kettle, with enough soft water to prevent the cloth being crowded; bring water to a scalding heat; take it out and let drain; add blue vitriol, and when dissolved put in the cloth again, and let it remain ½ hour at scalding heat; then take out and rinse in soft water. Empty the vitriol water into another vessel and dissolve the extract of logwood in sufficient water; scald, skim and put in the cloth, still keeping the dye hot; let it remain ½ hour; air frequently; then take it out and drain it; add the vitriol water to the dye, put it in again, occasionally airing it; cleanse in soft water and dry. — 3. For 110 lbs. 8¾ lbs. solid extract logwood; 5 lbs., 10 oz., catechu; boil together; boil the yarn in the decoction for 1 hour; steep in the cold liquid 24 hours; raise to a boil again; lift and air over night. Dissolve in sufficient fresh water, 2¼ oz. chromate of potash and 2¼ oz. blue vitriol, and work the cotton in this for ½ hour. Lift, drain, and dissolve 2¾ lbs. soda ash in the cold logwood liquor; heat to 139° Fahr. Re-enter the cotton; work 15 minutes, and rinse. This color bears washing and milling, and does not smear whites.

BLUE.—Commonly produced from indigo either in the form of sulphate or in aqueous solution. The most permanent blue is given by indigo, and particularly by what is called the "indigo vat." A variety of shades of beauty and permanence may be given by the Prussian blue process. With a persalt of iron or tin as a mordant, Prussian blue gives a splendid dark blue. Cheaper blues are commonly dyed with logwood and woad, sometimes aided by sulphate of indigo. There are two methods of preparing solutions of indigo for dyeing: by deoxidizing it, and then dissolving it in alkaline menstruum; and by dissolving it in sulphuric acid. The former method is used in preparing the ordinary indigo vat of the dyers. Wool, silk, linen and cotton, may be dyed blue in the indigo vat. The goods, after being passed through a weak alkaline solution, are subjected to the action of the vat for 15 minutes; then exposed to the air; the immersion in the vat and the exposure are repeated until the color becomes deep. Woad and madder improve the richness of the dye. Other deoxidizing substances besides those below mentioned, may be used to effect the solution of the indigo; thus, a mixture of caustic soda, grape sugar, indigo and water, is often employed in Europe for this purpose; and orpiment, lime and pearlash, are also used. When properly prepared, the indigo vat may be kept in action for months by the addition of one or another of its constituents as required. An excess of copperas or lime should be avoided. The cold vat is the one generally used for cotton, and is prepared as follows: Indigo, in powder, 1 lb.; green copperas, 2½ to 3 lbs.; newly slaked lime, 3½ to 4 lbs.; triturate the indigo with a little water or alkaline lye; then mix with some hot water; add the lime, and again mix; then stir in the solution of copperas, and agitate the whole at intervals for 24 hours. A little caustic potash or soda is frequently added, and a corresponding portion of lime omitted. For use, a portion of this vat is ladled into the dyeing vat, as wanted. After being employed for some time, the vat must be refreshed with a little copperas and fresh slaked lime, the sediment stirred up and the whole mixed together. The potash vat is best adapted to woolens; it is prepared with indigo, in powder, 12 lbs.; madder, 8 lbs.; bran, 9 lbs.; potash, 24 lbs.; water at 125° Fahr., 120 cu. ft.; mix well. At the end of 36 hours add 14 lbs. more potash; after 10 or 12 hours longer, add 10 lbs. potash, and rouse the whole up well; as soon as the fermentation and reduction of the indigo are developed, which takes place in about 72 hours, add a little fresh slaked lime. This vat dyes quickly, and the goods lose less color in alkaline and soapy solutions than when dyed in the common vat. The woad vat is prepared like the potash vat, except that woad is used instead of madder. The vat is set at 160° Fahr., and kept so until deoxidation and solution of the indigo has commenced. The woad and potash vat are sometimes called the warm vat. — Wool. 1. For 100 lbs. 4 lbs. Guatemala or 3 lbs. Bengal indigo, in the soda or woad vat; then boil in a kettle a few minutes, 5 lbs. cudbear or 8 lbs. orchil paste; add 1 lb. soda, or better 1 pail of urine; then cool the dye to about 170° Fahr., and enter the wool. Handle well for 20 minutes; take out, cool, rinse and dry. It is all the same if the cudbear is put in before or after the indigo. 3 oz. aniline purple, dissolved in alcohol, ½ pt., can be used instead of the cudbear. It produces a very pretty shade, but should never be used on mixed goods which have to be bleached.— 2. (*Purple Blue.*) For 100 lbs. Dip in the blue vat to a light shade; then boil in a solution of 15 lbs. alum, and 3 lbs. half refined tartar, for 1½ hours; then the wool taken out, cooled, and let stand 24 hours. Then boil in fresh water 8 lbs. powdered cochineal for a few minutes; cool the kettle to 170° Fahr.; handle the prepared wool in this for 1 hour, when it is ready to cool, rinse and dry. By coloring first with cochineal, and finishing in the blue vat, the fast purple or dahlia will be

produced. Tin acids must not be used in this color. — 3. For 2 lbs. Alum, 5 oz.; cream tartar, 3 oz. Boil goods in this 1 hour; then put into warm water which has more or less extract of indigo in it, according to depth of color desired, and boil again until it suits, adding more blue if needed. — 4. (*Saxony.*) For 100 lbs. Thibet or comb yarn. Alum, 20 lbs.; cream tartar, 3 lbs.; mordant, 2 lbs.; extract indigo, 3 lbs., or carmine, 1 lb., makes a better color. When all is dissolved, cool the kettle to 180° Fahr. Enter goods, and handle quickly; let it boil 1 hour, or until even. Long boiling dims the color. Zephyr worsted yarn ought to be prepared, first, by boiling it in a solution of alum and sulphuric acid, then the indigo added afterwards. — 5. (*Sky.*) Water, 1 gal.; sulphuric acid, a wineglassful; Glauber salts, in crystals, 2 tablespoonfuls; liquid extract of indigo, 1 teaspoonful. Boil the goods 15 minutes; rinse in cold water. —6. For 40 lbs. Bichromate of potash, 8 oz.; alum, 1 lb.; dissolve all and bring the water to a boil; put in the goods; boil 1 hour; then empty the dye, and make a new dye with logwood, 8 lbs; or extract of logwood, 1 lb., 4 oz.; boil in this 1 hour longer; grade the color by using more or less logwood, as you wish it dark or light in the color. This may also be used for silk. — 7. For 100 lbs. Color the cloth first by 1 or 2 dips in the vat of indigo blue, and rinse it well; then boil it in a solution of 20 lbs. alum, 2 lbs. half refined tartar and 5 lbs. mordant, for 2 hours; then take it out and cool. In fresh water boil 10 lbs. good logwood ½ hour in a bag or otherwise; cool off to 170° F., before entering; handle well over a reel; let it boil ½ hour; then take it out, cool, and rinse. This is a firm blue. — 8. For 3 lbs. Dissolve 1 oz. copperas in 4 gals. rain water; wet the goods in warm suds; then put into copperas water and let it remain 10 minutes; dissolve in another vessel 2 oz. prussiate of potash in 4 gals. rain water; now wring goods and put them into the solution and let them remain 5 minutes; then wring out again; now add 1 oz. oil vitriol to the potash water; stir well, then put the goods in again and bring to a boil, letting the goods remain in until the desired shade is obtained. — Silk. 1. (*Light.*) For cold water, 1 gal.; dissolve alum, ½ tablespoonful, in hot water, 1 teacupful, and add to it; then add the chemic blue, 1 teaspoonful at a time, to obtain the desired color; the more chemic the darker the color. — 2. To 45 or 50 gals. water, heated to 122° Fahr., add 12 oz. indigo, 8 oz. madder, 8 oz. bran, and 24 oz. potash; in 36 hours introduce 12 oz. more potash, and the same in 12 hours after; in 72 hours, add a little lime to check fermentation. Wool, silk, linen and cotton may be dyed in this bath. — Cotton. 1. Triturate 1 lb. of indigo with water and a little caustic potash; then add 3 lbs. lime, and afterwards 2½ lbs. sulphate of iron in solution, stirring together. The solution contains refined indigo, soluble in lime and alkalies. The cotton, linen, etc., to be dyed, is repeatedly dipped in the solution, and afterwards rinsed in water soured with hydrochloric acid. — 2. For 5 lbs. 6 oz. copperas; 1½ oz. prussiate of potash; ½ oz. sulphuric acid; dissolve the copperas in enough hot water to cover goods; put in the goods and let them remain 1 hour; then rinse and put them in the solution of prussiate of potash and sulphuric acid, previously prepared; simmer 1 hour, or until color suits; then hang out to dry. Prepare the solution of prussiate of potash and sulphuric acid by first dissolving the potash in sufficient hot water to cover goods, then add the acid, stirring constantly.

BROWN. — Wool. 1. (*Snuff.*) For 50 lbs. Camwood, 10 lbs.; boil for 20 minutes; dip the goods for ¾ hour; then take them out and add to the dye, fustic, 25 lbs.; boil 12 minutes, and dip the goods ¾ hour; then add blue vitriol, 10 oz., copperas, 2 lbs., 8 oz.; dip 40 minutes; add more copperas, if the shade is required darker. — 2. (*Olive.*) For 10 yards. Boil fustic, 1 lb.; logwood, 3½ oz.; cudbear, 2½ oz.; cool to 200° Fahr.; enter, and winch for 20 minutes; air out; repeat; sadden to pattern with 4 oz. copperas; wash and dry. — 3. Water. 3 gals.; bichromate of potash, ¾ oz.; boil the goods in this 40 minutes; wash out in cold water; then take 3 gals. water, 6 oz. peachwood, and 2 oz. turmeric; boil the goods in this 40 minutes; wash out.— 4. (*French.*) For 50 lbs. Preparation, 1½ lbs. chrome. Dyeing, 6 lbs. fustic; 1 lb. ground madder; ½ lb. cudbear; 1 lb. tartar; if not dark enough, add 8 oz. logwood; boil ½ hour.—Silk. Annatto, 4 oz.; pearlash, 1 lb.; dissolve in boiling water, q. s. The silk is passed through it for 2 hours, then taken out, and squeezed dry; it is next passed through a mordant of alum, and then through a bath of Brazil wood, followed by another of logwood, to which a little green copperas has been added. — Cotton. Give the goods as much color, from a solution of blue vitriol, 2 oz., to water, 1 gal., as it will take up in dipping 15 minutes; then rub it through lime water; this will make a beautiful sky blue of durability; then run through a solution of prussiate of potash, 1 oz., to water, 1 gal.

BUFF.—1. (*Dark.*) Boil 6 lbs. turmeric with 3 lbs. alum in 6 gals. water; add this to hot water. Work yarns 5 turns, and lift. Add 6 gills nitrate of iron; 3 turns more. Wash in cold water, and stove. — 2. (*Light.*) Bleach; add a clear lime water. Work yarns 5 turns, and wring. Boil 2 oz. Bismarck brown; add this to a cold water bath. Work yarns 5 turns; wash in cold water, and stove.

CLARET.—Cotton. 11 lbs. yarns. Make up a beck with 17½ oz. prepared catechu, and work the yarns in it for 1 hour. Wring and steep for ½ hour in a hot beck of 6¼ oz. chromate of potash; take through cold water, and wash for ½ hour in a beck of 8 lbs. sumac at 190° Fahr. Dye in a cold beck with 1¾ oz. magenta; lift; add to the beck 8¾ oz. alum and the decoction of 2½ lbs. logwood. Enter again; work in the cold beck; lift, and add, according to the shade, ½ to 1¾ oz. chromate of potash; re-enter, and work to shade.

CRIMSON.—Wool. 1. 1½ lbs. lac dye; 5 oz. muriate of tin. Put the lac dye into a brass kettle and add sufficient water to cover goods; let it stand 12 hours; then add the muriate of tin; stir well together; put in the goods, and bring slowly to a scalding heat; retain this temperature for ½ hour for light crimson, or 2 hours

for deep crimson. — 2. For 10 yards. Bottoming, cudbear, 1½ oz.; preparation, tartar, 1½ oz.; scarlet spirits, 3½ oz.; dyeing, cochineal, 2 oz. Boil or scald the cudbear; winch in this 30 minutes; then prepare and dye as before. — 3. For 50 lbs. Prepare with 2 lbs. alum and ½ lb. tartar. Boil ½ hour; wash in 3 warm waters. Boil in 11 lbs. limawood, and add ½ lb. eudbear; boil in this ½ hour, and blue with warm water. — SILK. For 1 lb. Alum, 3 oz.; dip at hand heat 1 hour; take out and drain, while making a new dye, by boiling 10 minutes, cochineal, 3 oz.; bruised nutgalls, 2 oz.; and cream tartar, ½ oz., in 1 pail water; when a little cool, begin to dip, raising the heat to a boil, continuing to dip 1 hour; wash and dry.

DAHLIA.—This is produced by combining a blue or purple with red when a compound color is used. Upon wool and silk it can be obtained directly by means of archil or cudbear, either alone or blued by a small quantity of sulphate of indigo. Upon cotton indifferent shades of dahlia are obtained by macerating in sumac liquor, working in tin solution, and dyeing in logwood, mixed with red wood.

DRAB.—WOOL. For 50 lbs. 7 lbs. fustic; 8 oz. madder; 4 oz. cudbear; 2 lbs. alum; 8 oz. tartar. Enter between the cold and 160° Fahr. After heating up, boil from 10 to 30 minutes; wash in 2 waters. Dark shades may be slightly impaired with chrome; wash in 2 waters. — 2. (*Light.*) For 56 lbs. 4 lbs. fustic; 1⅞ lbs. alum; 4 oz. madder; 4 oz. tartar; 3½ oz. cudbear. Work as for dark drab. — 3. For 50 lbs. Logwood and alum, of each, ½ lb.; boil well. Enter the goods, and dip for 1 hour. Grade the color to any desired shade by using equal parts logwood and alum. — SILK. 1. For 100 yards. Boil 4 lbs. fustic and 6 oz. logwood; 2½ oz. eudbear; 1½ oz. copperas; cool to 200° Fahr. Enter; winch 20 minutes; air out; repeat; then take a little liquor out of the boiler; dissolve the copperas, reduce it to handling heat with water, and give 1 or 2 shots through it, as the pattern requires; 1 water out of the saddening; then give a warm but weak sour to clear the color; wash in 2 waters and dry. — 2. (*Fawn.*) Take hot water, 1 gal.; annatto liquor, 1 wineglassful; 2 oz., each, sumac and fustic; add copperas liquor according to shade required; wash out. It is best to use the copperas liquor in another vessel, diluted according to shade desired. — COTTON. For 40 lbs. Boil 6 lbs. fustic; scald 2½ lbs. limawood and 2 lbs. sumac; decant into a wooden vessel capable of containing 100 gals.; reduce with cold water to handling heat. Enter; 6 turns; wring out; sadden with 8 oz. copperas; 4 turns; wring out again, and give 4 oz. bluestone.

FEATHERS.—The same preparation as would dye silk of the same color will dye feathers. In dyeing silks the water is used hot, or on the simmer, for most colors; but feathers must be dyed in cold liquors, except for black, the dyeing materials being first boiled and then left to cool; the feathers must then be put in, and when this liquid is exhausted, add a fresh one, pouring off the old liquid.

FURS.—Any dye that will color wool will also color furs. — *Black.* 1. The best black is obtained by first dyeing the skin a blue. Then boil ¼ lb. powdered gall nuts, and 1½ oz. logwood, in 3 gals. water. If the flesh side is to be blue, while the fur or wool is another, this decoction must be sponged on. Get the wool or hair thoroughly impregnated with this, and then add ¼ lb. copperas to the dye, and go over the fur or wool many times with the sponge. The process above given will answer without previous blueing, but the black is not so brilliant.— 2. Make a bath of 8 oz. bichromate of potash, 6 oz. alum, and 4 oz. fustic; boil in water enough to cover a single skin. Make another bath of 4 lbs. logwood; 4 oz., each, barwood and fustic; or 8 oz. fustic; and same amount boiling water as last. Stir the skin well around in the 1st bath, keeping the water hot for 1 hour; then work it in the 2d bath the same length of time; take out and wring; then add ¼ lb. copperas, to the last bath, and give it a good stirring.— *Blue.* Furs are never dyed blue for sale, but sheep-skins are. The skin should be dipped several times in a bath of hot alum water, allowed to drain, and then dipped into a solution of sulphate of indigo and water, with a few drops sulphuric acid added. This gives a pale blue. — *Green.* Dye first blue, as explained above; then pass through a yellow dye till you get the shade required. An alum bath, cream of tartar, or spirits of tin, as below, must be used before the blue is given. — *Yellow.* Sheep-skins may be dyed yellow with black oak bark (quercitron bark), old fustic, annatto, and Persian (also called French) berries. The skin should be previously dipped into a hot bath of alum, cream of tartar, or spirit of tin, about 2 oz. to the gal. About ½ lb. of annatto, or 1 lb. of the other articles, are enough for a single skin.

GLOVES, Kid.—If not greasy, they may be dyed with any of the ordinary dyes by brushing the latter over the gloves stretched out smooth. The surface alone should be wetted, and a 2d or 3d coat may be given after the former one has become dry. When the last coat has become dry, the superfluous color should be rubbed out, a smooth surface given by rubbing them with a polished stick or piece of ivory, and the whole gone over with a sponge dipped in white of egg.

GRAY.—WOOL. 1. (*Ash.*) For 20 lbs. Dissolve 1 lb. tartar in 4 gals. water; turn the stuff through the liquor for ½ hour; add a decoction of galls, ¼ lb., and sumac 1½ lbs; put in the stuff and boil ½ hour; then take out the stuff; add sulphate of iron, 1 lb., when dissolved again, put it in, and work well ½ hour longer. — 2. (*Iron.*) Give the stuff a pale blue tint in the indigo bath; pass it through a weak decoction of galls and sumac; take it out; add a little iron liquor to the bath, and work the stuff well. In this way every shade of iron gray, slate gray, and the other shades that turn upon the blue, may be given. — 3. (*Pearl.*) Sumac, 2 lbs.; logwood, 1 lb.; make a decoction with water; pass the stuff through it; afterwards through a weak iron water; lastly, add a little iron liquor to the decoction, and again turn the stuff through it. — 4. (*Yellowish.*) Pass the stuff through a weak fustic bath, and next through a weak decoction

of galls, to which a little alum has been added. Remove the goods; refresh the bath with a little logwood; boil ½ hour; add some blue and green vitriol, and when dissolved finish. — HALF WOOL. Prepare for 3 hours with 2 lbs., 12 oz., sumac; wring out, and boil ¾ hour with 4½ oz. logwood and 1 oz. fustic. Sadden in the same beck with 1¾ oz. copperas at 200° Fahr. — COTTON. For 2 lbs. Take ¼ lb. cheapest black tea to be found; steep in an iron kettle, with the tea in a bag, and then boil, squeezing the leaves dry; add 1 teaspoonful copperas. Put in the goods. For light gray or drab, leave the goods in a short time; for darker colors, leave longer. Rinse in clear warm water. Wool long boiled and aired often, becomes brown in this dye.

GREEN.—WOOL. 1. For 1 lb. Fustic, 1 lb., with alum, 3½ oz. Steep until strength is out, and soak goods therein until a good yellow is obtained; then remove the chips and add extract of indigo or chemic, 1 tablespoonful at a time, until color suits.—2. (*French.*) For 50 lbs. Boil 7 lbs. fustic and 12 oz. cudbear; add 6 oz. extract of indigo and 1 pt. sulphuric acid; cool to 180° Fahr. Enter, and boil 20 minutes. — 3. (*Grass.*) For 10 yards. Fustic, 12 oz.; extract of indigo, 3 oz., 3 dr.; alum, 3 oz., 3 dr.; sulphuric acid, 1½ oz. Boil the fustic first; then add the extract of indigo, alum and acid; put off the boil. Enter and winch to shade required. If not blue enough, give more extract of indigo; if not yellow enough, more fustic. — 4. (*Myrtle.*) For 10 yards. Fustic, 1 lb.; logwood, 3 oz., 3 dr.; extract of indigo, 3 oz., 3 dr.; bluestone, ½ oz. Boil the logwood and fustic together; put off the boil. Enter; winch 20 minutes; air out and repeat; raise with 3 oz. bluestone dissolved in the boiler; then give the extract of indigo 1 water; rinse in the remaining 2 oz. bluestone; harden in a solution of alum, and dry. — 5. (*Olive.*) For 100 yards. 10 lbs. fustic; 2 lbs. logwood; 10 oz. camwood. Boil together 30 minutes; put off the boil. Enter, and winch 20 minutes; air out and repeat; sadden with 3 or 4 oz. copperas in the same liquor, or with a little of the liquor in another dish; when the required shade is obtained, wash and dry. — SILK. For 1 lb. Yellow oak bark, 8 oz. Boil ½ hour; turn off liquor from bark, and add alum, 6 oz.; let stand until cold. While making this, color goods in blue dye tub a light blue; dry and wash; dip in the alum and bark dye. If it does not take well, warm the dye a little. — COTTON. 1. For 40 lbs. Fustic, 10 lbs.; blue vitriol, 10 oz.; soft soap, 2½ qts.; logwood chips, 1 lb., 4 oz. Soak the logwood over night in a brass vessel; put it on the fire in the morning, adding the other ingredients; when quite hot it is ready for dyeing. Enter the goods, and handle well. Different shades may be obtained by letting part of the goods remain longer in the dye.—2. For 7 lbs. 2 lbs. fustic and 1 oz. extract logwood. Boil 2 hours; then add 1 oz. blue vitriol; color in brass. After it is colored dry it, and then wash it in strong suds.

HORN. — *Black.* 1. 5.5 lbs. burned lime are slaked in a little water, so that a powder-like hydrate of lime is obtained; this is mixed with 2.2 lbs. minium, and this mixture is formed into a thick paste with such lye as soap-boilers use, having a specific weight of 1.036. The articles of horn are placed in this solution for 24 hours; they are then taken out, rinsed off with water, dried with a cloth, brushed over with rape-seed oil, and then again rubbed dry. — 2. .14 oz. silver are dissolved in 2.1 oz. nitric acid (aquafortis), and this solution is applied several times to the article to be stained; the first coat should be entirely dry before another is applied. The articles are then burnished. — *Green.* 1. .52 oz. fine indigo-carmine are dissolved in 2.1 oz. rain-water; then .175 oz. pure picric acid are dissolved in 2.1 oz. boiling hot rain-water, and both solutions are mixed together. A beautiful, durable green color will be obtained, and can be used for the various manipulations. —2. 4.2 oz. copper cut up fine and gradually dissolved in 13 oz. nitric acid, and the articles to be stained boiled in this solution until they assume a fine green color. — *Purple.* 17.5 oz. logwood are boiled in 4.4 lb. milk of lime, and the same method is observed in the following. — *Red.* 17.5 oz. red Brazil-wood are boiled 1 hour in 4.4 lb. milk of lime, and filtered through a cloth. The articles of horn, ivory, or bone to be stained are boiled for 1 hour in a solution of 1.05 oz. alum in 17.5 oz. water. They are then placed in the above stain, and allowed to remain until the desired color has been produced. Articles stained in this manner will acquire a beautiful purple color by dipping in alum water. — *Bright Red.* 8.75 oz. logwood and 8.75 oz. red Brazil-wood are boiled in 4.4 lb. milk of lime. It is applied in the same manner as the one before. — *Tortoise-shell.* A rough dough is prepared from 17.5 oz. white litharge, 2.2 lbs. finely powdered unslaked lime, and 3.3 lbs. soap-boilers' lye having a specific weight of 1.036. The places of the horn which are to become dark are covered with this dough, and the horn allowed to remain in contact with the dough for 24 hours, until the latter has become dry. The horn is then cleansed with a brush. — *Yellow.* 17.5 oz. alum, free from iron, are dissolved in 4.4 lbs. rain-water. The articles are allowed to lie in this for 1 or 2 hours. In the meanwhile 7 oz. yellow berries are boiled with 4.2 oz. carbonate of potash in 2.2 lbs. water for 1 hour, and then strained. The articles stained with alum are placed in this decoction, and allowed to lie in it for 1 hour. They are then taken out and dried.

IVORY.—The pieces are first polished with whiting and water, and when washed clean from the whiting are then prepared for the stain by an immersion of from 3 to 5 minutes in acidulated cold water, in proportion of 1 part of muriatic acid, the ordinary acid of commerce, to 40 or 50 of water, or in an equally weak solution of nitric acid. This cleansing fluid extracts the gelatine from the surface of the ivory, and is essential to the attainment of a perfect color. Extreme cleanliness is necessary, with which view the work in process of staining is at no time touched by the fingers, but removed from one vessel to another by flat pieces of wood, attached to each other by a flat metal spring after the form of a pair of sugar-tongs, separate pairs being kept for different colors. Subsequently to

its treatment with the acid, the ivory is again placed in cold water that has been boiled, before it is transferred to the stain. — *Black.* 1. Lay for several hours in a strong solution of silver nitrate, remove and expose in a strong light. — 2. Place a handful of logwood in about 1½ pts. water in a saucepan, and let simmer till reduced to ¾ pt.; put the ivory into the boiling liquid, and let remain for 10 minutes; remove and lay before a fire or in an oven till well dried; afterwards polish with chamois leather. — 3. Make a decoction of 2 oz. logwood dust in 1 qt. water, and stain; dissolve 1 oz. iron sulphate in 1 qt. water; then heat the two stains in separate vessels to 100° Fahr., and immerse the ivory in the logwood 15 minutes; well wash, and put it into the iron sulphate for 5 minutes. — *Blue.* 1. Immerse for some time in a dilute solution of indigo sulphate containing potash. — 2. Elder berries and alum. — 3. Steep in a solution of verdigris and sal-ammoniac in weak nitric acid, in the proportion of 2 parts of the former to 1 of the latter, being careful to observe the same precautions as in staining red; then dip in strong solution of pearlash and water. — *Brown.* Alkanet root. — *Green.* Boil in a solution of verdigris in vinegar till the desired shade is produced. — *Red.* 1. Make an infusion of cochineal in liquor ammoniæ, and immerse pieces therein, having previously soaked them for a few minutes in water slightly soured with nitric acid. — 2. Dip in a solution of nitro-muriate of tin, and then in lac, to produce scarlet; by then plunging into a solution of potash it will become cherry red. — 3. Boil cuttings of scarlet cloth in water, and add pearlash by degrees till the color is extracted; add a little rock-alum to clear the color, then strain. Steep the ivory in nitric acid diluted with twice the bulk of water; take out and plunge into the dye till sufficiently deep. The acid bath must not be too strong, and the ivory should be taken out as soon as the surface becomes rough; the dye bath must be warm, but not hot. A variegated appearance may be produced by covering portions with white wax, these retaining their natural whiteness. — *Yellow.* 1. Immerse in a solution of ¼ lb. alum per pt.; then boil in decoction of turmeric in lime water. — 2. .175 oz. picric acid are dissolved in 1.05 oz. hot water. On the other hand, .07 oz. concentrated sulphuric acid are diluted with .35 oz. hot water, and the freshly-smoothed articles are laid in the fluid, and frequently turned. They are then taken out, dried off, and placed in a solution of picric acid while this is still hot, where they remain until uniformly yellow. A lustre is given by polishing with soap and water and fine whiting. This is a very good method for coloring billiard balls yellow. — *Vegetable Ivory.* Objects of this material may be stained by boiling a long time in a clear solution of the desired coloring matter. Picric acid, or potassium bichromate, iodine green, sumac, aniline dyes, etc., may be used conveniently. The ivory must be clean. It may be bleached by immersion several hours in a solution of permanganate, and then in sulphurous acid.

LAVENDER.—WOOL. For 50 lbs. Boil 5½ lbs. logwood with 2 lbs. alum; then add 10 oz. extract of indigo. When cold, put in the goods, and gradually raise to boiling point. — SILK. In a vessel of warm water as hot as the hand can bear, dissolve white soap enough to raise a lather; then add 1 gill archil liquor, and work the goods in this for 15 minutes; wring out and dry. Boil 1 oz. cudbear, and add the solution to the soap and water instead of archil, which will give a lavender having a redder tint than with the archil. If a still redder shade be required, the soap may be dispensed with. — COTTON. For 100 yards. Take 1 lb. logwood and 2 lbs. sumac; scald them separately; then decant into a proper sized tub; let them cool to 150° Fahr., and add 2 gills vitriol. Winch the goods in this 20 minutes; lift, and run them slightly through acetate of iron; wash in 2 waters; then give 1 lb. logwood as before; raise with 1 pt. chloride of tin. Wash in 2 waters; then, in a tub of cold water, put 4 oz. extract of indigo. Enter, and winch in this 15 minutes; lift, give 1 water, and dry.

LEATHER. — *Black.* Put the skin on a clean board, and sponge it over with gall and sumac liquors, made strong; then take a strong logwood liquor, and sponge it over 3 or 4 times; next take a little copperas, mix it in the logwood liquor, sponge over the skin, and finish as follows: Take the white of an egg, and a little gum dragon, and mix the 2 together in ¼ gill water; sponge over the skin, and when dry polish with a bottle, or a piece of glass prepared for the purpose. — *Blue.* 1. Steep the leather for a day in urine and indigo; then boil it with alum; or it may be given by tempering the indigo with red wine, and washing the skins therewith. — 2. Boil elder berries, or dwarf elder; then smear and wash the skins therewith, and wring them out; then boil the berries as before in a solution of alum water, and wet the skins in the same manner once or twice; dry them, and they will be very blue. — 3. (*Sky Blue.*) This is given with indigo steeped in boiling water, and the next morning warmed and smeared over the skin. — *Green.* Smear the skin with sap green and alum water, boiled. — *Dark Green.* Steel filings and sal ammoniac, steeped in urine till soft, then smeared over the skin, which is to be dried in the shade. — *Light Orange.* Smear with fustic berries, boiled in alum water; or, for a deep orange, with turmeric. — *Purple.* Wet the skins with a solution of roche alum in warm water, and, when dry, again rub them with the hand with a decoction of logwood in cold water. — *Red.* Wash the skins, and lay them 2 hours in galls; then wring them out, and dip them in a liquor made with privet berries, alum and verdigris, in water; and lastly in a dye made of Brazil wood boiled with lye. — *Yellow.* 1. Smear the skin over with aloes and linseed oil, dissolved and strained; or infuse it in weld. — 2. Picric acid gives a good yellow without any mordant; it must be used in very dilute solution, and not warmer than 70° Fahr., so as not to penetrate the leather.

MAROON.—WOOL. To a clear solution of 10 lbs. catechu, add 2 lbs. logwood and 2½ lbs. tartar. Boil the wool for 2 hours in this bath;

rinse, and add to the above bath 2 lbs. bichromate of potash and 1 lb. sulphate of copper. Put the wool in, and boil for ½ to 1 hour, according to shade required, and then rinse. — SILK. Take the silk through a catechu beck, weight for weight, if a good yield is desired. If a smaller yield is wished, less catechu is taken. Dye at a boil; lift, wring, and pass into a chrome beck at 6½° to 8½° Tw., and 77° Fahr. If the shade desired is very dark, the heat may be raised a little more. Wash well. Make up a beck of fustic, extract of indigo and orchil; add a little alum to draw on the fustic, and acidulate slightly with sulphuric acid for the blue. Dye at a boil, adding more of any of the colors as the shade may require.

NANKEEN.—Boil annatto with an equal weight of pearlash, in sufficient water.

OLIVE.—WOOL. 1. For 50 lbs. 10 lbs. bark; 2 lbs. logwood; 8 oz. bluestone. Boil the bark in a bag; put off the boil, and enter; winch 20 minutes. Lift, and put in the bluestone; return for 10 minutes; lift, and wash in 2 waters, and top; give the logwood in another dish; when dark enough, wash and dry. — 2. For 10 lbs. yarn. Boil with 96 dr. prepared tartar, 20 dr. blue vitriol, 375 dr. orchil, 50 dr. turmeric, and 40 dr. indigo sulphate. Cerise as required. — COTTON. For 11 lbs. Extract 8¾ oz. sumac in boiling water. Enter the yarn into the clear liquid; let steep, and make up a fresh beck with the same weight of copperas. Wring out the yarn, and enter into this second beck, working for ½ hour. Wring, and enter into a fresh beck of red liquor at 1½° Tw.; give 12 hours; heat to 144° Fahr. Wring out; and work for ½ hour in a decoction of quercitron bark.

ORANGE.—WOOL. 1. For 50 lbs. Boil 10 lbs. bark and 1½ lbs. cochineal; add 2 lbs. tartar and 2½ qts. yellow spirits. Enter at 200° Fahr.; boil 30 minutes. — 2. For 5 lbs. Muriate of tin, 6 tablespoonfuls; argal, 4 oz. Boil, and dip 1 hour, and add again 1 teacupful madder. Dip again ½ hour. Cochineal, about 2 oz., in place of madder, makes a brighter color. — SILK. For 10 yards. Annatto, 1¾ oz.; bark, 1½ oz.; chloride of tin, 1½ oz. Give a good body of annatto at 212° Fahr.; wash in 1 water, then top with the bark and chloride of tin. — COTTON. Boil 12 lbs. sugar of lead in 12 gals. clear limewater till dissolved; add this to enough cold water. Work yarn 5 turns, and wring. Repeat this process twice in the cold liquors, wringing after each time. Get a clear lime water up to the boil, and give the yarns 5 turns in it, working very quickly. It is important that the lime water should be boiling, to keep the yarns level. Wash off in warm water with a little soap and dry. This color, like all others in which lead is an ingredient, will be darkened and spoiled if exposed to fumes of sulphuretted hydrogen.

PEACH.—For 50 lbs. Drench 8½ lbs. cudbear with a little hot water; boil or scald it in 3 or 4 gals.; decant the clear liquor into a boiler containing 100 gals. water. Enter cold; bring to the boil; lift, and put in 1 lb. soda, or 2 gals. urine; return, and boil 10 minutes.

PINK.—WOOL. 1. Washed safflower, 2 oz.; salt of tartar, ½ oz.; cold water, 1 qt.; digest 3 hours; express the liquor and strain. Used to dye silk stockings rose color. The color is brought out afterwards by passing the articles through water soured with lemon juice.—2. For every 3 lbs. material, take 3½ qts. water, 2 oz. cochineal, and ½ oz. cream tartar; steep the cochineal in warm water 2 hours, or until the strength is extracted, and add the cream tartar; then wet the garment in clean water; wring dry; put it into the dye; bring it to a scalding heat, and let it remain a few minutes, stirring all the time, when it will be finished. If a lighter color is needed, use less cochineal; if darker, more. A cheaper dye may be obtained by using madder for cochineal. — 3. (*Purple.*) For 5 lbs. Boil 1 lb. cudbear in sufficient water; put in 1 oz. alum; when dissolved, put in the goods and let them simmer for ½ hour, stirring frequently; rinse in warm water. A tin pan is best for this color; iron will brown it. — COTTON. For 40 lbs. Redwood, 20 lbs.; muriate of tin, 2½ lbs.; boil the redwood 1 hour; turn off into a large vessel; add the muriate of tin, and put in goods; let it stand 5 or 10 minutes, and a nice pink will be produced.

PRIMROSE.—For 50 lbs. Boil 2½ lbs. bark; add 2 lbs. tartar; 2 qts. muriate of tin. Enter at 150° Fahr.; boil 30 minutes.

PURPLE.—WOOL. For 1 lb. Rinse goods well in soap suds; then dissolve 2 oz. cudbear in hot suds, and soak goods until of the required color. The color is brightened by rinsing in alum water. — SILK. 1. For 40 lbs. Bichromate of potash, 8 oz.; alum, 1 lb.; dissolve all, and bring the water to a boil, and put in the goods; boil 1 hour; empty the dye, and make a new dye with logwood, 8 lbs., or extract of logwood, 1 lb., 4 oz., and boil in this 1 hour. Use more or less logwood as you wish dark or light color. — 2. For 10 lbs. Enter goods in blue dye-bath, and secure a light blue color; dry, and dip in a warm solution, containing alum, 2½ lbs. Should a deeper color be required, add a little extract of indigo.

RED.—WOOL. 1. (*Rose.*) For 40 lbs. 1 lb. cochineal; 3 gills double muriate of tin; 1 lb. tartaric acid. Enter at 100° Fahr.; heat up; boil 15 minutes; lift, and cool to 120°, by throwing out part of the liquor, and filling up with water; add 1 gill ammonia paste, 12 oz. tartaric acid, and 6 oz. oxalic acid. Bring up to the boil. When the desired shade is obtained, wash well, and dry. — 2. The goods are first steeped or boiled in a weak mordant of alum and tartar, for 1 hour, and then allowed to lie in the cold liquor for 2 or 3 days, with frequent moving about; they are lastly boiled in the Brazil-wood bath for about ½ hour. — 3. For 40 lbs. Make a tolerably thick paste of lac dye and sulphuric acid; allow it to stand for a day; now take tartar, 4 lbs; tin liquor, 2 lbs., 8 oz., and 3 lbs. of the above paste; make a hot bath with sufficient water. Enter the goods for ¾ hour; afterwards carefully rinse and dry. — SILK. 1. The goods, after being alumed in the same way as wool, but at a lower temperature, are rinsed, and passed through the Brazil wood bath lukewarm.— 2. The most lively tints of cherry, flame, flesh, orange-red, poppy and rose color, are imparted to silk by the following process, modified to suit

the particular shade required: The safflower (previously deprived of its yellow coloring matter by water) is exhausted with water containing either carbonate of soda or of potash, in the proportion of about 5 per cent. of the weight of the prepared dye-stuff acted on; the resulting liquid is next treated with pure lemon juice until it acquires a distinct and rich red color; the silk is then introduced and turned about as long as it is perceived to take up color, a little more lemon juice being added as may appear necessary; for deep shades this is repeated with one or more fresh baths, the silk being dried and rinsed between each immersion; it is lastly brightened by turning it for a few minutes through a bath of warm water, to which a little lemon juice has been added. For flame color the silk should receive a slight shade with annatto, before putting it into the safflower bath. For the deeper shades, when expense is an object, a little archil is commonly added to the first and second bath. — Cotton. 1. (*Bright.*) The most permanent is Turkey red, which is made from madder, but the process is too complicated for family use. The following is easier and gives fair results: First steep the yarn or cloth several hours in a decoction of sumac with a little sulphuric acid; after the sumac has had time to form an intimate combination with the cotton, the yarn is worked in a solution of bichloride of tin of sp. gr. 1.015, and transferred to a boiler, in which about its own weight of barwood, finely rasped, is added, the water being nearly boiling, and the goods worked about until the required shade is obtained. — 2. Clean the goods by alkaline baths, after which they are steeped in oily liquors, brought to a creamy state by a little carbonate of soda; a bath of sheep's dung is next used as a secondary steep; the oleaginous bath, and the operation of removing loosely adhering oil with an alkaline bath, is repeated 2 or 3 times, care being taken to dry the goods after each process; then follow the distinct operations of galling, aluming, maddering, and brightening, the last for removing the dun-colored principle, by boiling at an elevated temperature with alkaline liquids and soap; the whole is generally concluded with treatment by spirit of tin. In this way are given the most brilliant reds on cotton. — 3. The goods are first boiled in a bath of sumac; next worked through a weak mordant of solution of tin, and then run through the Brazil bath lukewarm. This gives a bright red.

SALMON. — 1. For each lb., ¾ lb. annatto; ½ lb. soap; rinse goods in warm water; put them into the mixture, and boil ½ hour; shade will be according to amount of annatto. — 2. For 10 yards. Annatto, 1½ oz.; cudbear, 4 dr. Boil the annatto; then add the cudbear; put off the boil. Enter and winch 30 minutes; wash in 2 waters; then dry.

SCARLET.—Wool. 1. Take soft water sufficient to cover the cloth you wish to color; bring it to a boiling heat in a brass kettle; then add 1½ oz. cream tartar for every lb. cloth. Boil a minute or two; then add 1 oz. powdered cochineal and 3 oz. muriate of tin; boil 5 minutes; wet the goods in warm water; then wring and put in the dye; boil the whole nearly 1 hour; take the cloth out and rinse well in clear cold water.—2. Dissolve in boiling water, liquid extract of quercitron, 3 lbs., 8 oz.; oxalic acid, 3 lbs., 8 oz.; tin crystals, 1 lb., 12 oz.; tartar, 4 lbs.; eochineal, 4 lbs.; chloride of tin solution, 8 lbs.; mix well when dissolved; add cold water. Enter wool, and boil from 1 to 1½ hours. — Silk. 1. Boil for ½ hour 11 lbs. ground eochineal; filter, and set to clear liquor at 4° Tw.; add to the beck about 24 fl. oz. tin solution, and dye. It requires 24 hours to produce the scarlet. After dyeing, the silks are left wrapped up for 12 hours, rinsed slightly, brightened with citric acid, and dried. The solution of tin is made of 4 lbs. muriatic acid, 2 lbs. nitric acid, 5 lbs. feathered tin, dissolved gradually in the course of a day. — 2. Prepare in stannate of soda at 4° Tw. in the cold; take through weak vitriol sours, and wash well. Give a second mordant of red liquor at 8½° Tw., thickened with calcined starch at the rate of 3½ oz. per 35 fl. oz. of the mordant. Dry without rinsing for at least 24 hours; then rinse and dye with decoction of cochineal. When the color is as deep as is required, add nitrate of tin to the same beck. This process gives scarlets as fine as *1*, and with less loss of coloring matter. The object of the addition of calcined starch is to give the silk more body. In many dyeworks scarlets for silks are grounded with annatto.

SLATE. — Wool. Boil sugar-loaf paper with vinegar, in an iron utensil; put in alum to set the color. To produce a light slate color, boil white maple bark in clear water, with a little alum; the bark should be boiled in a brass utensil. The dye for slate color should be strained before the goods are put into it. They should be boiled in it, and then hung where they will drain and dry. — Silk. For a small quantity, take a pan of warm water, and about a teacupful of logwood liquor, pretty strong, and a piece of pearlash about the size of a nut; take gray colored goods and handle a little in this liquid, and it is finished. If too much logwood is used, the color will be too dark.

STONE.—For 50 lbs. 1 lb. logwood; 4 oz. fustic; 8 oz. extract of indigo; 3 lbs. alum; 1½ lbs. tartar. Work as for drab.

STRAW. — Bleach; mordant in either tin or red liquor; boil 1½ lbs. fustic extract in 3 gals. water; add this to warm water. Work yarn 5 turns; wash in cold water, and stove.

STRAW HATS. — *Black.* To obtain a level color, a solution of gluten is added to a lye of soda, which is allowed to stand for 24 hours and filtered. The hats are then steeped for 12 hours in the clear liquid. The straw is thus freed from grease, and the mordants of nitrate, sulphate or acetate of iron, as well as the decoction of logwood mixed with sumac or galls, is evenly taken up by the fibre. A slight addition of bichromate of potash improves the dye, and the goods are then finished by the use of gum or gelatine. — *Blue.* With 1 lb. litmus or lacmus, ground, and a sufficiency of potash lye, make a decoction; put in the straw and boil it. *Chestnut Brown.* For 25 hats. Use ground sanders, 1½ lbs.; ground curcuma, 2 lbs.; powdered gall nuts or sumac, ¾ lb.; rasped logwood, 1-10 lb.; boil all together with the hats in a large

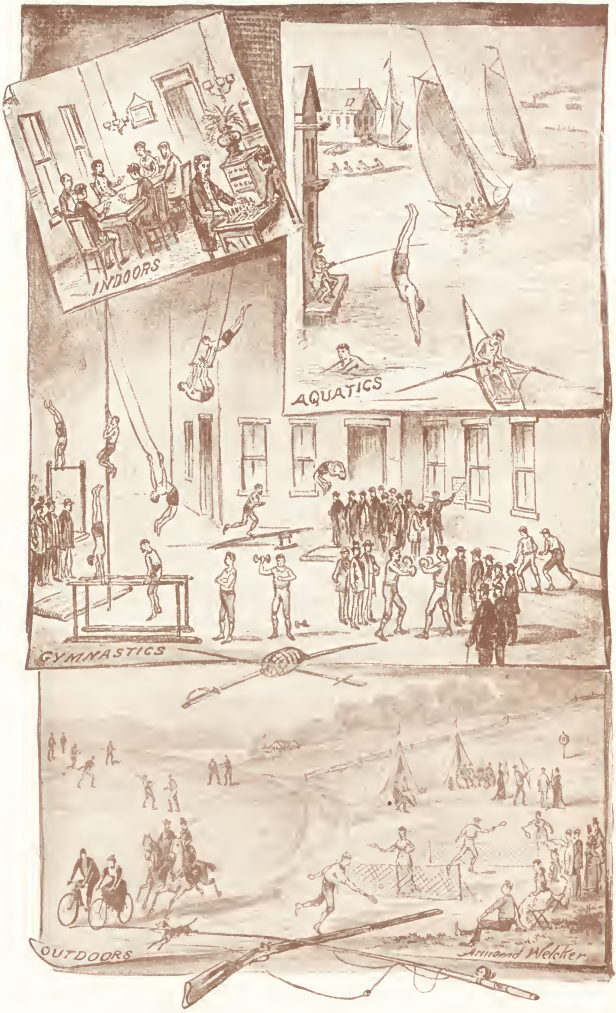
kettle for 2 hours; then withdraw the hats; rinse, and let them remain over night in a bath of nitrate, of 4° Baume, when they are washed. A darker brown may be obtained by increasing the quantity of sanders. To give the hats lustre, they are brushed with a brush of dog's grass when dry. *Red.* Boil ground Brazil wood in a lye of potash, and boil the straw hats, etc., in it. *Silver Gray.* For 25 hats. Select the whitest hats, and soften them in a bath of crystallized soda, to which some clean lime water has been added. Boil 2 hours in a large vessel, using for a bath a decoction of the following: Alum, 4 lbs.; tartaric acid, ⅜ lb.; some ammoniacal cochineal and carmine of indigo; a little sulphuric acid may be necessary to neutralize the alkali of the cochineal dye. If the last mentioned ingredients are used, let the hats remain an hour longer in the boiling bath; then rinse in slightly acidulated water. — *Slate.* Soak the bonnet in strong, warm suds, for 15 minutes, to remove sizing; rinse in warm water; now scald cudbear, 1 oz., in sufficient water to cover the hat or bonnet; work in this dye at 180° until you get a light purple. Now have a bucket cold water, blued with extract of indigo, ½ oz.; work in this until the tint pleases; dry, then rinse with cold water, and dry again in the shade. If you get the purple too deep, the final slate will be too dark. — *Violet.* Alum, 4 lbs.; tartaric acid, 1 lb.; chloride of tin, 1 lb.; dissolve and boil. Allow the hats to remain in the boiling solution 2 hours; then add as much of a decoction of logwood and carmine of indigo as is requisite to induce the desired shade; rinse in water in which some alum has been dissolved.

VIOLET. — Wool. Prepare a bath of 10 oz. of bichrome; 5 oz. sulphuric acid; 6 oz. oxalic acid. Work 1 hour in this, and then put in fresh bath with 15 lbs. logwood; 8 lbs. archil; boil 1 hour. — Silk. A good violet may be given to silk or wool by passing it first through a solution of verdigris, then through a decoction of logwood, and lastly through alum water. A fast violet may be given by first dying goods a crimson with cochineal, without alum or tartar; then rinse, and pass through the indigo vat. — Cotton. Linens and cottons are first galled with about 18 per cent. of gall nuts; next passed through a mordant of alum, iron liquor and sulphate of copper, working well; then through a madder bath, made with an equal weight of root; and, lastly, brightened with soap or soda. Another method is to pass cloth, previously dyed Turkey red, through the blue vat. Wool, silk, cotton, or linen, mordanted with alum and dyed in a logwood bath, or a mixed bath of archil and Brazil, takes a pretty, but false violet.

YELLOW. — Wool. To dye a buff, boil equal parts annatto and common potash, in soft, clear water; when dissolved, take it from the fire; when cool, put in the goods, previously washed free from spots and color; set them on a moderate fire till the goods are of the shade wished. — Silk. The silk must not be washed. A red shade is first given with annatto in a soap beck, not too strong; then washed and rinsed in the cold with sulphuric acid. The yellow shade is then given with picric acid, and the silk dried without washing. For a heavier shade the process is the same, but turmeric is used instead of picric acid. The solution of annatto is made by boiling together for ½ hour equal weights of potash and annatto. — Cotton. For 40 lbs. Sugar of lead, 3 lbs., 8 oz.; dip goods 2 hours. Make a new dye with bichromate of potash, 2 lbs.; dip until color suits. Wring, and dry. If not yellow enough, repeat the operation.

PART 5.

RECREATIONS.


INDOORS
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OUTDOORS
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THE PURSUIT OF PLEASURE.

ATHLETICS.

GYMNASTICS.

REMARKS ON TRAINING.— Gymnastic exercises may be begun at 8 years old, or earlier; but they must begin gently and proceed gradually, and never immediately after meals. The pupil should be careful, after exercise, of draughts or cold, and refrain from lying on the ground, or standing without coat or other garments. Rigidly guard against drinking cold water, which, in many instances, has been known to produce immediate death. A proper practice of gymnastics will develope the muscles for the performance of all athletic sports and exercises. But, as it is dry exercise for one alone, it will be best to get several to join him and form a club, and thus increase his interest in this recreation.

Baths.—An essential requisite and preparation for athletic feats, is the daily use of the cold bath. Dry and rub down the body with a towel until a healthy glow suffuses the skin; then put the towel aside and use the palms of the hands until obliged to cease from sheer weariness.

Costume. — The dress should be of little weight; and small, thin men should be observant of this, heavy clothing operating against them. Short-sleeved merino or gauze jerseys, and loose drawers reaching to the knee, are most useful.

Diet.—Articles of food, nutritious to some, act in the opposite manner on others; consequently each person must exercise judgment with regard to articles of consumption. No rule can be implicitly relied on. The following regulations will be found generally successful: *Breakfast* should be taken at 8 or 8:30, and consist of chops, chicken, beef or mutton, new-laid eggs, bacon and ham, oatmeal, toast or stale bread, tea or ale. Coffee should be avoided, unless felt to be beneficial. *Lunch* at 11 A. M. This should be light, consisting of biscuits or sandwiches. *Dinner* should be taken at 1:30 P. M. Roast mutton is very nutritious, but beef and game may be taken occasionally. Avoid fat as much as possible. Vegetables in moderation are good. Potatoes are least beneficial. Light puddings may occasionally be indulged in. Strawberries, oranges and figs can be eaten; but nuts, plums, etc., must be avoided. In a dinner of courses, eat little of each, and choose the simplest viands. This moderation is a great secret of training. *Supper* should be taken at 7 P. M., consisting of oatmeal, 2 fresh eggs, fresh berries or stewed gooseberries; with bread, toast and tea. Regular hours must be observed.

Disease.—It is an error to suppose that athletics induce heart-disease, though it may be developed where the seeds exist. It is advisable to be examined by a good physician before attempting to excel in athletics.

Drink.—A glass of wine now and then, of good quality, assists the system; but spirits should be totally shunned, except largely diluted with water. If a man has not been in the habit of taking them, he should abstain altogether. In the case of one accustomed to spirits, a wineglassful mixed with water should be the limit, and only taken at meal times. If fatigued from exercise, it is beneficial to take a glass of sherry before eating.

Exercise.—An essential to success in any test of skill, is regular exercise of the muscles to be exerted. Nothing is so beneficial and strengthening to the body as a walk. It is advisable to walk every morning before breakfast 3 to 6 miles, if weather permits and a reduction in weight is necessary. Before going out in the morning, if convenient, take an egg beaten up in sherry, or suck a raw egg and eat a biscuit. A crust of bread and ½ glass fresh milk are often handy, and answer the purpose as well. Regular exercise in the special branch in which a trainer is to appear, should be practiced daily, from 10.30 A. M. until noon, and from 3.30 P. M. until 5 P. M. Never do your best at any exercise until warmed up.

Sleep.—To attain the best physical and mental condition, 8 hours of sound, undisturbed sleep must be had. The trainer should retire at 9.30 P. M. regularly, and rise at 6 A. M., and rest from 12 M. to 1 P. M.

Smoking.—Those accustomed to smoke large-

ly should lessen the quantity until the practice is almost given up. The staying powers of the smoker are to a degree impaired, the wind is affected, and the languor occasioned by it induces a man to remain inactive when he ought to be taking his exercise.

CALISTHENICS.

A PRELIMINARY course to regular gymnastics consists in simple movements without implements, called CALISTHENICS.

ARM MOVEMENTS.—*Exercise 1.* Place the heels together and toes turned out; keep the body upright, shoulders well back, and arms stretched out on a level with the shoulders (*Fig. 1*); then bring the tips of the fingers quickly together in front of the chest (*Fig. 2*), having the

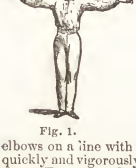


Fig. 1.

Fig. 2.

elbows on a line with the shoulders; then strike quickly and vigorously back to the original position.—*Exercise 2.* Close the hands tightly, bring them up to the chest, with the elbows close to the body; then strike forward vigorously (*Fig. 3*), backwards (*Fig. 4*), upwards (*Fig. 5*), downwards (*Fig. 6*), and sideways (*Fig. 7*), with the

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

hands closed. The elbows should be close to the body in the forwards, upwards and sideways movements; but brought up, away from the body, previous to backwards and downwards movements.—*Exercise 3.* Stretch the arms sideways and keep them straight, and the body erect; then describe quickly a circle from the shoulders, keeping the palms of the hands facing all the time (*Fig. 7*). The circle should become larger as the exercise proceeds.—*Exercise 4.* Stretch the arms forward, with the tips of the fingers touching. Strike back from the position, keeping the arms on a level with the shoulders.

Fig. 7.

BODY MOVEMENTS.—*Exercise 1.* Stretch the arms up, the palms of the hands facing each other; and keep the legs stiff; then bend forward, and, with the knees still firm, touch the ground with the tips of the fingers (*Fig. 8*). From this position, swing backwards to the back bend, keeping the legs straight.—*Exercise 2.* Stretch the arms up, the palms of the hands facing each other; heels together and toes pointing out. Bend to the right from the hips from this position, and then to the left (*Fig. 9*).

Fig. 8.

Fig. 9.

Fig. 10.

—*Exercise 3.* Advance the right leg 18 in., and stretch the arms up. Bend from this position to touch the ground with the tips of the fingers. (*Fig. 10*); then bend back (*Fig. 11*). The same

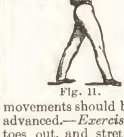


Fig. 11.

Fig. 12.

movements should be repeated with the left leg advanced.—*Exercise 4.* Place the heels together, toes out, and stretch the arms up, with the palms of the hands facing each other; then hollow the back, bend down from the hips, keeping the head back, and looking up to the ceiling. The legs should be kept straight (*Fig. 12*) while exercising.—*Exercise 5.* Place the heels together, toes out, hands on the hips; then turn the body from the hips, first to right, then to

Fig. 13.

Fig. 15.

Fig. 14.

left (*Fig. 13.*)—*Exercise 6.* Place the heels together, toes out; put the hands on the hips, and keep the shoulders well back. Rise from the toes (*Fig. 14*); then sink down, separating the knees (*Fig. 15*); again raise the body from this position on the toes, and return to first position. Repeat the exercise several times quickly.

LEG MOVEMENTS.—*Exercise 1.* Place the heels close together, with toes pointed sideways; the hands on the hips, and shoulders kept well back (*Fig. 16*); then bend the legs as much as possible. — *Exercise 2.* Stand with the hands on the hips, body upright, toes together, and heels pointing sideways (*Fig. 17*); straighten the legs. —*Exercise 3.* Place the right heel to the left toe, and bring the feet close (*Fig. 18*); then bend the legs, keeping the body erect and the head back.


Fig. 16.


Fig. 17.


Fig. 18.


Fig. 19

—*Exercise 4.* Body upright and hands on the hips. Raise the right knee high up (*Fig. 19*); strike out forwards, letting the toe point well down (*Fig. 20*); then bring the heels together again. This should be gone through quickly, the legs, after a little time, being reversed. — *Exercise 5.* Raise the left leg from the ground slightly, point the toe down; then bend down on the right leg, without allowing the left to touch the ground (*Fig. 21*), almost sitting on the heel. From this position the body must be raised again, heels together. Do this with the right leg stiff.


Fig. 20.


Fig. 21

DUMB BELLS.

FOR preliminary practice, dumb bells should not exceed 6 lbs. weight. For lads, 4 lbs. will be sufficient.

BELLS. Taking Up.—Stoop, as shown in *Fig. 1*; seize both bells, recover upright position, and raise them above the head. Repeat, lowering the bells to the ground, bending the knees, and rising on the upright position (*Fig. 1*).


Fig. 1.


Fig. 2.

CIRCULAR MOVEMENTS.—First with one and then with the other, and finally with both at once, will be understood by an examination of *Fig. 2*. These are succeeded by various elbow exercises—the forearm thrown out or raised, and brought slowly back, the other arm swerving in like manner, and then both arms together.

HORIZONTAL AND SLANTING PLANES.—Stand with arms extended over the head, bend gradually down, keeping the arms extended; then slowly resume upright position, and bend to the other side. (See *Fig. 3*).

MANTLET.—From the position shown in *Fig. 4*, swing the arms and meet the bells behind the back. After practice you will be able so to

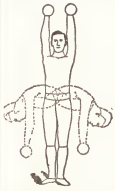


Fig. 3.


Fig. 4.

swing arms and clap palms of hands together behind the back without dumb bells.

SHOULDER FEATS.—Stand erect, holding the bells at the chest. Step out to the side, extending the arms horizontally. Regain first position, and repeat the movement on the opposite side. Vary the movement by stepping to the front and to the rear. (See *Fig. 5*).


Fig. 5.

SPREAD ARMS AND HEAD SWING. — These movements are shown in the illustration. Move the arms in graceful sweeps and curves, so as to avoid collision. The elbows should be close to the sides at the starting of each movement. (See *Fig. 6*).


Fig. 6.


Fig. 7.

THRUSTING OR STRIKING MOTION. — At

starting keep the elbows close to the sides; bend the right arm, and hold the bell to the chest; at the same instant raise the left high above the head. Reverse the arms, and repeat the motion as shown. Repeat the exercise again and again, till perfect. (See *Fig. 7.*)

Indian Clubs.

The beginner should use light clubs at first. In using them, the chest is expanded, greater freedom given to the arms, the muscles of the whole body brought into use, the wrist strengthened, the grasp of the hand made firmer, the circulation of blood regulated, and health greatly improved. The clubs should be grasped on the outside, palms turned in; position upright, heels together, arms down, head erect; clubs held an in. or two from the ground (*Fig. 1*).


Fig. 1.

From this position the clubs are raised horizontally, sideways, first right and then left, and then together; moving them to the left and right until about 6 in. apart.

BENT ARM EXERCISE. — Start from the first position—*To Order*—one or both clubs; and on the words, "To shoulder up!" bring the left hand club as seen in *Fig. 2* and keep it perpendicular. Perform the same movement with the other hand, and so alternate the motions. From this position you can thrust out, forward or


Fig. 2.


Fig. 3.

sideways; always with club straight. After the clubs have been raised forwards or sideways, before and behind, shifting the feet as needed, you can bring them to the front, and repeat the performance. In thrusting forward, the tops of the handles should nearly meet in front of the chest. Having brought the clubs above the head, drop them backwards (*Fig. 3*). This, when efficiently performed, is an elegant exercise.

CIRCLING THE CLUBS.—This mode is attractive, especially in public exhibitions. *Fig 4* is one of the most effective methods. Hold the clubs *To Order*, and then circle them forwards, sideways and backwards, and to left and right in front of the body, the arms remaining straight, and steady; they can also be circled in contrary directions in front of the body, one to right and


Fig. 4.

the other to left. Beginning from *To Order*, the right club is moved first, and the left follows when the right is upright. Inside and outside circles are described by holding the clubs horizontally or sideways (*Fig. 5*). They are done first with one arm, then with both in the same direction, and lastly in contrary directions. An outside circle backwards by the right club is made by

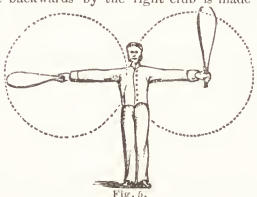


Fig. 5.

holding out the arms sideways, while the left describes an inside circle. The outside circles, with swinging forward, are shown at *Fig. 6*. At one, the clubs are raised to *A*; at two, circle backwards; at three, swing the clubs back to *B*; at one, again to *A*, and so on. The outside circles backwards, with swinging sideways, are shown in *Fig. 7*. At one, both clubs should be raised, twisting the body and bending the left knee; at two, circle backwards back; at three

Fig. 6.

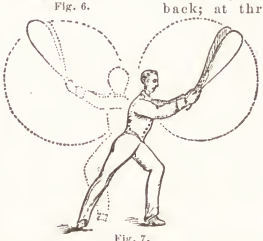


Fig. 7.

swing the clubs close in front of the body, twisting

the body in same direction, bending right knee; at four, circle backwards. Less attractive are the circles round the head. Starting from *To Order*, bring the left club, as shown in *Fig. 8*, and, without stopping, pass it by the back to its original position, as indicated by the dotted line. A similar performance is done with the right club, then both clubs alternately, and lastly both together. The body is bent forward. The circles in rear are done from the club above the shoulder. The club dropped to right or left describes a circle, passing close to the rear in a vertical plane. The back is hollow and the hand stationary. This circle should be practiced in rear, first with right club, then with left, and then with both simultaneously. When the latter exercise is done in the same direction (to the left or right) both clubs start together; but when the circles are made in a contrary direction, the second club only starts when the first has completed $\frac{1}{2}$ circle. Great regularity must be observed in describing circles, and no stoppages or jerks made. *Fig. 9* shows the circle in front, starting from the position with clubs above shoulder. In describing the circle the arm is stretched nearly to its full extent; but as the clubs swing round the arm bends by degrees until again in position above the shoulder from which it started, on the completion of the circle. This circle in front is done to left and right, alternately and simultaneously in the same manner as the circle in the rear. The above circles mastered, they should be

Fig. 8.

Fig. 9.

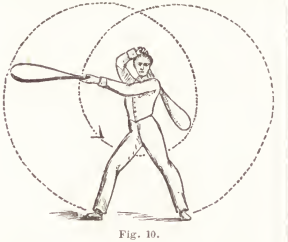


Fig. 10.

practiced in combination. Bring the right club up to the shoulder, describe a circle in rear, and follow up, without stopping, by a circle in front. When this is accomplished easily with the left and right clubs, raise both clubs to the shoulder, and while describing a circle in rear with the right, describe a circle in front with the left club (*Fig. 10.*) Circles above the head are done with an ordinary motion, and reversed. The clubs are raised above the shoulders, rather higher than for the circles in rear; the clubs are then swung round in an analogous manner to the circles already described. The back is hollow, and the performer looks up (*Fig. 11*).

Fig. 11.

HEAVY CLUBS. For Both Hands. — The men fall in at arms' length from each other, the club standing on the right side. On the words *clubs in front*, the clubs are placed in front between the two, and they are then ready to begin. The club is raised forwards horizontally above the head, and can be dropped behind the head. Of more value are the exercises which are struck with club. The club is raised above the head and struck downwards. The alternate bendings and stretchings of the legs are shown in *A B*, (*Fig. 12*). A variation of the above is the

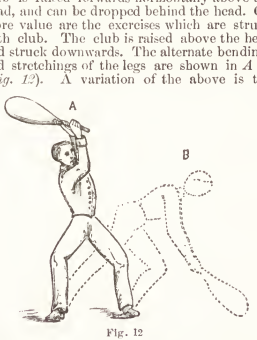


Fig. 12

sledge-hammer exercise. Instead of raising the club above the head, bring it over one of the shoulders, and deliver the stroke in the opposite direction, obliquely downward. Swinging the club in a circle over the head, and other exercises, can be practiced.

Fig. 13.

STRAIGHT ARM EXERCISE. — Raise the clubs horizontally in all directions. Forwards, diagonally forwards to the left and to the right, sideways,

and backwards. Both clubs can be raised to the side diagonally forwards or sideways, the body moving in the direction of the implements. Bring the clubs parallel to each other. Change from one side to the other by swinging the club down and up close by the legs; the arms kept straight (*Fig. 13.*) Next raise the clubs above the head, forwards, sideways, and to right and left alternately. (*Fig. 14.*) Having raised the clubs, swing them forward and backward, rising on tiptoe with every backward swing (*Fig. 15.*) Then move them horizontally, as directed. For the

Fig. 14.

Fig. 15.

circular motions (*Fig. 16*) form arms and clubs in one straight line. Then swing the right club

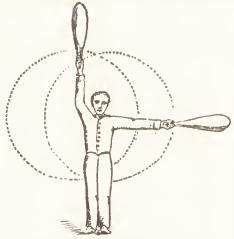


Fig. 16.

down, and round up. Follow it with the left hand club as soon as the right has completed 3 parts of the circle. Once in motion, swing the clubs in regular cadence. Many variations will suggest themselves. Both clubs may be swung in the same direction, or both in contrary lines, or each in a line of its own, taking care they do not clash; keep them parallel to each other, with both arms at their full stretch. Practice these, till you find you can perform them with ease and dexterity.

WRIST EXERCISE.—The arms are kept stationary, and the clubs moved by a turn of the wrist. Raise the clubs horizontally forward, and then drop them, in 2 motions, to the shoulders. At one they are to be raised perpendicularly; at two, they are to be dropped upon the shoulders. The same exercise may be performed with the clubs raised sideways (*Fig. 17.*) Variations of the wrist movements will suggest themselves, as grasping them in the front, swinging them to and fro, sideways, and so on (*Figs. 18* and *19*). The hands may be dropped, raised, again lowered, and reversed, according to the will of the performer, always keeping the clubs from contact with each other.

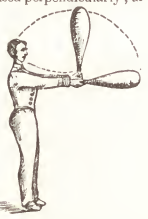


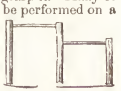
Fig. 17.

Fig. 18.

Fig. 19.

HORIZONTAL BAR.

Fix 3 posts, 1 lower than the other 2, in the ground, about 6 feet apart, and fix a bar between either 2 of them. One of the posts should be filled with notches to reach the top easily, or to descend. The bar at first should be placed just out of reach of the hands, so that a small spring is necessary to grasp it. Many of the feats here described may be performed on a swinging bar as proficiency is attained. At first the bar should be firm, and grasped with the hand, not with thumb and fingers. The thumb should rest by the side of the fingers, which should assume a hook-like form.



Horizontal Bars.

BREASTING THE BAR.—The first position is by taking hold with both hands (*Fig. 1*) of the side of the bar towards you, and raising yourself until you can look over it. Lower yourself gradually, and continue the exercise until it is easy and familiar. When it can be done easily, the body may be raised to the full extent of the arm (*Fig. 2*). This exerts the muscles and requires a strong effort. Raise the body as high as it is possible, throw the arms over the bar, holding firmly

Fig. 1.

by them (*Fig. 3*). This relieves pressure on the wrists, and is a useful exercise, particularly when

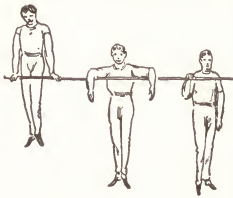


Fig. 2. Fig. 3. Fig. 4.

the body is raised from the ground, and is held up by one arm. To do this, the arm must be passed underneath the bar, which must be pressed firmly between the hand and shoulder (*Fig. 4*). Each arm should be tried alternately.

BRINGING THE BODY THROUGH.—1. Hang on the bar (*Fig. 5*), and gradually bring the legs up towards the bar; bend the knees, and pass them between the arms, under the bar, and allow the legs to pass through together with the body, which should fall as low as the arms will allow. Return through the arms again, without allowing the hands to loose their hold, or the feet to touch ground.

Fig. 5.

CIRCLING. — Pull the body up with the arms, and a slight motion of the wrist; carry the legs completely over the bar, and in going over they will act (*Figs. 6* and *7*)

Fig. 6.

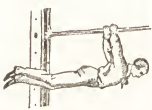


Fig. 7.

as a sort of balance to the body, and with the assistance of the arms, the body will be brought into the required position. For a young gymnast, fix the bar only about as high as his chin.

EVERLASTING TWIST.—Proceed as above, but in lieu of bringing the body again through the arms, let go one hand, when the body will swerve round; grasp the bar again, and repeat the exercise as often as convenient. If it be done 6 times without stopping, and always letting go the same hand, it will appear as if the arm was being twisted completely round.

HANGING BY THE LEGS.—Bring the legs through, and throw the legs over the bar instead of allowing them to fall toward the ground. Rest them, as shown in *Fig. 8*, bending them over the bar as far and as firm as possible; let go the hands, and allow them to hang loosely. After remaining in that position as long as convenient, bring the arms up, and by drawing the body up a little, grasp the bar again, and allow the body, after having unhitched the legs, to fall and drop to the ground, taking care to alight on the toes.

KICKING THE BAR.—Hang by the hands and draw up the feet slowly until the instep touches the pole. This is difficult, but is soon learned; do not kick or jerk violently.

Fig. 8.

LEVER.—This requires strength in the muscles of the arms, and is only to be achieved by practice. Go through the arms, keep the legs straight with the body, and gradually lower them until level with the ground. After remaining in that position a short time, drop to the ground, or carry the body back again through the arms; the latter preferred.

PANCAKE.—The bar should be placed about 2 ft. above the head of the gymnast, when standing on the ground. When the body has swung nearly as high as the bar, let go the hands (*Fig. 9*), and after bringing them smartly together renew the hold on the bar, and continue to swing.

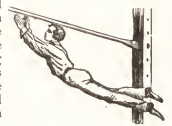


Fig. 9.

PANCAKE, To Turn.—Proceed as above, and when the body is in the forward swing (with the back toward the ground), give a smart turn, letting go the bar and grasping it again quickly, before the body has time to descend. After a little practice the body should be turned every time, thereby preventing it from descending in the backward swing; thus the gymnast has the opportunity of seeing which way he goes.

SITTING ON THE BAR.—When hanging on the bar, hitch one leg over the bar, the other leg hanging as low as possible (*Fig. 12*). Give a swing backwards and come up right on the bar. The other leg can be brought over so as to sit on the bar. The same attitude is assumed by passing both feet under the bar and stretching them straight into the air (*Fig. 10*) until the head points to the ground, and the heels to the air. Draw yourself up until the weight of the legs and feet brings you upon the bar seated (*Fig. 11*).

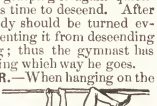


Fig. 12.

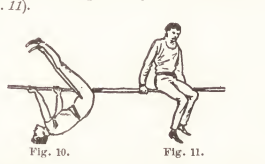


Fig. 10. Fig. 11.

SPINNING.—Assume the position shown in

Fig. 13, and try to turn round the bar. When you can do this easily, try the reverse way: bring the legs backward over the bar and spring in the Indian Cradle position (*Fig. 14*).

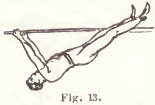


Fig. 13.

Fig. 14.

SUSPENDER.—Stand under the bar and grasp it with both hands, one on either side, and with a sudden spring throw the right leg over the bar towards the left; then place the toes of the left foot under the bar; then let go the hands, and allow the body to lower itself as much as possible, remaining in that position as long as convenient. Repeat the exercise by reversing the position of the legs. Keep the legs under the bar straight.

SWINGING. — Hang by the hands about the middle of the bar, move the legs and body to and fro as if on a common swing (*Fig. 15*); after a little practice the body will rise level with the bar. Swing to and fro about a dozen times, and in leaving the bar do so in the forward swing and alight on the toes. The farther the gymnast can alight on his feet from the bar, the greater his after success, and the more graceful his performance. Avoid jerking the legs in swinging.

Fig. 15.

WALKING.—Spring up from the floor and grasp the bar, fingers and thumbs on outside (*Fig. 16*). Keep arms straight and let the body depend from them in an easy and unconstrained manner, with the legs stiff and the toes pointing outward and downward. Now move, or, as it is called, "walk," along from one end of the bar to the other, one hand at a time. In this exercise you slip or press the hands forward. In dropping from the bar, take care to alight on the toes.

Fig. 16.

PARALLEL BARS.

THE bars should be about 7 or 8 feet long, and 4 feet high; smooth, rounded and strong. By their use the muscles are admirably developed. Ease and dexterity in their use, all come with practice.

BARS, To Get On.—Grasp the bar round the end, fingers outside and thumbs inside, and arms slightly bent (*Fig. 1*). Then spring up from the ground, keeping the arms perfectly straight. Practice till it can be done with ease.

BARBER'S CURL.—Stand between the bars, and sink down until the head is below the bars. Grasp the bars with the hands, and straighten the knees into a sitting posture, forming the letter L; then bring the legs gradually over between the arms (*Fig. 2*) till they form a circle, or come nearly down to the ground (*Fig. 3*); after staying thus for a short time, bring them back again slowly. The knees must be kept straight during this exercise, and the feet off the ground.

Fig. 1.

FORWARD SOMERSAULTS. —Generally performed at the end of any other exercise which brings you to the end of the bars. When the end of the bars is reached, with the hands firmly grasping the ends, lean a little forward and bring the body into an upright position, with legs bent over the head (*Fig. 4*), and in so doing bend the arms, causing the shoulders to come between the bars; bring the legs over; when nearly overbalanced, give a light spring with the wrists, and let go the hold of the bars, and alight on the feet; a slight swing will carry over the legs better, but the swing must not be too strong, or the head will go farther than is required.

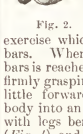


Fig. 2.

Fig. 3.

Fig. 4.

HOPPING. — Jump along from one end of the bars to the other, springing up, and taking rather short leaps (*Fig. 5*).

JANUS.—Mount between the bars in the middle, and throw a leg over each in front of the hands. Grasp the bars firmly, and, with a spring, bring the legs between the bars, and carry them behind; but cross the legs (*Fig. 6*), and in giving the body a slight twist, allow them to rest on the bars, when the right leg will be on the left-hand bar, and the left leg on the right-hand bar (*Fig. 7*). Do not always turn your body the same way, or let the same leg be always uppermost in crossing them. Repeat 5 or 6 times successively.

Fig. 5.

Fig. 6.

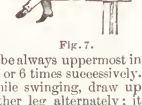


Fig. 7.

KICK OR SPUR.—While swinging, draw up both legs at once, or either leg alternately; it should be done in the back swing, and when the

legs are high above the bars. The sudden motion of the legs is likely to throw the body a little out of balance, but grasping the bars firmly will prevent it.

LEGS, To Bring Over.—Grasp the bars firmly, swing between the bars, and with a gradual motion throw both legs over the right-hand bar. (*Fig. 8*). With a sudden spring bring the legs

Fig. 8.

Fig. 9.

between the bars again, and throw them over the left bar.

LONG LEAP.—This exercise requires great strength. Swing the body at one end of the bars (*Fig. 9*), and, with a spring, jump to the other end, which must be done in the forward swing.

LONG RUN.—Get at one end of the bars with bent arms; let go the bar with the right hand, and balance the body with the left. Bring the right arm straight down by the side, and then grasp the other bar about 18 inches forward (*Fig. 10*). Now, raise the body into position; sink down with the arms in this stretched position, and bring the body close to the right side;

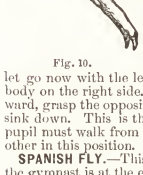


Fig. 10.

let go now with the left hand, and balance the body on the right side. Bring the left arm forward, grasp the opposite bar, raise the body, and sink down. This is the "long stride," and the pupil must walk from one end of the bars to the other in this position.

SPANISH FLY.—This is a brilliant finish when the gymnast is at the end of the bars. When at the end of the bars, place the hands over the ends, swing to and fro twice, making the back swing last, which must be made much higher than the bars; then open the legs, carry them over both bars, and by letting go your hold, alight on the ground. In flying over the ends of the bars, let the body lean forward, assisted with a spring of the hands, giving courage to let go, and a better method of bringing the legs together again. The greater the impetus used in swinging, the greater will be the success.

STANDING ON THE BARS.—Place your hands on either bar, spring with your toes, and throw the right leg over. Bring the other leg up, and hitch the toe under the bar; lean the body forward, with the arms extended in front to balance yourself, then bring the other (right) foot on the bar, as close as possible to the body, and by means of the toe under the bar, raise your body up so as to stand on the right leg. Do not unhitch the toe until you are firmly standing on the bent leg. Now lower yourself again, taking care how you slide the toe along under the bar, and to maintain a good balance.

SWINGING.—To get freedom in the arms and wrists, while suspended between the bars, swing the legs and body to and fro; little at first, for safety (*Fig. 11*). The legs must be kept close together, and straight. In

Fig. 11.

increasing the swing, the legs must be made to do their utmost in the forward and backward swing, and the feet carried as high as the head (*Fig. 12*). In the backward swing the body will be parallel with the bars (*Fig. 13*).

Fig. 12.

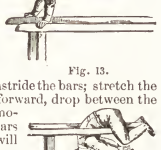


Fig. 13.

TURN-OVER.—Sit astride the bars; stretch the hands in front, fall forward, drop between the bars with a quick motion, and grasp the bars behind you, which will cause you to release your hold with your legs (*Fig. 14*), and by bringing them together directly they are free of the bars, they will drop between them, when you may alight on the ground. Try it slowly at first, and do not attempt to let go the bars with your legs until your hands have a firm hold, or when sure of not making a false aim at them. Gradually increase the quickness of the motion until you can achieve it without any pause.

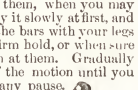


Fig. 14.

WALKING.—Bend the arms slightly, and incline the body forward, keeping the head back and the toes pointing down (*Fig. 15*); in this position jump along from one end of the bars to the other, raising both hands from the bars at the same time. Do not try at first to swing forward so much as in an upward direction. Spring well up.

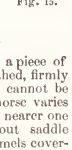


Fig. 15.

WOODEN HORSE.

FOR this exercise it only requires a piece of the trunk of a tree, barked and smoothed, firmly fixed on 4 posts, or legs, so that it cannot be pushed over. The height of the horse varies from the waist to the nose. A little nearer one end than the other, a rough, stout saddle should be placed, with wooden pommels covered with leather; the hind pommel higher than the other. On the off side of the horse a sawdust bed, 4 ft. sq., should be made, on which to alight. On the near side a spring board. A slight covering of sand on the near side is absolutely necessary to avoid slips in taking the leaps.

EXERCISE 1. — Grasp each of the pommels, thumbs inside and fingers outside (*Fig. 1*); spring up from the toes, and vault the horse over the right side, then over the left side.

EXERCISE 2. — Grasp the pommels. Now spring up and vault, allowing the left leg (bent) to go between the hands, and carrying the right leg (straight) over the head of the horse (*Fig. 2*). Proceed as above, but bring the right leg up and straighten the left, alighting on the opposite side of the horse.


Fig. 2.


Fig. 1.

EXERCISE 3. — Grasp the pommels. Now spring up to position *Fig. 3*, and carry the legs between the hands (*Fig. 4*), keeping the toes down, and alighting on the toes on the opposite side (*Fig. 5*).

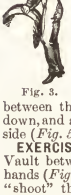


Fig. 3.

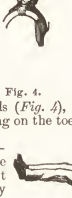


Fig. 4.


Fig. 5.

EXERCISE 4. — Vault between the hands (*Fig. 4*), but "shoot" the body well off from the horse as in *Fig. 6*. Hollow the back.

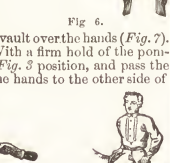


Fig 6.

EXERCISE 5. — Lay hold of the pommels, spring up, part the legs and vault over the hands (*Fig. 7*).

EXERCISE 6.—With a firm hold of the pommels, spring up to *Fig. 3* position, and pass the right leg between the hands to the other side of the horse. Sink down into bent arms (*Fig. 8*), rise to straight arms, and bring the legs up together to *Fig. 4* position, carrying the left leg in front and the right behind. This should be done quickly.

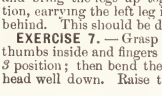


Fig. 7.

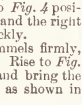


Fig. 8.

EXERCISE 7. — Grasp the pommels firmly, thumbs inside and fingers outside. Rise to *Fig. 3* position; then bend the arms and bring the head well down. Raise the legs as shown in *Fig. 9*; hollow the back, and do the somersault backward. Straighten arms, and alight on feet.

EXERCISE 8. — Sit on the horse at one side of the pommels (*Fig. 10*). Grasp the pommels and carry the legs over the end of the horse behind, and come into the same position on the other side of the pommels, then back again. This should be done quick.


Fig. 10.

EXERCISE 9. — For this exercise take the pommels off. Take a good run and jump the full length of the horse, grasping the horse a little above ¾ the length, and parting the legs as in *Fig. 11*.


Fig. 9.

EXERCISE 10.—Take a good run, but instead of jumping the full length of the horse, spring from the ground and let the hands be brought nearer to the end than as in *Fig. 11*; quickly hollow the back, bring the head well down, and carry the legs over the head (*Fig. 9*), throwing a somersault over the full length of the horse.

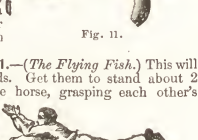


Fig. 11.

EXERCISE 11.—(*The Flying Fish.*) This will require 2 friends. Get them to stand about 2 yards from the horse, grasping each other's shoulders as in *Fig. 12*. Now take a run and jump over the horse without touching, head first, throwing the arms well up, and alighting in the arms of your friends.


Fig. 12.

Flying Rings.

The best rings are of wrought iron, covered with leather, 1¼ in. in diameter, and securely attached to the ropes by which they depend from the roof or a platform. Avoid home-made articles, and look especially well to the ropes.

EXERCISE 1.—Take each ring into the hands, thumbs inside. Hang by the rings and rise up to the position shown in *Fig. 1*. Hold well by the left hand, and carry the right out sideways (*Fig. 2*); remain thus a while. Bring the right hand back, and the same with the left. Repeat.

EXERCISE 2.—Grasp the rings with the wrists well up. Rise slowly to position *Fig. 3*; straight-

en the arms and come into *Fig. 4* position. Sink again into original position and repeat.


Fig. 1.


Fig. 2.


Fig. 3.


Fig. 4.

EXERCISE 3.—Hold the rings with stretched arms. Carry the legs up, drawing the body well together to *Fig. 5* position. Let the legs fall down backwards; hollow the back, and straighten the arms; keep the head well back; then fall into *Fig. 6* position. Raise the legs up to the back horizontal position and carry them between the rings again down to the first position. Keep the legs straight.


Fig. 6.


Fig. 5.

EXERCISE 4.—Carry the legs up to *Fig. 5* position. Place 1 foot in each ring, bring the head back, and twist the body coming into position (*Fig. 7*) with back bent. From this come back into *5*, or the feet can be loosed from the rings while in *Fig. 7* position, and the legs lowered as in *Fig. 6*, and then drop on the feet.

EXERCISE 5.—Swing well, keep the legs nearly straight, and when the body is at the forward position (*Fig. 2*) jerk above the rings (*Fig. 8*), keeping the head well back, back hollow, and toes pointing down. From *Fig. 8* position swing back; then lower and up forwards.

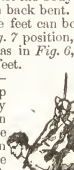


Fig. 7.


Fig. 8.

EXERCISE 6. — Swing well, rise above the rings forward (*Fig. 2*), swing back and lower, swing to the front again, and when at the back-swing rise above the rings again; swing up forward and backward alternately.

EXERCISE 7. — Hold each ring loosely, and stand under them. Quickly carry the legs up to *Fig. 5* position, and quickly part the legs, carry them over the hands (*Fig. 9*); let go the rings with the hands, alighting on your feet. Unless done quickly, the learner will fall unpleasantly. When this can be well done, try instead of alighting on the ground on the feet, to catch the rings with the hands. Repeat.

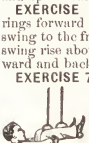


Fig. 9.

EXERCISE 8. — Stand under and grasp the rings loosely; bring the legs together, spring off the ground, carry the legs up, and separate them at same time (*Fig. 10*). As soon as the body gets in this position, nearly touching the rings, let go with the hands, throw the head back, and hollow the back, when you will alight on your feet. If not done quickly you will come down on all fours.


Fig. 10.

EXERCISE 9. — Grasp the rings firmly and carry the legs up as in *Fig. 5*. From this position let the head be brought back, back hollow, legs straight, and toes up. Now balance the body (*Fig. 11*). This may be done swinging, keeping the body and legs on a line with the ropes. From position *11* rise, bending the arms and keeping the legs up.


Fig. 11.

EXERCISE 10. — Swing well. Carry the legs up at the forward swing (*Fig. 2*) to position *5*. When at the back position with the legs up, raise the arms a little, hollow the back, and shoot the legs out backward (*Fig. 12*). Continue the swing to forward position, then raise the legs and repeat.


Fig. 12.

EXERCISE 11. — Hold each ring, carry the legs up (*Fig. 5.*) and hitch 1 foot in the ring; at the same time loose hold with the hand, and twist the body round in *12* position. Sink down into the straight arm, hollowing the back and keeping the leg straight. Rise with one hand to *13* position, and from here rise above the ring into the straight arms.

EXERCISE 12.—*Fig. 13* position, but grasping the rings with both hands, come down below the rings to stretched arms, keeping the foot in the ring. Twist round, coming again into original position.

EXERCISE 13. — Spring up and grasp the ropes above the rings, pull the body up and place the feet in the rings (*Fig. 14*). Grasp the ropes firmly, bring the legs up above the head, and carry them down backwards; dislocate; and come into first position (*Fig. 14*).


Fig. 13.


Fig. 14.

EXERCISE 14. — Grasp the rings and carry the legs up as in *Fig. 5*. Place the feet in the rings, toes pointing down, straighten the legs, lower the body, and hang by the toes. Then do

this exercise swinging. Raise the body, lay hold of the rings with the hands, and loose the feet.

EXERCISE 15.—Lay hold of the rings, bring the legs up (*Fig. 5*) and place the right leg over the right arm, left leg hanging down (*Fig. 16*).

Fig. 16.

Straighten the left arm, hollow the back, bring the body forward, and twist the body round, throwing the left leg backward over the right arm and leg, coming into the same position again (*Fig. 16*).

EXERCISE 16. — Stand under the rings and grasp them firmly. Keep the head back, and hollow the back, allowing the legs to fall gracefully down, toes pointing down. Raise the body from the ground (*Fig. 17*), and turn slowly round, head first, raising the legs and keeping the back hollow to position *18* down to position *6*. Slowly raise

Fig. 17.

Fig. 18.

the feet in the same manner round to the forward horizontal position. This requires great strength.

EXERCISE 17.—Position as in *Fig. 5*; carry the body a little further backward, and twist the body on to the right arm; hollow the back, and keep the legs straight; bring the head well back, and let go the ring with the left hand,

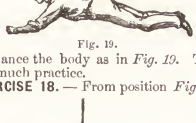


Fig. 19.

and balance the body as in *Fig. 19*. This requires much practice.

EXERCISE 18. — From position *Fig. 19*, al-

Fig. 20.

low the body to fall slowly forward (*Fig. 20.*)

EXERCISE 19. — Grasp the rings with the wrists high, muscle up, to *Fig. 3* position, and swing the legs up into the ropes backwards, head down, legs slightly bent, and feet touching the ropes (*Fig. 21*). Lower down to bent arms upon the rings, and raise again to stretched arms in first position.

EXERCISE 20.—From position *13* above the rings, which must be quite still, thumbs inside,

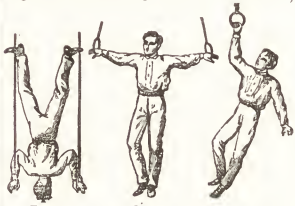


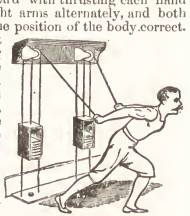
Fig. 21. Fig. 22. Fig. 23.

lower slowly down, stretching the arms out sideways (*Fig. 22*).

EXERCISE 21.—Grasp one of the rings firmly and hang at the full length of the arm (*Fig. 23*); now endeavor to rise up so as to touch the ring with the chest.

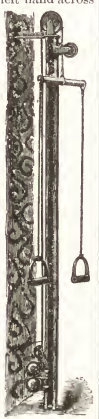
PULLEY EXERCISES.

CHEST WEIGHTS.—1. Grasp the handles, and stand away sufficient to clear the boxes from the rubber buffers. Keep the ropes straight, pull steadily, and do not allow the boxes to strike at top or bottom. The pulleys are placed shoulder-high for a variety of movements. If one foot is placed before or behind the other for a brace, change frequently, or the development will be one-sided. If the boxes strike at the top, step forward; if at the bottom, backward. Stand with feet together in executing forward and backward movements. — 2. Stand face out, handle in each hand, elbows close to the sides, knuckles of hand on line with chest, head thrown back; lean forward and backward with thrusting each hand forward to straight arms alternately, and both together; keep the position of the body correct. Now turn about face, standing with feet a little apart, braced; pull alternately, with the knuckles up, and bringing the handle to the shoulder at each time. — 3. Grasp the handles, and stand about 3 ft. from the apparatus, with feet together, holding the handles vertical; draw them back alternately to the sides of the body. — 4. Position as above,



Chest Weight Apparatus.

handles held horizontally; draw them alternately over shoulders with bent-arm movement.—5. Stand with back to the apparatus, and 2 ft. from it. Grasp the handles, thumbs out; bring the hands forward in a direct line, with bent-arm movement. —6. Position as above, with back to apparatus; bring handles to shoulders in a vertical position; then strike up and forward at an angle of 45°, keeping back and legs straight. —7. Face the apparatus, standing 3 ft. from it. Grasp the handles, hold them in a vertical position, thumbs up, and draw them alternately back to the sides of the body. — 8. Grasp both handles, and turn right side to apparatus; brace with the right leg, and draw the left hand across the body. — 9. Reverse of the above, with left side to apparatus.—10. Take a position facing the apparatus, in a bracing attitude; alternately pull handles to shoulders, with elbows pointing out.



Apparatus for Developing Muscles.

PULLING MUSCLES, Apparatus for Developing.—1. Grasp the handle with both hands, facing apparatus, arms straight, standing 30 in. from apparatus, feet together; bend trunk well forward, legs straight. Raise up, step back with right and left foot alternately, bend trunk backward, with an overthrow backwards without bending elbows, head bent back; hold in this position a moment; return to starting-point, bringing up the foot, and repeat. Use the apparatus suited to the strength of the performer. — 2. Stand with back to apparatus, heels touching foot-piece, arms raised overhead, grasping the handles; pull down without bending elbows, till the handle touches the body; return to starting position, and repeat.

ROWING MACHINE.—1. Body straight, facing apparatus; resist any tendency to bend forward; palms down, handles horizontal. Right and left alternately; begin with left; bring arm straight down at side, handle just passing the thigh. — 2. Sit on sliding seat, and place feet in the straps; knees bent till the seat is as far forward as possible; grasp the handle, throw back head and shoulders until handle nearly touches legs; straighten knees, and bring handle with straight arms over the knees; then, with bent arms, bring the handle nearly to the pit of the stomach, keeping the body, after first throwing back head and shoulders, a little back of perpendicular. Sit on the sliding seat, with toes in straps; slide forward and grasp handle, and pull it nearly to pit of stomach; then keep legs straight; lean forward until handle just passes the toes; then bring handle back, with straight arms, to pit of stomach, leaning back until the body is nearly horizontal. — 3. Sit on sliding seat, with toes in straps, hands on hips; lean backward at an angle of 45°; then come to perpendicular. After practicing, lean back till

Rowing Machine.

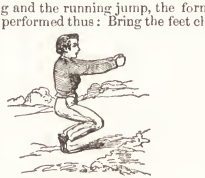
head touches the floor, with hands clasped behind neck.

JUMPING.

OF all corporeal exercises, jumping is most useful. To jump with ease and confidence, always fall on the toes, taking care to bend the knees and hips; the upper part of the body inclined forwards, and the arms extended towards the ground. In jumping, hold the breath, and be very careful that you never alight on the heels.

DOWNWARD LEAP.—Having mounted to the height from which you are to leap down, stand with feet together, toes pointing forward, not outward. Close the fists at the sides, and raise yourself gradually on tiptoe, bending the knees and raising the hands; on bending the third time, drop gently off the elevation, avoiding a spring, and, as you descend through the air, straighten the body, throwing the arms upward as much as possible. Directly the points of the toes touch the ground, bend the knees forward, to break the impetus of your fall. Take care to increase the height from which you leap gradually, and never attempt a deeper jump till quite perfect in the previous one. Another plan is to hang from the edge of the wall or bank, by the hands, which will lessen the distance of the leap.

HORIZONTAL LEAP. — This is divided into the standing and the running jump, the former of which is performed thus: Bring the feet close



Horizontal Leap.

together, bend the legs slightly, throw the arms forward, with the hands closed, at the height

of the shoulders. The bending of the knees should be repeated 2 or 3 times. When the right impulse is obtained, press the soles of the feet hard against the ground, and by a sudden and vigorous spring, extend the legs and arms at once; launch forward, alighting as far as possible on the toes. Care must be taken to bend the legs the moment the feet touch the ground after the leap, as this deadens the shock caused by the weight of the body on the feet. Begin with short distances; leap gracefully, gradually extending the distance.

RUNNING LEAP.—Start at a brisk pace, increasing as the point is neared; in reaching the point, jump without hesitation. On rising to leap, press the balls of the feet strongly against the ground, throwing the fists forward horizontally in the direction of the leap. On touching ground after the leap, the knees must be bent and the body thrown back. Two points are to be observed in jumping with a run: 1st, bound from the ground with as much force, and 2d, alight upon it with as little force as possible. Come down upon the ball of the foot, with toes and heels raised, then bring down the heels as the legs are straightened after the jump. In a horizontal leap, the jumper sometimes finds himself thrown unpleasantly forward, because he has not leaped high enough off the ground.

UPWARD LEAP. — Bring the feet close; close the fists, raising them above the head, and bend the knees 2 or 3 times to get an impulse. Jump suddenly from the ball of the foot (the heel not touching the ground), and as you rise, bring the hands rapidly down to your sides to give an additional impulse upward. Here the distance of the leaps must be increased gradually, as missing your tip, as it is called, may be unpleasant.

POLE-LEAPING.—The pole should be of hard, tough wood, and adapted to the strength of the person. The beginner may practice with a short pole, and without running. Hold the pole with the right hand above the head, thumb upward, and with the left hand at the height of the thigh, thumb downward; then start with a run, keeping the lower end of the pole in front of you. On reaching the edge of the ditch, or space you wish to jump, stick the end of the pole into the earth, and by a powerful spring raise the body, leaning the weight on the arms as you rise, making a half turn as you clear the space, and alight on the balls of the feet, on the other side, bending the knees to break the force of the descent. The longer the distance to leap, the nearer the top you grasp the pole, the distance between the hands and the lower end of the pole being the radius of $\frac{1}{4}$ circle, of which the feet in leaping describe the circumference. Low walls and fences may be jumped. It is necessary to lift the feet high, so as to clear the wall, and as you descend bring the upper hand smartly down, so as to jerk the lower end of the leaping pole upward, that it may clear the wall.

WRESTLING.

THE art of forcing an antagonist to the ground without resorting to blows, kicks, or any unmanly or unfair proceeding. The *Græco-Roman* style is much taught. In it the antagonists are not permitted to hold each other below the waistband, to throw by tripping, nor to turn back in the struggle. A distinction is made between full-hold and half-hold. In the former, both arms pass below those of the opponent; in the latter, one arm is passed above and the other below. The full hold is most advantageous, but in the half-hold both are on an equality. Sometimes they start with one and sometimes the other, facing each other, and endeavoring to obtain the full-hold; both are allowed to improve the hold, and the first full fall, when both shoulders touch the ground, gives the upper wrestler the victory. Another mode of wrestling is called *Catch as catch can*, in which all modes of attack or defence are fair except the following: The wrestler must not kick, strike or lay hold by the hair, flesh or clothes; he must not twist finger or arms, or make use of painful or dangerous grasps, nor get out of temper. If any of these be resorted to, the umpire must interfere, and the bout end. Whoever declines these restrictions is disqualified. In wrestling, either man going to ground so that both shoulders touch the floor, is declared thrown. This is the professional rule; the more usual one considers a wrestler thrown when he touches the ground with any part of his body, except hands, feet and knees. The wrestling position is, legs astride sideways, knees bent, hands on or in front of knees, with the thumbs outside, or held in front with the backs towards the body. Eye fixed on antagonist. The following instructions apply generally to both "Catch as catch can," and the *Græco-Roman* styles, with this exception, however: in the latter style no hold is allowed below the waist, nor tripping, nor using the legs in any manner.

Græco-Roman Style.

Wrestling Position.

HOLDS. — 1. Approach your opponent without getting into an erect position; place your right hand on his neck, looking over his right shoulder; then grasp his hand with your disengaged hand (*Fig. 1*). You are then on an equality. Close and wrestle. A common way to close is that adopted by boys; each taking the other by the collar of his coat, and endeavoring to throw him by tripping with the foot. The first fall completes the bout. —

Fig. 1.

2. (*Full-Hold.*) If it can be secured, the full-hold is advantageous (*Fig. 2*). The wrestler who keeps his back well bent is not exposed to risk

from this mode of attack. If such a hold be attempted, at the instant your opponent's hands are close to your loins, lower both arms, grasp the wrist of your left hand (the back of which is turned inwards) with your right hand, straighten arms and lean forward; you can press upon your antagonist's arms, and make him soon withdraw them. Allow him to do this to a certain extent, but as soon as you have space to turn in, give up the pressure suddenly, and catch your antagonist's right wrist with your left hand; turn to the left about, put your right arm round his neck or back, and throw him, as seen in illustration of *Head in Chancery*. Should he succeed in getting a full hold, so as to hug you close, you are almost certain to be thrown. But you may still save yourself by turning round during the fall. This is a favorite expedient to prevent coming down on the back. You may defeat his intention by keeping a firm hold of him till he is fairly aground. — 3. Place the right arm against the opponent's left arm; hook fingers, and press the back of left hand against his right loin; legs astride; left foot 24 in. in front, and weight of body resting principally on right leg. The shoulders must be squared, and the collar bones of both on same level (*Fig. 3*). To improve the hold, shrink the right breast under that of the opponent; tighten your arms round his loins, or pinion his right arm by pressing upon it with your left; then wrestle for the fall.

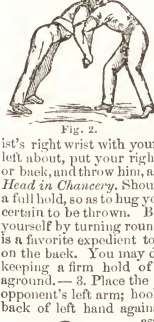


Fig. 2.

Fig. 3.

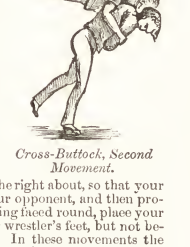
BACK-HANK. — The wrestler on one side makes a movement as if to give the buttock, and stands on the left of opponent; then raises his left leg backward, and passes it from the inside round his opponent's right leg to bring his instep in front of his shin. While effecting this he keeps nearly upright to prevent the other throwing him forward. Having attained this position, he turns suddenly to the left and forces his antagonist back and bears him to earth.

Back-Hank.

BACK-HEEL. — Pull your opponent towards you and put your left heel behind his right heel; then throw your whole weight upon him, at the same time forcing his foot up forward; then throw him backward. To counteract this the wrestler puts back his foot, or, if caught, tries to face while coming to the ground. The hank can be met with the right leg hipe. As soon as your antagonist advances his left leg to hank you, hipe him with the right thigh. *Hamming* is done similar to the back heel. Instead of passing your leg behind your opponent's heel, pass it behind his knee; this generally succeeds. To avoid it, get your leg out of the way; or, if your antagonist should raise his left leg, you can swing him round to the right.

Stopping; *Hamming*.

BUTTOCK AND CROSS-BUTTOCK.—These are similar, and succeed best with a slack hold. They are generally done facing to the right—the buttock; or to the right about—the cross-buttock. The wrestler suddenly turns or hoists to the right, so as to place the left hip against his opponent's middle. Then he pulls him close towards himself, stoops forward, and lifts him off ground. If he continue to turn round he will fall on his back. In the cross-buttock you face to the right about, so that your back is turned to your opponent, and then proceed as before. Having faced round, place your feet in front of your wrestler's feet, but not between them; tussle. In these movements the hands remain locked round the adversary's body, and shifted round according to circumstances. To save yourself from being thrown, hold firmly round the middle, crouch down and withdraw your head. On the other hand, if you fail in the buttock, you should try the look or back-hank. As soon as familiar with this, the technical terms will seem plain.



Cross-Buttock, Second Movement.

CROSS-BUTTOCK. — Starting from position, *Fig. 1*, shown in *Holds*, *A* places his right hand on *B*'s neck, and *B* puts his left hand on *A*'s neck, so as to leave *A*'s arm inside. *A* grasps with his left hand *B*'s right wrist. *A* now faces to the left about, letting go with the right hand, which he puts on *B*'s back, passing his arm beneath *B*'s left arm. Having a firm hold on his antagonist's right shoulder, or near his hip, he lifts him off the ground by stooping forward, and throws him. Having faced about, *A* must keep his legs astride in front of *B*. There are 2 ways of stopping the fall. As soon as *A* begins to turn, *B* places the knuckles of his left hand on his adversary's chest. If *B* is sufficiently nimble, he may throw *A*; all he has to do is to turn a little to the right, and place his left arm around *A*'s neck. The second way of stopping the fall is by putting your left leg over the left leg of opponent after he has turned round; this is a certain stop. To wrestle with advantage, practice con-

tinually, and without violence. *A* and *B* have the hold; *A* grasps with his left hand *B*'s right wrist; faces to left about, turning his back to-

Cross-Buttock; Arm Around Body.

Cross-Buttock; Arm Around Neck.

wards *B*'s chest, his legs standing in front of those of *B*, at the same time bringing his right hand round *B*'s neck. *B*'s right arm must be kept to the front; if *A* stoop forward *B*'s feet will leave the ground; and, with a swing and twist to the left, *A* throws him on his back. If done with energy, *B* will turn a somersault in the air; the cross-buttock will be completed. To stop this fall, as soon as *A* has faced about, *B* holds him firmly round the body with both arms; having thus insured himself against being thrown, it is advisable to let go, for there is little chance for *B* getting a throw.

Head in Chancery.

HEAD IN CHANCERY AND CROSS-BUTTOCK.—*A* and *B* place their right hands on each other's neck; *A* suddenly pulls *B*'s head towards him, and then brings it below his left arm-pit; then passes his left arm around his opponent's neck, and puts his right arm on his back. In this position *B* is helpless, for *A* presses upon him heavily, and prevents his freeing his head. Having kept his adversary for some time in chancery, the uppermost wrestler relaxes the hold of his left arm. The other withdraws his head; but on the instant *A* grasps his right wrist with the left hand, puts his right hand further round *B*'s back, faces left about, and throws him cross-buttock. To stop this, *A* disengages or twines his disengaged leg round that of his antagonist, so as to procure a double fall. Professionals make a sort of half turn in this fall, and occasionally succeed in getting the opponent beneath.

Withdrawing the Head.

LEFT-LEG HIPE.—Hug your opponent close; lift him off the ground and swing him round to the right, and turn in the same direction; then suddenly push or strike the inside part of his right thigh with the outside of your left thigh, and thus throw him off his balance; if the swing be strong, down he must go, with you on top. When the hipe does not succeed, change tactics, and try back-hank or buttock.

— *To Stop the Left-Hand Hipe.* As your opponent is about to insert his left leg, cross it with your right knee (shin), and when he attempts to lift you off ground, shrink your chest under him and get away. Previous to attempting to hipe you, he will slip in with his right leg; at that instant give him the back-heel with your right leg. Hiping is rough and dangerous, till you get used to the modes of attack and defence. The right-leg hipe exposes the wrestler to less risk than the left. There are other modes, as the right-leg stroke, right-leg hipe, etc.; but these are met by counter movements, as pushing with your left leg, putting it quickly down again, facing to the left, throwing him over the right buttock, etc.

Left-Leg Hipe.

LEFT-LEG STROKE. — Chip your opponent's right knee with your left leg, so that your knee is outside and your instep inside; then swing him round to the left. To stop this stroke, ham your opponent with your left leg. Some make this stroke outside the leg, instead of in and out.

Left-Leg Stroke.

LEG-HOLD.—If you maintain position shown in *Holds*, your opponent will not find it difficult to lay hold of your legs. *A* and *B* place their left hands on each other's neck; *A* grasps *B*'s right wrist with his right hand, and pulls him towards him. If *B* is induced to step forward with his left leg, *A* lays hold of it near the knee, pulls it up to the left, pulling *B*'s left arm to the right, or pressing upon the chest, he throws him on his back. Again, *A* and *B* place their right hands on each other's neck. Each endeavors to lay hold of his opponent's disengaged arm. Let us suppose *B* to have succeeded in grasping *A*'s left wrist; *A* lets go quickly with his right hand; with a push he releases his left, places it from the outside on *B*'s right shoulder-blade, and then takes hold of his elbow with his right hand. *A* now leans heavily on *B*'s right side, and to relieve himself, the latter grasps his assailant's fore-arm with his left hand; then *A* lays hold of *B*'s right knee with his left hand, lifts it up, and pressing his right fore-arm on *B*'s chest forces him down backwards. Once more *A* and *B* hold

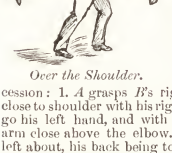
Leg-Hold.

each other by the upper arms. *A* pulls *B* towards him, and lets go suddenly; he instantly drops on his left knee, puts his head between *B*'s legs, which he grasps firmly; *A* lifts him off the ground, and throws him back. If done quick, it is often successful. To save himself, *B* leans forward, and seizes *A* round the body. There is great art in falling gracefully.

LOCK. — Put the left leg inside antagonist's right, or *vice versa*, and then bring him down.

RUSH. — *A* and *B* place left hands on each other's neck; *A* puts his disengaged right hand back, to induce *B* to catch it. In order to do this *B* leans to the left. At this instant *A* grasps with both hands *B*'s left upper arm; pulls him to the right, and simultaneously, his left shoulder in advance, he rushes upon *B*'s left shoulder, and forces him to the ground. To save himself, *B* places the back of his right hand upon *A*'s chest; he may then lay hold of his assailant's left leg with his right hand; the other secures himself by springing back. In this, all depends on quickness of eye.

THROWS OVER THE SHOULDER.—Only accomplished when players are about the same weight. From the hold *A* and *B* place their right hands on each other's necks. *A* grasps *B*'s right wrist with his left hand, pulls his arm down from the neck, and makes the four following movements in succession: 1. *A* grasps *B*'s right uppermost arm close to shoulder with his right. 2. He then lets go his left hand, and with it grasps *B*'s right arm close above the elbow. 3. *A* turns to the left about, his back being toward *B*, and places *B*'s arm on his right shoulder, as in illustration *Over the Shoulder*. Then *A* stoops forward and throws *B* on his back. This exercise should be thoroughly learned before being attempted in earnest. The defence to this is the same as that against the cross-buttock. Again, *A* and *B* take each other's neck as before. *A* grasps *B*'s left wrist further inside with his right hand, pulls down *B*'s left arm from his shoulder, rapidly raises it again, and grasps *B*'s upper arm from below. *A* now steps forward, left foot first, passes *B*'s left arm over his head, faces about at the same instant, and puts *B*'s arm on his right shoulder; *A* is then able to throw his antagonist.



Over the Shoulder.

TRIPPING-UP. — Place one leg behind your opponent's leg, and suddenly trip him forward, and force him down backward. When wrestlers face each other, the one who steps forward sideways to the left can put his right leg behind that of his antagonist; to avoid this, step back or meet with a counter-trip (*Fig. 1*). Another way is this: Suppose *A* places his right hand on *B*'s neck, grasping his left wrist with his own left hand. *A* pulls *B* obliquely to the left, taking a step with his right foot diagonally to the right, his right hand holding his adversary's right shoulder, the left grasping his left wrist, and his right leg behind the other's right leg; from this position the best man can force the other down backward (*Fig. 2*). Or *A* and *B*, standing as before, each with right hand on the other's neck; *A* grasping *B*'s right wrist with his left hand, and *B* doing the same to *A*. Both turn to the left about, and put themselves in the position shown in *Fig. 1*, in which case either has it in his power to throw the other. By putting your hip well under your opponent, you have the advantage (*Fig. 3*). In the struggle each man seems to have an equal chance; but one steps forward, puts his right foot behind that of his opponent, and by sudden movement of foot and arm, throws him.


Fig. 1.


Fig. 2.

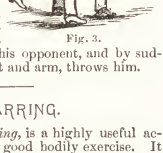


Fig. 3.

SPARRING.

SPARRING, or *Boxing*, is a highly useful accomplishment, and a good bodily exercise. It teaches to be on the alert with eyes, limbs and hands, and gives confidence.

Rules, etc. — Blows from the belt up, are fair, all others are foul; if a person is struck upon or below the waistband, his adversary loses the battle. Blows are of 4 descriptions; round, straight and chopping blows. The first are given by those not skilled in the art; the second belong to boxers, and form the surest mode, because a straight line will reach an object sooner than one that is circular. Neither of these ought to be constantly followed; aim those blows to which the adversary appears most exposed, and which the circumstances appear likely to render successful. The parts of the body and face which are subject to suffer by round blows, are the temporal arteries, the jaw bone, the glands of the ears, the ribs and the loins; those subject to straight ones, the eyes, nose, mouth, and pit of the stomach. In hitting, drive home by the full weight of the body, the hands tightly closed. In the left hand lead off at the head, the blow should be given with the upper knuckles. In leading off with the left hand at the head, the arm should be straight, with elbow turned under and palm up. For other blows the arm should

be slightly bent, the elbow pointing outwards and the palm turned half down and inwards. There are 4 hits: The left hand at the head; the left hand at the body; the right hand at the head; the right hand at the body. The best gloves for boxing are of soft leather and ventilated in the palms; backs of dressed sheep-skin, stuffed with hair. Should dirt get on these gloves, it is easily washed off with a sponge and some soap and water.


Left Hand Lead Off at Head.


Left Hand Body Blow.


Right Hand Cross Counter.


Right Hand Body Blow.

ATTITUDE, or GUARD. — Stand astride with the left foot about 20 in. in advance of the right; the toe of the left foot points toward the antagonist, and the right forms a nearly right angle with the left. The legs are slightly bent, and the weight of the body rests on both. The body must be kept erect and head thrown back. Both arms are then brought to the front. The left arm in advance, and its fist higher than the right. The elbows turned in, and close to the sides. The arms are moved to and fro in anticipation of a blow from the adversary. The fingers are tightly clenched, with the thumb doubled down over them outside. When striking, the muscles of the hand, arm, and entire body, must be braced up. At other times the fist remains clenched, but not tightly, to avoid fatigue. To bar a blow place your arm on the part at which it is aimed.

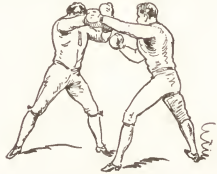

Both Men on Guard.

ADVANCING.—Move the left foot about 10 in. forward, placing it upon the ground, heel first. Let the right foot follow it in the same distance. The space between the feet should vary as little as possible.

BREAKING GROUND.—This term is applied to the usual method of retreat. In leading off at the head the right foot will be raised from the ground. As it is set down again and the weight of the body transferred to it from the left leg, spring backwards, letting the left foot touch the ground first, and alighting on the same spot upon which you formerly placed the right, which then assumes its natural position in the rear. It is necessary, if the opponent follows up very quickly, to double the step, that is, to make two consecutive springs backwards. For other blows, although the right foot is not raised from the ground at the moment of striking, the movements in breaking ground are precisely the same, for the moment the weight falls on the right leg, spring back as described above.


Breaking Ground.

CHOPPING BLOW.—A blow given downwards or sideways, on the face with the back of the hand. The power of striking this blow with dexterity often enables one to return with the same hand with which the hit of the adversary was parried. Thus, if struck at either side of the face,


Chopping Blow.

raise up your elbow, catch the blow on it, quickly bring round your arm, and give the chop. Whenever the elbow is pointed a little upwards it is a more favorable situation for striking the chopper than when your fist is raised up for it.

CLOSING, or GRAPPLING. — At the moment of grasping, throw your left foot behind your adversary's right, and attempt to fling his body over your foot. To prevent this he should remove his left leg from before his opponent's and place it behind, by which you stand in the dangerous situation from which he has just extricated himself. Remove your leg from before his, and put him in the same state he was at first. Then lose no time in throwing him, lest he should alter your respective situations again and throw you. Let one of your arms, instead of clinging round his neck, be against it in front, which, by pushing him from you, will contribute to pitch him over your leg more effectually.

COUNTER-HITTING.—Giving blow for blow, or anticipating a blow and paying it back. If your opponent is addicted to counter-hitting, your best plan is to draw him out by a feint, to parry, and plant a good hard blow in return.

DISTANCING.—Sometimes done by your having longer arms than your adversary, and thus keeping him off, sometimes by throwing your body on the hind leg when he strikes, and sometimes by retreating. Either of these methods is fair.

DRIVING.—A man is driven when he finds he cannot stand against his opponent, and is driven before him.

DROPPING.—Falling on your breech, knee or back, when your adversary strikes, or when you have struck at him and wish to avoid the return.

DUCKING.—Throwing the head on one side and slightly lowering the body, so as to allow

the blow intended for the head to pass harmlessly over the shoulder. Never duck without at the same time hitting. When opposed to a bigger man, fight at his body. There are five ducks: The duck to the right, as practiced when countering with the left hand on the head; the duck to the right, when intended to deliver a left hand body blow; the duck to the left while delivering a right hand cross-counter; the duck to the left, giving at the same time a right-hand body blow; the duck to right, which is sometimes used when leading off at the head with the left hand, in order to avoid a counter.

Lead-off with Right Hand at Head, and Duck.

FACE BLOWS. — Keep your fists near each other at some little distance from your body, as in the guard, except that your elbows are more inclined towards your side and that the flat part of your fingers is opposite your adversary. Then throw your arms one after the other in a direct line towards the centre of your adversary's face, first with your right hand, which is instantly to return to its former situation, and afterwards with the left, which is to return there likewise. Thus keep successively striking with each hand and recovering your guard, aiming your blows in a straight forward direction at his face, while he secures himself from being struck, by holding his head and stomach back, just far enough to prevent your blows from reaching him.

FEINTING.—A false attack made to divert attention from the real danger which follows. Its object is to induce the opponent to deliver a certain blow which it is your intention to counter; you do this either by feinting and enticing him to follow you up, or by laying yourself open with apparent carelessness to the attack which you wish him to make. When your opponent feints or attempts to draw you, either get back or guard both head and body.

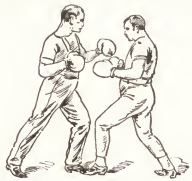
HEAD IN CHANCERY. — When in close quarters be on a look out to get your adversary's head in chancery. If it occurs, grasp him firmly round the neck with the left arm, and use the right to punish him.

Head in Chancery.

HEAD IN CHANCERY, To Get Out.—Push your opponent back, and at the same time fight with both hands. If the danger is discovered before the grasp has tightened, place one hand under his forearm near the elbow, the other under the shoulder, and push the arm up, ducking at the same time, and dragging the head away.

HITTING, To Prevent.—Bend the elbow quickly; place your fore-arm against his throat, and thrust his head back. Grasp left shoulder with left hand and seize left elbow with right hand.

IN-FIGHTING. — Half-arm hitting with both arms, when close to antagonist. Rely upon quickness in hitting, and do not pay much attention to guarding. Bring right foot forward until nearly in line with left; drop the chin and lean forward to receive the blows on forehead. Keep your eyes fixed on the antagonist. Use both hands and hit rapidly, bringing the shoulder well forward at each blow. The arms should not be drawn too far back; a great deal of the force of the blow is obtained by turning the body to right or left. Keep the hands close together, to have them inside those of the antagonist. Aim the left hand at the eyes and nose, the right at the chin or angle of jaw. Never fight at the body in in-fighting; make the head your mark.



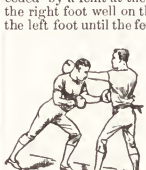
Getting Out of Chancery.

Avoiding Blow, Having Led Off and Passed Over Antagonist's Shoulder.

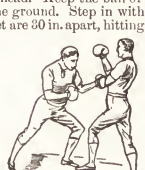
In-Fighting.

LEAD OFF AT THE BODY. To Avoid.—When attacked, retire a step, to take you out of distance; then, as your opponent is recovering guard, deliver a left hand hit at his face.

LEFT-HAND BODY BLOW.—Never attempt this without plenty of room behind you. Direct the blow at the pit of the stomach, and it may be preceded by a feint at the head. Keep the ball of the right foot well on the ground. Step in with the left foot until the feet are 30 in. apart, hitting out and ducking to the right. If the adversary try to counter you with



Left-Hand Body Blow.



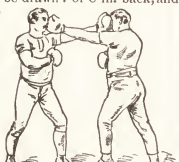
Guard for Left-Hand Body Blow, and Double Lead-Off at Body and Head.

the left, your head will be outside his arm, which will then pass harmlessly over your left shoulder. For this blow the arm should be bent, the elbow turned out, and the palm of the hand turned in and partly down. The right arm should be drawn back 7 or 8 in., and the glove held close to the side. To get away, turn the left heel out and spring back, taking care not to raise the head until out of distance.

LEFT-HAND BODY BLOW. Guard Against. — To guard the left-hand body blow, throw the left arm across the mark, and put up the right-hand guard, so that, should the adversary make the double lead off at the body and head, you are guarded. Hold the left arm firmly against the body. Step back 6 in. with the right foot, to be able to resist a rush.

LEFT-HAND FACE BLOW. — Having foreseen your adversary's intention, hit him full in the face with your left hand before he can get his head down. Keep your right arm in its original position across the mark.

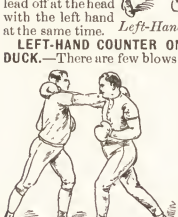
LEFT-HAND COUNTER ON THE BODY. — Delivered when adversary is leading off at your head with his left hand. Duck to the right, step in 12 in., and aim at the pit of his stomach. The right hand should be drawn 7 or 8 in. back, and held close to the side. To get away, turn the left heel out and spring back; do not raise the head until out of distance.



Left-Hand Counter on Head.

LEFT-HAND COUNTER ON THE HEAD. — This happens when 2 men lean off at the head with the left hand at the same time.

LEFT-HAND COUNTER ON THE HEAD AND DUCK. — There are few blows more startling than a good left-hand counter which meets you full-face. As your adversary leads off at your head with his left hand, duck to the right to allow his blow to pass over your left shoulder; step in about 12 in., and strike at his face. The right foot must not move.



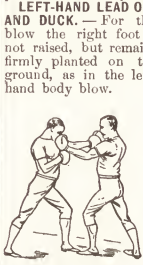
Left-Hand Counter on Head and Duck.

LEFT-HAND COUNTER ON THE HEAD AND GUARD. — The difference between this and the preceding counter consists simply in guarding your opponent's lead off, instead of ducking. You step in, and hit out as before.

LEFT-HAND FEINT AND LEAD OFF. — Feint a lead off with left-hand, to induce adversary to throw up his right-hand guard; should he do so, hit at the pit of the stomach. Should he not raise his right hand, follow the feint with a lead off at the head. Particular attention should be paid to the feet. Make a short step with the left foot (about 6 inches), as though going to lead off, then withdraw it, and suddenly deliver the blow. This movement requires practice, as it should be performed with rapidity.

LEFT-HAND LEAD OFF AND DUCK. — For this blow the right foot is not raised, but remains firmly planted on the ground, as in the left-hand body blow.

Left-Hand Lead-Off and Duck.

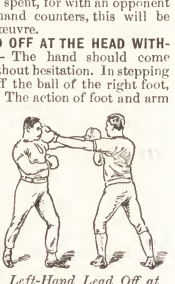


Left-Hand Lead Off.

Left-Hand Lead Off at Head and Guard.

LEFT-HAND LEAD OFF AT HEAD AND GUARD. — It requires practice to do this without detracting from the rapidity of your lead off; your trouble will be well spent, for with an opponent who attempts left-hand counters, this will be found a useful manœuvre.

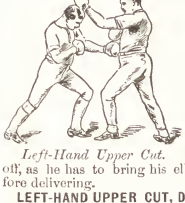
LEFT-HAND LEAD OFF AT THE HEAD WITHOUT GUARDING. — The hand should come straight out, and without hesitation. In stepping in push yourself off the ball of the right foot, and spring in 18 in. The action of foot and arm should be simultaneous. The lead off at the head with the left hand is the only blow delivered while the right foot is raised from ground. As you step in, the right foot should follow, and at the moment of striking hang over the spot formerly occupied by the left. When you step in, place the left foot upon the ground, heel first. If the toe touches the ground first, and your adversary gets back instead of guarding or receiving your blow, you do not meet with the expected resistance, and are apt to overbalance; and, until you can recover, you are at his mercy.



Left-Hand Lead Off at Head Without Guarding.

LEFT-HAND UPPER CUT. — This blow should be given when a man is leading off at your head while his left hand holds his head down. Guard your face with the right arm, step in 12 in., and hit up with the left. The arm should be bent, and elbow turned down. The force of the blow must come from the body. It is necessary to

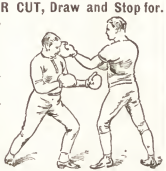
keep the elbows close to the sides, as by doing so the body is better covered when on guard; you are readier for hitting, and can hit straighter, quicker and with more force. A man who spars with his elbows stuck out makes two motions instead of one, in leading off, as he has to bring his elbow into line before delivering.



Left-Hand Upper Cut.

LEFT-HAND UPPER CUT, Draw and Stop for. — Feint a lead off at opponent's face with head down, then duck to the right, and give the left-hand body blow.

OUT-FIGHTING. — Out-fighting means long-arm hitting and guarding, and includes manœuvering for a hit with a readiness to guard.



Stop for Left-Hand Body Blow.

RIGHT-HAND BODY BLOW. — Aim a little below the heart; deliver under the same circumstances and in the same manner as the left-hand body blow, with these exceptions: Duck to the left instead of right, and the feet, when you have stepped in, should be 20 in. apart instead of 30. Have room behind for retreat. Should he attempt to put his left arm round your neck while

Right-Hand Body Blow.

Guard for Right-Hand Body Blow.

delivering this blow, duck to your right under his arm, and get away. This should be done when a man attempts to seize your head. When opposed to a man who stands with the right leg in front, duck to your left.

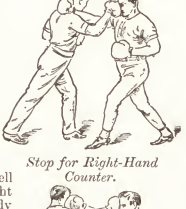
RIGHT-HAND BODY BLOW, Guard for.—Bring the left side forward and drop the left arm slightly bent so as to cover the side and front of the thigh. Press the arm close to the body, to prevent the jar of the blow.

RIGHT-HAND BODY BLOW, Stop for.—This is the same as that recommended for the left hand body blow.

RIGHT-HAND COUNTER, Stop for.—Duck your head to the left as you lead off.

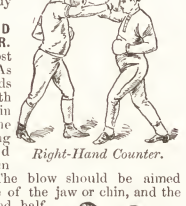
RIGHT-HAND COUNTER.—This occurs when both men lead off together with the right hand.

RIGHT-HAND COUNTER ON THE BODY. — Duck to the left to avoid opponent's lead off, and strike out with the right hand at a point a little below the heart. Draw the left hand back. In other particulars this blow represents the preceding. For this and the left hand counter it would be well to study the right and left hand body blows.



Stop for Right-Hand Counter.

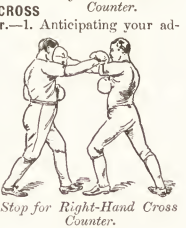
RIGHT-HAND CROSS COUNTER. —This is the most severe blow. As your opponent leads off at your head with his left hand, step in 12 in. ducking to the left, and shooting the right hand across his left arm and shoulder. The blow should be aimed either at the angle of the jaw or chin, and the palm of the hand half turned down. Let both feet be turned slightly to the left; as by this means the right side is brought forward, and greater force given to the blow. As the counter is delivered, draw the left hand back to position; then, should a second blow be necessary, deliver it.



Right-Hand Counter.

Right-Hand Cross Counter.

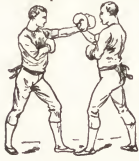
RIGHT-HAND CROSS COUNTER. Stop for.—1. Anticipating your adversary's purpose, hit him full in the face with the left hand before he ducks; or deliver the blow on the right side of his chest near to the shoulder, and his right hand will be stopped. — 2. As you lead off with your left, drop the head well forward, so that at the end of the movement your left ear will be touching the inside of your upper arm when the angle of your jaw and chin will be covered by your shoulder.



Stop for Right-Hand Cross Counter.

RIGHT-HAND GUARD FOR HEAD.—To guard the head from your opponent's left hand, raise

the right hand to a level and in front of the left temple. Let the fore-arm cross the face, and be thrown forward so as to turn the weight of the blow. Keep the elbow down. Close the hand firmly to brace the sinews, and turn the palm partly out, or the blow will fall on the bone of the arm; bend the head forward and to the right; thus, the face is well out of danger and you can see your opponent over the fore-arm.



Right-Hand Guard for Head.

RIGHT LEAD OFF AT THE HEAD.—Feint with the left, hitting opponent on right arm. Do not withdraw your hand, but as he raises his guard rest upon it with your left, and pin it to his chest; then bring in the right hand, aiming at the chin or angle of the jaw.

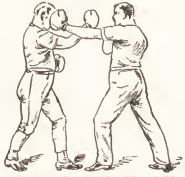
Right-Hand Lead Off at Head and Guard.

Right-Hand Upper Cut.

RIGHT LEAD OFF, AND GUARD FOR IT, AT THE HEAD.—Feint with the left, then bring in the hand, aiming it at the chin or angle of the right jaw.

RIGHT-HAND UPPER CUT.—With this exception that you do not guard, this blow is similar to and delivered under the same circumstances as the left hand upper cut, and the head slightly bent to the left.

Fig. 1.



Draw and Stop for Right-Hand Upper Cut.

RIGHT-HAND UPPER CUT, Draw and Stop for. — 1. Feint with the head as if it were your intention to lead off with it down, then throw the head back and lead off at your adversary's face with the left hand. — 2. Feint a lead off at your opponent's face with the left hand; then duck to the left and put in the right hand body blow. The position of the hand not absolutely in use should be noticed. Never drop your hands until out of distance.

Fig. 2.

Draw and Stop for Right-Hand Upper Cut.

RIGHT LEG AND ARM IN FRONT, Guard For. —Lead off with the right hand and duck to the left. When your adversary leads off with the right hand, duck to the left and counter either upon the face or body.

SHIFTING. — Resorted to, to get beyond reach of opponent. Standing on guard with left foot in advance as usual, place your right 20 in. behind it, changing guard at the same instant. Then put the right foot a step back, again changing guard; and so on continuously. Practice this in advancing.

Duck and Counter for Lead Off at Head, Right Leg in Front.

SIDE STEP.—Useful in avoiding a rush or in getting away when you are driven back against the ropes. Suppose you are in position facing the adversary; by a sudden movement of the feet half spring, half step, turn the body to the right, change the relative position of the legs, and assume the attitude of a fencer on the lunge, the right instead of the left leg in front, as is usual in boxing. The left should now be turned towards your adversary, the line of your feet being at right angles to the line in which they formerly stood. The left foot should be upon almost the same spot formerly occupied by your right foot. If the adversary advances hastily and without due caution, he is apt to trip over your left leg. Bring the left foot into position before the right and you will then stand a pace to the right of your original station. If executed rapidly you elude your opponent, and can easily get away from the ropes. A combination of the side step and breaking ground should also be practiced. Spring back as if breaking ground, and alight in the posture above described as that of a fencer on the lunge, with the body turned to the right, bring the left foot into position before the

Side Step.

right, and thus get back and work to the right of yourself at the same time.

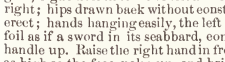
SLIPPING.—This is a useful manœuver, which enables you to avoid a rush or get out of a corner. Feint a lead off, tapping your adversary lightly on the chest or right arm; do not retire, but as he comes at you duck to the right, make another step forward and pass under his left arm. To face him, again turn to the left.

Slipping.

FENCING.

FENCING has become almost obsolete in America, except in a few circles, and it is not deemed advisable to give much space to it. Still, it is an admirable exercise, bringing into play most of the muscles of the whole body and limbs, and training to quickness of the eye and hand.

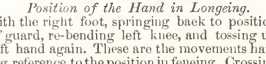
ATTITUDE.—Place your right breast opposite adversary, eyes fixed on his, right foot pointing to the front, the left to the left, at right angles; right heel in front of left ankle; body upright; hips drawn back without constraint; head erect; hands hanging easily, the left holding the foil as if a sword in its scabbard, convex side of handle up. Raise the right hand in front of body as high as the face, palm up, and bring it across to the hilt of the foil, which grasp lightly. Raise both hands above the head, separating them, so that the left hand holds the point of the foil. Bring down right arm with foil, until elbow is on a level with waist, and 8 in. in front of it; the thumb along the surface of the hilt; the fore-finger under the thumb; the point of foil as high as chin; and forearm and foil in a straight line. The left arm must remain in the position in which it held the point above the head, except that the palm of the hand is to be turned to the front. Then, without moving the body or neck, bend both knees as low as you can, and advance the right foot 12 or 14 in., so that the leg, from knee to ground, is perpendicular. You are on guard, the position from which attacks are made and parried. Short men should have the guard as high as their necks; men of middle height a little above the middle of chest; tall men the middle exactly. Regulate height of guard by that of adversary. Upon the hold of the hilt depends freedom of the wrist. The arm and hand may be turned and twisted, but no finger stir from the position. The foil must be held firmly; the thumb advanced along the upper side of the hilt, and nearly touching the shell; the fore-finger exactly underneath it; the others close up to fore-finger, not separated.



How to Hold the Foil.

ADVANCE AND RETREAT.—Take a short, quick pace to the front with right foot, not raised too high, but so as just to skim the ground. As the right foot touches, bring up the left the same distance, keeping the feet in their relative positions, *i. e.*, at right angles, and the right heel on a line with the left ankle. In the *retreat*, take a short, quick pace to the rear with left foot, and as it touches ground bring back right foot, planting it firmly on the ground.

LONGE.—Straighten right arm, raising the hand and depressing the point of the foil, until arm and foil form one horizontal line; and as you do this, turn the nails up. Then step forward 15 to 18 in. with right foot, and straighten left leg by pressing back the knee; not moving the left foot, but keeping it flat and firmly planted; then let the left hand fall to within a few in. of the thigh. Have a mark on the adversary's plastron to aim at; or, for self-practice, make a mark on a wall at the height of the centre of a man's breast. The lowering of the left arm is useful to preserve balance. To recover from the extended position, press the ground



Position of the Hand in Longeing.

with the right foot, springing back to position of guard, re-bending left knee, and tossing up left hand again. These are the movements having reference to the position in feneing. Crossing swords is termed the engagement. When your opponent shifts his blade into a new line, as from the inside to the outside, or *vice versa*, he disengages. In the engagement the sword should be held securely, without strain; but at the moment of parrying, the hold tightened. Simple parries are when, on the adversery's disengagement, your point is passed in direct course either from tierce to quarte, or quarte to tierce (high lines); septime to seconde, seconde to septime (low lines); or when the point is raised and lowered from high to low, or from low to high lines on the same side, *e. g.*, from quarte to septime, septime to quarte. Thus the simple parries always throw off the attack in the line it is directed. Counter-parries are when the sword-hand (in parrying a disengagement) describes with the point a circular course round adversary's blade, till it meets it in the line of the original engagement, throwing off the attack in an opposite line. This movement commences under the adversary's blade in the high lines, and over his blade in the low; from the engagement of quarte (the foils joined on the inside), on the adversary's disengagement the circle is described by lowering the point, passing it under his blade, towards the right, returning up, and resuming position of quarte. From the engagement in the other lines, the disengagements are parried on the same principle, as seen in diagram, where the arrow-heads denote the course taken by the foil. The counter-parry may be used to meet a direct thrust, without disengagement; in quarte, by dropping the point under adversary's blade and circling up, throwing off attack in the opposite line of tierce; in tierce, by throwing it off in quarte. Parries are termed semi-counters when, by a half-circular action, the attack is thrown off from a high line into the opposite low (quarte to seconde) or brought up from a low line into

the opposite high (as septime to tierce). As a general parry, a circular movement of the point in front of the body, from right to left or left to right (the hilt maintained at the centre), may be adopted. Two or more parries are often combined in continuous action, so that if the adversary's blade should be missed in one line it may be met in another. A simple parry is performed after a counter, or a round parry after a simple. All these parries are not of equal importance. Tierce, with its counter (or outer circle), and quarte, with its counter (or inner circle), should be principally employed. In parrying during the action of recovering from the longe, the outer circle is preferable to the inner. Other parries are variations of quarte and tierce in lowering or raising the point. The half of the foil nearest the handle is called the *forte*, the other half the *faible*. To constantly oppose the forte of your blade to the faible of your adversary is one of the secrets of fencing. Keep your wrist raised a little above your adversary's, so as to dominate his in the upper lines; in the lower lines, keep your wrist a little lower. The *Line* is the direction the foil should take for attack or defence, pointing to opponent's body, not extremities.

DEFENCE. — Pupil and instructor are on guard, opposite to one another at longeing distance; the blades of their foils joined on the inner line, touching but not pressing. The clearest description of the lines of defence is afforded by the diagram. A swordsman presenting his point to the front, defensively or offensively, may be attacked in one of the following lines of defence:

On the left of his sword-hand, beneath the hilt, the low inside line.
On the right of his sword-hand, beneath the hilt, the low outside line.
On the right of his sword-hand, above the hilt, the high outside line.
On the left of his sword-hand, above the hilt, the high inside line.

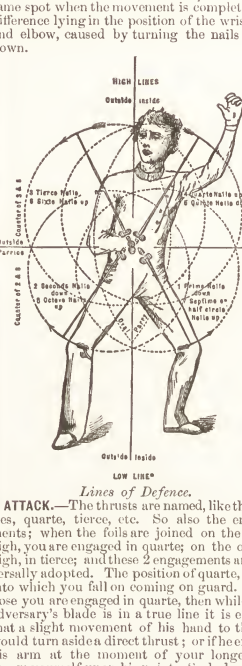
It will be seen that, with a sword of ordinary length, I only of these lines can be defended at a time, and the 3 other lines remain open to attack. For the defence of each line there are 2 parries; the sword being placed in a similar direction, the parries differing only in position of sword's edge, the sword-hand being held in the one case in supination (the nails turned up), and in the other in pronation (the nails turned down). These 8 parries are called:

Prime.	Quarte.	Septime (or half circle).
Seconde.	Quinte.	Octave.
Tierce.	Sixte.	

The allotment of these parries to the lines of defence is thus: From the centre of the breast, and with the elbow moderately bent:

1. Prime and 7. Septime (or half-circle).	The hand tending to the left, the point lowered and inclined to the left, the nails turned down. The same, but with the nails turned up and the arm elongated.
2. Seconde and 8. Octave.	The hand tending to the right, the arm straightened, the point lowered and inclined to the right, the nails turned down. The same, but with the nails turned up.
3. Tierce and 6. Sixte.	The hand tending to the right, the point raised and inclined to the right, the finger nails turned down. The same, but with the nails turned up.
4. Quarte and 5. Quinte.	The hand tending to the left, the point raised and inclined to the left, the nails turned up (slightly). The same, but with the nails turned down.

These parries are effected with the forte of the blade upon the adversary's faible, by a sharp bent or a simple pressure. In each of the 2 parries to meet the same attack, the foil blade follows the same line, so that the point is in the same spot when the movement is completed, the difference lying in the position of the wrist, arm and elbow, caused by turning the nails up or down.



Lines of Defence.

ATTACK.—The thrusts are named, like the parries, quarte, tierce, etc. So also the engagements; when the foils are joined on the inside high, you are engaged in quarte; on the outside high, in tierce; and these 2 engagements are universally adopted. The position of quarte, is that into which you fall on coming on guard. Suppose you are engaged in quarte, then while your adversary's blade is in a true line it is evident that a slight movement of his hand to the left would turn aside a direct thrust; or if he extends his arm at the moment of your longe, you throw yourself upon his point. Seek, by pressing with the forte of your sword upon the faible of his, to force it out of line. If he allow you to do this, his breast is exposed to attack, and a direct thrust will hit it without risk to yourself.

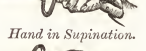
If your adversary obtains advantage in the engagement, and his sword commands yours, the direct thrust becomes impossible, and you must disengage to get an opening. The more completely his inside line is guarded (in quarte) the more exposed must he be on the outside line. Lower your point under his hilt, straightening your arm as you shift to the outside line, and longe like lightning. Rapid as you are, your adversary is as quick; his eye is fixed on your wrist; his foil touching yours, aids him to divine your intentions, and when you disengage he is ready with his parry in tierce or seconde before you longe. In this case you seek your opening for a second engagement, and hit him in quarte after all. This double disengagement is called the *one, two*, and is difficult to defeat with two consecutive parries; for the formation of the first leaves the breast so much exposed, that it is barely possible to form the second in time.

Binding.—In a counter-disengagement, your foil follows and avoids adversary's. When your blade clings to his, as it turns with it, in conjunction with the delivery of your thrust, it is termed *binding* his blade. The favorite attack on this principle is termed *falconade*, and the following directions will explain the principle: Draw your wrist sufficiently in towards you to oppose the forte of your blade to antagonist's feible; then suddenly bind your sword over his, and without quitting it bring your point in a line with his body under his arm, and immediately longe, strictly in opposition, which will here be in octave; the opposition being that of one blade against the other. If the swords are not in opposition, you cannot presage an attack, and are unable to insure against mutual hits. The change of engagement differs from a disengagement, as it is a shifting of your foil from one side of your adversary's to the other without straightening the arm; it is an attack upon his blade only. In the high lines it is performed by a circular movement which carries the point of your sword under that of adversary; in the low lines, by passing over the forte of his blade into the opposite line. When an adversary changes his engagement follow him, so as to prevent his gaining command of your blade; if he beat, do not change engagement, but disengage. During a succession of changes of engagement, be on the alert to parry. Feints are used to bring an adversary, who seeks an advantage by refusing his blade, to an engagement, or to draw him from his line of defence. They may be either offers of direct thrusts or disengagements without longeing. A beat is a sharp blow on the opponent's blade to confuse him, or throw his weapon off the line preparatory to a feint or attack. Frequent extension of the right arm without longeing is to be avoided.

Cut-over Point. — The attacks hitherto mentioned are directed either below the adversary's hilt, or to the side of his blade; there is another in which you seek to reach the adversary's breast by a whip over his weapon; raising your point, clearing his, extending your arm as your point descends, and longeing when it is extended, these motions being simultaneous, when you have learned to perform them. The action may be exemplified by taking a cricket stump, and fixing it in the ground by a downward throw. The action is that of striking, but the result is to fix the point in the spot aimed at. Never attempt the cut over in loose play until you are perfect at it, or you will slash your opponent over the arms and shoulders. The most dangerous moment for a fencer is that following an unsuccessful attack.

Ripost.—This is the return thrust, and more hits can be made by it than by any other form of an attack. Commence by paying attention to the formation of the parry, so that the attacking blade may be thrown out of line, and then, from the position of the parry, without longeing (the adversary's body being brought within distance by his longe), without movement but that of the sword-arm, thrust in return. As you acquire precision, make the ripost more rapidly, until that and the preceding parry appears almost one movement to a bystander. The ripost is generally delivered with the hand in supination, but when executed from a parry in which the nails are turned down, as from prime or seconde, there is advantage in keeping the hand in pronation during return thrusts. The ripost with a mere extension of the arm is not always feasible; the adversary, feeling his thrust parried early, may recover in time, and yet leave an opening; then the ripost must be accompanied by the longe. These ripostes, so deadly from their rapidity, are called direct; but if you are quick enough to seize the opening afforded by the adversary's attack, and find the line of direct return closed, make your ripost by disengaging, cutting over the point, or passing under the hilt, either with or without the longe.

Hand in Supination.



Hand in Pronation.

Remise.—When the original attack is yours and the adversary delays the ripost after having parried, you may repeat your attack while on the longe, without springing up to the guard again in the ordinary way.

Reprise. — A doubling of the attack while on the longe, but made without reference to opponent's play.

Time Thrusts.—Success depends upon their being timed exactly as your adversary is planning or executing an attack. You thrust in forestalling it, instead of turning it with a parry. Time thrusts are made in opposition (with the blades crossing) or out of opposition (with the blades not meeting). Those in opposition are least exposed to the danger of an exchange of hits, and of these there are 2, the time over the arm, and the time in octave. Time over the arm is applicable to all thrusts when the longe is made on the outside. Time in octave when the longe is directed to the inside of the body or under the arm. Time thrusts out of opposition are only employed where the adversary exposes himself, by exceeding wildness in attack, drawing back his arm to thrust, or longeing without straightening it. Even the legitimate time thrust, made

with the swords in opposition, is to be avoided unless you are sure of what you are about; for if you make a mistake a mutual hit is hardly to be avoided.

FIELD SPORTS.

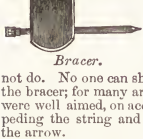
ARCHERY.

IMPLEMENTS.

ARROWS. — As much depends upon the arrow as the bow in making a successful shot. They are made of lancewood, pine, linden, ash and poplar; those without feathers will not fly true. For a bow 5 ft., 10 in., the arrows should be 27 in. in length. Ladies' arrows are generally 2 ft. long. The notches for the string in the tips are called hocks. The *Quiver* is a case generally of green tin, for keeping arrows in. The *Belt* is worn round the waist, and carries the arrows in use, a pot of grease, composed of beeswax and suet, and a tassel to wipe the dirt away from the arrows.

BOWS.—Bows are made from yew, lancewood and hickory. Those made of yew are unequalled in elasticity of pull, and freedom from tendency to kick. For beginners the best bows are self-bows, that is bows made from a single stick. Of this class the majority are of lemon wood and lancewood. The strength must be in proportion to that of the archer. An ordinary man will commence with a 50 lb. bow, and continue until he can draw a 75 lb. bow. A youth's or lady's bow should be from 25 to 40 lbs. in strength. Every bow has over the handle the number of lbs. it takes to draw the bow down to the length of an arrow, and is ascertained thus: The bow being strung is placed horizontally on a ledge; a scale is hooked on the string, in which weights are put, and that quantity which bears the string down till it is the length of an arrow from the bow, is its weight. The bow-string should be of flax or hemp; the latter preferred. The distance between the bow and string should be 6 in. at the widest part.

BRACER, or ARM GUARD.—A piece of heavy hard leather, 7 in. long and curved laterally to fit on the inside of the left arm from the wrist toward the elbow, and is fastened by 2 elastic bands, having rings and hooks. This is to prevent the blow of the sharp cord from injuring the arm or sleeve, and to allow the string to slide forward when it is struck, which the sleeve will not do. No one can shoot in comfort without the bracer; for many arrows will fall short that were well aimed, on account of the sleeve impeding the string and retarding the flight of the arrow.

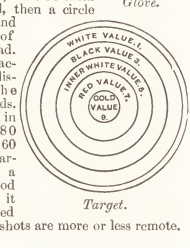


Bracer.

SHOOTING GLOVE.—Composed of 3 finger ends of thin leather, kept in place by strips branching from a broader part, strapped round the right wrist, for the protection of the fingers. The archer will also shoot with greater regularity and more accuracy who accustoms himself to shoot with it.

Shooting Glove.

TARGET.—The modern target is a flat circle of straw covered with painted canvas, the centre a circular patch of gilt, 7 in. across, then a circle of red and another of white, each of them 3½ inches broad, then a circle of black, 1½ in., and an outer one of white, 1 in. broad. It varies in size according to its distance from the archer. At 100 yds. it should be 4 ft. in diameter; at 80 yds., 3 ft.; at 60 yds., 2 ft. The target is fixed on a triangle of wood or iron, so that it may be elevated or depressed, as shots are more or less remote.



Target.

SHOOTING.

AIMING.—The first principle is to have the arrow, in drawing, directly under the right eye, and lying directly in the line of vision, as it looks at the point of aim. The bow being strung, take your stand in front of the target. Take an arrow from your quiver with the right hand (bow being held in the left). Grasp the arrow between the forefinger and middle finger, 6 in. below the feather. Holding the bow with the left hand horizontally across the body, with the upper limb to the right, pass the point of the arrow under the string and over the bow, until it projects 6 in. beyond the bow. Hold it there with the forefinger of the left hand, while you shift the right hand past the feathers to the nock. With the right hand turn the arrow till the cock-feather comes uppermost; then pass the arrow down the bow, and fix it upon the nocking-point of the string, exactly opposite that portion of the upper limb of the bow that joins the plush handle. The upper limb of the bow is made longer than the lower, that the arrow may slide on the upper limb, just above the plush handle. The archer should test the matter, and discover

that point of the string coinciding with this point of the bow, and then mark it with a little wrapping of fine red silk-thread; thus he will know the proper point for the arrow nock. The strings come wrapped for about 6 in. at the centre with black thread, to prevent the wear of the string. When this wrapping becomes loosened or worn, remove it, and take a silk thread rubbed with bees-wax; string the bow so as to hold the cord tight, and wrap the cord anew. Put the wrapping on in the direction of the twist of the bow-string. The ends of the thread should be drawn under the wrapping neatly. If the string becomes frayed, rub it with bees-wax. Every arrow describes in flight a regular parabola, and if the mark is 50 or more yards distant, allowance must be made for the falling of the arrow. No rule can be formulated to guide in this matter, for the elevation given to the arrow does not altogether depend upon distance. The strength of

Drawing the Bow.

the bow, the quickness of its cast, the weight of the shaft, the width of the feather, and many other things, affect the range of an arrow. The wind will increase the elevation of the bow-hand, if blowing hard along the range in the face of the arrow, and diminish the elevation for a shot in the opposite direction. Continual practice will enable the archer to raise his bow-hand instinctively to the proper elevation at any distance within the range of his bow. There are several causes for the wabbling of the arrow. One is the placing of the arrow-nock too low or too high on the string. If your arrow wabbles, place the next higher; if it continues to do so, place it lower. If, after many shiftings of the nock, the uneven flight continues, see if one of the eyes of the string is not awry in the nock. If the string is even, you are holding the string too high upon your fingers. Draw with the cord a little nearer the tips, and see if the flight is not true. Continue your examination into the causes of poor flight until you get at the truth. If the arrow does not fly perfectly steady, something is wrong. Although the feathers appear straight, yet they are not so, but are put on in a slightly spiral course, so that they turn as they fly, and this motion tends to keep them in a direct course.

ATTITUDE.—Never shoot with the right hand below the top of the right ear. It is easier for the novice to shoot with the right hand low, but he can never be a good archer shooting thus. Do not look at the arrow-head at the moment of loosing, to see if drawn too far, but depend upon your sense of touch. Keep your eyes upon the centre of the mark, and lose sight of all other objects. Do not attempt to take sight, but when the mind thinks that the arrow is properly directed, let drive. When the arrow is drawn to the head, loose at once. Fix your mind upon the matter in hand, so that the instant the right hand stops at the ear, the direction is found and the arrow gone. A second's hesitation will destroy the shot.

STRINGING THE BOW.—Hold the handle in the right hand, with the back of the bow towards you. Place the bottom horn against the hollow

Stringing the Bow.

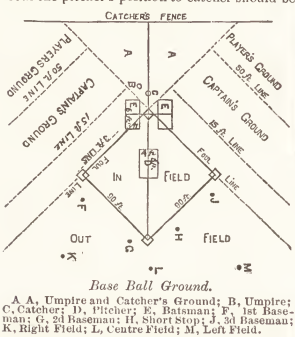
of the right foot, turning the latter so as to secure it, the left foot being advanced. Place the palm of your left hand on the upper end of the bow, taking the eye of the string between the finger and thumb, and slide it up towards the notch as you push with the left hand, and pull with the right till the string is in the notch. Make sure that it is firmly there, and not awry. Some use the left hand to pull at the handle with, and push the top of the bow with the right. Unstring in a similar manner. If the weather is cold, warm the bow before bracing it. If a powerful bow, you may not be able to put it in practice; then you may use your knee as a fulcrum, placing the bow across it with the lower horn in the ground, and the rounded inner side toward you, and pulling the top down with the left hand, while you nock the string with the right. Do not keep your bow strung; when not using, unstring it at once, even if only a few minutes are likely to elapse before you use it again. A bow kept braced too long will acquire a bend; this detracts from its strength. Rub the bow frequently with an oiled rag; the better the care, the better will be the results.

TARGET SHOOTING.—Target shooting is best

practiced by small parties of 4 to 8; 2 targets are needed, placed from 40 to 120 yds. apart. Each stand, properly placed, is called "an end." The proper number of arrows, as fixed by agreement, are then shot from one "end" to the other by each archer, when all walk to the other "end." Extract such arrows as are fixed in the target, gather up those that have missed, and then shoot back at the opposite target. This is continued until the whole number of "ends" agreed upon have been shot. Targets are made of plaited straw faced with canvas, and having a target face of muslin or linen upon the outside, painted with a gold centre, or bull's eye, and with 4 concentric rings from the bull's eye, in the following order: Red, white, black, white. In scoring, the gold counts 9; red, 7; the inner white, 5; the black, 3; the outer white, 1. Targets are of several sizes; but those 4 feet in diameter are generally used. When 4 ft. targets are used, the general distance for shooting is 60 yds., though many ranges are shot at 100 and 120 yds. If the archer is determined to become a good shot, the longer ranges he shoots the better. Target shooting is preferable to any other form of practice for the beginner, because he can keep his scores, and by comparison can discover just the extent of his daily improvement. A target card is carried at archery meetings—the ladies wearing it suspended from the waist, the men from a button-hole. On it the scores of the competitors are marked with pin-pricks, the columns being colored in correspondence with the target. When the number of arrows agreed upon are shot, the score is thus easily cast up. In target practice none but the best-footed, full-nocked arrows, with parallel points, should be used.

BALL GAMES.

BASE BALL. — A base ball field should be at least 500 ft. in length and 350 in breadth; the in-field level and covered with rolled turf of small grass and clover; the grass frequently cut so as to become velvety and close. The ground from the pitcher's position to catcher should be



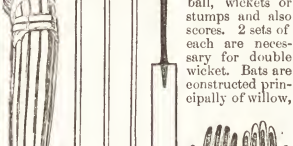
Base Ball Ground.

A A, Umpire and Catcher's Ground; B, Umpire; C, Catcher; D, Pitcher; E, Batsman; F, 1st Baseman; G, 2d Baseman; H, Short Stop; I, 3d Baseman; K, Right Field; L, Centre Field; M, Left Field.

bare, 8 ft. wide and laid with hard, dry soil, so as to throw off water, and the edge level with the turf border. The paths on the lines from base to base, 3 ft. in width, laid with hard soil, and a circle around each base. The in-field is marked off in the shape of a diamond, with equal sides, each measuring 90 ft.; bases are placed at 4 corners, so as to be distinctly seen by the umpire. The 1st, 2d and 3d bases should cover a space equal to 15 in. sq., and the home base 1 sq. ft. of surface. The 1st, 2d, and 3d bases should be canvas bags, painted white, and filled with soft material; the home base, white, of marble or stone, fixed in the ground even with the surface, and within the diamond. One corner of said base faces the pitcher's position, and 2 sides form part of the foul lines. The foul-ball posts are placed on a line with the home and 1st base, and home and 3d, and should be at least 100 ft. from the bases. On a line between home and 2d base, 50 ft. from the centre of the home base, is the pitcher's 1st point; the 2d point being 6 ft. farther on the same line. The following are the terms used in the game: A *fair ball* is a ball delivered by the pitcher wholly within the lines of his position and facing the batsman, and the ball passing over the home base at the height called for by the batsman. An *unfair ball* is a ball delivered by the pitcher as before, except that the ball does not pass over the home base, or does not pass over the home base at the height called for by the batsman. A *balk* is a motion made by the pitcher to deliver the ball to the bat without delivering it, except the ball be accidentally dropped; or, the ball be held by the pitcher so long as to delay the game; or, delivered to the bat by the pitcher when any part of his person is upon ground outside the lines of his position. A *dead ball* is a ball delivered to the bat by the pitcher, that touches the batsman's bat without being struck at, or any part of the batsman's person while standing in his position, without being struck at, or any part of the umpire's person, without first passing the catcher. A *block* is a batted or thrown ball that is stopped or handled by any person not engaged in the game. A *fair hit* is a ball batted by the batsman, standing in his position, that first touches the ground, the 1st base, the 3d base, the part of the person of a player, or any other object in front of, or on either of the foul lines, or (exception) batted directly to the ground by the batsman, standing in his position, that (whether it first touches foul or fair ground). bounds or rolls within the foul lines, between home and 1st, or home and 3d bases, without first touching the person of a player. A *foul hit* is a ball batted by the batsman, standing in his position, that first touches the ground, the part of the person of a player, or any other object that is behind either of the foul lines, or that strikes the person

of such batsman, while standing in his position, or (exception) batted directly to the ground by the batsman, standing in his position, that (whether it first touches foul or fair ground) bounds or rolls outside the foul lines, between home and 1st, or home and 3d bases, without first touching the person of a player. When a batted ball passes outside the grounds, the umpire shall decide it fair should it disappear within, or foul should it disappear outside the range of the foul lines. A *strike* is a ball struck at by the batsman without its touching his bat; or, a ball legally delivered by the pitcher at the height called for by the batsman, and over the home base, but not struck at by the batsman. A *foul strike* is a ball batted by the batsman when any part of his person is upon ground outside the lines of the batsman's position. *Play* is the order of the umpire to begin the game, or to resume play after its suspension. *Time* is the order of the umpire to suspend play. Such suspension must not extend beyond the day of game. *Game* is the announcement by the umpire that the game is terminated. An *inning* is the turn at bat of the 9 players representing a club in a game, and is completed when 3 have been put out. A *time at bat* is the term at bat of a batsman. It begins when he takes his position, and continues until he is put out, or becomes a base-runner. *Legal*, or *legally* signifies, as required by the rules of the playing clubs. The contestants include 9 on each side, one side taking the field, and the other side going to the bat. Their different positions are shown in the diagram. When the fielders have taken their positions, the pitcher delivers the ball in any manner the batsman demands—a high ball which is higher than the belt, but not higher than the shoulder, or a low ball which is not higher than the shoulder nor lower than the knee. If the batsman hits the ball and it is not declared foul by the umpire, he drops the bat and starts on a run to reach the 1st base, and, as he sees opportunity, the 2d, 3d and home bases. If he succeeds, without being put out, he scores a run, and the side scoring the greatest number of runs during the 9 innings, wins the game. If, before the batsman can reach a base, a fielder holding the ball touches that base or the person of the runner; or, if the ball, hit by the bat, is caught before touching the ground; or, if a foul ball be caught after touching the ground but once; or, if after the batsman has struck at the ball 3 times in vain, he fails to touch the 1st base before the ball is legally held there, he is declared out by the umpire. Each batsman is followed in rotation by the other batsmen of his side, until 3 are put out, when the field side takes the bat. A batsman becomes a base runner when 6, 7 or 8 balls, as required by the rules of his particular club, have been called by the umpire, and after 3 strikes have been declared. He is entitled to hold a base until he has legally touched the next base, or until he has been forced to vacate for a succeeding base runner. The 1st, 2d and 3d basemen must be sure catchers, swift and accurate throwers, and good judges of which base to send the ball to in order to put an opponent out, and must exert themselves to touch the person of the player while off base. The umpire is the arbiter of every point of the play, whether pitching, catching, fielding, striking or running. The catcher's duty is, when the striker has made the 1st base, to close up behind the bat to take the ball from the pitcher quick enough to send it to second base and prevent the 1st base from making 2d base. The pitcher must deliver the ball to the batsman, by toss, jerk, or over-hand throw, according to the demand of the batsman. His tactics should be to deceive the eye of the batsman as to where the ball is coming; and he should squarely meet and catch all balls hit straight at him. The short-stop is required to back up all the positions of the in-field and to catch over-thrown, or wide-thrown balls, to occupy any base player's position, while he (the base player) goes after the ball, and to intercept a ball thrown by the pitcher, and prevent the basemen reaching home. The out-fielders, right, left and centre, are to catch balls and return them to the pitcher or the basemen; and they should never hold a ball longer than necessary to handle it. Upon their good running, judgment, and quick returns of the ball depend much of the success of the game. The captain of each 9 is spokesman, and stations and directs the players. As each club or association has its rules, it is not advisable to give any one set, especially as the game is a modern one, with changing regulations from year to year.

CRICKET.—There are 2 forms of cricket, known as single and double wicket. Single wicket may be played by 2 or more players, but for double wicket 2 sides should be formed, each consisting of 11 players. The game should be played on smooth ground. The implements for single wicket are, a bat, a ball, wickets or stumps and also scores. 2 sets of each are necessary for double wicket. Bats are constructed principally of willow,

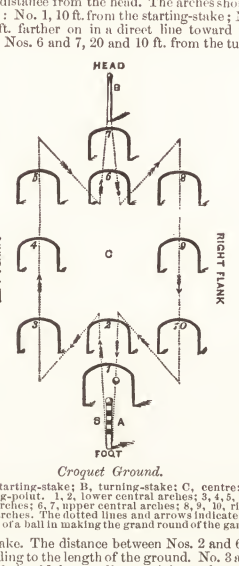


Leg Guard. Stumps. Bat. Gloves.

the handles being generally made of cane, or of willow spliced with cane or whalebone. Each wicket consists of 3 stumps, made of lancewood or ash, pointed at one end for insertion in the ground, and tipped with brass and grooved at the top. In the grooves at the tops of the stumps, are set, when fixed, 2 small pieces of wood, termed bails, their length being fixed at 8 in. For double wicket, the wickets are pitched opposite each other and 22 yds. apart. A line 6 ft., 8 in., in length is drawn at each wicket, the stump standing in its centre; this line is termed the *bowling-crease*. At each end of this line, short lines are drawn at right angles

behind the wicket, known as the *return-crease*. Within the spaces marked out by these lines, the bowler stands to deliver the ball. 4 ft. in front of the wicket and parallel to it and the bowling-crease, is another line of unlimited length, but not shorter than the bowling-crease, known as the *popping-crease*. Having chosen sides and tossed for innings, the players on the side which is out take their places, the bowler behind the wicket from which he intends to bowl, and the wicket-keeper behind the wicket opposite him. All the other men on the outside are called *fielders*, and consist of the long-stop point, cover-point, short-slip, long-slip, middle-wicket, long-field-off, long-field-on, and leg. When all are in their places, the players on the inside send out 2 batsmen, who take up their posts before each wicket respectively. One of the umpires calls "play," and the bowler delivers the ball towards the opposite batsman, so as to either hit the wicket, or that the batsman may play a catch; if either case happens, the striker is out. If the batsman hits the ball to such a distance that he is able to exchange places with the opposite batsman, he scores 1 run to his side. Every time an exchange occurs, a run is scored to the side which has the innings. The delivery of every 4 balls constitutes an "over," the bowling is transferred to the opposite wicket, and all the fielders change their positions accordingly. When a batsman is put out, another of the players on his side takes his place, and so on, till all but one are put out, when those who have had their innings field out, and those who have been fielding out take their innings. Each side has 2 innings, and that making the largest score wins. If the bowler sends a ball on the outside of the popping-crease at the opposite wicket, it is called a wide ball, and scores 1 to the inside. The bowler must also deliver the ball within 1 foot behind the bowling-crease; the ball must be bowled, not thrown or jerked, and the bowler must not raise his hand above his shoulder in delivering the ball. An infraction of these rules constitutes a "no ball," which scores 1 to the inside.

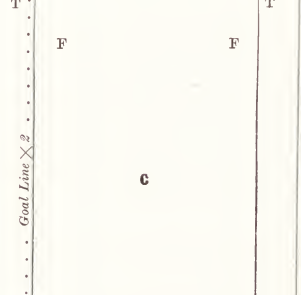
CROQUET.—This can be played only on level ground with an area of about 60 by 90 ft., provided with a shallow ditch around it to prevent the balls from straying. The lower part is the base, the opposite end the head, and the sides the right and left flanks. In the centre of the foot from whence the play begins, the starting-stake is set; and in the centre of the head is the turning-stake. There are 10 bridges, with a span of 12 in., made of iron wire, and stuck in the ground, leaving 6 to 8 in. above ground. The stakes are of wood, 2 ft. in length, and having 8 rings of different colors running down in this way—black, yellow, red, white, blue, orange, brown, green. It is from the starting-stake, through the bridges, touching the turning-stake, and from the other flank back to the spot, that the balls are driven by a mallet in the hands of the player. The balls are of wood, and painted to correspond to the rings on the starting-stake. This allows 1 to each player, though when 4 play they can use 4, or play 2 each. The distance from the starting-stake should be about 10 ft. from the base, and the turning-stake should have the same distance from the head. The arches should be set: No. 1, 10 ft. from the starting-stake; No. 2, 10 ft. farther on in a direct line toward the head; Nos. 6 and 7, 20 and 10 ft. from the turning-stake. The distance between Nos. 2 and 6 is according to the length of the ground. No. 3 and No. 10 should be on a line at right angles with Nos. 1, 2, 6 and 7, and in line with 2; and No. 5 and No. 8 in a like position with No. 6. Midway between 3 and 5, and 8 and 10, the two remaining arches are set. The precise place of the spot is one mallet's length behind arch No. 1. Another mode of setting the arches is the same as that shown in the diagram, except that the arches 4 and 9 are set at right angles, so as to have their edges presented to the arches immediately above and below them. The object of each player is to make the grand round, and strike out against the starting-stake. The course of the ball is, first from the spot, through arches 1 and 2, upward; then to the left flank in front of 3; through 3, 4, and 5; back to the line of the centre in front of 6; through 6 and 7, making the half-round. The stake is next struck; after which the ball runs back through 7 and 6, downward, or contrary to its previous course. Having re-run 7 and 6, it crosses over to front of the right flank arches, their front being the reverse to that of those on the left. It then runs 8, 9, and 10 downward; crosses again to the centre line above 2, and re-runs 2 and 1 toward the starting-stake. It has thus completed the grand-round; and being once



Croquet Ground.

A, starting-stake; B, turning-stake; C, centre; S, starting-point. 1, 2, lower central arches; 3, 4, 5, left flank arches; 6, 7, upper central arches; 8, 9, 10, right flank arches. The dotted lines and arrows indicate the course of a ball in making the grand round of the game.

more placed upon the spot, has the option either of striking out or continuing the play, with the privileges of the rover. As victory is not declared till all the friends of a side are struck out, striking out is delayed by each until the last of that side has completed the round. The striking out of a ball, while any of its friends are back in the game, is a serious loss to the side to which it belongs; especially since the rover is endowed with privileges which render him a valuable friend or a formidable enemy. 2 of the party, usually best players, are chosen chiefs, one for each side; these determine the first choice of players by a trial of skill. Each chief in turn plays a ball from the starting-point, and he who, with one blow of the mallet, drives his ball nearest the turning-stake, wins, and opens the game, and is followed by the chief of the opposing side, and the players on each side play alternately, in accordance with the colors marked upon the starting-stake. Each player continues to play so long as he drives his ball through the next arch in order, strikes the



Plan of the Field.

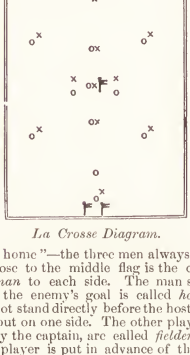
AA, goal lines; PP, goal posts; F, field of play; C, centre of play; TT, lines of touch; B, touch in goal (for Rugby union game).

turning-stake in order, or achieves either roquet, croquet, or roquet-croquet, or a combination of 2 or more of these. Failing to accomplish either, he relinquishes his turn. Each player, at starting, places his ball a mallet's length in front of the starting-stake, opposite the centre of the first arch, and, holding the mallet with one hand, strikes.

FOOT-BALL. — There are two styles, one known as the *Rugby* game, and the other as the *Association* game; the former uses an oval ball, and the latter a round one. They are made of India rubber bladder covered with strong leather. In all games of foot-ball, the object is to drive the ball towards the opponent's goal, and score a "goal." The ground from goal to goal should not be less than 100 yds. in length, nor more than 200 yds. Its width from touch line to touch line should vary from 50 to 100 yds., according to length. The lines of touch are marked out by 4 flags for each line. The goal is formed of 2 upright posts, which, in the Rugby game, are joined by a cross-bar at a height of 10 ft., and in the Association game by a tape at the height of 8 ft. The aim in the Rugby is to drive the ball between the posts and over the cross-bar of the enemy's goal; in the Association, to drive it through the posts below the tape. 2 side-lines, called goal-lines, are drawn from each of the goals, and the boundary of the ground on each side is marked by a line called *touch-line*. The opposing players take position opposite each other at different ends of the field. The game is decided by the number of goals won in a certain time, which is divided into equal parts, after each of which the players change ends. The Rugby commences by a *place-kick* (kicking the ball when placed on the ground) from the middle of the field. A goal may be won by a *drop-kick* (letting the ball fall from the hands and kicking it the instant it rises) over the adversary's goal, or by a place-kick resulting from a *touch-down* (putting the hand upon the ball to make it dead) or a drop-kick over the adversary's goal, or by a place-kick, resulting from a touch-down or *fair-catch* (a catch direct from a kick, or a throw forward, or a knock on, by the opposite side). The touch-down is as follows: Any player who catches the ball before it has touched ground or on the bound, may run with it till he gets behind the adversary's line of goal, where he will touch it down as near as he can to the goal, if possible between the posts. This is called *running-in*, and secures the right of a place-kick at the goal, from any spot outside the goal-line in a straight line from where the touch-down was made. When the ball is touched down behind the goal line, but not near the goal, a different mode, called the *punt-out*, is adopted. When the ball crosses the touch-line at the side of the field, it is lifted and thrown out in a straight line, to be secured by either side. In the Association rules, holding or carrying the ball is prohibited, and no one is allowed to use his hands, except the goal-keepers, to protect the goal. Tripping and hacking is not allowed, and the game is milder than the Rugby.

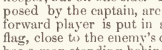
LA CROSSE. — In this game the ball is not thrown by hand, but hooked up from the ground by a long stick of hickory, bent at the top, and across the hooked portion of which a net-work is formed of raw hide or dock strings. The ball is of India rubber sponge, 8 to 9 in. in circumference. 2 poles, surmounted by flags of different colors, are set up at each end of the field, and are called goals. The object is to drive the ball through the goal of the adversary. The players are distributed into pairs (a friend and foeman)

through the field; and it is better for the contestants to dress in contrasting colors, and to have their flags similar. 12 players constitute a full side, but fewer can play. No two of a side should be close together, except goal-keeper and point. The diagram shows the positions of the players, the marks O and × representing players of the respective sides: Goal-keeper, point, and



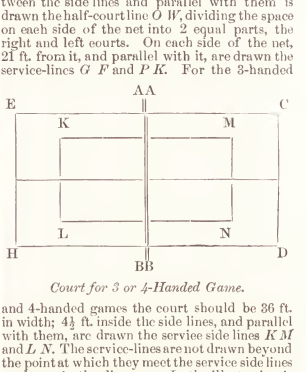
La Crosse Diagram.

hostile "home"—the three men always close to goal. Close to the middle flag is the centre or *facing-man* to each side. The man stationed next to the enemy's goal is called *home*; he should not stand directly before the hostile goal-keeper, but on one side. The other players, disposed by the captain, are called *fielders*. One forward player is put in advance of the centre flag, close to the enemy's cover-point. Each side has a man standing behind each facing-man, or behind its own facing-man, to take the ball from him if he succeeds in getting it away from his opponent. The players are supposed to keep to their stations, especially goal-keeper and point. Beginning near the centre of the field, the players struggle for mastery over the ball, and to convey it to the opponent's goal. When scooped up from the ground, it is carried horizontally on the crosse, the player running towards one of the goals. If possible, he pitches the ball off his crosse towards a colleague, in a better position to convey it towards the goal. The ball is not touched by the hand, except under special circumstances. If the ball be accidentally driven through the goal of the same side, the other side wins the game. The player must not strike, trip up, grasp another, nor lay hold of his crosse. Two on the same side may fling or carry the ball consecutively.



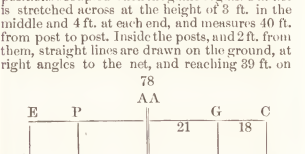
The Crosse, or La Crosse Stick.

LAWN TENNIS. — This may be played on a lawn of moderate dimensions by 2, 3, or 4 persons. For the single game, the court is 78 ft. long and 27 ft. wide. It is divided across the middle by a net, the ends of which are attached to 2 posts, *A A* and *B B*, standing 3 ft. outside the court on either side. The height of the net is 3 ft. 6 in. at the posts and 3 ft. in the middle. At each end of the court parallel with the net and 39 ft. from it, are drawn the base lines *C D* and *E H*, the ends of which are connected by the side lines *D H* and *C E*. Half way between the side lines and parallel with them is drawn the half-court line *O W*, dividing the space on each side of the net into 2 equal parts, the right and left courts. On each side of the net, 21 ft. from it, and parallel with it, are drawn the service-lines *G F* and *P K*. For the 3-handed



Court for 3 or 4-Handed Game.

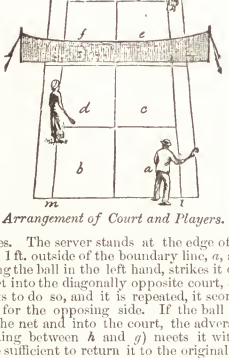
and 4-handed games the court should be 36 ft. in width; 4½ ft. inside the side lines, and parallel with them, are drawn the service side lines *K M* and *L N*. The service-lines are not drawn beyond the point at which they meet the service side lines as shown in the diagram. In the illustration is shown a lawn-tennis court, with 4 players in the positions occupied when the game begins. The net is stretched across at the height of 3 ft. in the middle and 4 ft. at each end, and measures 40 ft. from post to post. Inside the posts, and 2 ft. from them, straight lines are drawn on the ground, at right angles to the net, and reaching 39 ft. on



Court for Single-Handed Game.

each side of it. The ends of these lines are joined by 2 other straight lines, parallel with the net, the whole court forming a parallelogram, 78 ft. long and 36 ft. broad, divided into 2 equal parts by a line running lengthwise down it, so that there is a right hand court (*c a l*) and (*f k h*) and a left hand court (*d b m* and *e g i*), intersected by a cross line, 21 ft. from the net, called the *service-line*, which separates the ground on each side of the net into 4 courts. To make strokes more easy an inner line on each side of the ground is run across it parallel with the side lines, 4½ ft. from them, and at right angles to the net shown at *k m l i*. In a 4-handed game they cut off from the 4 inner courts, into which the ball is served from

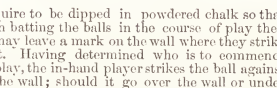
time to time, a part of the extreme portion, where it is easy to place difficult services. Unless the ball falls into the central part, it is a fault. In a single game, the lines reduce the size of court by cutting off the outer portion between them and what is in a 4-handed game the boundary. The choice by sides and right of serving during the 1st game is decided by toss; provided that, if the winner of the toss choose the right to serve, the other player has choice



Arrangement of Court and Players.

of sides. The server stands at the edge of the court, 1 ft. outside of the boundary line, *a*, and, holding the ball in the left hand, strikes it over the net into the diagonally opposite court, *b*. If he fails to do so, and it is repeated, it scores a point for the opposing side. If the ball falls over the net and into the court, the adversary (standing between *h* and *g*) meets it with a stroke sufficient to return it to the original server, who returns it at the first bound. The ball is thus returned alternately, until one makes a failure, either striking the net or sending the ball outside the opposite court, when it scores a point for the adversary. The person who begins to serve continues through the game. If the ball, in passing, strikes the net, it is not a failure, provided it falls in the proper court. The players change sides at the end of every set of games. When a series of sets is played, the player who was server in the last game of one set is the striker-out in the first game of the next. In the 2-handed game, the single player serves in every alternate game. In the 4-handed game, the pair who has the right to serve in the 1st game may decide which partner shall do so, and the opposing pair may decide similarly for the 2d game. The partner of the player who served in the 1st game serves in the 3d, and the partner of the player who served in the 2d game serves in the 4th; and so on the same order in subsequent games of a set or series of sets. The players take the service alternately throughout each game; no player receives or returns a service delivered to his partner.

RACKETS.—Usually played out of doors on an open space of ground bounded at one end by a high wall. The ground is marked out into 4 compartments or courts, so that there may be 2 courts adjoining the wall and 2 beyond. A broad white line is marked on the wall about 42 in. above the ground, and in play every ball struck against the wall should hit it above this line. The game is played by 2 or 4 players; in the latter case they form sides, 2 on each side. When only 2, each guards 2 courts; when 4, they each occupy a court, those nearest the wall being the in-hand, and those farthest from the wall the out-hand players. To strike the ball a light bat or *racket* is used. This consists of a frame-work of wood or cane, with a strong network of catgut, and provided with a handle. The balls are tennis balls, and should not weigh more than 1 oz. each. A large number are required; after being struck one or twice they re-



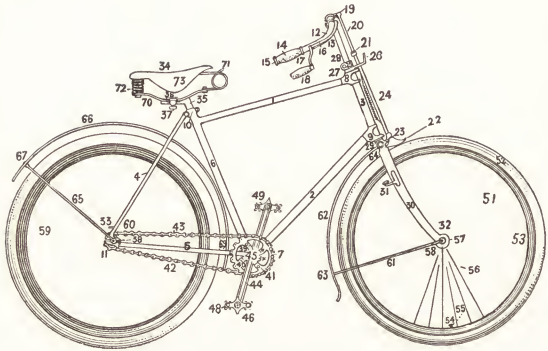
Racket for Throwing Ball.

quire to be dipped in powdered chalk so that in batting the balls in the course of play they may leave a mark on the wall where they strike it. Having determined who is to commence play, the in-hand player strikes the ball against the wall; should it go over the wall or under the white line, or rebound anywhere but in one of the outer courts, the striker is out, and the out-hand player takes his place. Should it rebound into one of the outer courts, the out-hand player must strike it against the wall above the line in such a way that it may rebound into one of the inner courts. Should he fail to do this, the in-hand player scores 1 point, and serves the ball again, and so on. Should the out-hand player succeed, the in-hand player must take the ball as it rebounds and strike it so that it may in turn rebound in one of the outer courts. The great object of the game is to strike the ball so that on its rebound in the legitimate court the opposing player may fail to strike it correctly.

GOLF.—A Scottish game, played with ball and club. The players number one or more on each side, and each is provided with a separate ball. The most skillful player is he who can land his ball in a given series of holes with the fewest strokes of his club. To place the ball in a proper position for striking off is called "teeing," and the plot in which the game is played is termed the "putting ground." The balls now used are generally made of gutta-percha. Golf may be practiced on any good stretch of meadow-land, where the grass is not too rank. Small holes, of about 4 in. diameter, are punched in the turf at distances indefinitely variable, but ranging from about 100 to 400 or 500 yds.; and from one of these holes into the next in order, a ball of about $1\frac{3}{4}$ oz. weight has to be driven with implements (clubs) of some variety devised for the purpose. These clubs may generally be shafts of wood with so-called *heads* of wood or iron attached.—1. *Mode and Order of*

Playing. The game is played by 2 persons, or by 4 (2 of a side), playing alternately. It may also be played by 3 or more persons, each playing his own ball. The game commences by each party playing off a ball from a place called the *tee*, near the 1st hole. In a match of 4, those who are opposed to each other, and to play off, shall be named at starting, and shall continue so during the match. The person entitled to play off first shall be named by the parties themselves; and, although the courtesy of starting is generally granted to old captains of the club, or members, it may be settled by lot or toss of a coin. The hole is won by the party holing at the fewest strokes, and the reckoning of the game is made by the terms *odds* and *like, one more, two more*, etc. The party gaining the hole is to lead, unless his opponent has won the previous match, in which the latter leads off, and is entitled to claim his privilege, and to recall his opponent's stroke should he play out of order. One round of the links, or 18 holes, is reckoned a match, unless otherwise stipulated. If, in a double match, 1 person shall play twice in succession, he loses the hole.—2. *Place of Teeing.* The ball must be teed not nearer the hole than 8, nor further than 12 club lengths, except where special ground has been marked by the conservator of the links, which shall be considered the "teeing ground," and the balls shall be teed with and not in advance of such marks. After the balls are struck off, the ball farthest from the hole to which the parties are playing must be played first. When 2 parties meet on the putting green, the party first there may claim the privilege of holing out, and any party coming up must wait till the other party has played out the hole, and on no account play their balls up lest they should annoy the parties who are putting. No player may play his teed ball till the party in front have played their 2d strokes. —3. *Changing the Balls.* The balls struck off from the tee must not be changed, touched or moved before the hole is played out (except in striking, and the case provided for by Rule 9), and if the parties are at a loss to know the one ball from the other, neither shall be lifted till both parties agree.—4. *Rubs of the Green.* Whatever happens to a ball by accident, such as striking any person, or being touched with the foot by a third party, or by the fore cady, must be reckoned a rub of the opponent, or his opponent's cady or clubs, the opponent loses the hole; or if he strikes himself or his partner, or their cadies or clubs, or if he strikes the ball a 2d time while in the act of playing, the player loses the hole. If the player touch the ball with his foot, or any part of his body, or with anything except his club, or if he with his club displace the ball in preparing to strike, he loses a stroke, and if one party strike his opponent's ball with his club, foot, or otherwise, that party loses the hole. But if he plays it inadvertently, thinking it his own, and the opponent also plays the wrong ball, it is then too late to claim the penalty, and the hole must be played out with the balls thus changed. If, however, the mistake occurs from wrong information given by one party to the other, the penalty cannot be claimed; and the mistake, if discovered before the other party has played, must be rectified by replacing the ball as nearly as possible where it lay. If the player's ball be played away by mistake, or lifted by a third party, then the player must drop a ball as near the spot as possible, without any penalty. Whatever happens to a ball on a medal day, such as a player striking his cady or himself, or his clubs, or moving his ball with his foot or club, or his cady doing so, or the player's striking it twice before it stops rolling motion, the player in such cases shall lose one stroke only as the penalty.—5. *Lifting Balls.* When, on any part of the course, or off it, or in a bunker, the balls lie within 6 inches of each other, the ball nearest the hole must be lifted till the other is played, and then played as nearly as possible in its original position—the 6 in. to be measured from the surfaces of the balls. In a 3-ball match, the ball in any degree interposing between the player and the hole on the putting green, must be played out.—6. *Ball Lost.* If a ball is lost, the player (or his partner, in a double match), returns to the spot, as near as possible, where the ball was struck, tees another ball, and loses both the distance and the stroke. If the original ball is found before the party has struck the other ball, the first ball shall continue the one to be played.—7. *Holing Out the Ball.* In holing no mark shall be placed, or line drawn, to direct the ball to the hole; the ball must be played fairly and honestly for the hole, and not on your opponent's ball not being in the way to the hole; nor, although lying in the way to the hole, is the player entitled to play with any strength upon it that might injure his opponent's position, or greater than is necessary honestly to send your own ball the distance of the hole. Either party may smooth sand lying around the hole, but this must be done lightly and without pressure, or beating down with the feet, club, or otherwise. If, in holing out, the ball rests upon the flag-stick in the hole, the player shall be entitled to have the stick removed, and if the ball falls in, it shall be considered as holed out; but either party is entitled to have the flag-stick removed when approaching the hole.—8. *Unplaying Balls.* In *Match* playing, every ball must be played, wherever it lies, or the hole given up, excepting when it lies on clothes, in water, or in the bed of the burn, or in any of the holes, or short holes, made for golfing, in which latter case it may with propriety be lifted, dropped behind the hazard, and played without losing a stroke. In *Medal* playing a ball may, under a penalty of 2 strokes, be lifted out of a difficulty of any description, and teed behind the hazard, and if in any of the golfing holes, it may be lifted, dropped, and played, without a penalty. In all cases where a ball is to be dropped, the party doing so shall front the hole to which he is playing, standing close on the hazard, and drop the ball behind him from his head.—9. *Breach of Rules.* Where penalty for infringement of a rule is specially mentioned, the loss of it shall be understood to be the penalty.

BICYCLING.



The Parts of a Bicycle.

This description applies to an ordinary diamond-frame wheel. There are many extra attachments, and different makers have different ways of putting a wheel together, so that they may differ in one or two minor details. The description given, however, is in the main correct. It includes mud-guards and their parts—which are used but little here, but are on all wheels made in England. They are used generally on drop-frame wheels in this country.

1 Upper main tube.
2 Lower main tube
3 Front frame tube
4 Rack stays.
5 Back forks.
6 Center stay.
7 Crank brackets, containing cones at outer ends; crank axle with ball bearings and adjustment clip bolt
8 Upper ball head race, or cup
9 Lower ball head race, or cup
10 Saddle post adjustment clip.
11 Back fork end.
12 Handle-bar
13 Handle-bar stem
14 Handle.
15 Ferrule, or nickel tip.
16 Brake lever.
17 Brake lever crank.
18 Brake lever handle.
19 Brake plunger connecting bolt.
20 Brake plunger.
21 Brake plunger adjustment nut.
22 Brake shoe.
23 Brake shackles, bolts and nuts.
24 Brake spring.
25 Handle-bar clip and ball head cone.
26 Lamp bracket.
27 Lock nut for handle-bar clip.
28 Ball head adjusting nut
29 Front fork crown, with brake lug in front.
30 Fork sides, right and left.
31 Coasters
32 Fork ends.
33 Step.
34 Saddle.
35 Saddle post.
36 Saddle clip.
37 Set screw
38 Chain adjustment bolt
39 Crank axle.
40 Detachable sprocket wheel.
41 Sprocket bolts
42 Chain.
43 Detachable link in chain.
44 Crank.
45 Cotter pin nut and washer for detachable crank on other side of machine.
46 Pedal.
48 Pedal pin
49 Nut and washer.
51 Steering wheel.
52 Tire.
53 Rim.
54 Air valve.
55 Valve cap.
56 Spokes.
57 Hub, which comprises outside shell, with ball bearings, bushes and axle.
58 Washers for fixing to forks.
59 Driving wheel.
60 Driving wheel hub.
61 Front mud-guard stays
62 Front mud-guard
63 Front mud-guard screws.
64 Back mud-guard.
65 Back mud-guard screws
66 Back mud-guard screws
67 Back mud-guard screws
70 Saddle frame.
71 Front saddle spring.
72 Rear saddle spring.
73 Leather top, with tension adjustment screw in front, underneath.

LEARNING TO RIDE.—Any person who has the use of his limbs can learn to ride. The beginner should have the assistance of a cycling friend. He should steady the machine by means of the handle-bar while you mount, and then should hold the bar firmly with one hand, while with the other he grasps the saddle spring or lower part of the saddle. This avoids a fall and gives complete control of the wheel. He should then walk by your side, holding the machine as described, and assist you in your efforts to steer it. The bicycle is maintained in its upright position through balancing it by means of steering wheel. When you find yourself about to fall to the right, turn the wheel towards the right; if about to fall to the left, turn the wheel towards the left; in short, turn the wheel towards the side to which the machine is falling. This action will restore the equilibrium of the rider. Should a violent and unexpected swerve occur so that the machine actually falls, simply hold out your foot on the side you are falling, and you will save yourself and wheel. When you find you can steer well enough to keep the machine erect and able to use the pedals, you can dispense with friend and try it alone. Hold the bars firmly and steer steadily, and, should you fall, it is very easy to put out your foot

and save yourself. A little practice of this sort will soon enable you to become accustomed to the wheel. The next thing is to learn to balance the wheel from the step preparatory to mounting. Stand behind the machine, leaning forward and grasping both handle-bars; then place your left foot on the step and put the wheel in motion by hopping 2 or 3 times with your right foot. Keep your wheel erect and straight by turning the steering wheel very gently from side to side. After a few hops rise carefully on your left foot, thus carrying your weight on the step, and see how far you can maintain the balance of the wheel, always remembering to turn towards the side you are falling. When you can preserve your balance on the step, and ride a short distance standing on it, move your right leg along until it rests partly over the saddle, then slide gently forward into it. Do not give a spring or jump, but take it easy and gently. The easier the mount you make the less is the steering affected. A jump or lurch into place will make the machine wabble. Feel quickly for your pedals, in order to keep the wheel in motion. At first you will experience trouble, but practice will soon give you confidence and final control of the wheel. A woman may learn to ride just as easy as a man, and often more quickly. The method is the same as with a man regarding the assistance of a friend, only the care and attention should be a little greater. The assistant should place the machine in position, with the right pedal a little forward of the vertical. Then he should hold the handle-bar firmly while she grasps the handles from the left side, places her foot on the right pedal and rises to the saddle. After she is properly seated he should grasp the handle-bar and frame and walk along on the left side of the wheel, steadying it with his right hand and assisting in steering with his left. The rider must pedal slowly, in order to enable her assistant to keep pace with her and keep the wheel steady. Frequent rests should be taken, as it is tiresome work at the start, and the first lessons should be short ones. To mount and dismount alone is the next thing to learn. The simplest way to get off the machine is to slow up until you are just moving, then apply the brake, and as the wheel inclines to one side reach for the ground with the foot on that side. As the foot touches the ground, draw the other foot through after it, taking care to hold the handles steadily and prevent the pedal from striking the ground. Although this is not a very graceful dismount, yet it is practically unavoidable at the start. The becoming and regular dismount is to ride very slowly, apply the brake as the left pedal reaches the lowest point, bear all your weight upon the left foot as you stop, carrying the right foot through to the left side, and so stepping off upon the ground on the right foot. A little practice is required to do this well, but it can be learned with patience. To mount alone, the novice can go to a curb or large stone, stand close to the left side of the wheel, holding the handles firmly, with the right pedal just a little forward, beginning to descend. Put the right foot upon the pedal, adjust your dress to hang evenly, and then rise to the saddle by bearing your weight upon the right pedal. This action enables you to reach the saddle and also put the wheel in motion. It should be done quickly, but evenly and without a jerk or a jump. You will find the machine begin to move forward as you rise, and you must pay attention to the steering. The proper position for a bicycle rider is, in the first place, an upright one. He should push nearly straight downward with his legs—not backward, as one must do who bears far forward. His arms should not be rigid and extended to their full length, but a little bent, and the handles can be easily adjusted to bring this about.

CLEANING AND OILING.—A wheel should be cleaned and oiled at least once a week. To clean the wheel, place the wheel upside down, resting on the saddle and the handle-bar, which should rest on a cloth or piece of old carpet to prevent its being marred. The dust should be removed from the wheel with a dry brush. If the rims and frames are muddy, use a wet cloth; a small brush will be found useful in cleaning the sand or mud from the hub or sprocket wheel. If the enamel of the frame appears streaked after washing off the mud, it should be rubbed with a dry piece of cloth or chamois skin. Oily rags should not be used on the enameled parts. The spokes should be cleaned with a cloth.

PUNCTURES.—A simple manner in which to repair a puncture of a single-tube tire, if it is not a difficult one, is to insert a nozzle to which a tube of cement can be attached in the puncture. Then turn the wheel until the puncture is at the lowest point, when a drop or two must be injected. Immediately withdraw the nozzle while the cement is still running, so that all sides of the puncture will be coated with the cement. Wind on ½ doz. turns of tire tape and inflate, still having the puncture down, in order to keep the cement over the puncture. The tire should be blown up very hard, and then ridden for about ½ hour. The tape can be removed in 24 hours, and the tire will be found intact. It takes only about 3 minutes to fix a tire by this method, and it's always successful.

—o—

HUNTING.

DOGS.

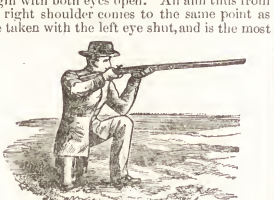
A WELL-TRAINED dog is indispensable to success in gunning. The highest place among shooting-dogs is awarded to the *setter*, the hairy protection of his feet enabling him to go through an amount of work without injury. The *pointer* is more nearly allied to the hound than any other. It will, with little breaking, stand at game of any kind. To select a pointer choose one

whose head is broad at the tip, long and tapering, the poll rising to a point; nose open and large; ears tolerably long, slightly erect and falling between the neck and jawbone, slightly pointed at the top; eyes bright and clear; neck and head set on straight; chest broad and deep; legs strong, muscular and straight; feet small and hard; body not too long and well ribbed up; loins broad at the top, but thin downwards; hind quarters broad; hind legs strong and large; tail long, fine and tapering; hair short, sleek and close. If these points are found in a dog, he is a good pointer, and will give satisfaction. The *water spaniel* and the *Newfoundland* are of great use to a sportsman when bent on shooting water birds. The water spaniel rivals every other breed in docility. The retriever's value consists in his fearlessness and perseverance in penetrating the thickest bushes. (See DOGS in PET STOCK.)

GUNS.

REMARKS.—The barrel, lock and mounting are of metal; the stock of wood. The interior of the barrel is called the bore, the front end the muzzle and the back end the breech. The following explains the parts of a muzzle-loading gun: Butt of stock, extremity of stock, placed on the shoulder in taking aim; chain or swivel, a small chain connected with tumbler and mainspring; chamber, a cavity in the breech to receive the powder; cock, the striker; guard, bar to protect the trigger; heel-plate, plate which guards the butt of stock; lock-plate, supports the principal works of the lock; mainspring, which governs the tumbler and the cock; scear, which catches the tumbler for ½ or whole cock; tumbler, movable centre piece of trigger; worm, screw at end of ramrod.

AIMING.—The manner of holding the gun is shown in the illustration; many first-rate shots prefer holding the left hand close against the trigger guard. Practice bringing the piece to shoulder with breech and sight on a level, and pulling the trigger the moment the gun is brought up to the centre of the object; as the first sight is best. Begin with both eyes open. An aim thus from the right shoulder comes to the same point as one taken with the left eye shut, and is the most



Rifle Shooting at Long Range.

ready method of shooting quickly. Time must be allowed for the movement of the game as well as for the attraction of gravitation and reflection of the charge caused by the wind. When on the wing, aim well forward and higher, as game, particularly wild fowl, is always further off than it seems.

CHOICE.—A good gun is necessary to success in hunting. Barrel should not exceed 30 in. and be of medium gauge; a twisted barrel is best. To ascertain whether the shape of the stock is best adapted, the shooter should frequently raise the gun to his shoulder, and take aim at a distant point with both eyes open; then, closing the left eye, he will perceive whether or not he has taken correct aim. If, with the left eye closed, he does not see the object, the stock is too crooked; if he sees all the rib, it is too straight; and if his line of aim is not along the centre of the breech, but from the left corner of it, the stock is not properly cast off. Should the line of aim be along the right side of the breech, the stock is too much thrown off. With a gun properly fitting, the aim is instantaneous. In looking along the rib, ⅓ of the whole length of the stock next the muzzle should be visible, as well as the sight. This gives the shot elevation and increases the range. The wood should be hard and tough; the mounting and locks carefully fitted; in shape the stock should be thin and suited to the grasp; the fore-end of stock broad, full and wide at the end of the lock plates; the lock simple, but finished in all its parts to perfection; the mainspring of good metal and elastic. A good lock should not grate harshly when the striker is raised. Draw the trigger, retaining the thumb upon the striker, and observe that it goes down freely, with increasing force as it approaches the nipple. The trigger should be long and well curved, affording a good hold for the finger; the edges rounded so as not to cut the finger and set well separate. The guard of the trigger, termed the bow, should be rounded and somewhat thick at the edges, and have no improper projection likely to injure the middle finger.

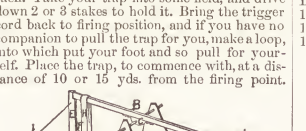
BREECH-LOADERS.—The advantages of breech-loaders are the facility, quickness, and additional safety in loading; the increased rapidity of shooting; absence of foulness, recoil, and liability to be affected by damp. In using this gun, place the stock under the arm, and with the right hand pull the lever back, and ease down the barrels with the left hand. Take out the exploded cartridges with the thumb; or, should they be rather tight, tap the pin with a loaded cartridge, or draw them out with the small instrument made for the purpose. When loading, pour the powder and shot into a basin. Use the small brass measures, and first put in a measure of powder, then 2 felt waddings, next the shot, and then 1 card wadding, and turn the end of the paper over to secure the wadding, with a screw-press socket. To clean, wipe out the barrels with dry tow; grease them slightly with an oiled rag. The barrels need not be taken off the stock in cleaning.

LOADING.—(*Muzzle-Loaders*). Rules on the subject must be laid down with several reservations. Hold the gun upright, and in that position pour in the powder, striking the butt-end of the piece against the ground, to carry down such grains of powder as may be lodged against the

sides of the barrel, and also to settle the mass. Next, pass the powder-wad down until it reaches the powder, on which press tightly; then pour down the shot, and give a shake or two to settle them in their bed. Place over them wadding of sufficient substance and elasticity to maintain the shot in position, by giving a pressure to the wad, but do not ram it hard. The first charge may be pressed harder than subsequent ones. When the powder is wadded, observe whether it makes its way to the nipple. It does not always follow, that if the powder is not seen on the pivot, it will not explode; but it is more satisfactory to see it there; and when it cannot be seen, the breech should be slightly tipped to introduce the powder up the touch-hole. Lastly, put on a cap, letting the cock down gently. When a gun has been discharged, it is a good practice to load it while the barrel is still warm.

POWDER.—The quality of gunpowder is estimated by actual trial of its power and cleanliness in use. It should be dry, hard and free from any dust; the grains of uniform size, glossy, and of a dark gray, or brownish gray, not perfectly black. A very little placed on a piece of paper and fired, should instantly explode with a flash, and neither leave a residue on the paper nor burn it. Dried by the heat of boiling water, it should not lose more than ½ to 1 per cent. of its weight. When gunpowder has been exposed to the air, it should be dried before using, especially when the atmosphere is moist. The common tin case is not sufficient for keeping it, unless it be rendered water-proof, and closed either by a soft velvet cork, or a fine-threaded screw. An excellent plan is to divide large quantities into smaller ones, and put them into bottles, each containing 4 oz.; which, being corked and sealed, prevents exposing more than is wanted for use.

PRACTICING.—It is better to practice at glass balls thrown into the air by means of a spring, until proficiency in aiming is acquired. The illustration shows a trap, or spring, for the purpose, which can be made at home at no expense for material except for 2 rubber springs, at 25 cts. each. Take your trap into some field, and drive down 2 or 3 stakes to hold it. Bring the trigger cord back to firing position, and if you have no companion to pull the trap for you, make a loop, into which put your foot and so pull for yourself. Place the trap, to commence with, at a distance of 10 or 15 yds. from the firing point.



Trap or Spring.

A, Platform of 1¼ in. boards; B, lever of hard wood, 1¼ in. square, and 36 in. long; C, cleat, nailed on lever to receive D, a rod of iron, placed about 12 in. from one end of the lever, serving as a pivot, and passing through holes at the top of CC, the standards, in length about 12 in. above the platform to the pin D; E, a trigger, held at foot by a hinge, and drawn forward by a rubber spring, F; G, a block of wood to check trigger at desired point, with arms on either side to direct the trigger in line with the lever; H, a heavy rubber door spring, which can be purchased of every dealer in rubber goods, and at most of the hardware stores. It is secured to the foundation, and passes under G; I, cup to receive object to be thrown; K, check cord of stout clothes-line or strap, which regulates the direction ball is thrown by being lengthened or shortened; L, trigger cord, for releasing the lever. A guiding ring (O) should be fastened to platform, through which to pass pulling cord. From trigger E to axle D, 12 in.; from D to cup I, 24 inches.

Glass balls are not large enough for the first lessons; old oyster or fruit cans are better, and even after they have been shot full of holes you can tell when struck again, as they will be driven onward. If glass balls are considered expensive, pine blocks may be substituted.

RUST, To Prevent.—To those who shoot along the seashore, the following mixture will prove invaluable: Take any quantity of olive oil, with ¼ its bulk of camphor, and a few shavings of lead, and it will be found superior vaseline jelly.

RUST, To Remove.—Have an ashen rod turned a few in. longer than the barrel, and nearly the size of the bore. Let one end of the rod be cut lengthwise, so as to make a slit of 6 in. long; into which insert as much fine emery paper as will completely fill up the bore of the barrel, taking care in folding the paper tightly round the wood, that the emery surface is outward. Force it into the barrel by screwing it downwards from the top to the bottom; repeat this process until the barrels show a perfectly clean and polished surface. Sand and other coarse materials should never be used.

SHOT. — Use as large shot as consistent with even, regular and close distribution at ordinary range, and vary the size according to the size of the bird hunted, and the season. As fall comes on, birds are stronger and more wary, and a larger size will be necessary. For quail, plover, woodcock, wild pigeon and birds of similar size, use Nos. 7, 8, or 9 shot. For larger birds use from 1 to 7; for smaller, 8 to 10. For geese, and other heavy birds at long range, shells loaded with B B shot, or B shot, are desirable.

SHOT, No. of to the Ounce.

	Diam. In.	No.
Fine		
Dust		1½–100	84,021
Dust		3–100	10,784
12		4–100	4,565
11		5–100	2,326
10		6–100	1,346
9		7–100	848
8		8–100	568
7		9–100	399
6		10–100	291
5		11–100	218

	Diam. In.	No.
4		12–100	168
3		13–100	132
2		14–100	104
1		15–100	86
B		16–100	71
BB		17–100	59
BBB		18–100	50
O		19–100	42
OO		20–100	36
OOO		21–100	31

COMPRESSED BUCKSHOT (TO THE LB.)

	Diam. In.	No.
6	25–100	288
5	27–100	225
4	30–100	172
3	32–100	140

	Diam. In.	No.
2	34–100	113
1	36–100	100
Balls	44–100	50

SHOT GUN. — The gun principally used in hunting, since the disappearance of large game from the older sections of the country, and is exclusively used for fowl shooting. Its first essential of good quality should be the force with which it throws the shot; second, the evenness with which it disperses them. Heavier charges

of shot require heavier charges of powder. For a No 12 gun of $7\frac{1}{2}$ to $8\frac{1}{4}$ lb. weight, use 3 to $3\frac{1}{4}$ dr. powder, and $\frac{7}{8}$ to 1 oz. shot. Increase the quantity of powder and shot for a heavier gun, until the charge reaches 4 dr. powder and 1 oz. or more for a gun of 10 to 11 lb. weight. The proper charge once learned, do not vary it.

SHOT, Scattering, To Remedy.—The only remedy known to gunsmiths is *choke-boring*; that is, boring from the breech of the gun, so as to have a gradual taper towards the muzzle. This improves the shooting qualities of the gun, as the charge concentrates at the muzzle. Large shot are more apt to scatter than fine, but this depends on the bore. A large bored gun does not shoot fine shot so well as medium. A small bored gun throws fine shot with greater force than a large bored one. As a general thing, a small bored gun is not adapted to large shot, as it does not chamber them well. The length of gun also depends on the size of bore—28 or 30 in. for a gun of from 10 to 14 gauge; 30 to 34, of guns from 8 to 10; 26 to 28, of guns 15 to 18 gauge.

GAME.

BARKING SQUIRREL.—Strike the bullet under the point of the limb where the animal is stretched out, so that the blow will shiver the bark, kill the squirrel by the concussion, and send it whirling to the ground. The skin will not be injured nor the flesh torn.

BUFFALO. — Buffalo hunting is not without danger. When the head of the herd is disturbed, they flock together in a mass, and rush through all obstacles; they should only be approached on the outskirts. The usual way of hunting them is on horseback, as a person on foot cannot approach them without screening himself. An 8 in. navy revolver is best, but a breech-loading carbine or rifle is good. Hunt up a drove feeding; approach them from the leeward side, or they will scent you and move off. Lie down on the horse and let him gradually work towards them; select a cow, and approach her on the left side if you have a pistol, and right side if you have a rifle. Shoot for the heart; aiming just back of the fore leg, a few inches above the brisket.

DEER.—In hunting deer, approach from the leeward. When ascending a hill, keep the body below the level of the top. When a sight of game is obtained, it is generally necessary to make a *detour* to get within range without causing alarm. In mountainous sections, a light is affixed to the hunter's hat. In winter deer are followed by their trail in the snow, or paths in the forest. Dogs are seldom used, except where 2 men work together, one with the dogs driving out the deer, while the other awaits them at their *runs*. Sometimes the game is driven in this way to the water, the hunter being in a boat. In *still hunting*, the trail is followed up till in sight of the deer. The hunter should provide himself with a good rifle, and a pair of deer-skin moccasins. When finding the trail, he should walk carefully, and keep a good look out, as deer are always looking back on their trail. When routed, they almost always stop on hills. In order to get within gunshot, circle round, and come up toward in front or at the side. When early snow comes, deer usually feed till about 10 o'clock A. M., when they lie down till 3 o'clock P. M., then start on a rambling excursion till near the next morning. They almost always return to the place from whence they started, or near to it. In still hunting, when the buck, doe and fawns are found together, shoot the doe first; the buck will not leave till you get another shot. A favorite method is night hunting in a boat, a lighted torch being placed in the bow of the boat, shining on the forward gun-sight, leaving the hunter concealed. The deer are fascinated, and not only permit the silent boat to approach, but swim toward the light. The animal's position is shown by the eyes, and at these the aim is directed. It is in summer and early autumn that they frequent the neighborhood of rivers and lakes, in winter returning to more elevated regions. 1 person, equipped with fire-pan and gun, can hunt in this way; but commonly 2 go, one carrying the gun and the other the pan. The party with the gun walks in front, a few paces in advance of the light, as noiselessly as possible, and watchful for the "eyes." The man with the torch follows. On his shoulder he supports a long-handled pan containing the light, made from pine-knots or cotton balls saturated with tar or spirits of turpentine. The wildest and shyest animals pause and gaze intently. The animal's bright orbs, reflected by the strong light cast upon the barrel of the gunner's weapon, allow him to see the sights clearly, and draw accurate aim at the motionless game. Allowing for the elevated position of its head, aim 1 ft. or more below the eyes.

GRIZZLY BEAR.—On sighting the hunter, the bear will make for his enemy, and has a habit, when 60 or 70 yards distant, of sitting up erect, and will repeat this at intervals of nearly 20 yds. as he approaches. The hunter will do well to reserve his fire until the bear comes within a few yards, when, if he suddenly extends his arms, the animal will come to a full stop and erect himself. This is the time to take aim at close quarters, and make sure work. On the Pacific coast he is often hunted in mounted companies of 5; 4 use the lasso, which they throw over the bear at opposite angles from each other, and while he is thus held from 4 opposite directions, it is possible for the fifth man to approach and finish him. It is dangerous work; for if one or more of the ropes should slip, unless it is immediately secured by another successful throw, there is danger of instant death to the nearest man, if his horse is not smart enough to carry him off.

QUAIL. — The best time for quail shooting is in the morning early, or late in the afternoon. Cross-shots may be effected by walking across or heading your dog when pointing. If you go straight from him to the birds, they will generally go straight away. Birds, when flying across you, present an easier shot. Wheat stubbles and turnips are the best spots for holding quail. In storms and fogs quail lie close, and in fine days which follow storms. Heavy rains cause them to lie extremely close in turnips.

RABBITS.—These are the best for the first ef-

forts of the young sportsman. In approaching, never advance in a straight line, or look directly towards them; walk leisurely along in the face of the wind; stoop and pick up a bough or piece of turf, or examine any matter before you; such conduct will often throw them off their guard. If a dog is with you, keep him close; your clothes, also, should be dark. When you have ventured as near as they will allow, then stoop. When storms arise, the intervals between are often favorable for getting near rabbits, particularly when the wind blows from them to you. When a number are come upon suddenly at the edge of a wood, it often happens that the old ones will immediately take the covert; but the young ones will prick up their ears and perhaps raise themselves up to examine you; now take your shot.

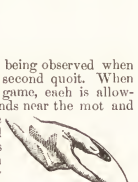
SNIPE, or WOODCOCK.—Found in low, marshy grounds, but in spring they disperse to higher situations. The first sight is the best. Not a moment should be lost after you have drawn a sight; pull the trigger at once. In cross-shots, fire well before your bird. Differing from the usual practice, you should walk down wind; the cause for this is, that the snipe always rises against it. The difficulty of hitting them when on the wing is surmounted if they are allowed to reach a certain distance, when their flight becomes easy to traverse with the gun, and they will fall to the ground if struck with the smallest shot. In severe weather they visit warm springs. Snipe lie better in windy weather than any other, and as they usually make a momentary halt or hanging on, that is the time to fire. A regular snipe locality should be tried not only every day, but twice a day, so uncertain are they in fixing themselves even for a day. Avoid hurry and keep cool.

WATER FOWL. — Do not fire too soon; many good aims are worthless through miscalculated distance. Experience and practice enable the sportsman to judge correctly. The scent of the fowl is keen, and to get within range keep to the leeward of them. All moving about in the boat should be avoided, and the body kept from view by the sails. The lower the position when firing, if a number of birds are together, the better; a larger family shot may be made in this position than when standing, as the aim is not so likely to be distracted by the motion of the boat. When firing at a large number on the water, aim at the birds farthest from you. In shooting select for your aim those that are sitting with their heads away from you, particularly when using a small gun, in order that the shot may pass under the feathers; for every bird you will kill in this position you would fail to hurt 2 or 3, though you struck them sitting facing you. Never take the eyes off the birds till they have gone right away, for it nearly always happens that there are several birds in a flock mortally wounded, which fly possibly 100 or 200 yds., and then fall dead.

WILD TURKEYS.—The best hour for their pursuit is early in the morning, before leaving their roosts, when they can often be approached within range. When discovered in the woods, stand still until the bird has moved position so that you are no longer in view. Then move to leeward, and advance as rapidly as consistent with caution, looking well to likely roosting trees to which they often fly when frightened. When within shot, aim at the head. Well-trained dogs are invaluable in wild turkey hunting, as they drive them to the trees, and the birds are so absorbed with them, that they are easily approached. A successful method of hunting them is to climb into a small tree having a dense top, first having placed a tame gobbler near by with a string to his leg. By pulling at the string, it will give voice, and decoy any bird within sound. A call is sometimes made from a turkey bone. They may also be hunted sucessfully by moonlight.

QUOITS.

THE common game of quoits is played with iron rings, nearly flat, the inner edge higher and thicker than the outer edge, which is sufficiently thin to stick in the ground where thrown; these are made and distinctively marked in pairs, each 2 of a similar size, mark and weight, to suit the player; the points, or spots, at which the quoits are aimed, are marked by iron pins, called *mots*, sufficiently long to allow of being driven firmly in the ground, and project exactly 1 in. above. The object is to throw the quoits as near as possible to the mot. The method of playing is as follows: 2, usually the best players, are selected as chiefs, who decide for choice of players by tossing a quoit, the winner having the first choice, and then alternately till the sides are arranged. Each player having furnished himself with a pair of quoits, the game is commenced by the chief who won the toss, by throwing one of his quoits, followed by the chief of the other side, and the other players of each side alternately, the same routine being observed when the players throw their second quoit. When 2 players engage in the game, each is allowed a director, who stands near the mot and furnishes him with the necessary information and directions for placing his quoit. When more than two play, the chief, or any other player on the same side, acts as director. In match games, each side chooses a non-participant as umpire, and the umpires select a third party to act as referee, whose decision is final in case of disagreement between the umpires. The points are made in the following manner: The quoit nearest to the mot scores 1 point to the side to which the thrower



Holding the Quoits.

belongs. Then such other quoits as belong to the same side which has not been beaten by a quoit which belongs to the other side, also will score one point each.

—o—

RIDING.

DRIVING.

HOLDING THE REINS. — In driving, the fore-finger is first placed between the reins, then both reins are grasped by the other fingers, and the near side rein held firmly against the fore-finger by the thumb. In this way, on emergency, the left rein may be pulled by holding it firmly with the thumb, and suffering the other to slip through the fingers, or *vice versa*. While turning, or when driving a high-spirited horse, and in critical situations, the right hand must be called to the assistance of the left; thus, the reins being grasped as before stated, you pass the 2d and 3d fingers between them, and loosening your hold on the off-rein a little, let the right hand have command, still firmly holding both reins in your left; this position gives great power over the horse.

STARTING. — Holding the reins with both hands, start the horse either by voice or by reins, gently feeling his mouth, but neither pulling at it nor jerking. If a young horse's mouth is hurt by the driver checking him every time he starts he is sure to incur some vice. If he refuses to start, let the groom lead him off, caress him, and encourage him to proceed, and if he presses on one side, as if he wanted to go round, turn him round, if there be room, and as soon as he has his head the right way, give him his liberty, and by voice or whip urge him to proceed.

TRAVELING.—Look well ahead, to avoid carriages and impediments, such as loose stones, by which the horse might be thrown down, or any object which might frighten him. Keep your horse well in hand; be prepared, if he stumbles, to help him; if he starts, draw the reins gently, so that he can feel them. This is called driving with a light hand, and is the perfection of driving; but drivers, in attempting this, frequently allow their horses to run from one side of the road to the other, which must be avoided, as nothing is so ungraceful. Holding in hand sometimes produces another bad practice, particularly if the horse's mouth is not delicate; it gets him into the habit of hanging in your arms, and bearing continually upon the bit, until his mouth becomes so callous that if he stumbles he must come down, unless you can hold him up by main strength. This may be avoided sometimes by keeping the bit moving in his mouth, but more frequently by not unnecessarily pulling at the rein. If the reins are held with both hands, you will have more command, and a little attention will prevent these inconveniences. Continual whipping dispirits, and does not remedy the evil. If kept well in hand, you will generally be able to keep him from coming down. You will naturally put more force to your pull upon his making the stumble, and this jerk, if succeeded by a strong, continuous aid, generally keeps him on his legs, a smart stroke with the whip should follow, to remind him that his carelessness is not to be repeated. If a horse slips, a sudden jerk will probably throw him down; in such a case, the horse must be aided by a strong, steady hold.

HORSEBACK RIDING.

MOUNTING AND DISMOUNTING.—If there is a groom, he should hold the rein with his right hand, standing by the off shoulder of the horse, so as with his left hand to hold the stirrup iron for the rider's right foot, as he throws it over the horse's back. The rider stands at the shoulder of the horse, with his left side toward that part; then lays hold of the reins with his left hand, drawing them up so short as to feel the mouth, and at the same time twisting a lock of the mane in his fingers, so as to steady the hand; next, the left foot is placed in the stirrup; at this moment a spring is given from the right foot, the right hand reaches the cantle of the saddle, and the body is raised till the right leg is brought up to the level of the left, when the slightest pause is made, and then the right leg is thrown over the back of the horse, keeping the toe down and heel elevated, while the right hand leaves its hold, and the body falls into its position in the centre of the saddle; after which, the right foot has only to be placed in the stirrup. Dismounting is exactly the reverse of mounting, and requires, first, the reins to be shortened and held in the left hand, with a lock of the mane; secondly, the right leg is taken out of the stirrup, and thrown over the back of the horse, until it is brought down to the level of the other leg. After this, if the horse is of a size suitable to the rider, the body is gently lowered to the ground, and the left leg liberated from the stirrup; but if the horse is too high, the foot is taken out of the stirrup by raising the body by means of the hands on the pommel and cantle of the saddle, and then the body lowered to the ground by their assistance.

POSITION IN SADDLE.—Should be square to the front, without either shoulder being in advance; the loins arched inward without stiffness; the elbows close to the side, held easily; the knees placed upon the padded part of the flat in front of the stirrup-leathers; toes turned slightly out, and the foot resting on the stirrup, the inside of which should be opposite the ball of the great toe, and the outside corresponding with the little toe. In hunting, it may be placed with the stirrup close to the instep. The heel should be lowered as far as possible beneath the level of the toe, which gives a firm seat. The great point is to obtain a good grasp of the saddle by the knees, without tiring the muscles by such an effort. The left hand is now to be held slightly above the pommel, and the right easily by the side of it, with the whip held in a slanting position.

Lady's Position.—The lady should sit so that her weight falls perpendicularly to the back of the horse; her face directly to the front, shoulders drawn back, and elbows held to her sides. She will permit her body, from the hips upward, to bend with the motions of the horse, in order that she may preserve her balance. The reins are held in the manner prescribed for men, the hand in front of the body, and in a line with the elbow. The whip is carried in the right hand, with the point toward the ground. The horse should never be struck upon the head, neck or shoulder. The horns of the saddle, the superfluous one at the right side being dispensed with, should be of length and curvature to suit the rider. The right leg holds the upright horn close in the bend of the knee, by such a pressure as the action of the horse or other circumstances dictate, the left foot thrust into the stirrup to the ball of the foot, and the heel, as a rule, carried down; but when the heel is elevated, the upper part of the left knee should find support in the side horn, and for that end the stirrup-leather given such a length as will permit this. By the grasp given by the elevation of the left knee from the stirrup, and the embrace upon the upright horn by the right leg, the rider will have as strong a seat as her strength can afford, and, with a proper balance, she will not be likely to find a horse that will unseat her.

REINS. Management of.—When the single rein is used, the best position is to place the middle, ring, and little fingers between the two reins; then to turn both over the fore-finger, where they are tightly held by the thumb. In all cases the thumb ought to point toward the horse's ears. If a double rein, let the snaffle (*S*) be first taken

Single-Rein Grip. *Double-Rein Grip.*

up on the middle finger, and then let the curb (*C*) reins pass in a similar way on each side of the third finger; let the loop of the reins come out below the thumb, so that the rider can discover which of the two to tighten when required, by drawing them through his left hand by means of the right; then, with the reins in the grasp, it is safe to mount (or take a hand up, if the rider is too small to reach the stirrup).

TROT. CANTER AND GALLOP.—To cause the horse to *trot*, the reins are taken rather short in the hand, and the mouth held firmly, but taking great care not to jerk it. The animal is then slightly stimulated by the voice, and the body if necessary rises from the saddle, so as to indicate what is wanted. This seldom fails, and the horse at once breaks into a trot; or, if very irritable, he may be compelled to do so by laying hold of an ear and twisting it, to avoid which he drops his head, and trots. The *canter* is an acquired pace, and for its performance a curb-bridle is required. In order to make the horse begin, the left rein is pulled, and the rider's left leg pressed against the side, by which the horse's right leg is made to lead off, this being the usual and most comfortable "lead" for the rider. The hands must make a gentle and steady pull on the curb-rein, and the body be very quiet in the saddle, while, at the same time, a gentle stimulus is given by the voice, repeated at short intervals, or the canter will be changed to a trot or walk, both of which gaits are preferred by most horses. Young riders should avoid cantering long upon one leg, as it leads to inflammation of the joints; and they should either change the lead or alter the pace to a trot or walk. In the *gallop*, the

The Gallop.

seat is close to the saddle, with the body inclining backwards, or standing in the stirrups, in which position the knees and calves only touch the saddle, and the body is bent over the withers. It should be the endeavor of the rider, while he bends his shoulders forward, to throw his loins well back, to avoid straining the horse's forequarters, by bearing too much weight. This is done by the hold of the knees on the saddle, and by keeping the feet back; also, by rounding the loins backwards, and thus throwing the centre of gravity as far as possible behind the stirrup-leathers. The object of standing in the stirrups is to save the horse when at full gallop. This attitude allows the horse to exert himself without feeling the weight of the rider to impede his movements.

LEAPING.—This requires only an extra exertion, added to the ordinary spring of the gallop, the attitude being the same. It is best learnt by beginning with small ditches, which the rider is soon able to clear. In riding at a bar, lay hold of a snaffle-rein in each hand, taking care to keep them close together by the right rein being held also in the left hand. The horse is then urged to a canter or hand gallop, and held straight to the bar in this way, so that he is obliged to leap; or if disliking the act, being urged by the whip down the shoulder, or spur, or the groom's voice and whip behind. Young riders should never be put upon a bad or reluctant leaper, but should be taught upon one which is fond of the amusement. At the moment of rising into the air for the leap, the reins are relaxed, but should not be left quite loose; while the horse is in the air the

body becomes upright, and as he descends it leans well back, until, after a high leap, it almost touches the croup. During this period the reins should be suffered to remain nearly loose, the hand barely feeling the mouth; but, as the horse reaches the ground a stronger hold is taken, to guard against a mistake, which might require the aid of the rider to prevent a fall. There are various kinds of leaping; as the flying leap, the standing leap, the leap in hand, etc. The flying leap is one taken at a fast pace, and when the rider can maintain a good seat in the gallop. The standing leap is effected from a state of quiescence, and is more difficult to sit, because the horse rises and falls more suddenly. Between the two is the slow or steady leap, which is only effected safely by the hunter or well-broken horse; but, when perfect, it is almost as smooth as a rocking-horse. This is the mode in which the young rider should be taught to leap. Leaping in hand is necessary for horses in the hunting field, which would otherwise never be able to compete with full-sized hunters in the way they do. The young hunter, when he meets with a gate or other strong fence, which he knows is too much for the powers of his horse, at once gets off and leads him over by the rein.

RUNNING.

CORRECT METHOD.—Good running must be accomplished on the ball of the foot, with the heel elevated; the arms kept well up to the sides, but not too high. When you can work the arms and legs together, you will be able to take a good stride with ease.

RACING.—Stand on the balls of the feet, with one foot toeing the mark, and the other 12 in. behind. The forward leg and foot will bear the weight of the body until the body is drawn back to get a final impetus. A vigorous dash when the signal is given puts the body in motion, and in a few yds. you are running at full speed. In every description of race, even when awaiting one is contemplated, obtain a good start. It does no harm to dash off the first 50 yards at the highest speed, and then settle down to a steadier pace. It frequently so surprises an opponent as to paralyze his efforts, so that he is unable to regain his lost ground. The inside position should be immediately taken, and no deviation made from it during the whole race, except to pass an adversary. This rule may not be observed when a waiting race is to be made with an obstinate and tough opponent, whom it is advisable to intimidate as soon as possible, or when the running path is cut up so that it is desirable to obtain a better footing on a part of the course less used. When the former tactics are necessary, the right shoulder (supposing the race be run to the right) should be kept close in the rear of the other competitor and the position maintained until the proper moment arrives for passing. This movement should be done with celerity, when the antagonist exhibits a tendency to hang back and shows signs of weariness. The greater speed with which he is passed, induces him to believe his opponent capable of winning the race. No relaxation in efforts should take place at such a moment, and though the opponent seems to have the race in his hands, there is every probability of another change in their places before long. It frequently happens that a runner who has seemingly gone by in the grandest style decreases his speed considerably before reaching the post, although using his best exertions. This is because the spurt has been made too soon, or is the result of certain circumstances of condition. Although the decrease of speed is perceptible to the body of spectators, it may not be so apparent to those running immediately behind him. The efforts of the latter should never cease for a moment, for it is impossible to calculate upon the leading man not tiring or giving way. In the straight run home, or in the last lap, this watching is of infinite importance. During a final struggle, avoid every chance of a collision, and with every sinew and muscle braced together, run to the tape at top speed.

TRAPPING.

REMARKS.—The skins of animals trapped are far more valuable than those shot. To get the highest price for skins, they must be taken care of, cleaned and properly prepared. Visit the traps frequently so as to obtain the skins free from taint. Winter is the best season, as the skins of fur-bearing animals are then in the best condition, but trapping may be profitably done from Oct. 1st to April 1st. Under the head of traps are included all contrivances for the capture of birds and animals, either by inclosing them, seizing and holding them, or by killing them. 1st, set the trap so that the animal will go to it; 2d, so it will catch him; 3d, so it will hold him when caught. A cautious animal should be invited several times before the trap is set; arrange a place with saw-dust, hay seed, chaff, and chicken feathers, several inches deep; scatter through it food adapted to the animal to be caught; offal of chickens, bones, meat, fish-heads, etc., if for fox; nubbins of corn, etc., for coons; set your trap (free from the iron smell) and cover with the material you have used; scatter bits of food therein. Strong smelling substances are the best baits; and if the smell of the kind of animal to be caught can be given to the bait, it will be sure to lure the animal. If a fox skin be dragged along the ground in the direction of the trap, every fox striking the trail will follow it up; so it is with other animals. The baits for

steel traps consist of some substance which forms the food of the animal to be captured, or for which they have a liking. The muskrat will take carrots, potatoes or apples, or any similar food. The mink, sable, fisher, skunk, ordinary weasel, etc., will take fish fresh or salt; it should be toasted, so as to emit more smell. Beavers will take any fresh root or sapling for bait. Castoreum, called bark-stone by the fur traders, is a fatty substance of an intensely strong odor contained in similar sacs in the back parts of the beaver. It forms a more attractive scent for that animal than any other. It is pressed from the bladder-like bag which contains it into a vial with a wide mouth. 5 or 6 of these stones are taken, and a powered nutmeg, a dozen or more cloves, a teaspoonful of ground cinnamon, all mixed with alcohol or whisky until it is about as thick as good syrup; cork the bottle and keep 3 or 4 days. It should be used for attracting the beaver toward the trap, but not be put in it. Fish oil is prepared by cutting up eels, trout or other small fish, into small pieces; these are placed in a bottle loosely corked, and hung for 2 or 3 weeks exposed to the heat of the sun; a kind of oil results, possessing a penetrating odor, which can be detected by these animals from a great distance, and allures them to the spot where it has been sprinkled. Another secret of old hunters is to take the parts peculiar to the sex of the female wolf, fox or dog, and preserve it in alcohol or whisky for use. A small piece of this is used in drawing either fox or wolf to the traps, and proves irresistible to the male, and no matter from which species it is taken, it proves alike attractive to the fox or wolf. It is not used as a bait, but to bring the animal toward the trap. The trap may be baited as usual, or the substance may be suspended over the trap; in trying to reach it to smell at it the animal steps into the trap.

BADGER.—The badger is a cunning animal, and not easy to catch without considerable caution. Set the traps at the mouth of their holes, carefully covered, or in the paths which they make in corn-fields. Early in the spring they may be caught by pouring water in their holes; for the ground being frozen at that period, the water does not escape through the sand, but soon fills the hole, and its tenant is obliged to come out. They may also be caught in deadfalls (which see); the bait may be a mouse or a piece of meat, as anything in the shape of flesh is food for the badger. The most appropriate size of steel trap is that known as the Newhouse, No. 3.

BEAR, Black. — It requires a large steel trap for the bear; the Newhouse Nos. 5 and 6 are best. It must have a short chain attached to a clog, the weight of which must be according to the kind of bear found in the locality. Select a spot for the trap between logs, trees, or hills, close to the suspected haunts, and secure it with a a short, stout chain. Bait the trap with pork, mutton or beef, and if the bait is scented with honey it will prove a powerful attraction. The following stratagem has proved successful in destroying the bear: Take a portion of some domestic animal (or other bait of which he is fond) to the woods and place it in such a position, near some fallen trees, so that the bear will be compelled to go between two logs in order to reach the carcass. At right angles with this passage way, but back from it, secure a rifle (loaded with slugs) in a firm position so as to sweep the passage, and arrange a small cord extending across the narrow avenue, with one end fastened to the trigger of the rifle, and the other to the timbers opposite its muzzle. A dead bear shot through the heart behind the fore-legs, within a few feet of the rifle, will be the result.

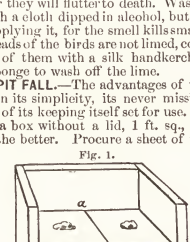
BEAVER.—In its prime about October 1st, and continues to improve till about May, when it deteriorates. They have numbers of holes in the banks of the streams, as places of retreat when injury is offered to their houses, and it is in those holes that they are taken. To find these places each man is furnished with an ice-chisel, which he lashes to the end of a small staff about 4 or 5 ft. long; he then walks along the edge of the banks, and keeps knocking his chisel against the ice. When the hole is thus indicated by sound, a portion is cut through the ice large enough to admit a full-grown beaver; this is continued till as many as possible of their bodies are found. While thus employed, others are busy breaking open their houses. When the beavers find their habitations are being invaded, they fly to their holes in the banks for shelter; the entrances of the holes are then blocked up with stakes of wood, and the beavers are hauled out by hand, or by a long stick with a large hook at the end, if the hole be deep. Beavers are occasionally caught by spearing through the ice, when thin, as they come up to the surface of the water under the ice to breathe. The experienced trapper readily detects any sign of proximity to a beaver lodge, and proceeds to plant his trap upon the shore below the surface of the water, and secures it by a chain to a pole set deep in the mud. A small twig is then stripped of bark, and one end dipped in the bait. This end of the stick rises 4 in. above the surface of the water; the other end is planted between the jaws of the trap. The beaver is attracted by the odor of the bait, and as he raises his nose to it, his foot is caught in the trap. In his fright he throws a somerset into the deep water. The trap resists all his efforts, the chain by which it is fastened defies his teeth, he struggles, at length sinks, and is drowned. Upon rocky bottoms, where it is not possible to plant the pole, it is thrown into the stream. In case several members of a household have been trapped, and the others become shy, the trapper gives up the use of the bait, and conceals the traps in their usual paths and crossing-places.

BIRDS. — These may be caught in traps (see *Brick, Coop, Fowling Net, Sieve, Snare,* and *Spring Trap*), and with bird-lime. It may be made from the holly, slippery elm, mistletoe berries, and the young shoots of the elder. It should be boiled with water in a pipkin till the green bark is separated from the gray; the green bark should then be laid upon the stone of some outhouse and covered with rushes; in about 14 days it will turn into a kind of slime; beat this up in a mortar with a few grains of wheat, after which it may be put into an earthen vessel and kept: when required to be used, it should be

melted over the fire with a little goose-grease, in a dry pipkin; the twigs should then be smeared with it. When the bough is well limed it must be fixed on a low dead hedge near a rickyard, hemp or flax field, or in some other resort for small birds, and the sportsman having concealed himself as near to the bough as he can, must imitate, with his mouth or with a bird-call, the notes which birds make when they attack or call one another; but if he should not be expert at this, there is another mode called a *stale*. A hawk of any species, or a bat, make very good stales, but an owl makes the best of any. If an owl be fastened in some conspicuous place at a short distance from the limed bough, the birds will collect around it in great numbers, and will settle on the bough and be taken. When one bird is thus enticed and stuck fast, it must not be disengaged, but suffered to remain and attract others by its fluttering, so that many may be taken at once. A stuffed owl will do nearly as well as a live one. Sometimes the representation of an owl carved in wood is used, and being painted in the natural colors of the bird, is found to succeed. As soon as the birds are caught relieve them, or they will flutter to death. Wash off the lime with a cloth dipped in alcohol, but be careful in applying it, for the smell kills small birds. If the heads of the birds are not limed, cover that portion of them with a silk handkerchief, and use a sponge to wash off the lime.

BOX PIT FALL.—The advantages of this trap consist in its simplicity, its never missing, and the fact of its keeping itself set for use. It consists of a box without a lid, 1 ft. sq., and the deeper the better. Procure a sheet of tin large

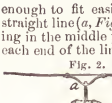
Fig. 1.



Box Pit Fall Trap.

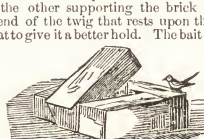
enough to fit easily inside the box; scratch a straight line (*a*, *Fig. 1*) across the centre, and ending in the middle points of 2 opposite sides; at each end of the line solder a loop of tin (*b*, *Fig. 2*); over the middle of the line, and at right angles across it, rivet a strip of tin in the form of a loop, extending 1½ in. on each side of the line, and bagging out about 2 in. In the centre of the loop bore a hole, through which pass a string with a weight attached, to hang down 3 or 4 in. (*a*, *Fig. 2*). The weight must be enough to serve as a counterpoise to keep the tin in a horizontal position. The tin is then fastened inside the box, to form a platform 3 in. below the top edge of the box, done by driving 2 pieces of stout wire, one through each side of the box, so as to pass through the small loops soldered on the edges of the tin; these pivots form the only support of the tin platform, which swings freely on them; the weight of a small mouse jumping on it will tilt up the platform, and let the mouse drop down into the box. As soon as the tin is relieved of the weight of the mouse it returns to a level position. The bait is placed on each side of the tin, and fastened by a string passing through holes in the tin; without this the bait would fall off the first time it was disturbed. The box should be sunk into the ground with its upper edges level with the surface.

Fig. 2.



Box Pit Fall.

BRICK.—Bricks are arranged, 2 lengthwise, upon their narrow sides, 1 in front, and the 4th between the 2 side bricks; this is so placed that it will fall easily upon the front brick. Within the trap a stout peg is driven into the ground, upon which a forked twig is placed horizontally; above this a stick is placed, one end on the twig and the other supporting the brick slanting. The end of the twig that rests upon the peg is cut flat to give it a better hold. The bait is strewn

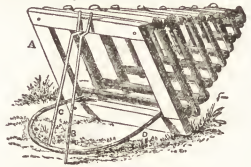


Brick Trap.

upon the ground inside of the trap. When the bird flies to the trap he generally perches for a moment on the forked twig and causes it to give way; the brick that has been propped up falls upon the front brick, securing the bird. In preparing the trap proper caution should be used in setting the upper brick, so that it does not fall between the 2 side bricks unsupported by the front brick, as in such a case the bird would be crushed.

COOP.—Construct a coop with strips of wood, in the manner shown in the illustration. Procure a thin strip of rattan, or a thin piece of willow; its length such that, when bent into a semi-circular arch, the height of the arch will be a little more than ½ the diameter of the coop. Through each end of the rattan, burn a hole with a piece of hot wire; nail the ends to the inner edge of one side of the coop, in such position that all parts of the curved rattan are well inside the opening of the coop; also using nails that fit loosely through the holes, and allow the rattan some freedom of motion. Next get a straight stick *B*, with a fork at one end, and long enough (exclusive of the fork) to support one side of the coop when tilted up at an angle of about 30°; another stick is needed, having a crook 2 in. long at one end, as shown at *C*; the straight part of this stick should be 1 in. less than the straight part of the forked stick *B*. To set the trap, raise up one side of the coop to the height of the fork of the stick *B*; insert the crook of *C* through the fork and underneath the edge of the

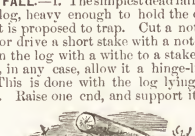
coop, forming a catch on which the side of the coop rests; press the lower end of *C* back inside the rattan hoop, and lift the latter from the



Coop Trap.

ground high enough to catch and hold the end of the stick *C*. Lastly, strew appropriate bait on the ground inside the hoop. When a bird hops on the rattan, the suspended hoop will fall to the ground, releasing the end of the stick *C*; the coop will fall, and enclose the bird.

DEAD FALL.—1. The simplest dead fall is made with a log, heavy enough to hold the creature which it is proposed to trap. Cut a notch in a stump, or drive a short stake with a notch in it, or fasten the log with a withe to a stake or sapling, or, in any case, allow it a hinge-like motion. This is done with the log lying on the ground. Raise one end, and support it upon a



Dead Fall Trap.

figure four (which see), baited. The bait stick of the figure four must be at right angles with the log, and inclosed with stakes, to allow the animal to approach only from one side, and obliging it to stand to cross the line in which the log would fall. Another way is to arrange 2 logs, one to fall on the other in the same way. Stakes may be driven at the side, if necessary, to insure one log falling on top of the other.

FIGURE 4.—For rabbits, squirrels, opossums, wood chuck, etc., use an ordinary box trap, with a figure 4 to support the lid.

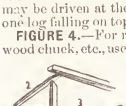
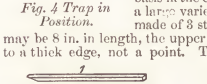


Fig. 4 Trap in Position.

But if for any animal but a rabbit, line with tin or sheet iron, to prevent them gnawing their way out. The *figure four*, which forms the basis in the construction of a large variety of traps, is made of 3 sticks; the first may be 8 in. in length, the upper end whittled to a thick edge, not a point. The horizontal



Pieces of Fig. 4 Trap.

piece or trigger, 10 in. long and square, has a notch on one side, 7 in. from one end. On the upper face of the trigger, 6½ in. from the side notch, is another notch. The diagonal has both ends beveled or brought to a wide edge, and a notch cut near one end. In setting up the figure, hold the perpendicular up, fit the trigger to its side, then adjust the notch in the diagonal to the perpendicular, and insert the other end of the diagonal in the notch near the end of the trigger. Let the lid of the trap, or the fall, rest on the end of the diagonal immediately over the trap: this makes the figure four stand firm, yet ready to fall at a slight pull upon the trigger, to which the bait is fastened, the trigger extending 3 in. from the perpendicular. Directly under the fall dig a hole, 4 to 6 in. in depth; the size regulated by the board; over the hole place a bridge of sticks, or fill it up with straw. When the trap springs, and the board falls, it will strike the bird or animal sufficiently hard to kill it, but the straw under it will keep it from being crushed.

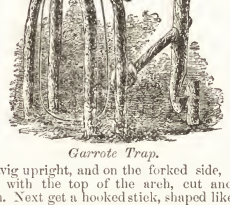
FOWLING NET.—A contrivance for catching birds at night, and is constructed as follows: 2 poles of light flexible wood, 8 ft. long, bent at one end, each kept in a bent position by a cord (*C*), one end of which is tied to the top of the pole, the other end secured half way down. The 2 bent ends are hinged by a strip of leather at *E*. A fine net (*A A A*), 7 ft. long and 4 ft. wide, is fastened between poles, the bottom end of it turned up 8 in., forming a bag or pocket (*B*). There must be 3 persons engaged, one to hold the net, another to carry a lantern, and a third to beat the bushes. The darkest nights should be chosen; and if a stiff breeze is blowing, so much the better, for the birds then roost low, and are not able to hear well. The net should be held 1 ft. from the bush, etc., and the lantern held so that the light is thrown evenly over the back of the net. The bush should be slightly beaten, and the birds, on being disturbed, will fly against the net, which should be instantly closed and brought to the ground, and the birds secured.

Fowling Net.

FOX.—The trap should be a Newhouse No. 2, and free from human scent. In order to avoid this, the trap must be thoroughly washed in weak lye, and when dry, greased and smoked over burning feathers. The fox has a keen scent; it is therefore necessary to employ clean buckskin gloves in handling the trap. The trap should be concealed in a bed of ashes, leaves, chaff, or buckwheat, well smeared with blood or beeswax. Fasten to a clog, so that he can move about. To make the allurement sure, obtain from the female of the dog, fox or wolf, the matrix, in the season of coition, and preserve it in alcohol, tightly corked. Leave a small portion of it on something near the trap; and, when visiting the trap, put some on your boots. Make a trail round the trap; a piece of raw flesh may also be dragged about; and leave everything around the trap as natural as possible. Another good plan is to get some earth from a kennel where a tame fox is kept. Set the trap in it. Bait the beds several times before setting the trap, until a degree of

confidence appears to have been established, then put the trap in its place, and catch him.

GARROTE.—Provide 2 stout switches 30 in. long, sharpen both ends, bend one into the form of an arch and plant it firmly in the ground; bend the other into the same form, and plant it by the side of the first, leaving one in. clear between them. Cut a number of stakes and plant them in the ground so as to make a circular fence of which the second arch forms a part, inclosing a space 1 foot in diameter, to which the only entrance is through the arches. Drive a notched peg into the ground at the back of the inclosure, opposite the centre of the arch; cut a piece of twig a little longer than the height of the arch (it should have a short fork sloping away from its side, to which the bait is fastened); at the lower end of the twig and on the side opposite to the fork, cut a notch to fit into the notch in the peg driven in the ground; hold



Garrote Trap.

the twig upright, and on the forked side, at a level with the top of the arch, cut another notch. Next get a hooked stick, shaped like the one in the illustration, long enough to reach from the outer arch back to the upright twig. On a line with the arches, and 3 ft. distant, drive into the ground a crotched stick, so that the crotch is level with the top of the arches. Get a stiff pole, 6 ft. long, weighted at one end with a heavy stone tied to it; at the other end fasten a loop of cord or fine wire in the shape of a U, the same width and height as the entrance under the arch. To set this trap, lay the pole across the crotch, adjusting it so that the loop hangs exactly between the arches; place the hook of the stick, under the top of the front arch, the remainder of the stick extending over the pole and back into the inclosure; catch the end of it in the upper notch of the upright twig, and secure this last by its lower notch to the notch in the peg which has been driven in the ground; let the fork which holds the bait point a little sideways from, rather than towards the entrance of the arch, as it will make the springing of the trap more certain. The animal must first pass partly through the arches; as soon as it seizes the bait the upright twig is displaced, the hooked stick set free, and the loop hoists the animal up by his hind-quarters, and holds it firmly caught against the top of the arches. This is an excellent snare for rabbits, raccoons, etc.

GOPHER.—Hillocks of earth serve to show the track of the burrow beneath, and by digging down in the line between the hills of earth which the animal deposits at intervals of 5 and 6 yds., the burrow will be found, and a No. 1 steel trap may be set on a level with the bottom of the passage, laying a piece of board over the opening, and re-arranging the earth above it; the gopher will be caught in the trap the first time it passes through.

HAWK AND OWL.—To catch hawks or owls, take a pole 20 ft. long, to be set a short distance from the house or barn, or on the poultry house. Split the top to admit the base of a common steel trap, which should be made fast. These birds naturally light on high objects, such as dead branches of trees, or tops of stacks, and one should use judgment about the place to put the traps; an open field near the chicken-yard is probably the best.

MARTEN.—The *Pine-Marten*, or *American Sable*, lives in the trees and preys on partridges, mice, squirrels, hares, etc. A piece of either of these may be used as bait, or the head of a fish, pheasant, or a piece of meat, and the trap (Newhouse No. 3) may be placed in a hollow tree, in any inclosure, or in the track of a deer; in each case let it be well covered with light grass, moss, or rotten wood, to present a natural appearance. The *Fisher-Marten* is attached to low, swampy ground; is partially web-footed, and subsists on fish, mice, rabbits, etc. Be careful to scent the trap and conceal it properly; also attach it to a spring-pole, so that when caught it will be elevated out of the way of becoming a prey to larger animals, and prevented from dismembering itself to get clear of the trap. The pine-marten and the fisher live and breed in hollow trees; they are not difficult to trap, but are furious when caught. Draw a trail composed of oil of anise, assafœtida, and the musk of the muskrat, mixed with fish oil, and placed in a deer-skin bag about the size of a mitten, pierced full of holes with a small awl. If drawn along the line of traps, the scent is sure to attract the fisher's attention; and when an animal once finds it, he will follow the trail till he comes to the trap.

MINK.—Minks should not be taken for the fur earlier than October nor later than March. They can be taken on land or water; the land is preferred by trappers. The trap is set near the bank of a stream. If one of their holes cannot be found, make one. Three sides of the cavity should be barricaded with stone, bark, or wood, and the trap set in the entrance. For bait, use fish, bird, or muskrat, cut in small pieces, and placed in the hole beyond the trap. Cover the trap with leaves, grass, or feathers. In the coldest weather, smoke the bait. The best scent for attracting mink is fish oil. The chain of the trap should be fastened to a spring-pole, to lift the animal out of the reach of depredators; or, if the trap is set near water, it should be attached to the sliding-pole, so as to drown it at once. Another plan is to form a triangular inclosure, by driving short stakes into the ground. One side is left open for an entrance, and for a cover a few evergreen boughs are used. The bait is pinned by a forked stick to the ground in the point of this inclosure, and the trap set in front, so that the game must pass over

it in order that it may be able to reach the bait.

MOLE TRAP.—1. In *Fig 1*, the plank, *P*, 8 to 12 ft. long, has a hole in the lower end which passes over a pin driven into the ground, to hold it in place; 3 or more stout wires, very sharp, are inserted 1 inch apart on each side of the end of the plank. The pairs of wires should be 9 in. apart. A stone or other weight, *S*, is added to bring it down forcibly. A common fig. 4, *T*, is placed under the plank, with the trigger lying across the mole track. When setting it, the track is flattened with the foot where the trigger is to rest upon it. The plank should have a fall of 12 to 15 in. The mole in passing lifts the trodden ground and the trigger resting upon it, and is instantly pierced by

Fig. 1.

Mole Trap on Fig. 4 Principle.

the descending points. — 2. Mark every new mole hill by a slight pressure of the foot, and observe on the following day whether a mole has passed over it and destroyed such mark; this operation should be repeated 2 or 3 mornings without making the pressure so deep as to alarm the animal. A trap should be then employed, as shown in *Figs. 2* and *3*, made of wood, and thus constructed: Take a piece of wood, 4 in. long, 2 in. wide, and ½ in. thick. In one side of this insert 2 half circles of wood, *A A*, *Fig. 3*. Bore a hole through the centre, and one at each end. Make 2 loops of wire by bending and pinching it through the holes at each end, so as to leave the ends standing up a little way out of the holes, above the surface of the wood, where they are to be tied to a string. In the half circle of wood cut small grooves, and open the wire loops so that the wire may lie in these grooves; then plaster them over with mold. To set the trap, select a tough, green stick to act as a springle, and tie a piece of strong cord to the end of it. Pass the other end of this cord through the hole in the middle of the trap, and tie a knot in it. This hole must be large enough to allow the knot to pass through easily. A little wedge of wood (*B*, *Fig. 3*) is pushed up between the knot and the wood beneath, to keep the knot from slipping through, and 2 pieces of wood are placed across the trap to keep it down to the ground. The springle, fixed in the ground, is driven down and tied to the string to which the wires are attached. The trap is then set in the

Fig. 2.

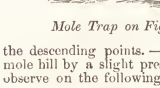
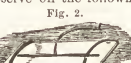


Fig. 3.

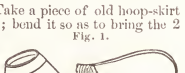


Mole Trap.

places marked, and when the mole attempts to pass it is compelled to go through one of the half circles of the trap, and in doing so it moves the wedge which holds the knot of the string tied to the springle. This done the springle flies up, draws the wire loops tight, and the mole and the trap are by this means both suspended in the air.

MOUSE. — 1. Take a piece of old hoop-skirt spring 14 in. long; bend it so as to bring the 2 ends together to make an irregular oval (*Fig. 1*). Tie the bait, strong-smelling bacon or toasted cheese, or anything of the sort, to the place where the spring is brought together. Turn a wash-bowl upside down, put the spring as arranged on its edge, under one edge of the bowl, bait inside, and your trap is set. This trap springs readily; but there is a difficulty in securing your game. A flexible piece of wood will answer instead of the spring. — 2. This is made of a common brick with 2 pieces of wood inserted into the ground (*Fig. 2*); a bit of sewing-thread is tied to each stick, and a loop is formed in the thread in the centre, into which a bean is put. To form this loop, take the 2 ends of the string and cross them, in the same manner as when tying a common knot; then draw the ends, and the loop will become smaller; insert the bean, and draw the thread tight, until it slightly penetrates the bean. Poise the bean half way between the 2 sticks, and let the brick rest upon the string, which should be tied tightly. When the mouse nibbles at the bean it will gnaw the thread, the brick will fall, and the mouse will be killed. — 3. Procure a tolerably tight barrel; bore a hole near the bottom for entrance; set in the place where mice gather; throw into it an armful of ears of corn and a handful of rags or waste paper, to make a nest; cover it, and let it stand a few days to give the mice time to colonize, then plug up the entrance. As mice are lively little animals, dash in a few gallons of water to moderate their friskiness.

Fig. 1.



Mouse Trap.

Fig. 2.

Mouse Trap.

MUSK-RAT. — Allied to the beaver, and may be caught in the same way (see *Beaver*); they may also be taken as follows: 1. Sinking an old barrel with its top on a level with the ground, on the edge of a stream near their haunts; half fill it with water; put in a couple of shingles or light strips of board to float on the water; on these place small bits of sliced apples, potatoes or carrots, and some in the runs, so as to lead them towards the barrel. The rats will leap into the barrel after their food, and cannot get out.— 2. Find a muddy spot near the rat's hole; make a pen of sticks driven down close together, leaving an opening in front just wide enough for the trap. Put sweet apples in the pen far enough so that the animal will have to step over the trap

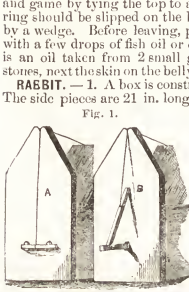
in order that he may be able to get at them.

OPOSSUM.—They may be caught by setting traps in their haunts, baited with corn, mice, etc. They visit hen-roosts, and can be caught at the entrance by traps. A Newhouse No. 2 or 3 will answer for an ordinary-sized opossum.

OTTER.—The fur is valuable. In summer it is short, and almost black; in winter, a rich reddish brown. Look along a stream for the deepest holes where the fish ily when pursued. On close observation tracks where the otter comes out up the bank will be seen, and often you will find a tuft of grass greener than the rest; open this, and you will find the dung of the otter, full of scales and bones of fish. Having found out his favorite landing-place, make a run, shunting from the water up the bank, with a trapping-paddle; dig out a place the form of the trap; set the trap shunting, so that the otter should not tread on the spring, and cover it over with fine mold. When done, go back as far as you can, and with your hand throw water on the place where the trap is set and all around, to take away the scent of your hand and the fresh mold. Fasten the trap as follows: Cut a small tree, the size of the chain ring, and set it upright near enough to the path to help the animal into the trap, supporting it in that position, and securing the trap and game by tying the top to another tree. The ring should be slipped on the butt and fastened by a wedge. Before leaving, perfume the trap with a few drops of fish oil or otter-musk. This is an oil taken from 2 small glands called oil stones, next the skin on the belly of both sexes.

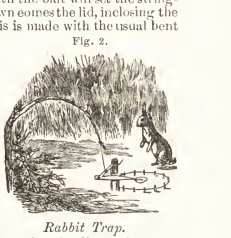
RABBIT.—1. A box is constructed as follows: The side pieces are 21 in. long and 9 wide; the bottom the same length as the side-pieces, and 7 in. wide; the piece for the back 18 in. high and 7 wide. Nail the side-pieces against the edges of the bottom; set the back-piece upright in the end and nail it fast through the sides and bottom. The movable lid consists of 2 parts; the lid itself 20 in. long and 7 in. wide, and the end-piece 8½ in. long and 7 wide; nail the end of the lid on to the top edge of the end-piece, and plane off the edges of the lid and flap, to allow the whole to work freely inside the box. Bore a hole through each of the side-pieces, 4 in. from the tall end, and ⅜ in. from the upper edge. Through each of these holes drive a piece of stout wire (2 in. long, pointed at one end), one into each edge of the lid; these serve for hinges. Bore a hole through the tall end-piece, *B*, 4 inches above the bottom, and 2½ in. from the right side of the box, making the hole admit freely a round stick of wood, the thickness of an ordinary lead pencil, and 4 in. long, for a bait-stick; provide another strip of wood for a string-piece, 6 in. long, and thicker than the bait-stick; fasten the end of a piece of strong cord to the middle point of the extreme edge of the lid; cut a nick in the top point of the tall end-piece, pass the string over the nick, and down the back of the end-piece, as seen at *A*; tie this end of the cord to the string-piece, 2 in. from its end, adjusting length of string so that, when the lid of the box is down, the string-piece to which the cord is attached will hang down on the back of the end-piece 10 in. above the bottom of the box. At a point on the back, 2 in. distant from the left side, and 4 in. above the bottom, drive in a nail, so that the head will project ½ in. To set the trap, put the bait on the end of the bait-stick, insert the other end of the bait-stick from inside the box, into the hole, allowing it to project outside the back ½ in.; pull the string-piece down, slip the shorter end under the nail, and let the other longer end catch slightly but securely underneath the projecting end of the bait-stick. The lid of the trap will be found to have been raised 6 in., affording free ingress to any animals passing by; the first one that ventures to meddle with the bait will set the string-piece free, and down comes the lid, inclosing the prisoner. — 2. This is made with the usual bent sapling and string.

Fig. 1.



Rabbit Trap.

Fig. 2.



Rabbit Trap.

A circle of stakes acts as the spreader. The string comes down from the spring, is tied to the diagonal of a figure four, passes thence around the ring or stakes, but not enclosing the upright of the figure four. The noteh in the horizontal bar must be sharp and oblique, so that the diagonal cannot draw out. The noteh in the upright should be square and deep, for it is here the leverage comes. Although the notch in the upright is square and deep, a little pushing on the part of the rabbit at a bit of apple easily throws ont the trigger, when he will be found caught, if he does not sit entirely in the ring. If he does the string is likely to pass over him; but if, like most wild animals, he nibbles a bit before he crosses the line, he is almost certain to be caught.

RACCOON.—Set a steel trap on the edge of a swamp, 1½ in. below the surface of the water, and secure by a chain to a stake. Suspend the bait, a piece of chicken, fish, or frog, 2 ft. above the pan of the trap. The raccoon will leap for it, and when he comes down he springs the trap, and is held a prisoner.

RAT.—1. Take a circular piece of wood, smaller in circumference than the barrel in which it is to be placed; saw it straight through the middle. Hinge each piece, like a table leaf, to a bar fitted across the middle of the open end of the barrel. Pass a cord through a small hole in each leaf, and make a knot underneath to prevent it from pulling through. Fasten a weight to the loose end of each cord, and pass them over the bar, crossing them, and hang them down

into the barrel, to keep each leaf extended in a horizontal position. The bait is fastened to the top of each leaf, to prevent it from falling off. The weight of the rat turns the leaf, and precipitates it into the barrel, which should contain sufficient water to drown a number. To be self-adjusting, the hinges and cords must work freely.—2. Procure a barrel which is water-tight; place a stone or rock in the bottom, and pour in water to nearly cover the rock, leaving only enough of it bare to allow of a resting-place for a single rat. Instead of the head, stretch a piece of thick paper, or other durable material, over the top of the barrel, and fasten it securely by means of a cord passed around the outside of the barrel; damp the paper slightly with a sponge, and it will become tight when dry. On the paper strew cheese parings, etc., several days in succession. As soon as the rats appear to have sufficient confidence to come regularly to supper, cut a cross in the middle of the paper, and spread the feast as before. The first rat that drops through will establish himself on the rock; the next rat falls, and tries to gain a footing on the rock; the first rat resents the aggression, and the 2 argue the point with such determination, that all the rats in the vicinity hasten to the disturbance, and meet the fate of their predecessors.

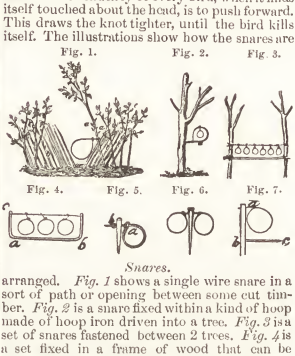
SIEVE. — For taking all birds that gather upon the ground. It is most effective when snow lies upon the ground, for then the birds are less shy in the pursuit of food. The trap consists of an iron or wooden hoop covered with a net formed of meshes of about 1 in.; the lighter the net the better. The hoop is put to stand at an angle, and is propped up by a piece of stick 2 feet in length. At the bottom of the net, and lying upon that part of the hoop which rests upon the ground, is placed a heavy stone, so that when the stick is withdrawn, the net drops down upon the

Sieve Trap.

birds. A long string is tied to the stick, and is held by the person, who keeps as far away as is compatible with his being able to see when the birds are under it. It is better not to drop the trap when a single bird enters, as it will serve as a decoy, and a little patience will be rewarded by the capture of a number of birds instead of one.

SKUNK.—Place an old barrel on the side of a triangular stick of wood 6 in. high, fastening the bait on the bottom of the barrel. When the skunk goes for the bait, as soon as he passes the centre, the barrel turns up with the skunk, without any scent. Then take it by the tail, and do with it as you please. Great care must be taken in placing the barrel, that it will not be too high, as it might throw over, and not remain upright. The more skunks you catch in the same barrel, the better the trap.

SNARES. — Snares are not very certain, but they are little trouble to make. They must be set in the paths or runs of the birds. They are of horse-hair or thin copper wire, tied in a running knot. The tendency of every bird, when it finds itself touched about the head, is to push forward. This draws the knot tighter, until the bird kills itself. The illustrations show how the snares are



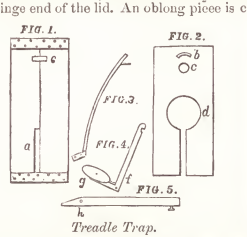
Snares.

arranged. *Fig. 1* shows a single wire snare in a sort of path or opening between some cut timber. *Fig. 2* is a snare fixed within a kind of hoop made of hoop iron driven into a tree. *Fig. 3* is a set of snares fastened between 2 trees. *Fig. 4* is a set fixed in a frame of wood that can be taken up and set down anywhere. Care must be taken that the frame be heavy enough not to topple over, or it should be sustained by small sticks. *Fig. 5* is made of stiff string or thin cat-gut, fixed to a stake driven into the ground, and *Fig. 6* is a double wire snare, in which the wire is passed through the stake. This is also driven into the ground. *Fig. 7* shows a snare arranged as it would be in an ordinary post. In *Figs. 3, 4* and *7* the parts of the arrangement immediately below the snare, which serves for the bird to perch upon, should be wide enough to contain small grain.

SQUIRREL. — Place a steel trap on the upper rail of a fence where they frequent; set a pole with an ear of corn, or other squirrel food, fastened on the end, up against the fence, leaving it so as to spring the bait over the trap at a height of 6 or 8 in.; when the squirrel reaches to get the bait he will get into the trap.

TREADLE, For Small Animals.—It should be made of common outside boards of pine, and stained (not painted). *Fig. 1* is the floor of the trap, 22 in. long, 14 in. wide, and $\frac{3}{4}$ in. thick. It must be made in 2 pieces to admit of the treadle or trigger being screwed on the edge of one of the boards, which must then be nailed together with 2 battens, 2 in. wide and $\frac{1}{2}$ in. thick. A strip is cut out 6 in. long and $\frac{3}{4}$ in. wide, at *a*, and the heel of the trigger works in this opening, and is screwed through the hole at *f*. *Fig. 4*, on the edge at *a*, *Fig. 1*. *Fig. 2* is the lid, made solid, or in 2 pieces, like *Fig. 1*, but 2 in. shorter; *b* is a staple to receive the end of the

lever; *c* is a hole to allow the iron stanchion, *Fig. 3*, to pass through without grazing; *d* is a hole, 3 in. in diameter, with its centre 4½ in. from the hinge end of the lid. An oblong piece is cut



Treadle Trap.

out from this hole to the hinge end ½ in. wide, so as to allow the neck of the trigger to work freely. The hinges may be made of old stirrup leather. *Fig. 3* is an iron stanchion of ½ in. round iron, flattened at the foot, having 2 holes for screws; it must be bent to a radius of 15 in.; ½ in. from the other end it must have a pin riveted in, about the thickness of a quill, standing out at right angles, and ¾ in. long. The stan-

Fig. 6.

Treadle Trap.

chion is screwed on to the floor at *e*. *Fig. 4* is the trigger and plate. From notch to *f* is 4½ in.; from *f* to *g*, 3 in. The plate is a piece of round sheet iron, 3½ in. in diameter, with a hole in it to be riveted to the trigger. *Fig. 5* is a wooden lever, ¾ in. wide and ½ in. thick, to reach from the top of the trigger, when set, to the staple *b*, *Fig. 2*. 2 in. from the end, as at *h*, is a hole to receive the pin in the top of the stanchion, and at the other end a lath-nail to catch the notch in *Fig. 4*. *Fig. 6* is the trap when set. *Fig. 7* is a round piece of sheet iron, 4 in. in diameter, with 4 holes punched in to tie the bait on. To set the trap, put the lever on the iron stanchion, raise the lid till the end of the lever catches under the staple; press the other end down, and let the nail catch the notch in the top of the trigger, and weight the lid with stones. Having tied the bait on *Fig. 7*, merely place it on the hole *d*, with the bait downwards, but not too low. The animal, reaching up to smell at it, lets the trap off by setting its feet on the trigger.

STEEL.—These are about the best traps used; are made of every style, and are best bought. The Newhouse are much used, and we give the following directions for them:

SIZES OF NEWHOUSE TRAPS ADAPTED TO THE CAPTURE OF DIFFERENT KINDS OF GAME.

Kind of Animal.	No. of Trap.	Bait Required.
Squirrel	0	Grain, nuts, or ear of corn.
Gopher	1	Grain, nuts, or ear of corn.
Muskrat	1	Carrots, potatoes, apples, etc.
Woodchuck	1 or 1½	Roots, fruit, corn, or bread.
Mink	1½	Fowl, flesh, or roasted fish.
Fisher-Marten	1½	Meat, muskrat, or deer flesh, fish.
Skunk	1½ or 2	Mice, meat, piece of a fowl.
Fox	2	Fowl, flesh, fish, toasted cheese.
Opossum	2 or 3	Nuts, corn, mice, piece of fowl.
Raccoon	2 or 3	Chicken, fish or frog.
Badger	3	Mice or flesh of any kind.
Otter	3	Fish, piece of a bird, or otter musk.
Marten	3	Head of a fish, piece of meat or fowl.
Beaver	4	Fresh roots, eastoreum on the end of a stick.
Wolf	4	Waste parts of tame or wild fowl.
Com. Black Bear	5	Pork, beef, ear of corn, honey.
Grizzly Bear	6	Pork, beef, ear of corn, honey.

The numbers 0, 1, and 1½, respectively, are single spring traps; No. 0 is the smallest size; all the others are double spring traps, No. 6 being the largest trap made. The above baits should be scented where necessary by a proper selection from the preparations previously described.

WILD TURKEY.—A trap is made by digging a ditch; then over one end is built a rude structure of logs, covered at the top. The structure should not be tight, but sufficiently close not to let the birds through. Indian corn is scattered about, and in the ditch and inside the pen. The turkeys follow up corn in the ditch, and emerge from it on the inside. Once there, the birds never think of descending into the ditch, but walk round and round the pen, looking through the chinks of the logs for escape that way. To make all sure, the ditch should end about the centre of the pen, and a bridge of sticks, grass and earth built over the ditch, just inside of the pen, and close to the logs; otherwise, in going around, the bird might step inside the ditch.

WOLF.—The wolf may be caught in various ways. An attractive bait will allure them into any fair sized dead-fall, or they may be secured in a steel trap of medium size, attached to a clog. The trap may be placed at the entrance to an inclosure. The wolf is very shy, and almost as quick-scented as the fox. Use a trap well cleaned with weak lye; after drying, oil or grease it well, and smoke it over burning hair or feathers. In handling it, use clean buckskin gloves, to avoid imparting the least human odor. Make the bed for the trap 3½ ft. in diam., so that the jaws, when set, will be on a level with the ground. Cover with fine dried grass, wheat, oat or buckwheat chaff; secure it well with a chain; level all neatly to a natural appearance, and bait with fresh meat or roasted cheese. Wolves are strongly attracted by the odor of sweet-fennel, which may be sprinkled in a powdered state around the traps, to overcome human traces; the oil of rhodium is successful in luring the wolves to any spot where placed; and some trappers use this

oil on the soles of their boots, in order to cause the wolves to follow their tracks leading to the traps. A small quantity of strychnine, mixed with lard, smeared on slices of meat, and the meat rolled up so as to conceal the poison, will kill a wolf in a few moments. The poisoned baits may be laid around in places where they prowl; or the animals may be attracted from a distance by the smell of blood taken from any fresh killed beast or bird, and judiciously exposed in the neighborhood of traps and baits. Poisoning is often resorted to when wolves make havoc among sheep or in the farm-yard; but the use of it is detrimental to the fur, when the animals are trapped for their skins.

WATER SPORTS.

FISHING.

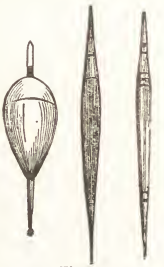
REMARKS. — The art of angling is varied by circumstances, and must be based on a knowledge of the habits of fish. The regular season for fishing is from April to November. The best time of the day during summer is from sunrise to 2 or 3 hours after, and from 2 hours preceding sunset until 1 hour after; in the colder months, from 12 to 3. The south wind, and after that the west, is considered best by experienced anglers; a cloudy, though not cold day, is favorable. Fish are whimsical; one may have fine fishing on a cold day, with an east wind; and then again when the sun is beaming down scorchingly, and not a cloud in the sky. Be cautious. Fish are shy. Never show yourself near where the fish lie, if you can help it. Never let your shadow fall on the water; and if you cannot fish with your face to the sun, take shelter behind a tree, bush, or rock. A disgorger will be necessary to aid in getting out the hook when swallowed very far; and also a little leather case containing extra hooks, a pair of pliers, scissors, some shoemaker's wax in a piece of soft leather, and a piece of stout cord, to be waxed and wrapped around the rod, in case it should break; and lastly, a fish-basket.

TACKLE.

CARE OF.—Every line, after use, should be run off from the reel and laid out freely, or stretched on pegs to dry. Should they have been lying by for any length of time, they should be examined and tried in every part before using. Lines will chafe and fray out by constant wear, and many large fish are often thus lost. When the season is over, the rod should be cleaned, oiled, and put away in a cool place. The best rod, if exposed a length of time to a dry atmosphere, will shrink, causing the ferrules and guides to become loose. A moist atmosphere is preferable to a dry one. When rods have not the ends covered where the joints are put together, and become by a day's service swelled, hold the ferrule over a candle or lighted paper, to dry out the moisture, and the parts can be easily separated. To prevent this, oil the wooden part that is let into the socket.

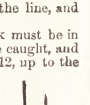
CLEARING-RING.—A ring weighing ½ lb. to 6 oz., tied to a stout cord, and when the line is caught in some obstacle under the water, is placed around the line, and sent down to clear the way.

FLOATS.—Floats can be procured of all sizes and shapes. For small fish and slow streams, quill floats are best; and in strong rivers, or for larger fish, cork floats can be employed. If the angler prefers to make his floats, procure a piece of fine-grained, sound cork, and bore a hole through it with a small red hot iron; then put in a quill which will exactly fit the aperture, and cut the cork into the shape of a pear. When this is finished, grind it smooth with pumice stone, and paint and varnish it. The cork float should swim perpendicularly in the water, so that it may betray the slightest nibble, and must be poised by fastening a few shot on the line; the proper sizes of shot are from swan shot down to No. 4; they should be split ½ way through with a small chisel, so as to make a gap sufficiently wide to admit the line, and the gap closed with pliers.



Floats.

HOOKS. — The size of the hook must be in proportion to the kind of fish to be caught, and vary from the little fly hook, No. 12, up to the salmon, No. 0. As to style, the Limerick, *A*, *B*, is decidedly a favorite; although, for some fishing, the Kirby, *C*, is excellent. The sizes of both kinds are the same. There is also the Virginia hook, which is popular with Southern fishermen. It is shaped like the Kirby with a Limerick barb, and is longer in the shank than either. After getting the hook to suit, test each and see that it has a good temper, and that the point is sharp and perfect. When fastening the hooks on the lines, use strong but fine silk near the color of the bait; wax the silk thoroughly with shoemaker's wax, and wrap it 4 or 5 times round the body of the hook, then place the gut or hair



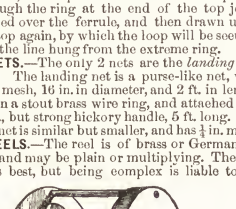
Fish-Hooks.

on the inside of the hook, and continue winding the silk tightly round till wrapped about 3 parts down the hook. Whipping is finished off by slipping the end of the silk through the last circle, and drawing it tight; knotting by laying 2 pieces of gut or hair together, one overlapping the other 3 in. or so, then holding one end in the left hand, while forming a simple slip-knot on it; then turning the other end to the right and doing the same; after that drawing the two together, which makes the knot complete. No direct pull will ever unloosen this, though it can be undone easily.

LINES.—Different lines are required. For catching shiners, a stout piece of homespun thread will answer, and with this and a No. 11 hook, you can capture a ½ lb. sunfish or perch. Sea grass is good for a short line. For the main line, plaited silk or well-twisted hemp is best, measuring 50 yds. It should be boiled in linseed oil before use, which will render it less liable to kink. To catch large pike, where you troll for them, a stout cotton or hemp line is best. The most serviceable lines are pure horse-hair. Good lines should be perfectly twisted; round, and without irregularities, and those of a light gray, brown or white are most useful; some prefer a light sorrel tint. The bottom or casting line for fly fishing, which is affixed to the line on the reel, must be of gut, and of about the same length as the rod; the gut should be strong at the top, and very fine at the dropper or bottom, and before any flies are made upon it, it should be picked to see that it is of uniform thickness. When fastening the line on the rod, the loop of the line should be passed through the ring at the end of the top joint, carried over the ferrule, and then drawn up to the top again, by which the loop will be secured and the line hung from the extreme ring.

NETS.—The only 2 nets are the *landing* and *bait*. The landing net is a purse-like net, with ⅜ in. mesh, 16 in. in diameter, and 2 ft. in length set on a stout brass wire ring, and attached to a light, but strong hickory handle, 5 ft. long. The bait net is similar but smaller, and has ¼ in. mesh.

REELS.—The reel is of brass or German silver, and may be plain or multiplying. The latter is best, but being complex is liable to get



Reel.

out of order. The plain imported reel is very good. The reel is used for the purpose of carrying the line safely, and to allow of rapid extension or drawing in of the line.

RODS.—Fishing rods are made of vine, bamboo, hazel and hickory, of various lengths and fashion. The butts are frequently made of maple, with bored bottom. Rods for travelers are made in joints. A perfect rod should taper from end to end, be tight in its joints, and uniformly pliable, not bending in one place more than another. Have a rod for each kind of fishing. The rods should be ringed to guide the line from the reel; and when screwing the joints together attention should be paid to the rings to see that they run regularly on the under side of the rod, so that the line will not get twisted. If the joints of the rod shrink in dry weather, moisten a little to make them adhere better. Varnish the rods once in 2 or 3 years with copal varnish, or else with india rubber dissolved over a slow fire in linseed oil; either preparation preserves the rods. When re-varnishing, scrape off the old surface before putting on the new. A single-handed fly rod ought to be 12 to 15 ft. long, and as light and elastic as possible; a trout rod, for trolling with minnow, about the same length, but stronger; a rod for worm fishing, the same; while a pike rod ought to be strong, stiff, and as straight as a dart, and 14 ft. long; the rings through which the line passes ought also to be of good size and strong, and the fewer of them on the rod the better.

SINKERS AND SWIVELS.—The ordinary plain sinker is of lead, round, like a pipe-stem, and swelling out in the middle, with loops of brass wire on either end to attach the line. The weight is from ¼ oz. for trout, to 2 lbs. or more for sea-bass and porgies. The swivel-sinker is similar to the plain one, except that instead of loops, there are swivels on each end to attach the line. This prevents the line from twisting and tangling. In trolling, swivel-sinkers are indispensable. The slide-sinker, for bottom-fishing, is a leaden tube, which allows the line to slip through it when the fish bites. This is an excellent arrangement, as one can feel the smallest bite, whereas, in the other case, the fish must first move the sinker before you feel him. Split shot are sometimes put on trout lines in place of a sinker. Independent swivels are useful in some kinds of fishing, to prevent the entanglement of the line.

Baits.

REMARKS.—Fish take such bait as the changing seasons produce, and will not at one time of the year bite at the same bait which they will at another; in spring and autumn, worms may be used all day long, and night too; but in summer, worms must only be used early and late, morning and evening. An earth-worm is the first bait the angler looks out for, and may be used for certain kinds of fish, with the certainty of hooking something. When baiting with a worm, the hook should be put in close to the top of the worm's head, and then passed carefully down, gently working the worm up the hook at the same time. Not more than ¼ in. of the worm should be left hanging over the hook. To scour or starve these worms, and get rid of the earthy matter they contain, they must be placed in damp moss, not soddened with water, but only damp. In creeping through the fibres of the moss, they compress and empty themselves. They grow

almost everywhere except in sandy soils. The common white grub is used in trout fishing. They are found in fresh-plowed earth, and under old stumps, decaying foliage, etc. The grasshopper is good for trout in his season. The trout or salmon spawn will attract trout quicker than any other bait, but it is not always to be had. Caterpillars, flies, locusts, beetles, etc., are good for trout.

FLY, Natural. — Fishing with living flies, grasshoppers, etc., which are found on the banks. It is practiced with a long rod, running tackle, and fine line. When learning this system of angling, begin by fishing close under the banks, gradually increasing the distance until you can throw your live bait across the stream, screening yourself behind a tree. In rivers where weeds grow so as almost to check the current, fish where the stream runs most rapidly; in throwing your line into these parts, do not entangle it among the weeds. Draw out only as much line as will let the fly touch the surface; and if the wind is at your back, it will be of no material service to you in carrying the fly lightly over the water. In such places the water is still, and the bait must be dropped with no more noise than a living fly would make if it fell into the water. Keep the top of the rod a little elevated, and frequently raise and depress it and move it to and fro gently, that the fly by its shifting about may deceive the fish. The instant the bait is taken, strike smartly, and if the fish is not so large as to overstrain and snap the tackle, haul it out immediately, as you may scare away many while trying to secure one. Wasps, hornets, and bumble-bees are good baits for dace, eels, roach, bream and chub; they should be dried in an oven over the fire, and if not overdone, they will keep a long while.

FLY, Artificial.— These should be made to resemble, in form and color, the natural fly; but for hiding the counterfeit, and also to hide the hook, add to it an unnatural quantity of legs (hackles), which move with the movements of the fly; these make it impossible for the fish to discriminate between the natural and the artificial fly. The points to keep in view are size, shape and color. Flies are made of green, brown, or yellow silk, and should be coated with a colorless, waterproof wax, made as follows: Burgundy pitch, 120 gr.; white resin, 60 gr.; tallow, 20 gr.; reduce the rosin and pitch to a mixed powder and put them into an oven, and when quite melted add the tallow, stirring thoroughly for several minutes; then cool, and it is ready for use in 12 hours. The following table will be useful in making artificial flies:

COLOR.	HACKLE FOR LEGS AND WHISKERS.	BODY.
Green ..	Very dark green...	Dark green sewing silk, lightly waxed with colorless wax.
Brown.	"Fiery," or cinnamon (not claret) brown	Dark orange sewing silk, well waxed with cobbler's wax, and then drawn tightly between the finger and thumb.
Yellow	Darkish golden olive	Golden yellow sewing silk, lightly waxed with colorless wax.

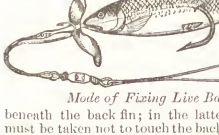
The single rod for artificial fly fishing should be 11 to 13 ft. long, light and flexible, and one easily wielded. Swing the rod back without effort, so as almost to describe a circle round the head, and when the line has reached its full extent behind you, throw it forward, taking great care in the movement. In order to acquire a good style of throwing, and a correct eye for measuring distances, practice at first at a short length only, without a fly on the line, and when you can throw to a moderate range one fly may be put on and practiced with; and as expertness is gained, 2 or 3 may be employed. It is a good plan to fish in rapid streams, until dextrous in casting the fly. When casting, drop the fly lightly on the water. On perceiving a rise, throw the fly above the spot, and let it drop down the stream, and directly the bait is taken strike quickly. When you have hooked a fish, run him down the stream, play him cautiously, keep his head up, and draw him by gentle force toward you. Keep the back to the wind, and if the sun is shining stand with your face to it, that your shadow may not be cast upon the water. If the day is calm, keep away from the brink. The best time for fly fishing is when the day is overcast and gloomy after a beautiful clear night, or when a light breeze agitates the stream; and if the wind is from the south or west and the water turbid from recent heavy rains, it is all the better. Keep your fly in motion that it may appear to be a natural one.

GROUND BAIT, Natural.—Ground baiting is an essential part of angling, as success in bottom or float fishing cannot be expected unless proper means for drawing the fish together are resorted to. The object of throwing bait into the water, is to collect the fish to one spot, and then use a superior bait on the hook. When going to use earth worms, throw in for ground bait those that are unscoured, and fish with those well scoured. For small creek fish, mix bran and clay together into lumps the size of an apple; place grubs in the middle and close the clay over them. It is useful in a still pond, hole, or slight eddy. Or take the crumb of white bread, soak it in water, and squeeze it almost dry; add bran, and work them up together until like clay. Brewer's grains are serviceable, but must be fresh. Grubs, worms, the toughest parts of crabs, lobsters or clams, may be thrown in without taking the trouble of working them into balls or clay, if the water is still; but if fishing in a stream, such a system is injurious, as they are carried away and draw the fish from the spot.

GROUND BAIT, Artificial.—1. Salmon roe is an excellent bait for trout. The roe of large trout or salmon trout is just as good. These are tempting baits for many fresh water fish. Fishermen preserve it as follows: 1st, put it in warm water, not hot to scald; then separate the membraneous films; rinse it well in cold water, and hang it up to dry. The next day salt it with 2 oz. salt and ½ oz. saltpetre to 1 lb. roe. Let it stand another day and then spread it to dry. When it becomes stiff, put it in small pots, pouring over each some melted mutton tallow. —2. The English are famous for paste baits, some of which are made as follows: Shrimp paste is made from shrimps, being prepared as

the salmon roe. Wheat, rye, barley and other grains, soaked in water and then boiled in milk, are good baits for small fish in still water. Soft bread and honey, kneaded together, is a good bait. Grated cheese, worked into paste with soft bread, honey and saffron, are frequently used. Tallow chandler's scraps, fresh scalded to separate the slimy particles, the particles then mixed with clay and bran, are a good ground bait. It is only good when fresh made.

LIVE.—The live bait must have a No. 3 or 4 hook passed either through its lips or the flesh



Mode of Fixing Live Bait.

beneath the back fin; in the latter plan care must be taken not to touch the backbone, or the bait will die. If the live bait seeks the weeds, it must be stopped, and should it become sluggish a good shake of the rod will stir it up. Use a float with live bait, as the length of the line renders it difficult to heave the bait in mid-water at a proper depth without.

SECRET. — The following secret arts are inserted to gratify curiosity, but are not recommended, and some of them are prohibited by statutory law: 1. Put oil of rhodium on the bait.— 2. (*Chinese Method.*) Take *Coccubus Indicus* or Indian hemp; pulverize; mix with dough, and scatter it over the water. The fish will seize it with avidity, and turn belly up on top of the water, and may be easily gathered, and if put into fresh water will be as lively as ever. — 3. Take for bait a handful of swamp apple blossoms; put them in a glass jar or bottle, with 1 gill rum; cork the bottle tight, and stand in the sun for 3 or 4 hours; then take ½ pt. water from a place where fly-trap grows, in quag-moss, around a fresh water pond; saturate the bait with the liquid several hours before using. — 4. Take the juice of a smallage or lovage and saturate any kind of bait. — 5. Get over the water at night with a light and a dead fish that has been smeared with the juice of the stinking gladwyn. The fish will gather around in great numbers and may be easily scooped up.

TROLLING. — Generally practiced at mid-water, and includes spinning with a live, a dead, or an artificial bait. When neither fly fishing nor bottom fishing can be practiced, trolling can be resorted to. The fish taken by any sort of trolling in rivers are pike, perch and trout. Trolling is divided into 3 parts: Sinking and roving, trolling with gauge and snap-hooks, and spinning. Sinking and roving is practiced with a live bait: a minnow or a loach for the common trout or perch; bleak, gudgeon, dace, or roach for pike or large trout. The best bait for all sorts of trolling is the gudgeon. The rod should be a long bottom one, with a good winch, and prepared plaited silk trolling-line. For footline, 1½ yds. best gut. The link to which the hook is tied should be of fine gimp, if pike are sought for; but gut, or three-twisted hairs, will do for trout and perch. The bait must be lively, and placed on the hooks carefully. Allow the bait to swim here and there, generally at mid-water; but in deep places, deeper, drawing it up gently to the surface now and then, letting it sink again, and guiding it to the best looking spots. Snap-baits are used when pike do not feed with voracity. The rod used must be short and stiff; the pant-barbel rod is the best. Snap-baits are two-fold, one which does not spring when you strike the fish, and the other which does. The first named consists of 3 hooks, 2 large ones, tied back to back, with their barbs pointing different ways; and one smaller, tied on at the top of the shanks of the others, and pointing straight out from them. The spring-snap is used with dead bait; it requires deep insertion in the bait to allow the spring to act, which it will not do without some resistance. Spinning is a dashing, killing method, and requires muscular exertion. The best spinning rod is of East India mottled cane, 14 or 16 ft. long, well ringed, with a screw winch, requiring no winch fittings. With this, salmon and large trout can be trolled for in deep and wide waters. In narrow streams, spin with a small portion of line out, and avoid casting, the length of the rod allowing the bait to be dropped noiselessly where wished, and to spin accordingly. The baits should be of the brightest minnows and gudgeons; the hooks of bright steel color, and whipped on with light-colored silk, waxed with white wax. Artificial spinning bait kill fish more or less successfully; but they are inferior to the natural bait. A small sail boat is used, with an attendant to manage the boat. Live, or an artificial bait may be used. A stiff rod and reel, with the same tackle as before described, and no sinker, is requisite. The boat should move gently, and the line drag far in the rear. With artificial bait the fish is hooked instantly. If you use live bait, be careful in determining when the fish has gorged it; give him several minutes after he has seized it. On seeing the bait, a pickered will generally run off with it, and will then stop to gorge it; the sign that he has swallowed it is a peculiar slackening of the line, which experienced anglers understand. But if he has gorged the bait, he will soon start off a second time, and sometimes will stop and start off the third time. In these cases, never be in a hurry. When convinced that he has taken down the bait, draw a tight line, and strike. If he is large, play with him until he is exhausted, or you may lose him. The difficulty of taking a pickered from the hook may be obviated, in a measure, by gagging. For this purpose anglers provide themselves with prepared sticks of various lengths. If the hook is swallowed, open the stomach in the middle, cut away the hook, and unslipping the knot that holds the gimp, draw it out that way rather than through the mouth.

WINTER CATCHING. — 1. On the clear ponds in the North, when frozen over, fish are caught as follows: The fisherman, armed with a hatchet, or ax, or mallet and hatchet, goes upon the ice when the sun is shining, and the fish, lying close up to the ice, sunning themselves; when a

smart blow of the mallet stuns them so that a hole can be cut in the ice, and the fish taken out. If put in fresh water again they recover. — 2. A plan practiced on the Western lakes in winter consists in having a small house, built on runners like those of a sled, in which is placed a stove, while in the floor a small aperture is left, through which to drop the lines. Holes are cut in the ice, the houses are moved over them, and the fishermen sit by a warm stove while drawing in the fish.

Varieties of Fish.

BLACK BASS. — This fish is peculiar to the Western lakes and streams running into the great rivers of the West. It resembles the sea-bass, but is not black. There are several varieties—some bottle green on top and some with broad stripes around them. They harbor in deep holes in summer, shooting out into shallows at times, after small fish. The best bait is the minnow or chub, to be caught in their vicinity; and if for big fish, use tolerably large bait. The black bass is prized by the angler on account of his gamy qualities and excellence as food. The following are the ways of fishing: *Still fishing*, so

Black Bass.

called because the fisherman remains stationary, either in an anchored boat or upon the shore, is the most common way. A moderately stiff rod is used, 12 feet long. The further the bait from the boat, the better. A strong line and reel are used. The hook should be tied on single gut snell. If fishing with cork and bobber on the line, measure the depth of water, and place the bobber so that the bait will be 1 ft. from the bottom. A light sinker is necessary, placed 1 ft. above the bait. When the bass sees the minnow he darts for it, takes it in his mouth, and carries it 5 or 6 ft. before he overcomes the force of the rush. When he stops, he shifts the minnow about in his mouth until he gets it head foremost, and then proceeds to swallow it. As soon as he gets the minnow swallowed, he will start to swim off. When the angler sees that a fish has struck his bait, give him line until he stops, and when you see he has stopped nibbling and is moving off, make a quick strike, which can be done so that if you don't hook the fish the bait will not move more than a foot, and if you miss the fish the first time the chances are that he will take it again. If fishing without a bobber, after you see that the fish is not hooked, let the bait settle to the bottom, and the fish will think he has killed the minnow, and nine times out of ten he will go for him again. — *By Artificial Flies.* Fishing for black bass with artificial flies, by trolling or casting, is considered the most scientific way, as the tackle is finer and more skill is required to handle and land the fish. The act of casting requires practice and skill. In trolling with flies use the same rod, line and reel as for still fishing. Use a single gut leader. The gut should be one size finer than salmon gut, and the leader should be in length 1 ft. shorter than the length of your rod down to the reel. A small brass swivel should be used to connect the leader with the line to keep the leader from twisting, and 2 B shot split and placed on the leader about 1 ft. from each end. The body of the fly should be nearly as large round in the thickest part as an ordinary lead pencil. The brightest flies should be placed at the upper end of the leader, for bright flies attract the bass, and your lower lines, following in quick succession, are the ones on which the fish are usually caught. When hooking a fish, take time in getting him in, for, in doing so, you save the fish, and, if there is another fish near, the chances are that he will take one of the remaining flies. Keep the fish on the spring of the rod, and do not let the line slack.

BLACKFISH.—Found in the bays from Cape May to Cape Cod. Striped bass tackle and soft shell clam bait, are used; but he will often bite at the large salt beach worm. Look for him on rocky bottoms; he will not bite well during a thunder storm, nor in dull weather.

BLUE-FISH.—Abound in the waters of Massachusetts, Rhode Island and Connecticut. The tackle consists of a large hook, attached to an ivory or bone imitation of a small fish. In the absence of this gear a common cod line, with a piece of red flannel wound round the cord close to the heel of the hook, so as to form a cylinder ½ in. in diameter, will answer. A quick working boat is necessary, and at least a 5-knot breeze, for the fish are taken by trolling. Throw the line overboard, and make fast at the stern

Blue-Fish.

of the boat while under full headway. The hook will drag near or on the surface of the water, and the blue-fish will snap at the bait. When he gets on, pull in, and be sure you keep a taut line all the time. If you succeed in getting him into the boat, hit him over the head with a club, for he has teeth, and has been known to bite.

CARP, or TENCH. — Requires strong tackle; a light quill float, a short leader of gut, and a light-colored worm, a brandling being better than an angle-worm. Fish on the bottom, or near it. He is a very shy fish; bait the spots the day before fishing, by throwing in bread-crumbs, chicken-entrails, or lumps of dough.

CAT-FISH.—A fresh water bottom fish, found

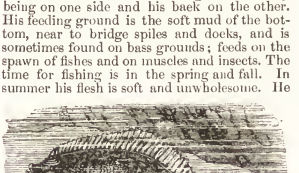
in streams and ponds; easy to catch. Procure tackle strong enough, using a hook according to the size of your game. A single or double gut leader is necessary. Minnows, pieces of fish, shad-roe, worms, toasted cheese, insects, pieces of meat or liver, chicken's offal, attract the catfish. The proper hook is the Limerick salmon, from No. 1 to 5, according to the size of fish. They do not bite vigorously, but perform a series of nibbles. They are plentiful in mud bottoms, above mill-dams, and in coves of the river. The large ones are often taken by trolling with artificial squid or fly. The time for fishing catfish begins in April, and lasts until cold weather.

COD AND HADDOCK. — Bait each hook, of which there should be 2 on the line, with a whole clam, and let the line run out till the sinker strikes the bottom; then haul in about 3 feet, and hold the line between the thumb and forefinger. When you feel a sharp pull, jerk the line up and haul in. Keep the fish bearing upon the line all the time. May and June are the best months; and the later in the season the farther out to sea you must go. — *Rock Cod.* If you do not succeed in deep water, run in near the rocks; anchor, or make fast the painter of the boat to some buoy which marks a sunken ledge, and you may catch rock cod. They are fine fish for the pan or chowder-pot.—*Cod Net.* The cod keeps near the bottom of the sea, and the net is made about 3 fathoms wide; ordinary seine twine is used. One edge of the net is weighted to keep it on the bottom, the other edge buoyed by hollow balls of glass; the net is set with anchors at each end, left out over night, the same as a trawl, and hauled in at the first opportunity. The mesh used being large, the small and unmarketable fish will not be taken at all, and the expense of procuring bait and the disagreeable job of baiting trawls avoided.

DRUMFISH.—A very large fish, and is sometimes caught when fishing for blue-fish or bass, and unless you are expert and he is very small, he will teach the necessity of taking extra hooks and leaders when fishing.

EELS.—*Bobbing.*—There is good sport sometimes in bobbing; but the eel is not much liked on a hook, from his habit of twining the line, and the slime he leaves on the fingers when handled. He is found especially in muddy bottoms. Bobbing for eels is very amusing night sport. String worms on threads, by running a blunt-pointed long needle through them from head to tail. When enough strings are threaded, tie the ends together, and then fold them into a regular hank, like a hank of yarn, and double and treble, until 3 in. long. Through the middle tie a stout cord, to the bottom of which is a round dipsy. Over this last the two ends of the bunch (which should be about the size of a boy's fist) hang. Anchor the boat on the muddy flats of a river, at high tide, or lean over the bank of a creek or river at a muddy bottom, and drop in the bob and sinker. Presently a sharp pull is felt. Draw up into the boat, or on the bank. The eel has his teeth entangled in the thread, and cannot let go until he is in the boat, or on the bank. To grasp an eel on the hook, place the second finger on one side of him, and the first and third on the other, 1½ in. from his neck; then, by pressing the fingers together he cannot move, and you may take the hook from his mouth, and throw him in your basket. — *Potting.* Eels are caught in rivers, in baskets or pots, to which access is easy, but retreat difficult, wherein have been placed small fish, or some flowers of the elder tree, and in bucks, which are large baskets made on the same principle, fitted to a frame-work, and at suitable periods and convenient states of the water, lowered therein, when the eels run into them on their downward passage to the sea, or when seeking a new locality. —*Spearing.* Eels are taken by spearing them while they are lying singly on the bottom, or in clusters imbeded in the mud. The instrument used is called an eel-spear, consisting of 6 or 8 prongs of flattened iron, the edges of each prong notched and fastened to a long pole. It is then plunged into the mud and quickly withdrawn, and the eels retained between the prongs.—*Sniggling.* The line must be of plaited silk or whipcord, and instead of a hook a stout worsted needle should be fastened by its middle to the line. A large worm, tough and well scoured, is the best bait. When baiting the needle thrust its point into the worm's head, and draw it through the body of the worm until the latter completely enshrouds it. When sniggling carry the line on a winder in hand, and search for the fish near flood-gates, wharves, bridges, piles, holes in the banks of rivers, ponds and canals, in ditches, and among osiers and willows. Put the bait into the lurking holes with a stick having a forked head, and when the bait is taken give the fish a few seconds to gorge, and then strike smartly, which will cause the hook to fall across his stomach; then hold the line fast and pull it toward you.

FLOUNDER.—An odd-looking fish, his belly being on one side and his back on the other. His feeding ground is the soft mud of the bottom, near to bridge spiles and docks, and is sometimes found on bass grounds; feeds on the spawn of fishes and on muscles and insects. The time for fishing is in the spring and fall. In summer his flesh is soft and unwholesome. He



Flounder.

will bite at almost any thing used in salt water for bait. Use any kind of tackle. A small hook is necessary, No. 8 being the usual size.

GARFISH.—Called often the garpike, having a long bony snout armed with teeth. No hook

will enter his snout. The best thing when they are around, is to go somewhere else. To catch him, prepare a bunch of thread and horsehair, which dispose of around the live bait, loosely but firmly. Pull out suddenly on the bite, and the chances are that the gar's teeth will be so entangled that he will drop on the bank.

HALIBUT.—A deep sea fish, taken by fishing schooners, principally on George's Banks and off the coast of Nova Scotia, with hook and line.

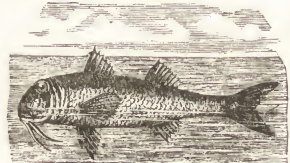
Halibut.

MACKEREL.—If so fortunate as to fall in with a school of mackerel, abandon all thoughts of cod, haddock and perch. If you strike the school, occasionally heave over refuse fish or

Mackerel.

clams, cut up fine, to keep them near the boat. Bait the jig with salt pork, and sink it only 2 or 3 ft. They bite quick and snarp. Haul them in, swing them over the fish tub with a jerk, and they drop from the line without further assistance. Catch them as fast as you can, or you will not catch them at all.

MULLET. — Always fish on the bottom for these, with a small hook and any moderately



Red Mullet.

strong line. They require no skill, and the coarsest and cheapest tackle will answer.

PERCH.—The white, yellow, black and red perch belong to this family. Perch fishing is pretty sport. A strong line and a stout pole are not required, and you will rarely, unless with a big fellow, have occasion to use the reel. He is a quick biter. The bait may be small minnows, shrimps or worms. Great numbers are taken in rivers from the first hour before the flood of tide to the hour after, just outside of the channel grass, with a bow line made with a whalebone, which is kept near the bottom by a dipsy. Each end of the bow is furnished with 2 or 3 hooks, set on 4 or 5 in. of gut, and baited with worms. From May to July is their best season, and the hook is a Limerick trout, from 2 to 5 in size. Perch are gregarious, and in the winter, when frosts and floods have destroyed the beds of weeds, they congregate in pools and eddies, and are then to be angled for with great success from 10 to 4 o'clock, at the edge of the streams forming such eddies.

PIKE AND PICKEREL.—The varieties of this fish are numerous. Besides the true pike, there is the pickerel, and in the West and Southwest the muskallonge. Then there is a fish known

Pike.

on the Ohio and its waters as the salmon, but properly called the pickerel. The pike and pickerel are fond of shady places, and in summer frequent parts of the stream near where the pickerel weed grows. In winter they get under rocks or stumps, or convenient holes, and can be taken then with small live fish for bait. Pickerel are caught near the mouth of some small stream emptying into the river. The fall is the best time. In the hot summer months they seldom bite except on a very windy day. Pickerel fishing in the spring is sometimes successful, though the fish are not so good. In more Northern waters they are sometimes taken as early as August in good condition. The tackle used is a 10 ft. rod, with a reel, and some 50 or 60 yds. of flax line, protected by the hook with gimp or wire. The Limerick or Kirby salmon hook is used; the size is 0 to 5. In a running stream the sinker and float will be necessary. The bait should be a small live fish or frog, or the hind leg of a frog, skinned. In using live bait do not draw the line too quick. The bait, if properly impaled, will be lively. Inexperienced anglers may take this movement for a bite; but when the bite comes there is no mistaking it. When using live frog bait, pass the hook through the skin of the back or belly, or the back muscle of the hind legs. The live frog is generally used on the top of the water; if not, let him rise occasionally to take air. When the pickerel has seized the bait, give him time to swallow it, and

plenty of line. Sometimes he will hold it in his mouth and play with it before gorging. On bringing him to land be careful of his teeth.

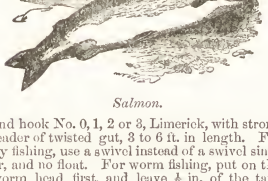
RED EYE. — A Western fish, looking like a cross between the striped bass and sunfish, with a red spot in his eye. He is taken after the manner of perch (which see); he is good at all seasons; his haunts are under banks and beneath overhanging bushes.

REDFISH. — Found southward of Cape Hatteras, as far as Pascagoula, and occasionally in Delaware Bay and on the New Jersey coast; length from 1 to 4 ft. He is like silver in color but becomes darker when out of the water. Just in front of his tail fin is a black or brown spot, bordered with white, which has given him the name of the "Branded Drum." His time of biting is from March until January, except far south, where he is taken all the year. He is caught with a stout hand line and cod hook, with shrimp bait or pieces of fish, and may also be taken with rod and reel.

RED-HORSE. — A species of soft-fleshed fish, sought after in spring, when he swarms in the Western waters. He will not bite well at that time, and is taken by spearing. He may be caught with a worm, by ground fishing, in the autumn months, but is bony and not prized.

ROACH.—A silver-sided, handsome fish, small, and considered poor eating; taken in most of the rivers in the eastern part of the Northern States, in the same manner as sunfish. He will bite well at small lumps of dough.

SALMON.—Confined to Maine, California and Oregon, and some of the Western lakes. The time of taking is from April to July, and they are treated either to the fly, worms or minnows. A heavy rod and a large reel are needed, and from 300 to 600 ft. of line. A swivel sinker and cedar float are used, when fishing with live bait,



Salmon.

and hook No. 0, 1, 2 or 3, Limerick, with strong leader of twisted gut, 3 to 6 ft. in length. For fly fishing, use a swivel instead of a swivel sinker, and no float. For worm fishing, put on the worm head first, and leave ½ in. of the tail; throw it gently in the current, draw it up quietly after it has floated down, keeping the bait in motion. Keep a tight line when he bites, but do not strike too soon; allow him to gorge, then strike sharply. If the bite should be only a sudden jerk, pay no attention to it; wait, and he will call again; if he does, look sharp. Let him have line enough as he goes from you, but as he returns reel up. Keep him clear of stumps and rocks; draw him gently to shore; and then put the hook of the gaff in his gills and land him.

SEA BASS.—Well known to all. Take about 80 ft. stout hemp line, with 2 or 3 No. 1 Kirby

Sea Bass.

hooks, and a dipsy weighing 1 lb. This, with hard clams, well salted for bait, and a pair of old gloves, to keep the hands from being chafed by hauling on the line so much, completes the outfit.

SHEEPSHEAD. — Has a smutty face, banded sides, and a queer mouth, not unlike a sheep's. To capture him, requires a strong cord ¾ in. in diameter, 20 to 50 yds. long, a heavy sinker, a stout blackfish hook, and either soft shell clam, with the shell on, or small rock crab, and fish near the bottom. There is a fresh-water sheepshead, caught at times in the lakes, but he is worthless.

STRIPED BASS, or ROCKFISH.—They delight in rocky shoals. When the sea is agitated cast-

Striped Bass.

ing for them from the rocks with rod and reel, and menhaden bait, is more exciting than angling for any other fish. The rod and tackle required is the same as for salmon, with a hook from No. 0 to 3. The bait is minnow, shiner or shad-roe, and when in the bays or mouths of rivers, shedder crabs, shrimp and shad-roe in their season. In boat-fishing in still water, use a cedar or large cork float, but in fishing at the bottom of dams or in swift currents, have no float and no other sinker than a plain swivel. Manage them, in striking and taking, like the salmon. They can be caught by trolling, with either squid or spoon bait or minnow.

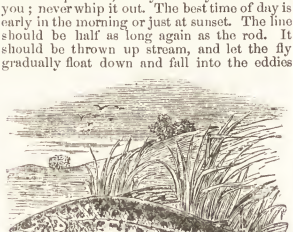
SUCKERS.—There are many different species, and some of them will not bite at any bait. The kind that does not bite, is sometimes taken with a wire slip noose. The regular trout tackle and hooks are used, and worms for bait, though he will bite at shad-roe in the spring. They suck in the bait, and thus nibble at the hook. They are not lively when pulled up, and unless they

are cooked immediately their flesh grows soft.

SUNFISH.—Several varieties. An extemporized rod, of length according to the place, a light line, a No. 7, 8, or 9 hook, and a lively worm or a grasshopper, are all that is necessary. He lies in holes under banks, and in tolerably deep water. His spines protect him from larger fish, and he is quite fearless and handsome.

Sunfish.

TROUT. — Caught in the numerous running streams of the United States, and varies in color and size. Black trout are found in sluggish, muddy streams, and do not belong to the species. The time for taking trout is in the spring and summer. The finest are taken in May and June. They bite best in March and April. Fly fishing is the most interesting mode in summer. The rod should be light, and the line made of hair, or silk and grass. The fly should be placed on a length of gut, or a single light hair. Fish with the face to the sun; stand as far from the stream as possible; always throw your line from you; never whip it out. The best time of day is early in the morning or just at sunset. The line should be half as long again as the rod. It should be thrown up stream, and let the fly gradually float down and fall into the eddies



Trout.

where the fish are apt to retreat. Let your line fall into the stream naturally and lightly, and raise it gently and by degrees. Only a part of the line should be in the water. If bushes intervene do not rustle them, or make a noise. The usual length of a rod is 14 ft. The bottom of the line, unless light hair, should be strong silkworm gut. The size of the hook will depend upon the flies. Nos. 4 and 5 are used for worms and beetles, and 7 to 9 for small flies. If the flies are too small, put two on the hook. The largest and best trout lie in shallow water, faced up stream, or else near the surface. They are found on the shady side of the stream. Grasshoppers and other small field insects are used with success when worms fail. Worm fishing for trout is practiced with caution. After a rain, when the water of the brook is a little riley, trout can be caught very rapidly. A single split shot will generally be enough to sink the line, unless the stream is rapid. The rod should be of bamboo, 16 to 20 ft. long, and the line shorter than the rod. Keep the point of the rod above bait, steadily following it, as the bait drags along the bottom. When the fish takes the bait, do not let him run with it, but keep a steady hand. Do not jerk, but play gradually with him. If the day be clear, and the stream shallow, wade up the stream, throwing your line far up, and letting it come gradually towards you. Bottom fishing with blue-bottle flies is practiced as follows: Use a silk or fine hair line, with gut leader, and a small quill float. Hook No. 10 is about the proper size. You will want one or two split shot on the line. Fill a glass bottle with the common blue-bottle fly found on fresh horse or cow dung. Bait the hook with two of these flies, and let it sink nearly to the bottom. This kind of fishing is practiced in July and August. When the fish has taken the bait, play him towards the top of the water. Do not let him tangle your line in weeds. The fin of a trout, or rather small fish, is sometimes used as a bait for trout with success. It is dropped and roved, as with a minnow or fly. The following are the different varieties of trout:—*Brook.* Too well known to need description.—*Black.* This seems to be the same as the brook trout, modified by its dwelling-place, which is muddy streams and ponds. Then there is the *Salmon.* It has a finer flavor than the lake trout. For all of these fish you want a heavy rod, and spoon-bait or revolver. You troll for him, or you can use the large minnow. The line must be stout. Manage the fish as in taking any other salmon, for a member of the salmon family he is.—*Lake.* Found in a few lakes in the Middle and Northern States, and differs from the Mackinaw trout. It is blackish, with gray spots, body comparatively short; its back fin has a sinuous margin, and its length is 2 to 4 ft. *Mackinaw.*—Dark-gray above, of a light ashgray or cream-color on chin, throat and belly; back and sides having many lighter gray, brown, or dirty white spots; breast and belly-fins yellowish; teeth, gums, and mouth of a purplish tinge; length 2 to 5 feet.—*Hulbo.* Has a forked tail, dusky back, yellowish belly-fin; all the other lines palish purple, and grows from 2 to 4 ft. long. It is to be taken after the fashion of the lake trout. The best time for taking the common trout is from April to August; or, if it be mild weather, as early as March.

WEAKFISH.—Sometimes called wheatfish, and sometimes squeteague; has an even tail, speckled back and sides, one or more sharp, long front

teeth in the lower jaw, and yellowish ventral fins; found in salt or brackish waters, in New York, Connecticut and Massachusetts; bites at shrimp and shedder crab, and is to be caught with the same tackle and in the same manner as the striped bass. They will be found in rather deeper water, farther from shore, and more in the eddies.

BOATING.

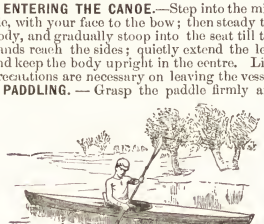
REMARKS. — Until within a few years, the English custom of having a *coxswain* in every boat propelled by several oarsmen, was not adopted in America. Instead, the oarsman who had the best "head,"—who was the coolest leader and commander—was denominated the "captain;" while the most powerful and capable oarsman, giving time to the rest, was called "stroke-oar." Frequently, but not always, these two positions were combined in the same man, and the fashion still largely prevails, except in eight-oar practice and regular races, where the English coxswain has become firmly established. This result simply exhibits the influence of the superior English method and style, after several international contests had occurred. Our instructions, therefore, will be found to largely follow English authorities, which will account for the frequent allusion to the coxswain.

CANOEING.

CAPSIZING, To Prevent.—Take a strip of linen drill, duck, or strong calico, 12 or 14 in. wide, and the length of the gunwale; sew the edges close, forming a bag; fill with cork shavings; sew the ends up, and give 2 or 3 coats of oil paint (white). Lash one on each side of the canoe, on the outside, below the gunwale, and above the water line.

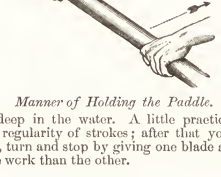
ENTERING THE CANOE.—Step into the middle, with your face to the bow; then steady the body, and gradually stoop into the seat till the hands reach the sides; quietly extend the legs and keep the body upright in the centre. Like precautions are necessary on leaving the vessel.

PADDLING. — Grasp the paddle firmly and



Paddling.

decisively. The hands should be at an easy distance from each other, with backs uppermost. The blade should enter the water close to the side of the canoe, and be drawn back as far as the length of the arm will allow. The canoe then shoots forward in a straight course. A slow, steady stroke is the one by which the best work can be achieved. Hurry and fuss are to be avoided. In a cruise, greater progress is made by taking things quietly, than by exerting too much at the beginning. 20 miles is a fair day's work. In propelling the blades of the paddle must take a circular direction, not going

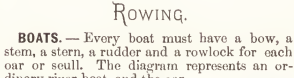


Manner of Holding the Paddle.

too deep in the water. A little practice will give regularity of strokes; after that you will steer, turn and stop by giving one blade a little more work than the other.

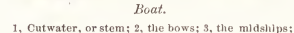
ROWING.

BOATS. — Every boat must have a bow, a stem, a stern, a rudder and a rowlock for each oar or scull. The diagram represents an ordinary river boat, and the oar.



Boat.

1, Cutwater, or stem; 2, the bows; 3, the midships; 4, the stern; 5, the rudder; 6, the rowlocks; 7, the seats, or thwarts; 8, stern-sheets; 9, fore-sheets.



Oar, or Scull.

ENTERING THE BOAT. — Step in with your face to the stern; place yourself nearly in the centre, and take your seat quietly on the thwart, which should be firmly fixed. Thus you will sit square, and swing back and fore in the line of the boat's progress. Have the stretcher adjusted to allow the oar to clear the knees. Keep the button inside the thole. Grasp the oar with the thumb above the handle, the inside hand grasping the loom just where the rounded part joins the square or wider part, with the thumb beneath. You are now ready for the stroke—body upright, shoulders square, elbows to the sides, arms straight, and head bent slightly forward.

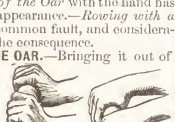
FAULTS.—*Catching Crabs.* Falling back from the seat, through not taking hold of the water

in the attempt to pull.—*Doubling the Body over the Oar at the End of the Stroke.* Prevents

Catching Crabs.

shooting of the arms and body simultaneously forward.—*Jerking.* A fault to which men who are powerful in the arms are liable; instead of throwing the body gradually back, and thus partially pulling by their weight, they depend upon the muscles.—*Not Keeping Time.* Not putting your oar into the water at the same time as the stroke-oar; an effectual bar to rowing in concert. —*Not Keeping Stroke.* It is not doing work at the same time as the stroke-oar. It is the most destructive fault that can be committed; for the speed of the boat must depend upon the simultaneous effort of its crew. The pull should commence the moment the blade is properly immersed in the water.—*Rowing Round.* This arises from not entering the water deep enough at the first. The rower feels that he has not sufficient resistance, and consequently deepens water with an oar, forming a portion of a circle, and brings the flat part of the blade perpendicularly to the water, tending to drag the boat down.—*Slacking Arms Too Soon.* Decreases the power of the stroke, and causes an impediment to rapid progress; this habit is generally accompanied by feathering the scull before it is out of the water, or allowing the boat to carry it along. In the former you add to your labor; in the latter you, to a certain extent, stop the boat. Light boats are apt to cause these faults. The remedy is, to dip the scull deeper at the commencement of the stroke; but the same faults are also committed in ordinary boats.—*Throwing Up Water.* This must be avoided, as it is excessively annoying.—*Capping the End of the Oar* with the hand has a very awkward appearance.—*Rowing with a Round Back.* A common fault, and considerable loss of power is the consequence.

FEATHERING THE OAR.—Bringing it out of the water in a flat or horizontal position, by dropping the wrists smartly at the end of each stroke.



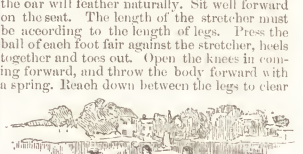
Feathering Positions.

LANDING. — If the tide favors, bring the boat in a rather slanting direction toward the landing. In landing on the sea-shore where there is a swell, more care must be used. Watch for a smooth sea, then give way to the shore. The bowman should jump ashore with the painter and then pull the boat well up out of the reach of the surf.

LAUNCHING.—When there is a swell, and the boat is large, 2 should get into the boat with their oars; the others, equally divided, lay hold of each side of her gunwale, entering the water with her and forcing her head to the sea. They must not all jump in until fairly afloat, for if she were to ground and ship a sea, the probability is that her head would be turned, and the next sea capsize her.

MEETING AND PASSING. — In meeting, the boat going with the tide or stream must get out of the way. If the boats are close to each other the sculls are usually unshipped and laid flat on the water (shifted out of the rowlocks and allowed to drift on one side) till the boats have passed. In going in the same direction, or passing a boat in the water, the sculler who passes the other boat must take the side farthest from shore and nearest to the middle of the stream. If the other boat is a distance from shore, this is not necessary. Whatever way a boat is going, avoid a collision, and keep clear of the sculls of other boats. When one boat is crossing the water, and another is going with the tide, the one crossing should be allowed to pass, and the boat which has the assistance of the tide should hold astern.

PULLING. — Catch hold of the oar as it is—hands about 4 in. apart, one being at the extremity, and train both thumbs under the handle. Hold the oar tight, and when getting forward do not shift the hands, but let the knuckles and back of the hand turn with the handle, so that when you are forward as far as you can, a person sitting and looking straight at you would only see the back of your hand on the handle. When you have pulled the oar through the water, and your hands are well home to your body, the oar will feather naturally. Sit well forward on the seat. The length of the stretcher must be according to the length of legs. Press the ball of each foot fair against the stretcher, heels together and toes out. Open the knees in coming forward, and throw the body forward with a spring. Reach down between the legs to clear



Rowing Pair-Oar Outrigger.

the top of the stretcher. Take care, when reaching forward, to put the oar into the water where you reach to, and not bring the oar back before you put it in. Dash the oar in lively, and pull as hard at the beginning as at the end of the stroke. Pull the oar well through the water from beginning to end. The blade of the oar should be the same depth in the water all through the stroke, and the hands kept the same height. Do not shirk at any part of the stroke. One man rowing mild, and leaving an unfair

quantity of work for the rest, brings them into a bad state. Row the oar home close to the body, by throwing the shoulders back and bringing the elbows straight behind you. The handle of the oar should be at last a little below the chest, close to the navel. Feather the oar low in coming out of the water, and bring it out clean without throwing up water on the next oar. Bring the outer hand and handle a little to the side; by this means the oar is longer in the water, and more work is done at the last part of the stroke. It is a bad thing to go too far back. A crew may be strong, and each man pull well, but if they do not keep time, it is one pulling against the other.

SEA ROWING.—The oar must be held firmly. The whole art consists in the crew moving backward and forward (called "swinging"), and laying hold of the water, avoiding pulling in the air with force when there is a trough or interval between two waves, and avoiding a heavy wave, which has a tendency to dash the oar out of the hand. This requires practice, and the steersman or coxswain should watch for the high waves and warn his men. He should take care to cross the roll of the sea as much as possible, so as to avoid being struck on the side of the boat called "the counter," which would swamp her or knock the oars out of the rowlocks. In this kind of rowing the feathering of the oar is not attempted, but merely pulled steadily, strongly backward, and then pushed forward in the rowlocks. To pull up sharp, the order is, "Hold water," or "Hold up all!" If passing close to the piers of a bridge, a vessel at anchor, or any obstruction, the command to prevent the oars touching it is, "Mind your oars, bow side," or "stroke side." With these words the crew is conducted, adding the number of the man when giving personal orders.

STEERING.—Every 8-oared boat usually has a coxswain or steersman, who is of lighter build than the average oarsman. Take your seat on the aftermost thwart, in the middle. Sit upright and easy, with the body prepared to swing forward with the motion of the stroke. Cross the legs and bring them close under, so that the feet will rest on their outer edges, and the knees be well apart. Take the yoke lines, one in each hand—a turn of the lines round the hands, and pulled taut. There are loops made in the yoke lines for the thumbs, which can be used; but always tie the lines together in front, so that in case of a lurch, the yoke lines will not slip overboard and tow astern. The hands may rest on the gunwale, with the fingers outside and thumbs inside; this will help steady the boat, and a turn of your wrist will slacken or tighten the yoke lines; or the hands may be held in the lap. At every stroke ease slightly forward with the lift of the boat, but do not bob backwards and forwards. The coxswain pulls the line on the side he wants the boat to go. If steering a straight course, take as a mark an object, such as a tree or chimney; if there is a turn in the river, keep the course straight for the point in the water where the boat will turn, keeping wide of the corner. Do not jam the rudder hard up suddenly; the boat's head should be brought round gently. The coxswain has the direction of the crew, and the few words of command must be remembered. When the men are in their places he asks, "Are you all ready?" and then says, "Row on all." To decrease speed, he says, "Row easy, or "bow side." At the order, "Easy all," every one stops. This order should be given as the crew are coming to the end of a stroke.

Sculling.

REMARKS.—Sculling, is using both sculls at once, one by each hand. There is no difference in the action of sculling from rowing, except that in the latter the oarsman pulls one oar with both hands, and in the former he pulls a pair

Sculling.

of shorter oars one in each hand. But there is a marked distinction in some minor points. The oarsman does not sit in the centre of the boat, while the sculler sits exactly in the middle of the thwart. The sculler should sit low in the boat, with his stretcher perpendicular to give his feet a purchase. His speed when in good form is from 30 to 40 strokes a minute; the average is about 32 or 33; except in sudden spurts, it is impossible to keep up the higher rate. In a match the great difficulty is to keep the course and avoid obstructions. Familiarity with the boat and the sculls comes with practice.

ENTERING THE BOAT.—The boat is placed in the water sideways, and not end on, with its head against the stream or tide. Get in and sit in the middle of the thwart, and get the outside scull in position by placing the handle through the rowlock from the outside, and drawing it inboard till the button is within the thole pins; next, do the same with the inside scull. The attendant will then take hold of the end of the blade of the inside scull, and, holding it close to the water, gently push off.

FAULTS.—A bad sculler may be known when he does not straighten his arms before him, and keeps two convex, instead of the outside wrists bent; when, after the shoulders have attained full reach, he puts his hands forward by a subsequent motion, thus getting the body forward without the arms. The opposite error is, when he extends the arms without a simultaneous bend on the part of the shoulders, which is getting the arms forward without the body. An imperfect sculler catches the water with unstraightened arms, and slackens the tension of the pull, and weakens uniformity of work; hangs, before dip-

ping downwards to begin the stroke, and in dipping does not cover the blade up to the shoulder; rows round and deep in the middle, with hands high, and blades still sunken after first contact, and curves his back forward or aft; rocks when he should be steady, and holds one shoulder higher than the other; prematurely slackens the arms, and cuts short the end of the stroke; doubles forward, bending over the oar at the "feather," and brings the body up to the handle of the oar, instead of pulling the oar to the body; the feather is consequently shivered out while work may yet be done; he has an ungainly and exhausted look when he holds the head between the shoulders, instead of erect; rolls backwards with an inclination toward the inside of the boat; turns the elbows at the feather, instead of bringing them sharp past the flanks; looks out of the boat instead of straight before him, causing a roll of the boat; and, finally, throws up the water, instead of throwing it well aft at the lower angle of the blade.

LANDING.—In landing, bring the boat alongside by holding water with the inside and pulling with the outside sculi; always have the boat with its head against the stream or tide.

PASSING.—If not using the sculls, let them lie flat on the water. In cases of meeting or passing other boats, if you are sculling with the stream or tide, get out of the way; or take the outside, unless there is plenty of room between the boat passing and the shore; if the boats are close, lift the sculls out of the rowlocks and let them lie alongside in the water.

PULLING.—Seated well in the centre of the boat, the stretcher fixed, the legs extended, the sculls shipped and lying flat on the water, the boatman grasps the sculls and prepares for business, as follows: Bend the body so that the head is well on the knees; extend the arms straight and well forward, with the sculls a corresponding distance behind; dip them well and pull; let the dip of both sculls be of equal depth. The young sculler's first difficulty is that the sculls seem longer than they need be, and the body is not perfectly straight. One sculi is apt to go higher than the other, which can be remedied by moving the seat a few inches to right or left without shifting the feet from centre of stretcher. A slightly oblique position is obtained, and the hands worked clear of each other. The end of the pull does not take place till the elbows are brought to the top of the hips and the hands towards the chest. The body is thrown back by pulling; the sculls as they leave the water, feather, and prepare for the return of the sculls for the following stroke; done by bending up the wrists, while the backs of the hands are turned toward the forearms, which offers the least resistance to the water and brings you again into position. Stroke after stroke the same series of actions proceeds, till it becomes as easy to row as to walk.

TURNING.—In turning a boat much art is required. When the inexperienced tries for the first time to turn round, he will find both hands have a tendency to go the same way. The difficulty is overcome by practice. In turning a boat in the water, pull with one sculi and back with the other. One sculi must be reversed, its rounded face towards the sculler while he pushes it from him, at the same time that he pulls sharply with the other until the boat's head is turned round in the direction intended. When the boat is righted, both sculls should be pulled together, a little extra pressure being given to the side which has been backing water.

RULES.—1. Take the whole reach forward, and fall back gradually a little past the perpendicular, preserving the shoulders square and the chest developed at the end. 2. Catch the water and begin the stroke with a full tension on the arms at the instant of contact. 3. A horizontal and dashing pull through the water immediately the blade is covered, without deepening in the space subsequently covered. 4. Rapid recovery, after feathering, by an elastic motion of the body from the hips, the arms being thrown forward straight simultaneously with the body, and the forward motion of each ceasing at the same time. 5. Equability in all the actions, preserving full strength, without jerking, isolated movements.

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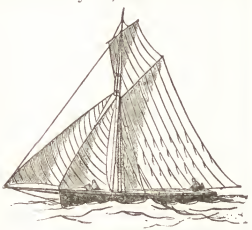
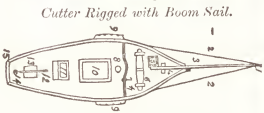
SAILING.

REMARKS.—Local prejudices rule in all parts of the world; and the rig, size and model of a yacht, are defined by the custom of the waters in which it is to be sailed. Iron yachts are most lasting, and have more accommodation than wooden ones of the same tonnage; but they are more affected by temperature, being extremely chilly in cold, and uncomfortably hot in warm weather. Their compasses are liable to error, and their bottoms require constant cleaning. The combination system of wood and iron affords nearly equal advantages with regard to space and accommodation with those possessed by iron yachts, and presents none of the drawbacks enumerated. For bays, sounds, harbors, and inland tidal waters, the yacht should be of a shoal model and centre-board principle, and usually the sloop or cat-boat rig. For ponds and small lakes it should be of good beam, light draught and small sail, on account of the frequency of puffs of winds from unexpected quarters. For outside work, or in places where the tidal currents are strong, or the wind sweeps across the water for miles, the deep keel model, with schooner or cutter rig, will be the better boat. But even on this question there are disagreements. The following are the different kinds of yachts in use: The *Cutter* has 1 mast and 4 sails, viz.: Mainsail, maintopsail, foresail and jib. Some smaller crafts have larger jibs and no foresail. — *Dandy-Rigged Yacht, or Yawl.* Differs from a cutter in having no boom for the mainsail, which can be hauled up by a rope passing round it. She has a mizzen-mast

standing in the stern, which sets a sail called a mizzen, and which is stretched on a horizontal spar projecting over the stern. This style is more safe for a yacht, as the boom in ordinary



Cutter Rigged with Boom Sail.



Deck Plan of Cutter.

1, bowsprit; 2, bowsprit shrouds; 3, stem; 4, bowsprit bitts; 5, fore-hatchway; 6, windlass, with bitts; 7, foresheet-horse (an iron bar passing from side to side); 8, mast; 9, channels; 10, main-hatchway; 11, companion and binnacle; 12, tiller for rudder; 13, cabin skylight; 14, rudder-head and case; 15, taffrail.

cutters is liable to sweep persons overboard, and the sail can be taken in quicker by brailing it up. — *Hatteener.* Has 2 sails, a foresail and mainsail, of a triangular shape. Each has a spar standing from deck to peak of the sail, and

Yawl, or Dandy-Rigged Cutter.

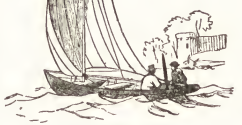
a boom at the bottom like a cutter. This rig is adapted for narrow waters. — *Lugger.* Used by fishermen and smugglers, and is a handy vessel when managed with skill; but luggers are difficult to maneuver by the ordinary means. — *Mainsail and Foresail.* This rig is adopted in open boats which are broad in the beam and roomy. It is an easily managed boat. — *Schooner Rig.* It has a mainsail, mainguff, topsail, foresail (or fore-spenser) and jib. Occasionally it

Mainsail and Foresail Rig.

has a third sail, called a jigger, raised on a light spar at the stern. A schooner has 2 masts, a standing bowsprit and jib-boom, and occasionally a running bowsprit. Schooners are fore-and-aft or square top-sail. The former have a mainsail, main-gaff-topsail, foresail (or fore-spenser) and

Schooner Rig, with Sprit Sail.

fore-gaff-topsail, fore-staysail and jib, while the latter carry a square-topsail and top-gallant-sail on the fore-topmast. The square-topsail schooner carries a square-topsail and top-gallant on the foremast. It is the perfection of a sailing yacht of large tonnage; but requires a competent captain and crew. — *Lugsail. Spritsail, etc.* For small



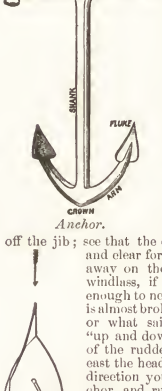
Lug Sail.

open-decked yachts, the lugsail and spritsail, the spritsail-and-foresail, and the balloon-foresail are the general styles of rig. All are intended for experienced handling, and are much in use at watering-places. A single sail in an open boat is usually a lugsail, and is controlled with com-

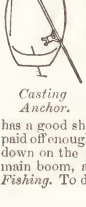
parative ease. The lugsail brings the boat well round in tacking, because that a portion of the sail is before the mast in sailing close-hauled, while the boat rigged with a spritsail only has its canvas abaft, and needs to be aided by putting out an oar to leeward in bringing her round. For a small crew or a single man the lugsail is preferred.

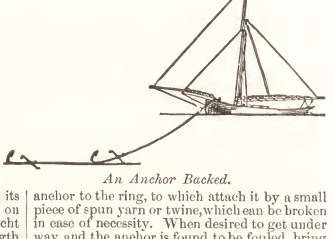
BALLAST. — Broad, shallow yachts need less ballast than deep, narrow ones. Large pieces of iron and tanks of water are used as ballast. For bay and harbor sailing and short cruises, there is nothing better than canvas bags of sand. As a rule, sailing boats and small yachts are "trimmed by the stern;" that is, the bow is slightly elevated from the water, the boat being pressed by the position of its ballast, deeper into the water at the stern than at the bow.

CASTING ANCHOR.—On the anchor and its appurtenances rests the safety, often, of all on board. Every yacht over 25 ft. in length should be fitted with 3 anchors, or at the very least, 2. If 3 in number, 2 of them should be nearly of same size, and one small, called the "kedge anchor." Iron cables are used in large ships, and manilla hawsers in small yachts. There are advantages in favor of a chain-cable for small yachts; but, as a rule, pliable but strong manilla rope is the favorite. To cast the anchor, hoist the mainsail, and take the gaskets off the jib; see that the downhaul is cast off and clear for hoisting; then heave away on the cable, by hand or windlass, if the yacht be large enough to need one, till the anchor is almost broken out of the ground, or what sailors call, the cable, "up and down;" then, by means of the rudder, if in a tide-way, cast the head of the yacht in the direction you wish; trip the anchor, and run up the jib as soon as it will draw. If there is no tide-way to act upon the rudder, then, before breaking out the anchor, hoist the jib; if desired to cast the boat upon the port tack, trim the jib to port, and shove the main boom well out over the starboard quarter; and, when the boat has a good sheer, trip the anchor; when she has paid off enough, let go the port jib-sheet, and trim down on the starboard-sheet, and haul aft the main boom, and proceed on the way. — *For Fishing.* To drop anchor, to hold the yacht stationary for a short time in some known place, make it fast with a clove hitch around both arms at the crown, and lead it along the shank of the



Anchor.


Casting Anchor.


An Anchor Backed.

anchor to the ring, to which attach it by a small piece of spun yarn or twine, which can be broken in case of necessity. When desired to get under way, and the anchor is found to be fouled, bring enough strain upon the cable to part the twine at the ring. — *Grounding and Floating.* If the yacht takes the ground on any shoal, and is left by the tide, get out an anchor in the direction of the wind before the tide returns.—*In a Gale.* When caught in a gale, anchor before the yacht has been driven too near the shore or breakers. When everything is ready, bring the yacht to the wind, and let the sails shake in the wind's eye; as she gets stem-way, let go the best bower anchor, taking care not to snub her too quickly, but let considerable of the cable run out before checking her; then take a turn or two round the knight-heads, long before there is any strain, and be ready to give her cable as she needs it; get this turn round the knight-heads before there is any strain, for, if it has been neglected, it will be too late, and the whole cable go overboard, unless the yacht be brought up by its being fastened below. The first anchor bites, and the yacht seems to come head to wind, and hold, let go the second anchor, and pay out plenty of cable on both, keeping the strain equal on each.

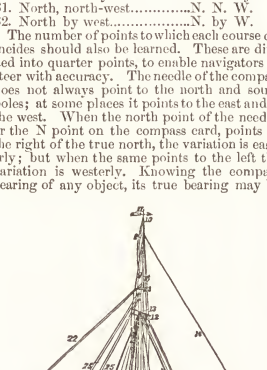
CHART, Use of.— Care should be taken to see whether the courses laid down to be sailed are magnetic ones; that is, with the variation of the compass allowed. There are charts where the variation of the compass must be allowed to make the courses true. Read all the notes upon the margins of a chart. Nearly all the charts of harbors and the coast-line will be found with two scales of miles upon them; one marked statute miles, and the other nautical miles. A scale that marked statute miles means a mile of 320 rods of 16½ ft. each, or 1,760 yds. of 3 ft. each, or 5,280 ft.; while a nautical mile means the 60th part of a degree of the earth's surface measured at the equator, which is about 6,086.4 ft. in length.

COMPASS. — Familiarity with the compass is essential, and all beginners should learn to box it; that is, to commit to memory the names of the points. The following are the 32 points, each representing 11° 15′, or in all 360°.

1. NORTH.....N.
2. North by east.....N. by E.

3. North, north-east.....N. N. E.
4. North-east by north.....N. E. by N.
5. NORTH-EAST.....N. E.
6. North-east by east..... .....N. E. by E.
7. East, north-east .....E. N. E.
8. East by north.....E. by N.
9. EAST.....E.
10. East by south.....E. by S.
11. East, south-east .....E. S. E.
12. South-east by east.....S. E. by E.
13. SOUTH-EAST.....S. E.
14. South-east by south.....S. E. by S.
15. South, south-east.....S. S. E.
16. South by east.....S. by E.
17. SOUTH .....S.
18. South by west.....S. by W.
19. South, south-west .....S. S. W.
20. South-west by south.....S. W. by S.
21. SOUTH-WEST.....S. W.
22. South-west by west.....S. W. by W.
23. West, south-west.....W. S. W.
24. West by south..... .....W. by S.
25. WEST.....W.
26. West by north.....W. by N.
27. West, north-west..... .....W. N. W.
28. North-west by west.....N. W. by W.
29. NORTH-WEST .....N. W.
30. North-west by north.....N. W. by N.
31. North, north-west.....N. N. W.
32. North by west.....N. by W.

The number of points to which each course coincides should also be learned. These are divided into quarter points, to enable navigators to steer with accuracy. The needle of the compass does not always point to the north and south poles; at some places it points to the east and to the west. When the north point of the needle, or the N point on the compass card, points to the right of the true north, the variation is easterly; but when the same points to the left the variation is westerly. Knowing the compass bearing of any object, its true bearing may be



Cutter at Anchor.

determined by applying the variation when easterly to the right hand, when westerly to the left hand, the observer supposed to be placed in the centre of the compass, and looking towards the points from which the navigation is to be allowed. The influence of iron disturbs the direction of the magnetic needle, according to the extent and position of that metal.

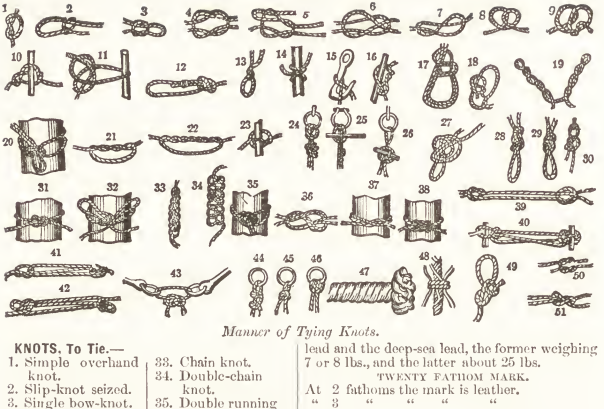
COMPASS, To Steer by.—The periphery of the circular casing in which the card revolves should be marked plainly with a perpendicular black line; this line should, by moving the compass-box, be brought to bear in a direct line with the keel of the yacht, and the box secured in that position. Move the helm to bring the point on the compass-card opposite to this black mark on the compass-box, and, having brought the point needed to this position, keep it there by moving the helm; this is called "keeping the vessel on her course."

HULL, MASTS AND SPARS.—

1. Stem.
2. Stern.
3. Tiller.
4. Anchor.
5. Cable.
6. Bowsprit.
7. Bobstay.
8. Mast.
9. Topmast.
10. Truck.
11. Vane and Spindle.
12. Cross-trees.
13. Trussle-trees.
14. Gaff.
15. Boom.
16. Topmast-shroud.
17. Topmast-backstay.
18. Topmost-stay.
19. Runner and Tackle.
20. Traveler for Jib.
21. Forestay.
22. Topping Lift.
23. Lift Blocks.
24. Mainsheet.
25. Peak Halliards.
28. Foresheet.
29. Signal Halliards.
30. Companion.
31. Forecastle.
32. Rudder.

JIB, To Reef.—If fitted with a bonnet instead of reef-points, bring the yacht to the wind, lower away on the jib-halliards, and bowse on the down-haul, and lower the jib enough so as to bring the reef cringle down to the bowsprit; then, if a bonnet, unlace and cast off, and if reef points, tie up the sail with them, and lash the outer clew to the bowsprit, and cast off the jib-sheet blocks, and hook the sister-hooks into the reef-cringle; hoist up the sail, and trim it.

JIB, To Take in.—First bring to by the wind; but the jib can be taken in and furled, with the yacht in different positions. Stand by the jib-halliards, and have the down-haul well manned, also the lee jib-sheet; then, at the command, "Down jib!" or, "Let go the jib-halliards!" or, "Take in the jib!" the halliards are cast off, the lee jib-sheet eased off, and the down-haul bowsed upon, till the head of the jib is snug down to the boom, when it should be carefully belayed, and the lee-sheet again made fast, leaving a little slack for furling. Then lay out upon the bowsprit, on the weather-side, and pick up the sail from out to leeward, and furl it to the bowsprit by stops, or in any way arranged for, being careful, if the yacht is pitching much, not to be thrown over the bowsprit to leeward, if submerged in a sea; for the person is suddenly lifted by a sea that may reach only to the middle, and, if care is not taken, pitched over the bowsprit to leeward. Having made everything fast, lay in, and set taut the jib-halliards, and belay them, and bring the after-clew of the jib amidships, by setting taut on the starboard and port jib-sheets, and belaying them, and coiling down everything snug.



Manner of Tying Knots.

KNOTS. To Tie.—

1. Simple overhand knot.
2. Slip-knot seized.
3. Single bow-knot.
4. Square or ruf-knot
5. Square bow-knot.
6. Weaver's knot.
7. German, or figure 8 knot.
8. Two half hitches, or artificer's knot.
9. Double artificer's knot.
10. Simple galley knot
11. Capstan or prolonged knot.
12. Bowline knot.
13. Rolling hitch.
14. Clove hitch.
15. Blackwall hitch.
16. Timber hitch.
17. Bowline on a bight.
18. Running bowline.
19. Catspaw.
20. Double running-knot.
21. Double knot.
22. Six-fold knot.
23. Boat knot.
24. Lark's head.
25. Lark's head.
26. Simple boat knot.
27. Loop-knot.
28. Double Flemish knot.
29. Running knot checked.
30. Crossed running knot.
31. Lashing knot.
32. Rosette.
33. Chain knot.
34. Double-chain knot.
35. Double running knot, with cheek knot.
36. Double twist knot.
37. Builder's knot.
38. Double Flemish knot.
39. English knot.
40. Shortening knot.
41. Shortening knot.
42. Sheep shank.
43. Dog shank.
44. Mooring knot.
45. Mooring knot.
46. Mooring knot.
47. Pigtail worked on the end of a rope.
48. Shroud knot.
49. A bend or knot used by sailors in making fast to a spar or a bucket handle before casting overboard; it will not run. Also used by horsemen for a loop around the jaw of a colt in breaking; the running end, after passing over the head of the animal and through the loop, will not jam therein.
50. A granny's knot.
51. A weaver's knot.

LEAD LINE.— For the purpose of sounding, vessels are supplied with 2 lead lines, the hand-lead and the deep-sea lead, the former weighing 7 or 8 lbs., and the latter about 25 lbs.

TWENTY FATHOM MARK.

At	2	fathoms	the mark is	leather.
"	3	"	"	"
"	5	"	"	white rag.
"	7	"	"	red rag.
"	10	"	"	leather with round hole.
"	13	"	"	blue rag.
"	15	"	"	white rag.
"	17	"	"	red rag.
"	20	"	"	piece of cord with 2 holes.

The deep-sea line is marked in a similar manner to the 20 fathom mark, after which an additional knot to every 10 fathoms is fixed in the line, and between the 10's a piece of leather; both leads have a hole in the end filled with soap, so that when it strikes the bottom it may bring up a sample of it, which adheres to the soap.

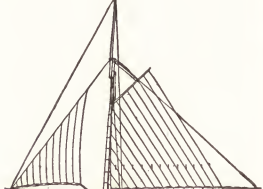
LEAKS, To Stop. — Never neglect a leak, but have it repaired at once. The pump should be kept in order, and ready for use. To stop a leak pass a light sail over the bows, and bring it aft over the leak by means of ropes on both sides of the yacht. Leaks are more easily stopped on the outside, the pressure of the water forcing the canvas into the damaged part. When a leak is discovered the yacht should be put before the wind till it is secured.

MAINSAIL, To Take in and Furl.—Bring the yacht close to the wind, and haul the main-sheet flat aft, and belay it carefully. Then stand by the throat and peak halliards, and, at the word "Lower away," ease away on each, taking care not to let the peak drop too fast, which causes the hoops to jam and the sail to stick, till the peak halliards are hoisted upon again to clear things. When the sail is down, make fast the halliards, and get along on the weather-side of the main-boom, and pick up the sail by what is called "skinning it," repeatedly taking the canvas, and shaking it towards one, it is finally rolled up so

as to lay snugly on the boom, to which it should be fastened by gaskets. The main boom should then be lifted into a crotch, and the throat and peak halliards hauled taut, and the main sheet again belayed, as it will have to be slacked to get the crotch under the boom, and every thing coiled up snug and belayed.

REEF, To Put in a Mainsail.—Haul down the jib, bring the yacht to the wind, haul the main-boom chock aft, and belay the sheet carefully; lower away on the throat and peak-halliards till the reef-band is down lower than the main boom; then, by the reef pennant rove through the reef-cringle on the outer leach of the sail, bowse the foot out on the boom, and lash it fast by passing an earing through the cringle and around the boom by several turns, till the clew of the sail is fastened; then pass an earing from the reef cringle in the luff of the sail around the main boom in the same manner, and commence fastening the reef-points, either around the main-boom, or to an iron jackstay, fastened to the boom, or around the foot of the sail, according as the yacht may be arranged, making each knot a square knot. When the sail is half lowered, so as to get at the reef-band, etc., the yacht is kept head to sea and "hove to," by placing the tiller towards the lee-side of the yacht, or what is called "hard-a-lee," where it is secured till the vessel is reefed, and started on her way. In reefing, haul out on the reef pennant first, and stretch the foot of the sail, and then lash the luff next, and fasten the reef-points last. When the points are tied, hoist away on the throat and peak halliards, and set sail. Take in a second reef in the same manner as the first, except in first commencing to reef, two reefs can be taken in one by lowering the sail to the second reef band, and proceeding the same as in the first reef, except that the two extremities of the sail are lashed at the second reef-band cringles; and in tying the reef-points no notice is taken of the first reef points, but they are stowed with the rest of the sail to the boom, and are not tied.

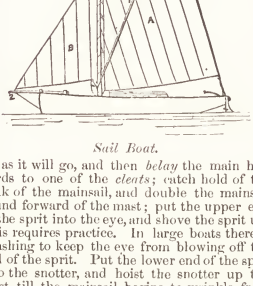
REEF, To Shake Out.—Bring the yacht to the wind as for reefing, and unknot all the reef-points; then cast off the lashing at the luff,



Reefed Sails.

and, lastly, the earing at the end of the boom.

RIGGING.—The sail-boat is sloop-rigged, with or without a jib, but has no main boom nor gaff, the sail being kept up by a *sprit*. Her rig is as follows: One mast, with a *mainsail*, *A*, and a *foresail*, *B*; one mast, a *sprit*, *1*, and a short *bowsprit*, *2*. The mast has one *shroud* on each side, and a *forestay* to the stem, each set up by *lanyards*. The mainsail is hoisted by a *main halliard* passing through a hole, or over a *sheave* in the mast; have this hole or sheave *above* the shrouds, as also the hole for the fore-halliards, one hole above the other. The *sprit* fits into an *eye* at the peak of the mainsail, and into a *becket* or *snotter* round the mast; large boats have a rope to hoist and keep up the snotter. In small boats, the snotter, when wetted, sticks tight enough to the mast. The *mainsheet* works on a *horse* at the stern. The *fore-halliards* pass through a hole in the mast-head, and the foresail is *laced* to the forestay. The *foresheets* lead through holes in the knees. To set the sails, hoist the mainsail by the main-halliards *chock up*, or as



Sail Boat.

far as it will go, and then *belay* the main halliards to one of the *cleats*; catch hold of the peak of the mainsail, and double the mainsail round forward of the mast; put the upper end of the sprit into the eye, and shove the sprit up. This requires practice. In large boats there is a lashing to keep the eye from blowing off the end of the sprit. Put the lower end of the sprit into the snotter, and hoist the snotter up the mast till the mainsail begins to wrinkle from tack to peak; then haul the mainsheet taut and belay it till ready to start. The foresail is wrapped around the forestay; *untoggle* the sheets and unwrap the foresail, then toggle on the sheets, ship the *tiller*, and the boat will be ready. The usual small sail boat is rigged without a foresail or jib, and the mast, to balance it, is set forward of the spot where it stands in the cut. It has no shroud or forestay, being shipped into a thwart running across the boat, and secured in a step below. It is set with more of a *rake* or pitch backward than is shown in the illustration. The beginner will soon learn the principles on which a boat *tacks*, how to *jibe* safely, *reef* the mainsail and the foresail, fit a *reefed snotter*, *stow the sail* and *moor the boat*, *pick up moorings* and *come alongside*. Sailing boats are usually fastened by a chain to a stone under water; when the boat gets *under way*, the chain is let go and

is then picked up again by a rope, one end of which is made fast to the chain, the other to a piece of wood, called a *buoy*. To pick up this buoy the sails are lowered, and the boat runs at it; but usually the boat is taken to leeward, and at the proper distance is *luffed up*, so as to come head to wind, and stop as nearly as may be over the buoy. The beginner should go where he has plenty of room, taking out a buoy or piece of wood, and practice picking that up till he can measure his distance accurately.

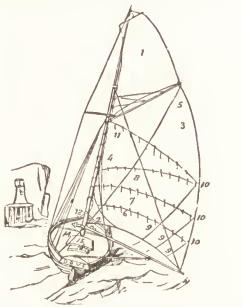
ROPES. — The ropes to hoist and lower sails are called halliards; there are other ropes, called sheets, to haul in sails and make them stand to wind. In a yacht the mainsail has sometimes a sheet on each side; and sometimes only 1 sheet reeved through double blocks, which travel on an iron rod, called a "horse," from side to side.

Topmast and Fore-topmast Stay.

The jib has 2 sheets, the starboard and port. The foresail has the same, except when it has but 1 sheet working on a traveler, like the mainsail. The topsail has 1 rove through a sheave at the end of the gaff, and a block at the throat of the gaff, and then down to a cleat on deck. Signal halliards pass through a small sheave in the truck at the end of the topmast. Ensign halliards are reeved through a small block at the peak end, and lead down to the boom. The other ropes, for support of spars, are called "standing rigging," while those for sails are called "running rigging."

RUDDER AND TILLER.—The rudder is a flat board, with a pole rising up on the side, fastened to the vessel, on the top of which is fixed the tiller. In large vessels there are 2 ropes fastened to the tiller, carried through blocks on each side of the vessel, then brought back through blocks fastened on the mizzen mast, and passed round a wheel. The tiller passes through the rudder head, and is moved to right or left, termed moving the helm. When the tiller is moved to right (starboard) the rudder is forced in the water to the left (port).

SAILS. — It is necessary to fully understand the sails to become a thorough yachtsman. The illustration represents a yacht in full sail, running before a light breeze. The sails are governed and managed by certain ropes, spars, etc., known as rigging. The quantity of sail carried by a yacht must vary with wind and weather, the build of the vessel, position of mast, number of persons aboard, and other circumstances. The following directions are good for a cutter yacht: *Nice working breeze.* Whole mainsail, large working topsail, whole foresail and No. 1 jib. — *Stiff breeze.* Whole mainsail, topmast housed, whole foresail, and No. 2 jib. — *Strong Breeze.* Single-reefed mainsail, single-reefed foresail, and No. 3 jib set on a reefed bowsprit. — *Strong squally winds and sea rising.* Double-reefed mainsail, double or single-reefed foresail, and No. 4 jib on a double-reefed bowsprit. — *Gale with moderate sea.* Three-reefed mainsail, close-reefed foresail, and No. 5 jib on close-reefed bowsprit.—*Strong gale with heavy sea.* Trysail and storm jib, and bowsprit slung in. These gradations of wind must be judged by the yachtsman; experience is the only guide, and even that must give place sometimes to foresight and mother wit.



Sails, Etc., of a Cutter.

1, gaff topsail; 2, foresail; 3, mainsail; 4, tack bracing line; 5, peak line, or signal-halliards; 6, 7, 8, first, second, and third reefs; 9, reef ear-rings; 10, cringles; 11, balance reef; 12, anchor stock; 13, windlass; 14, foresheet horse; 16, main hatch; 10, companion and binnacle.

SCUDDING. — The most difficult steering of any; in rough water it is hard to keep the yacht upon her course; the seas will lift the stern out of the water, neutralize the use of the rudder for a moment, and cause the yacht to yaw; the speed changes and affects the rudder. When on the top of a sea, and all the sails full, the yacht will go fast; when she attempts to bury her head and kick up her heels, and beclams the jib and lower part of the mainsail, she will go slower. In running before the wind, guard against "jibing" of the main boom. If the sea is bad and the yacht steers wild, tack down to leeward by hauling up the yacht a little toward the wind on either tack, to bring it over the quarter, and then run before it for a distance, and by careful jibing bring the wind over the other quarter, and then proceed on.

SIGNAL LIGHTS.—The lights mentioned in the following articles, and no others, shall be carried in all weathers between sunset and sunrise:

Steamships. — All steam vessels, under way, shall carry: 1. At the foremast head a bright white light, fixed to show an unbroken light over an arc of the horizon of 20 points of the compass; fixed to throw the light 10 points on each side of the ship, from right ahead to 2 points abaft the beam on either side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of 5 miles. 2. On the starboard side a green light, to throw a uniform and unbroken light over an arc of the horizon

of 10 points of the compass ; fixed to throw the light from right ahead to 2 points abaft the beam on the starboard side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of 2 miles. 3. On the port side a red light, to show a uniform, unbroken light over an arc of the horizon of 10 points of the compass ; fixed to throw the light from right ahead to 2 points abaft the beam on the port side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of 2 miles. 4. The said green and red side lights fitted with inboard screens, projecting at least 3 feet forward from the light, to prevent these lights from being seen across the bow.

Steam-Tugs.—Steamships, towing other ships, shall carry 2 bright white masthead lights vertically, in addition to their side-lights, to distinguish them from other steamships.

Sailing Vessels.—Sailing vessels, under way, or being towed, shall carry the same lights as steam-ships under way, with the exception of the white masthead lights, which they shall never carry.

Exceptional Lights for Small Sailing Vessels.—Whenever, as in the case of small vessels during bad weather, the green and red lights cannot be fixed, these lights shall be kept on deck, on their respective sides of the vessel, ready for exhibition; and shall, on the approach of or to other vessels, be exhibited on their respective sides in time to prevent collision, in such a manner as to make them most visible, and so that the green light shall not be seen on the port side, nor the red light on the starboad side. To make the use of these portable lights certain and easy, they shall each be painted outside with the color of the light they respectively contain, and be provided with suitable screens.

Ships at Anchor.—Ships, whether steamships or sailing ships, at anchor in roadsteads or fairways, shall, between sunset and sunrise, exhibit where it can best be seen, but at a height not exceeding 20 ft. above the hull, a white light in a globular lantern of 8 in. diameter, so constructed as to show a clear, uniform and unbroken light visible all around the horizon, and at a distance of 1 mile.

Pilot-Vessels.—Sailing pilot vessels shall not carry the lights required for other sailing vessels, but shall carry a white light at the mast-head, visible all around the horizon; and also exhibit a flare-up light every 15 minutes.

Fishing Vessels.—Open fishing boats and other open boats, shall not be required to carry side-lights required for other vessels, but shall, if they do not carry such lights, carry a lantern having a green slide on the one side, and a red slide on the other side; and, on the approach of or to other vessels, such lantern shall be exhibited in time to prevent collision; so that the green light shall not be seen on the port side, nor the red light on the starboard side. Fishing vessels and open boats at anchor, or attached to their nets, and stationary, shall exhibit a bright white light. Fishing vessels and open boats shall not be prevented from using a flare-up light in addition, if considered expedient.

SIGNALS. Fog.—Whenever there is a fog, by day or night, the fog-signals described below shall be carried and used, and shall be sounded at least every 5 minutes. Steamships under way shall use a steam whistle placed before the funnel, and not less than 8 ft. from the deck. Sailing vessels under way shall use a fog-horn. Steamships and sailing vessels when not under way, shall use a bell.

SPEED, To Ascertain. — The rate of a ship's sailing is measured by a log-line and half-minute glass. The line is marked with a knot for each mile. The real distance between each knot being the 1-120 of a mile, since ½ minute is the 1-120 of an hour, and the number of knots carried out while the glass is running out, will show the number of miles the vessel goes in 1 hour.

SQUALLS.—If the sail is loose, and the boom, or lower leach of the sail, can move in a direction parallel to the wind, the boat cannot be upset by a gust of wind. It is the flaws of wind caught by the sail that capsize a boat; and, if the wind that has force enough to do this could be "spilled" out of the sail, the boat would be relieved. To insure safety, the person steering a boat should never belay the sheet, but keep it in hand, so as to be able to slack it off gradually, or cast it off at a moment's notice. To do this, one turn should be taken round the cleat; so that the sheet will slip under the force of a gust of wind, when the hand retaining it in place slackens it. If the whole sail points towards the wind's eye, it no longer has any effect upon the boat. The sail then shakes in the wind exactly as a flag does from the top of a flag-staff. Should the sheet be hauled aft, the sail would be filled with wind upon one side; and, if the wind had strength to overcome the gravity of the boat, capsize her. With boatmen who are practiced, the slacking of the sheet is seldom done; they obtain the same result with the rudder by bringing the boat into the wind until the sail shakes, with the sheet still fast. The best thing in a sudden squall is to use a modification of both methods; slack off the sheet a foot or two, so that the sail, before it can fill with wind, will be at such an angle with the hull, that the shock upon the latter cannot be great. This gives command of the boat, and insures quicker movement of the hull and obedience to the helm, should a sudden change occur. Slacking of the sheet prevents the boat from going about on the other tack, should she be brought too suddenly to the wind. If the boat is well under command when the squall is advancing, the method of steering into the wind's eye may be adopted. In small sail boats, on ponds or arms of the sea, when a thunder shower is coming up, take the boat as quickly as possible toward the nearest land, unless inaccessible; in which case furl all sail and let go an anchor, paying out such scope of cable that the boat will ride easily; the thunder gust can then do no harm. With an oar head the boat towards the coming blast, so that she will feel little of its force, and prevent dragging the anchor. Boats are often capsized by those on board scrambling to windward when a squall buries the lee gunwale in water. Should the boat at this moment be taken

aback by a counter squall or flaw, she will capsize. The safest position is for all, except the helmsman, to sit down in the bottom of the boat near the centre, which increases the steadiness of the boat.

STEERING. — The yachtsman should never neglect an opportunity of making himself a good steersman, which requires the eye of a hawk. He must thoroughly know his vessel. Different yachts demand different handling. He should always stand to windward of the tiller, to see the canvas and the direction of his course, so as to have more command over the vessel. A short, bluff-bowed, beamy yacht requires different steering from a long, sharp, narrow clipper; the former will quickly answer to the motion of the helm, while the latter will be longer. It is understood that when the rudder is placed at an angle of 35° to 40° with the line of the keel, it is in position to produce the greatest effect with the least diminution of speed. The nearer it is to a right angle, the more it tends to diminish speed, and the less effective it is in turning the vessel. If the desired effect upon a vessel's course is produced, the less helm given her the better. A yacht in perfect trim ought not to require much helm. If she does, something is defective in the balance of sails, adjustment of ballast, or form of the hull as regards draught of water forward. In beating to windward the sails should be kept full, and yet the vessel sailed as near the wind as she can go. Every stronger puff than usual should be taken advantage of, to eat as far into the wind as practicable; and in coming about the yacht should be given the full benefit of her run up into the wind's eye in stays, and no time lost in getting life into her on the other tack. A cutter-yacht is difficult to steer when she has the wind well abaft the beam or dead aft, especially if there is a heavy quarterly or following sea. This demands skill and judgment. The yacht will have a tendency to yaw wildly, alternately coming up in the wind and then falling off again. It is of the utmost importance that the steersman concentrate his attention, watching every variation in the yacht's course and every change in the wind. The following are the rules for steering:

Meeting. — If 2 sailing ships are meeting end on, or nearly end on, so as to involve risk of collision, the helms of both shall be put to port, so that each may pass on the port side of the other.

Crossing. — When 2 sailing ships are crossing so as to involve risk of collision, if they have the wind on different sides, the ship with the wind on the port side shall keep out of the way of the ship with the wind on the starboard side, except in the case in which the ship with the wind on the port side is close hauled and the other ship free, in which case the latter ship shall keep out of the way. But if they have the wind on the same side, or if one of them has the wind aft, the ship which is to windward shall keep out of the way of the ship to leeward.

Sailing Ships and Ships Under Steam. — If 2 ships, one of which is a sailing ship and the other a steamship, are proceeding in such directions as to involve risk of collision, the steamship shall keep out of the way of the sailing ship.

Ships Under Steam to Slack Speed.—Every steamship when approaching another ship so as to involve risk of collision, shall slacken her speed, or, if necessary, stop and reverse; and every steamship shall, in a fog, go at a moderate speed.

Vessels Overtaking Other Vessels. — Every vessel overtaking any other vessel shall keep out of the way of said vessel.

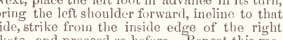
WIND, Sailing Against.—Only good boats sail with the wind on the bow or before the beam, and then not when the wind is more than 4 points before the beam, reckoning by the 32 points of the compass, and to do that the sails must be well set. Suppose a boat with her head pointing to the wind; her sails will then flap about and tend to drive her astern. Now suppose her bow gradually turned from the wind: if the sails are hauled pretty flat, after a time, when her bow is 4 points or the 8th of a circle off from the wind, the sails will fill and she will move ahead. Having gone some distance she may be put about and go at a similar angle to the wind in the other direction, and will thus advance against the wind; this is called tacking or turning to windward. In sailing to windward, the sails are hauled aft to an angle which varies for each boat, and is found by experience. They should be kept properly full of wind; if empty, they are doing no good; if too full, the boat is off her course. A rule is to keep the flag or vane just over the mainsail. Boats ought to carry a weather helm; that is to say, the bow should have a tendency to turn toward the wind. Putting weight in the bow makes the weather-helm stronger, putting it in the stern or increasing the head sails has the reverse effect. When the wind is on the starboard side of the vessel, she is on the starboard tack; when the wind is on the larboard, she is on the port tack; and when vessels meet, that which is on the starboard tack either keeps straight or luffs; that on the port tack gives way and passes to leeward. To sail with the wind on the bows, the boat must have a keel. In a sail boat this is made movable, sliding up and down within a well in the centre, and is called the sliding-keel or centre-board. A skiff may be made to tack by holding the flat blade of a scull deep in the water against the side of the boat on the leeward side.

SKATING.

REMARKS.—The dress should fit closely and yet insure freedom of motion. Neither skirts to coats nor full trousers should be worn. The wood of the skate should be hollowed, to adapt it to the ball of the foot. There are many varieties of skates; some are made with high

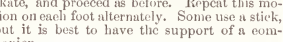
irons and some with low; some with narrow and some with broad; some with the bottoms of the irons at right angles with the sides, and some with a groove running lengthways through the bottom of the iron. For beginners, a low iron is best, and squarely ground.

BEGINNING.—The first attempt is to walk, which becomes a sliding gait, done entirely on the inside edge of the skate. The first impulse is to be gained by pressing the inside edge of one skate against the ice and advancing with the opposite foot. To do this, bring the feet nearly together, turn the left somewhat out, place the right a little in advance and at right angles with it, lean forward with the right shoulder, and move the right foot onwards, and strike the ice with the inside edge of the left skate, throwing the weight on the left foot. While thus in motion, bring up the left foot nearly to a level with the other, and proceed a short way on both feet. Next, place the left foot in advance in its turn, bring the left shoulder forward, incline to that side, strike from the inside edge of the right skate, and proceed as before. Repeat this motion on each foot alternately. Some use a stick, but it is best to have the support of a companion.



Inside Edge.

FORWARD ROLL. or OUTSIDE EDGE.—Usually considered the first step to figure skating; when once effected, the rest follows with ease. The impulse is gained as in the ordinary run; but to get on the outside edge of the right foot,

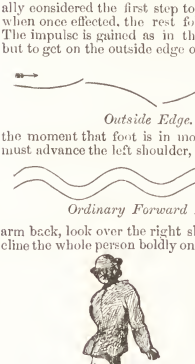


Outside Edge.

the moment that foot is in motion, the skater must advance the left shoulder, throw the right

Ordinary Forward Roll.

arm back, look over the right shoulder, and incline the whole person boldly on that side, keeping the foot suspended behind. On proceeding, bring the left foot past the inside of the right, with a jerk, which produces an opposing balance of the body; the right foot must then quickly press, first on the outside of the heel, then on the inside; the left foot is placed down in front,



Outside Edge Forward.

before it is removed more than 8 or 10 in. from the other foot; and, by striking outside to the left, giving a strong push with the inside of the right toe, the skater passes from right to left, inclining to the left side, in the same manner as he did to the right; then continues to change from left to right, and from right to left in the same manner.—*The Cross Roll*, or *Figure 8*, is done on the outside edge forward. This is only the completion of the circle on the outside edge, performed by crossing the legs and striking from the outside instead of the inside edge. To do this, as the skater draws to the close of the stroke on his right leg, he throws his left quite across it, causing him to press hard on the outside of the right skate, from which he immediately strikes, throwing back the left arm and looking over the left shoulder, to bring him well upon the outside of that skate. By completing the circle on each leg the 8 is formed. — *The Mercury Figure* is merely the outside and inside forward succeeding each other on the same leg alternately, by which a serpentine line is described, and is done with the force and rapidity gained by a run. When the run is complete and the skater on the outside edge, his person assumes the attitude of Mercury, having the right arm advanced and raised, the face turned over the right shoulder, and the left foot off the ice, a short distance behind the other, turned out and pointed.

Fig. 8.

INSIDE EDGE BACKWARDS, or FIGURE 3.—This is formed by turning from the outside edge forward to the inside edge backward on the same foot. The head of the 3 is formed like the half circle, on the heel of the outside edge, but when the half circle is complete, the skater leans suddenly forward, and rests on the same toe inside, and a backward motion, making the tail of the 3, is the consequence. At first, he should not throw himself quite so hard on the outside forward, in order that he may the more easily change to the inside back. When the skater is able to join the ends of the 3, so as to form one side of a circle, then, by striking off in the same manner, and completing another 3, with the left leg, the combination of the two 3's will form an 8. In the first attempts, the 3 should not be made above 2 ft. long, which is acquired imperceptibly.

Fig. 3.

OUTSIDE EDGE BACKWARDS.—The backward curve constitutes the base of all retrograde or backward figures. The position of arms and head is not the same as for the ordinary curve on the outside edge. When executing the outward retrograde curve the face must be turned toward the left shoulder. Having completed the 3, and being carried on by the first impulse, he continues his progress in the same direction, but on the other foot, putting it down on its outside edge, and continuing to go backwards slowly. To accomplish this, after making the 3, and placing the outside edge of the left foot on the ice, he should at once turn his face over the right shoulder, raise the right foot from the ice,

and throw back the right arm and shoulder. If unable readily to raise that foot which has made the 3, and leave him on the outside of the other skate, he may keep both down, putting himself in the attitude of being on the outside only of one skate, and gradually raising the other off the ice. When finishing any figure, the use of both feet backward has great convenience and beauty. In the *Double 3* the skates are brought from the inside back of the first 3, to the outside forward of the second. Having completed one 3, and being on the inside back, he must bring the whole of the left side forward, particularly the leg, till it is thrown almost across the right, on which he is skating. This action brings him once more to the outside forward, from which he again turns to the inside back. While still in motion on the second inside back of the right leg, he must strike on the left, and repeat the same on that. The *Back Roll* is a means of moving from one foot to another. Suppose the skater to have put himself on the outside edge back of the left leg, with considerable impulse, by means of the 3 performed on the right (not bearing hard on the edge, for the object is to change it, and take up the motion on the right foot); this is effected by throwing the left arm and shoulder back, and turning the face to look over them; when, having brought the inside of his left skate to bear on the ice, he must immediately strike from it to the outside back of the other, by pressing it into the ice as forcibly at the toe. Having been brought to the backward roll on the right foot, he repeats the same with it.—The *Back Cross Roll* is done by changing the balance of the body, to move from one foot to the other as for the back roll. The stroke is from the outside instead of the inside edge of the skate; the edge on which the person is skating not being changed, but the right foot, which is off the ice, being crossed at the back of the left, and put down, and the stroke taken at the same moment, from the outside edge of the left skate, at the toe. The outside backward roll is attained by a run, when the skater strikes on the outside forward of the right leg, turns the 3, and immediately puts down the 3 on the outside back. He then flies rapidly over the ice, the left arm being raised, the head turned over the right shoulder, and the right foot turned out and pointed.

Outside Edge Backward.

SALUTES. — The salute in a right line is not easy. Having struck out, place the feet in a horizontal line, elevating and rounding the arms. Continue the movement as long as you can. The salute in a curved line is easier. Having started, put your feet in the position you would adopt to describe the salute in a right line, only less horizontally. The head and body must be upright, the arms rounded, and the hands placed on the haunches; in this position describe a circle; then draw yourself up, the knees having become slightly bent, and, raising the right or left foot, prepare for another evolution, striking out straight forward, or toward one side.

Salute.

STOPPING.—Bring the second foot down on the ice, then glide forward, with both feet pointed in front of you, and parallel to each other, like the irons of a sledge; bend the body forward and throw the weight upon the heels. Those who wear skates with rounded heels cannot stop in this way, as the rounded irons, instead of sticking into the ice, would trip; he puts the second foot to the ground at right angles with the other, pointed entirely sideways, which stops his career.

SWIMMING.

REMARKS. — In the essential part of swimming (keeping the head above water) there is no skill; confidence in the sustaining power of the water is the secret; and if the novice will remember 3 simple rules, he cannot sink: 1. Keep the hands and feet well below the surface, and immerse the whole body up to the chin. 2. Hollow the spine and throw the back of the head upon the shoulders. 3. Move the limbs quietly. A good swimmer is distinguished by the ease of his movements. The arms and legs are flung out to their full extent, sweep round in the water equably, and are drawn up for another stroke without hurry. The bad swimmer never waits long enough to make a full stroke, but gives short jerks with his arms and legs, never extending them more than half their length. The best time of the day for swimming is before breakfast, between 6 and 8 in the summer, or 11 and 12 in the forenoon. Never enter the water on a full stomach, or after dinner; and never when over-heated or exhausted. Avoid entering when cold or with a headache. It is bad to walk until you get hot, then to sit down and cool, and afterwards to enter the water. It is wrong to enter during rain, as the clothes are often wet or damp, which gives cold.

AIDS. — Cork is sometimes used as an aid. It may be strapped on the back, as shown in the illustration. Boards are preferable. They should be over 4 ft. long, over 1 ft. wide, and 2 in. thick, and made of soft white pine or cedar. Wade into the water up to the shoulders, then take hold of the end of the board; push it be-

fore you; spring forward with the feet, and throw yourself flat upon the water. This car-

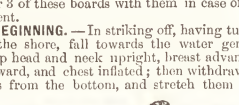
Swimming with Cork as an Aid.

ries you along a few feet; then draw up both legs at the same time; keep the knees as far apart as possible, and strike out with both feet

Swimming with a Board as an Aid.

sideways, like a frog. The stroke is made slowly and is repeated again, drawing up the legs slowly. The board keeps the head above water. When the leg stroke has been learned, one hand is taken from the board and the stroke learned, or the chin may be rested on the board while the stroke is taken with both hands; this compels the swimmer to keep his hand under the water. By-and-by the board may be pushed ahead, and the swimmer may swim after it. When a number go to swim, they should have 2 or 3 of these boards with them in case of accident.

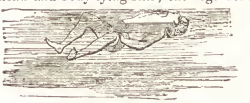
BEGINNING.—In striking off, having turned to the shore, fall towards the water gently; keep head and neck upright, breast advancing forward, and chest inflated; then withdraw the legs from the bottom, and stretch them out;



Striking Off and Swimming.

strike the arms forward in unison with the legs. The back can scarcely be too much hollowed, or the head too much thrown back; those who do otherwise will swim too near the surface, instead of allowing their feet to be 1½ ft. deep in the water. The hands should be placed in front of the breast, fingers pointing forward and kept close together with thumbs to the edge of the forefingers; the hands must be made concave on the inside, though not so much as to diminish the size. In the stroke of the hands, they should be carried forward to the utmost extent, taking care that they do not touch the surface of the water; they should next be swept to the side, at a distance from, but as low as the hips; then drawn up again, by bringing the arms towards the sides, bending the elbows up and the wrists down, so as to let the hands hang down while the arms are raising them to the first attitude.

BACK, Swimming on.—Place the hands on the sides of the body near the hips; lay the head and body easily on the water, the knees and elbows turned out so that they keep under; the head and body lying still; the legs drawn



Swimming on the Back.

up and used the same as in *Chest Swimming* (which see), not forgetting to use the ankle joint.

BACK, Swimming on, without Employing the Feet.—1. (*In the direction of the feet.*) The body is placed in a horizontal position, feet stretched out stiffly, heels and toes kept in contact, body somewhat curved at the seat, hands stretched flatly forward over the body, and slowly striking in small circles, the loins somewhat drawn up at each stroke.—2. (*In the direction of the head.*) The body is placed horizontally, but somewhat curved in the seat, head in its natural position, arms close to the body, elbows inclined inward, and hands describing small circles from the back to the front at about 1½ ft. from the hips. This strengthens the arms without fatiguing the breast.

BALANCING.—To perform this, when out of depth, fall gently back with the chin elevated to a line passing exactly through the centre of the body, from the chin to the toes, then fold the arms and remain motionless; the person may then suspend himself perpendicularly; but if he should extend his arms back and pass them gradually beyond his head, his toes, tips of his knees, abdomen and part of his chest, with the whole of his face will appear, and he will float horizontally without motion.

Balancing.

CHEST, Swimming on.—The great difficulty will be found in the management of the legs. The movement of the arms is natural, but that of the legs unnatural. The secret is to kick out the legs wide. The propelling power is caused by the legs being suddenly brought from a position in which they are wide apart into one in which they close together like the blades of a pair of scissors. In bringing the legs suddenly together, a wedge of water is forced backwards, and the resistance propels the body forward in an opposite direction. When this is considered, the importance of drawing the legs well up will be manifest. The beginner having practiced to move his legs properly by catching hold of

some object with the hands, should then try a few strokes in which he uses hands as well as

Chest Swimming.

legs. He will here experience a check. The moment he tries to move his hands, he will find that his legs refuse to obey. Were the hands placed sideways, the water would offer little resistance. By keeping the hands in the position named, the resistance offered by the water, in case of sinking, would be considerable. In drawing up the legs, the toes should be pointed. By this means the resistance of the water against the insteps of the feet is avoided. The movement of the arms is never one in which great difficulty will be found. The two hands shall be kept flat, the palms resting on the water; and, at the same time, as the swimmer strikes out with his legs, each hand should be brought slowly round, one to the right and the other to the left.

CRAMP. — Cramp proceeds from acidity of the bowels, or from the effects of cold water on the system. Some are subject to it, and will do well never to go out of their depth. But should a swimmer be seized with cramp, he should not be frightened, but the moment it is felt in in the foot or leg, strike out that foot or leg with the heel elongated, and the toes drawn upwards toward the shin-bone, never minding any pain it may occasion. Should this not succeed, he should, throw himself on his back, float quietly and paddle to the shore. He may also swim with his hand like a dog, and practice any motion of the upper part of the body for keeping his head above water till assistance arrives.

FLING.—The swimmer lays himself flat upon his waist, draws his feet close under the body, stretches his hands forward, and, with the feet and hands beating the water violently, raises himself out of the water. In this manner one may succeed in throwing one's self out of the water as high as the hips. This exercise is useful for saving one's self by catching a rope or other object that hangs from above the surface of the water, or from a perpendicular height.

FLOATING.—Floating is set down as the first requisite. Even an expert swimmer is liable to have his powers put to a test, so that the art of resting on the water without effort may be vital to him; while to him who knows nothing of swimming, to float securely is his only hope of safety in case of accident. Floating in a walking position, called "treading water," is easy to learn, but it presupposes deep water. Having learned to rest at ease on shallow water, the bather can float into deeper water without losing confidence, and thus pass by easy stages to swimming on the back, or through the practice of treading water to swimming in the usual way. The quantity of air in the lungs and buoyant portions of the viscera, but little more than suffices to float the body. With the arms extended the body is balanced as upon a fulcrum; the natural tendency of the feet to sink is counteracted, and the body floats, with the

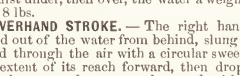
Floating.

mouth and nose out of water. With the arms at the sides, the preponderance of weight is below the centre of buoyancy, the feet drop, and considerable effort is required to keep the nose and mouth from being submerged, either by throwing the head back or paddling with the hands. It is true that a slight movement of the hands by a practiced floater suffices to keep the feet from dropping and the body horizontal; but that little effort is fatiguing, and is sure to be unskillfully made by a novice. Unless one is lean or deficient in lung capacity, floating can be easily learned; and in case of emergency the non-swimmer will find it a certain way of sustaining himself on water.

MILL. — The swimmer lays himself on his back, and contracts himself so that the knees are brought almost to the chin, and while one of the hands keeps the equilibrium by describing circles, the other continues working; thus the body is kept turning round more or less rapidly.

ONE HAND, To Swim with.—The learner, to do this, swims on one side, keeps his feet deeply sunk, while the arm which ought to work is kept quiet, and might be even taken out of the water. It is a good practice of strength to carry, first under, then over, the water a weight of 4 to 8 lbs.

OVERHAND STROKE. — The right hand is lifted out of the water from behind, slung forward through the air with a circular sweep to the extent of its reach forward, then dropped into the water edgeways, and turned, with the palm a little hollowed, downward, the body be-

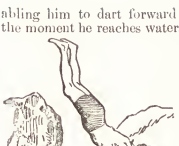


Overhand Stroke.

ing thrown a little on one side, and the right leg struck out backward to its full extent. The hand descends toward the thigh and then passes upward through the water in a curve toward the surface. The left hand and leg perform a similar movement alternately with the right, and the measure of progression attained by these combined movements is considerable.

PLUNGING AND DIVING. — In diving from a height, say 6 ft., the heels must be thrown well up, the legs kept straight and well together, and the hands brought forward in front of the head. The hands act as a breakwater, and should be turned up the moment the water is reached, preventing the diver going down deep, and en-

abling him to dart forward along the surface the moment he reaches water. A good diver can dive from a height of 40 to 50 ft., and yet never go a yard below the surface. If necessary to take a dive from a high place, you must not give the same movement to your body as if going off from the height of a few feet, otherwise you will turn over in the air and come down on your back.



Plunging and Diving.

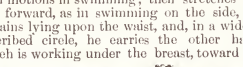
SAVING LIFE. — The swimmer must avoid approaching the drowning person in the front, in order that he may not be grasped by him. He should seize him from behind, and let go of him if the other turns toward him. His best way is to impel him before him to the shore, or to draw him behind: if the space to be passed be too great, he should seize him by the foot and drag him, turning him on his back. If the drowning person should seize him, there is no alternative for the swimmer than to drop with him at once to the bottom of the water, and to wrestle with his antagonist; the drowning man, by instinct to regain the surface, usually quits his prey, particularly if the diver attacks him with all his power. For 2 swimmers the labor is easier, as they can relieve each other. If the drowning person has presence of mind, they will seize him, one under *one arm, and the other under the other*, and without any great effort in treading water, bring him along, with his head above water, while they enjoin him to keep himself stretched out and as much as possible without motion.

SIDE, Swimming on. — The body is turned either on the left or right side, while the feet perform their usual motions. The arm from under the shoulder stretches out quickly at the same time that the feet are striking. The other arm strikes at the same time with the impelling of the feet. The hand of the latter arm begins its stroke on a level with the head. While the

Side Swimming.

hand is again brought forward in a flat position and the feet are contracted, the stretched-out hand is, while working, drawn back toward the breast, but not so much impelling as sustaining. As swimming on the side presents to the water a smaller surface than on the waist, when rapidity is required this way is often preferable.

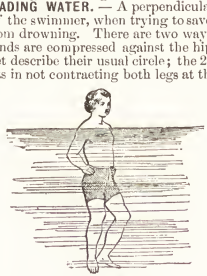
THRUSTING.—In the thrust the swimmer lies horizontally on his waist, and makes the common motions in swimming; then stretches one arm forward, as in swimming on the side, but remains lying upon the waist, and, in a widely-described circle, he carries the other hand, which is working under the breast, toward the



Thrusting.

hip. As soon as the arm has completed this motion, it is lifted from the water in a stretched position, and thrown forward in the greatest horizontal level, then sunk, with the hand flat, into the water; while the swimmer stretches forth the arm with the other hand stretched as wide as possible, he describes a small circle to sustain the body; then brings his hand in a largely described circle rapidly to the hip, lifts the arm out of the water, and thrusts it forward. During the describing of the larger circle, the feet make their movements. To make the thrust beautifully, practice is required. This mode of swimming is useful where rapidity is required.—*Double.* In the performance of this, the arm is thrust forward, backward, and again forward, without dipping into the water; in the mean time the stretched forth arm describes two circles before it begins the larger one.

TREADING WATER. — A perpendicular position of the swimmer, when trying to save a person from drowning. There are two ways: 1st, the hands are compressed against the hips, and the feet describe their usual circle; the 2d mode consists in not contracting both legs at the same



Treading Water.

time, but one after the other, so that while the one remains contracted the other describes a circle. In this mode the legs must not be stretched out, but the thighs are placed in a distended position, and curved as if in a half-sitting posture.

UNDER WATER. — When under water, the swimmer may move in the usual way, or keep his hands stretched before him, to enable him to cut the water and relieve his chest. If he approaches too near the surface of the water, he must press the palms of his hands up. If he wishes to dive to the bottom, he must turn the

palms of his hands up, striking with them rapidly while the feet are reposing; and when he has obtained a perpendicular position, he should then stretch out his hands like feelers, and make the usual movement with his feet, then he will descend with rapidity to the bottom. It is well to accustom the eyes to open while under the water, as it will enable the swimmer to ascertain its depth.

WHEEL BACKWARDS AND FORWARDS.—In the forward wheel the hands are put as far back as possible, and so pressed against the water that the head is impelled under the surface, and the feet, by a pressure of the hands in a contrary direction, are rapidly flung above the head, which in this manner is rapidly brought again to the surface. In the backward wheel the swimmer lies upon his back; he contracts himself; the hands, stretched forward as far as possible, describe small circles; the feet rise, and as the point of equilibrium has been brought as near as possible to the feet, the head sinks, and the feet are thrown over.

WALL FLOWERS.

DANCING.

REMARKS.—In dancing, to relieve the mind and prevent confusion, some person (not one of the dancers) should call out the details of each figure for the direction of the dancers, and the person must have experience in order to fulfill his duties creditably. The caller should ascertain what pitch of voice is most audible with the least noise; every word be clearly enunciated; not a word used beyond what is necessary to make the call plain, which should be so timed that the last word of the command is finished at the moment the corresponding movement is to begin, and not made an instant sooner than necessary. If the command is given in a short and distinct manner, the time occupied by the musical bar preceding the movement is ample. To simplify verbal instruction, there are 5 fixed positions for placing the feet, as follows: *1st Position.* The feet must be placed with both heels touching and toes pointing out, so as to form an angle of 60° or the 6th part of a circle. For precision it is supposed that the learner is standing with his face looking due north, body erect, without stiffness, and this maintained under all circumstances, the movements being made by the feet alone. The 1st position is the same for both feet.—*2d; Right Foot.* The weight of the body is thrown on the left foot, the right foot extended due east, with the toe on the ground and instep well arched, as far as it will reach without causing the body to deviate from its perpendicular position.—*3d; Right Foot.* The right heel is brought down against the middle of the left foot at an angle of 60°.—*4th; Right Foot.* The right foot is extended with the toe touching the ground as far due northeast as it will go without disturbing the equilibrium of the body, now resting on the left foot.—*5th; Right Foot.* The heel of the right foot is brought down touching the toe of the left foot, and forming an angle of 60° with it.—*2d; Left Foot.* The feet are supposed to be in the 1st position. The left foot is extended, with the toe on the ground, due west.—*3d; Left Foot.* The left heel is brought to touch the middle of the right foot at an angle of 60°.—*4th; Left Foot.* The left foot is extended with the toe on the ground, as far due northwest as the perpendicular position of the body will allow.—*5th; Left Foot.* The heel of the left foot is brought touching the right toe at an angle of 60°. In the 2d and 4th positions of the right foot the weight of the body rests perpendicularly on the left foot, and *vice versa.* In the 1st, 3d and 5th positions the weight is on both feet. These positions are indispensable, and should be carefully practiced, so that when referred to they will be comprehended. The 1st position is an absolute necessity, as it gives the key to the direction of the feet under all circumstances. Nothing is more ungainly for a dancer than attempting to execute any step, or even to walk with his toes straight in front of his feet; and there is a constant risk of treading on his partner's toes.

CONTRA DANCES.

REMARKS. — This is a class of dances which derives its name from the manner in which the dancers are arranged. In the quadrille, partners stand side by side, each couple forming the side of a quadrilateral figure or square. In the contra dances the partners of each couple stand opposite to and facing each other, the couples collectively forming two parallel lines.

VIRGINIA REEL.— The couples form in 2 lines down the middle of the room, gentlemen on one side and ladies on the other, partners facing, the gentleman and lady of the head couple standing at the head of their respective lines at the top of the room. The couples may be designated *first, second, third,* etc. (in their order as they stand), to the *last* couple; the top or bottom couple being that which happens during the dance to occupy the position at the top or bottom of the lines. Each couple in turn becomes top couple and bottom couple at least once during the dance. The step used is an easy swing trot, in exact time, commencing with the music. *First gentleman and opposite lady forward and back.* At the commencement the first and last couples are top and bottom. The first gentleman and last lady take 4 steps towards each other and back, without turning; count 8.— *First lady and last gentleman.* The same; count 8.—*First gentleman and last lady swing right hands.* Dance up to meet one another, join right hands, swing

half round and straight back to places; count 8.—*First lady and opposite gentleman.* The same; count 8.—*First gentleman and last lady swing left hands.* Same movement as last reversed; count 8. The other opposites do the same; count 8.—*First gentleman and last lady swing both hands.* Meet in middle as before, and swing half round to left, holding both hands, and back to places; count 8. The other opposites do the same; count 8.—*First gentleman and last lady dos à dos.* Advance to middle, pass each other on right hands, round each other to the right, back to back, without turning, and back, passing to left of each other to places; count 8. The other opposites do the same If the set consists of a large number of couples, and is long, each pair may find difficulty in traversing half way up and back in only 8 counts. If this should be the case, the other pair of opposites must commence to move *on time*, avoiding collision with the dancers who are behind time on their way back to their places.—*First couple turn right hands.* The first gentleman and partner join right hands across the head of lines, turn fully once round, and drop right hands; count 4.—*Separate and turn second couple, left hands.* The gentleman joins left hands with second lady, and swings her half round; at the same time the first lady joins left hands with second gentleman, and swings half round; the first gentleman and his partner meet face to face; count 4. The first couple repeat these 2 movements with each other and each succeeding couple, until they reach the bottom. There the first couple join hands and dance up the middle to their former places at top. The gentlemen march to the left in line; the ladies to the right, and come up the middle again to places. The top couple dance down the middle to bottom, and become the bottom couple, the second couple at top. This left them at the bottom of the lines. Top and bottom couples begin the figure over again, the dance continuing until the first couple have got back to the top.

MARCH OR POLONAISE.

REMARKS. — It is usual to inaugurate the dances of the evening at a ball by a preliminary march. It should be led off by a gentleman and lady who understand the necessary evolutions, assisted, in case of necessity, by one or more of the floor commitee, to preserve uniformity of action through the march. All marching should be done in straight lines, following the direction of the walls of the room, the change of direction being made at each corner. The leader and his partner should lead the march; moving slowly once or twice round the room, to give couples time to fall in and follow. To insure success no gentleman can act as cavalier to two ladies, as the movements require all to march in couples. The leader should regulate his pace to suit circumstances, keeping the line of march unbroken, and the couples at uniform distances. The couples must follow exactly in the track of those before them and the leader, keeping correct time with the music, and conforming in every particular with the leader's movements.

ARBOR MARCH. — All the couples march round the room in order. The first couple join right hands, stop, and raise hands, forming an arch. The second couple pass underneath the arch, the gentleman first, and form another arch; the third couple pass under both, and form an arch; each couple passing through the arches ahead of them in turn, until one continuous arch has been formed. The first couple (now in the rear) passes through and out at the front end of the arbor, followed by each rear couple, until the arches have disappeared. If the number of couples is large, the first couple can follow the last couple at once under the arches, and repeat the arbor as long as desired. The plain march in couples is then resumed, until the line of march is in order again.

MARCH IN COLUMN.—The first couple lead round the room, until the leader reaches the bottom left hand corner. There, instead of turning upwards at right angles up the side of the room, the first couple file to the right and march in a line parallel with the advancing couples, but in an opposite direction across the room; as each couple arrives at the same corner, they file to the right and follow the leader. When the leader has got across the room, the first couple file to the left, and march straight across back again, and so on, forming a serpentine line of march backwards and forwards across the room until the top of the room is reached. To make this effective it requires a number of couples, so that there will be at least four lines, constantly passing each other in opposite directions. When the first couple reach the top of the room, they lead the march round the room, until all the couples are following in regular column.

MARCH IN FILE.—As soon as all are in order the leader heads the line of march up the middle of the room; when he has reached the top, he turns to the left, and his partner to the right; the gentlemen follow in single file, the ladies following the leading lady in the same manner; when the leaders of the 2 lines arrive at the bottom, they pass to the left of each other, the gentlemen marching round the room on the outside, and ladies inside them, and in the opposite direction. When the first gentleman meets his partner at the top of the room, they march together round the room to the right; followed by the other couples in order. The leader should introduce sufficient plain marching between each figure to get all the couples following him in column before commencing a new evolution.

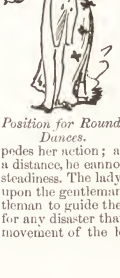
MARCH IN PLATOONS.—The first couple lead the march up the centre of the room. As they reach the top, the first couple passes to the right; the second couple to the left; the remaining odd couples in their order to the right, and the even couples following to the left. All march down their side of the room, until they meet in the middle at the bottom; then turn up the centre again 4 abreast. Arriving at the top, the first 4 wheel around by the right; the second 4 wheel round by the left, and so on alternately, each division marching down its side of the room. When they meet at the bottom, they advance up the centre again, 8 abreast. On reaching

the top of the room the first and the third 8 wheel to right, and the second and fourth wheel to left, each succeeding 8 wheeling right and left alternately down the sides of the room, meeting at bottom, and marching up the centre 16 abreast, thus forming full lines. At the top of the room all halt, the first, third, etc. (odd) lines face all to right; the second, fourth, etc. (even) lines all to left, the gentlemen step up by the side of their lady partners, and the front line marches off in couples to the right, the other lines following in their track, in the same manner as the *March in Column* (which see), and finishing the same.

SERPENTINE MARCH.—The couples march once round the room. The leader steps in front of his lady and leads the way up the centre of the room; as each couple turns to go up the centre, each gentleman steps into single line ahead of his lady, forming the couples into single file. When the first gentleman reaches the top of the room, he leads the way to the right entirely round and round the room, each successive round passing inside the former, describing a spiral track towards the centre of the room. As soon as the inner coil becomes small, the leader turns sharp round to the left and retraces his steps between the coils, until he marches between the coils entirely out of them. He continues his march until all the coils are unwound; then each gentleman retires a step to the left of his lady partner, and the march is continued in column until all the couples have fallen into order. At the conclusion of the march the leader stops, gives a signal for the music to change into a waltz, and leads off with his partner, followed by the other couples until the dancing becomes general.

Round Dances.

REMARKS. — In all couple dances, before commencing, the gentleman places his right hand to the lady's waist, so as to form a perfect support, and the lady then places her right hand in the gentleman's left. Both should turn their heads slightly to the left, the gentleman looking over the lady's right shoulder, and the lady over the gentleman's right shoulder, which position is maintained all through the dance without appearance of constraint. The gentleman should also preserve a proper distance between himself and partner. If he draw the lady too close, he necessarily impedes her action; and if he maintains too great a distance, he cannot support her with sufficient steadiness. The lady should not lean too heavily upon the gentleman. It is the duty of the gentleman to guide the lady, and he is responsible for any disaster that may occur. The slightest movement of the left hand indicates a change of direction. The lady should abandon herself to the guidance of her partner, and obey the slightest motion; for success depends upon the partners moving in concert. With fine dancers this seems like intuition. The gentleman should vary the direction of the dance, going forward and backward, turning to the right and reversing to the left in unceasing succession. The lightness and elasticity of successful waltzers can only be acquired by practice; and by shunning the appearance of laborious effort, the student will rapidly attain proficiency. One of the leading qualifications of a good dancer is not only to execute every step with precision, but adapt his steps and movements to conform with a partner who may not be absolutely correct.



Position for Round Dances.

ESMERALDA.—Music in 2-4 time. The gentleman slides 2 steps forward with left foot; then executes 1 polka step with the left foot (count 2), and continues 2 more polka steps with the right and left (count 2), recommencing the slide with the right foot, changing the feet alternately every time the sliding is commenced. The lady same as the gentleman, except the feet are reversed, she starting with right foot instead of left.

GALOP.—Although the time of this dance is different from the waltz, the portion of it used in turning is the same. In going straight down the room 1 foot is continually in front (left foot, gentleman; right foot, lady). Slide the front foot forward, bring the other foot up quickly behind, and slide the front again. Continue this movement till you wish to turn, then use the waltz step.

POLKA.—In this dance a hopping or jumping movement is ungraceful; so is the habit of kicking out the heels. The feet should scarcely be lifted from the ground, the dancers sliding and

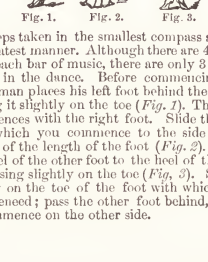


Fig. 1. Fig. 2. Fig. 3.

the steps taken in the smallest compass and in the neatest manner. Although there are 4 quavers in each bar of music, there are only 3 movements in the dance. Before commencing, the gentleman places his left foot behind the other, resting it slightly on the toe (*Fig. 1*). The lady commences with the right foot. Slide the foot with which you commence to the side to the extent of the length of the foot (*Fig. 2*). Bring the heel of the other foot to the heel of the first one, rising slightly on the toe (*Fig. 3*). Spring lightly on the toe of the foot with which you commenced; pass the other foot behind, ready to commence on the other side.

RACQUET.—The lady slides forward 3 steps with right foot; kick with right; count 1; kick with left; count one; kick with right; recommence the 3 slides with left foot, and so on. Do not kick high, but simply slide the foot outward slightly. A pretty way is to draw the foot slightly backward; the same for gentleman, except the feet are reversed.

REDOWA. — The most graceful of all couple dances; to execute it well avoid stiffness in the movements. The music is in $\frac{3}{4}$ time. The position in which the feet should be placed before commencing is the 3d, made by placing the heel of the right foot to the hollow of the left, the feet sufficiently turned so as not to make the dancers uncomfortable.—1. Spring lightly to the side with the right foot, point the toe of left to 2d position.—2. Slide left foot forward, pointing the toe of right foot behind.—3. Bring right foot up behind left to 3d position; then commence the step with left foot. Before attempting the backward step, with which the gentleman always commences, practice the forward step. To make the backward step, spring upon left foot, pass right foot behind, then bring left foot up to 3d position, in front of the right. The dance should be practiced up and down the room before attempting to turn.

SCHOTTISCHE.—Danced in 2-4 time, the first and third beat in each bar slightly marked. The slower the time played, in moderation, the more pleasing the effect. The gentleman starts off with the design of moving in circles; he slides forward the left foot, and as it stops, brings the right up to it smartly; slides the left forward again, and gives a spring on it, while he raises the right foot, and points it ready to start off with that, and repeat these movements. They may be continued without variation, the dancers revolving as in a waltz, if it is agreeable to the lady. When the first step has been performed 8 times, that is, 4 starting with the left foot and 4 with the right, alternately, the second part of the figure commences. This consists of 4 double hops. Take 2 on the left foot, half turning at the same time, then 2 on the right, completing the round. Repeat this; resume the first step for 2 bars; and so on throughout. But the *valse à deux temps* step is now substituted for the hops, and when a Schottische is played, good dancers often use that step throughout.

WALTZ, Boston Dip.—An exaggeration of the *Glide Waltz*, each glide accompanied by a considerable bend of the knee, which causes the body to sink down or dip at constantly recurring intervals. 1st. The gentleman should glide left foot forward; count 1. 2d. Bring up the right foot to 3d position, springing on it, and at the same time raising the left, pointing the toe to the floor; count 2. 3d. Spring again on the right, bring the left back close to and behind the right, heel raised, toe pointing to the floor; count 3. 4th. Glide left foot diagonally forward towards your partner, turning slightly to the right; count 4. 5th. Glide the left again, and bring the right in front of the left foot in the 3d position, and at the same time turn half round; count 5. The gentleman then commences with right foot, continuing with 5 more counts, making another half turn, thus completing the circle or turn. In taking the fourth step with right foot, the dancer (lady or gentleman) steps between his partner's feet, and not forward as directed for the left foot. The lady same as the gentleman, except the feet are reversed, she starting with right, instead of left foot.

WALTZ, Glide.—Music in $\frac{3}{4}$ time. 1st. The gentleman should glide backward with the left foot 1 step, bending both knees; count 1. 2d. Draw right foot back about 6 in. beyond the left, straighten the knees by slightly rising on the toes, and turn nearly half round to right, by throwing right shoulder back; count 2. 3d. Complete the half turn by bringing left heel up to right, settling down on both; count 3. 4th. Glide right foot directly forward, bending both knees; count 4. 5th. Advance left foot directly in front of right (4th position), straighten both knees by slightly rising on the toes, at the same time turn half round; count 5. 6th. Complete the half turn by bringing right heel up to left, and settling down on both. The lady commences at 4th position, right foot forward, continuing thus: 4th, 5th, 6th, 1st, 2d, 3d, and so on through all the waltz. While the gentleman executes 1st, 2d, 3d, the lady executes 4th, 5th, 6th, and while the gentleman executes 4th, 5th, 6th, the lady executes 1st, 2d, 3d. This continues all through the waltz without variation. The reverse is similar to the corresponding movement in the waltz. the change being made by gliding the left foot forward at 4th, instead of the right: 1st. Glide the left foot directly forward; count 1. 2d. Advance the right foot beyond the left, at the same time turning toward the left; count 2. 3d. Complete the half turn by bringing the left heel up to the right in 3d position; count 3. 4th. Glide backward with the right foot, bending the knees; count 4. 5th. Draw the left foot back 6 in. beyond the right, at the same time turning toward the left; count 5. 6th. Complete the half turn by bringing the right heel up to the left in 3d position. The lady executes 4th, 5th, 6th, while the gentleman executes 1st, 2d, 3d, and so on alternately.

WALTZ, Hop.—Music in $\frac{3}{4}$ time. 1st. The gentleman should spring from the right foot upon the ball of left, passing left foot behind right in 4th position; count 1. 2d. Pass right foot 2 or 3 in. behind left heel, turning on the ball of each foot; count 2. 3d. Complete the turn, bringing right foot front in 3d position; count 3. 4th. Spring from left foot upon ball of right foot, advancing right foot directly forward in 4th position; count 4. 5th. Advance left foot in front of right, turning on the ball of each foot; count 5. 6th. Complete the turn, bringing right foot front in 3d position; count 6. The reverse is executed the same as the plain waltz. The lady commences at 4th, continuing 4th, 5th, 6th, 1st, 2d, 3d, without changing.

WALTZ, Modern Plain. — This is the 3 step waltz, and the time is $\frac{3}{4}$. The gentleman takes his partner around the waist, same as for polka and other round dances. Pass left foot backward in direction of left. Pass right foot past left in same direction care being taken to keep right foot in rear of left (third beat), and then bring left up behind right; count 1. 1. Pass right

foot forward toward right. 2. Pass left foot forward still toward right. 3. Bring right foot up to right, turning at same time on both feet, and completing the turn; count 2. Always conclude with right foot in front to be ready to commence with the left. The above description is intended for the gentleman, who invariably commences on left foot; if, for a lady, *right* is substituted for *left*, it will be equally applicable. The usual progression of all waltzes is from the gentleman's left to right; but a good dancer should waltz equally well in the reverse direction.

WALTZ, Two Step.—Music in $\frac{2}{4}$ time, *i. e.*, 3 crochets in a bar. Commence from same position as in *Redowa*. Slide right foot forward (*Fig. 1*). Bring left foot up to 3d position, close behind right (*Fig. 2*). Slide right foot again forward (*Fig. 3*). Having completed the step with right foot, commence with left. In the backward step commence by sliding left foot back (*Fig. 4*). In practicing the step up and down

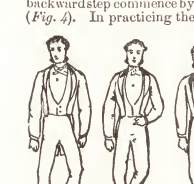


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

the room, the gentleman commences with the left foot, and makes the step backward.

Square Dances.

REMARKS.—Square dances should be danced by four couples, each couple occupying one side of the square. The gentleman stands on the left of his lady partner. In a ball-room the location of the first couple in each quadrille is usually on the side of the square nearest to the head of the room. The second couple stands opposite to and facing the first. The 3d couple is on the right hand of the first, and the fourth couple stands on the left of the first and opposite the third. The first and second are designated *head couples*, and the third and fourth the *sides*. It is not advisable to introduce more than 4 couples in a set, although occasionally done where space is limited, or when there are not couples enough to form 2 sets. A quadrille must consist of 5 parts. As soon as a gentleman has engaged his partner for the quadrille, he should endeavor to procure as his *vis-à-vis* some friend or acquaintance; and should then lead his partner to the top of the quadrille, provided that post of honor be still vacant. The music is divided into 8 bars for each part of the figure; 2 steps should be taken in every bar; every movement consists of 8 or 4 steps. When all the couples and sets are in order, the signal is given for the music to commence; the first 8 bars are preparatory, during which the partners of each couple salute one another; each gentleman bows first to his own partner, then to the lady of the couple on his left; each lady curtsies, first to her partner, and then to the gentleman of the couple on her right. People now generally walk through a quadrille. A perfect knowledge of the figure, a graceful demeanor, and a correct ear for the time of the music are required. The various figures of square dances are made up by combining certain elementary movements, each known by a distinctive name as follows:

TERMS USED IN DANCING.

SWING CORNERS.—Each gentleman takes 4 steps towards lady of right hand couple, who advances to meet him, count 4; he swings her half round, right hands joined, count 4; he then advances 4 steps towards his partner, who comes to meet him, count 4; and swings her with left hands joined to places, count 4.

ALL CHASSEZ ACROSS AND TURN CORNERS.—The gentlemen make 4 steps to right; the ladies 4 to left, and turn corners with right hands once round; count 8; all make 4 steps back to partners and turn them with left hands to places.

ALL FORWARD TO CENTRE.—All the couples join hands, forming a circle; advance 4 steps towards the centre, and retire; count 8.

ALL FORWARD AND TURN PARTNERS.—All, still with hands joined, advance 4 steps, and then turn partners to places; count 8. The entire figure is repeated by head couples, except that the second time, in crossing over, the second couple pass inside in going, and outside in returning. The side couples perform the same figure twice, in the same manner.

ALL POLKA TO THE RIGHT.—Each couple turns with 2 polka steps to right, and they occupy the former positions of their next right hand couples; count 4.

ALL PROMENADE.—The partners of each couple cross hands, right hands uppermost; all promenade to the right around the space of the quadrille, reaching their places at the end of the 8 bars of music; count 16.

BALANCE.—This term, strictly applied, is the movement made by a lady and gentleman as described under the head of *Balance in Place*; but by some old, but generally accepted perversion of terms, the second and fourth movements of the first figure in the plain quadrille are called balance, whereas they are really a promenade movement. In that instance, the term balance means promenade; but, under other contingencies, it is the same as *Balance in Place*.

BALANCE IN PLACE.—Slide right foot to the right, bring left foot in front of the right in 3d position, count 2; slide left foot to the left, bring right foot in front of left in 3d position, count 2; repeat the whole, count 4.

BALANCE TO CORNERS.—Each gentleman turns towards the lady of the couple on his left, makes 3 short steps or glides to the right, and stops; count 4; then 3 to the left, and stops; count 4; turns her with both hands, and returns to places; count 8. Ladies advance 4 steps to the right, 4 steps to the left, counting 8; turn gentleman to the right, and return to places; count 8.

BALANCE TO PARTNERS.—The partners of each couple face each other; each takes 4 steps to the right, and 4 back again to the left; count 8. Turn partners, holding both hands; count 4.

CHASSEZ.—This is properly the name of a step, but from being generally employed to execute certain movements, these movements have been identified with, and known by the same name. The step is very simple, and may be done by either foot. Slide the foot sideways (the right foot to the right, or the left foot to the left), and bring the other foot close up to it, repeating the same successively once to each beat or count of the music, as many times as circumstances may require.

CHASSEZ ACROSS.—This movement is generally executed when all the couples of a quadrille are standing in column, as in the last figure of the *Lancers*. Each lady makes 4 steps to the left, passing across in front of her partner, at the same time each gentleman makes 3 steps to the right; bring left foot up, count 4. All make a short step forward and back in half time, count 4. All make 3 steps sideways, back again to first positions, count 4; and two short steps again to fill up 4 counts.

CHASSEZ ALL.—Ladies chassez 4 steps to the left and back; at the same time the gentlemen chassez 4 steps to right and back, behind their partners; count 8.

Turn partners with both hands to places; count 8.

CHASSEZ TO PARTNERS.—Partners face each other; each takes 3 steps forward, passing one another on right side; count 4; then 3 steps backward again; count 4; turn partner in place with both hands; count 8.

CROSS OVER.—When a couple cross over, each partner proceeds in a straight line across, and faces round, occupying the place opposite that from which he or she started, so that the gentleman who was on the left of his lady when he started, finds himself on her right after they have crossed over.

CROSS RIGHT HANDS.—This requires 4 persons. The 2 opposite join right hands, and the 2 other opposites join right hands at right angles across the hands of the first 2. In this position all make 4 steps to left; stop; drop right hands, turn round and cross left hands; in this position all make 4 steps to right; back again to former positions; count 8.

DOS-A-DOS.—Usually danced by a gentleman and opposite lady. They advance, pass on each other's right side, step across to right, back to back, without turning round, and pass each other's left hands to places; count 8.

FIRST COUPLE SEPARATE, CROSS RIGHT HANDS WITH SIDE COUPLE, AND TURN TO LEFT.—First gentleman goes to left, and crosses right hands with the side couple on his side; the lady goes to right and crosses right hands with the side couple on her side; these 2 triangles turn once round to the left; count 8.

FORWARD AND BACK.—Begin with right foot, take 3 steps forwards, and bring left foot behind right; count 4; commence with left foot, take 3 steps backwards, and bring right foot in front of left; count 4.

FORWARD AND DOS-A-DOS.—Forward again, each gentleman going to left of opposite lady, passing round behind her, back to back, from left to right, and return to place; count 8. Sometimes each gentleman turns opposite lady with both hands, instead of dos-a-dos.

FORWARD FOUR.—Each gentleman of the head couples joins right hands with his partner, advances 4 steps, and retires; count 8. Again advances 4 steps; first gentleman leaves his partner, who joins left hands with opposite gentleman, who retires with both ladies, first gentleman retiring to his place alone; 8 counts.

FORWARD AND LADIES TO THE CENTRE.—Partners join right hands, advance 4 steps; count 4; retire 4 steps to places; count 4; again advance 4 steps towards centre; count 4; each gentleman swings his partner half round, so as to face him; she remains in centre, and he retires to his place; count 4.

FORWARD AND STOP.—Commence with right foot, take 3 steps forwards, and bring left foot up behind right; count 4. Remain so until further orders.

FORWARD THREE.—Second gentleman and 2 ladies advance 4 steps, and retire; he again advances and hands the 2 ladies to first gentleman (who advances to receive them), and retires, the 3 retiring at same time; 8 counts; first gentleman and 2 ladies advance 4 steps and retire; advance again and meet second gentleman, all joining hands in a circle; count 8.

GENTLEMAN TO THE RIGHT.—Each gentleman takes 4 steps to right, in front of his right hand couple; count 4; dances 4 steps in front of the lady on his right; count 4; then turns her once round with both hands, and so on around the set.

HALF PROMENADE.—Head partners join hands and cross over to other side, head couples passing on the right; count 8.

HALF PROMENADE AND TURN PARTNERS.—Partners join hands and promenade to places; count 8; then turn partners in places; count 8.

HALF RIGHT AND LEFT.—Head couples cross over, each lady passing between opposite couple, and touching right hands in passing; partners join left hands and turn half round to places; count 8. The whole figure is repeated by the head couples, and then performed twice by the sides, making 4 times altogether.

HANDS ALL ROUND.—All the couples join hands, forming a ring, and swing entirely round in a circle back to places; or, swing 8 steps to left, stop, and 8 steps to right back again to places; count 16. Either of these 8 steps, alone, constitute *hands all half round.*

HANDS AROUND.—Performed by 3 or more persons joining hands in a ring, and swinging round in a circle one revolution.

HEAD COUPLES CROSS RIGHT HANDS.—Head couples advance and cross right hands, the 2 gentlemen joining right hands above, and the 2 ladies below; all make 8 steps to left, half round; count 8; reverse by crossing left hands, and make 8 steps, returning to places; count 8.

HEAD COUPLES FORWARD.—Advance 4 steps and retire; count 8. Advance again, salute and retire; count 8.

HEAD COUPLES RIGHT AND LEFT.—Cross over, touching right hands in passing, and partners swinging half round with left hands; count 8. Back again in same manner to places; count 8.

LADIES BALANCE TO THE RIGHT.—Each lady advances to the gentleman on her right, taking 4 steps to right and 4 to left; he then turns her round and places her at his right side, in the place his partner has left. In this manner each gentleman gets an exchange of partner.

LADIES CHAIN.—Danced by 2 opposite couples at same time. The opposite ladies cross over, giving each other right hands in passing; count 4; each lady joins left hands with opposite gentleman, and swings half round; count 4. Repeat, swinging partners with left hand to places; count 8. When not repeated, this is called *Half Ladies' Chain*, leaving each lady standing to the right of opposite gentleman.

LADIES FORWARD AND BACK.—The 4 ladies advance to centre 4 steps and retire; count 8

LADIES' GRAND CHAIN.—This movement is similar to the *Ladies' Chain*, but performed by all 4 ladies at the same time. The 4 ladies cross right hands in centre, making a half turn; count 4; drop right hands, and each lady joins left hands with opposite gentleman, swinging him half round in place; count 4. Repeat the movement back to places; count 8.

LADIES TO THE RIGHT.—Each lady takes 4 steps to right, in front of her right hand couple; count 4; she then dances 4 steps in front of the gentleman on her right; count 4; she turns him once round with both hands, and remains standing on his right side, taking the place of his partner; count 8.

PROMENADE.—Each gentleman crosses hands with his partner, right hands uppermost, and crosses over, passing to the right of the opposite advancing couple, to opposite couple's place; count 8. Executed by a simple walking step, or the chassez step. The same repeated, in the same manner, back to places; count 8. When it is not repeated, it is called *Half Promenade*, and leaves the couple in opposite places.

PROMENADE ALL.—Partners cross hands, right hands uppermost, and all the couples glide or chassez 7 steps to right to opposite places, and stop; repeat to places. When this is not repeated, it is called *Half Promenade All.*

RIGHT AND LEFT.—Performed by 2 opposite couples. The 2 couples cross over, each gentleman touching right hands with opposite lady in passing; count 4. As he drops the passing lady's right hand, he joins left hands with his partner, both turning half round into opposite couple's place; count 4. The same is repeated, bringing the couples back to their original positions; count 8. When not repeated it is called *Half Right and Left*, and leaves the couple in the places opposite to those from which they started.

RIGHT AND LEFT ALL ROUND.—The partners of each couple turn facing one another and join right hands; the gentlemen all go round to right, the ladies to left. Each gentleman in starting passes his partner on her right hand, and drops her hand; count 4; joins left hand with next lady (advancing to meet him), and passes her on her left, and drops her hand; count 4; joins right hands with next advancing lady, passes her on her right, and drops her hand; count 4; and so on, alternately, right hand and left hand with each succeeding lady, until he meets his partner just half way round the quadrille; there he salutes her, and joining right hands with her repeats the whole again back to places, filling up 6 bars of music, or 32 counts.

RIGHT AND LEFT HALF ROUND.—The gentlemen each holds his partner's right hand, passing to right; the ladies passing outside to left; the gentlemen giving alternately left and right hands to ladies in passing, until they meet their original partners half way round. They can stop, take their partners by the right hand and swing once round; count 16.

RIGHT HAND ACROSS AND LEFT HAND BACK AGAIN.—Opposite couples cross straight over, ladies inside, each lady touching right hands with opposite gentleman in passing; count 8. All face round and return, each lady joining left hands with opposite gentleman, whose hand she retains; she then crosses her right hand over her left, and joins right hands with her partner; count 8.

TAKE SIDE LADIES AND GO OPPOSITE.—First gentleman holds his partner's right hand with his right; with his left he takes third lady by her right hand, and leads the 2 ladies to second couple's place; the second gentleman does the same in regard to his partner and the fourth lady, and leads them to first couple's place; count 8.

TURN PARTNERS.—The gentleman takes his partner with both hands, and they turn once round to the left. When *Turn Partners* is called, it means that both hands are to be used, unless the right or left hand is specified.

LANCERS.—1ST FIG. Top lady and opposite gentleman advance and retire; then advance and swing round; top lady and gentleman change places with opposite couples, passing in the centre and return to places, passing outside;

set to corners and turn. The other 6 do same. —2D FIG. *Head Couples.* Forward and back, count 4; forward and leave ladies in centre, count 4; chassez to right and left, count 4; turn partners to places, count 4. *Side Couples:* Divide, all forward in 2 lines, count 4; forward again, and turn partners to places, count 4. *Repeat. Side Couples:* Same twice. — 3D. FIG. Top lady advances alone, then the opposite gentleman does same; lady courtseys, gentleman bows, both retire. The 4 ladies give right hands across, and dance round to left; then change hands and dance round to right; gentlemen dance round singly, the reverse way to the ladies, changing as they change. — 4TH FIG. *Head Couples:* To the right, count 4; to the left, count 4; turn partners to places, count 4; right and left, count 8. *Repeat. Side Couples:* Same twice. — 5TH FIG. Grand chain, giving right and left hands all round, till all in places. Top lady and gentleman advance to top, standing with backs to bottom couple; the second lady and gentleman on their right place themselves behind them, the couple on their left behind the second couple; and, finally, the bottom couple place themselves behind the other 3 couples, advance and retire, across and back; the gentlemen turn off to the left and the ladies to the right, gentlemen following first gentleman and ladies following first lady; when all are returned to the former situation they form 2 lines, each gentleman facing his partner, and chassée forward and back; gentleman turns his partner into her own place; the other 6 do the same.

PARISIENNE.—This variety of quadrilles does not confine itself to the waltz alone, but introduces also the polka and redowa, affording a pleasing contrast. The change in the time of the music will prepare for the waltz or polka movement at the proper moment. 1ST FIG. *First Couple:* Advance and salute right side couples, count 2; back to places, count 2; advance and salute left side couple, count 2; back to places, count 2. *Head Couples:* Right and left across and back, count 8. *All:* Waltz, count 16. Danced 4 times, each couple leading off in rotation. —2D FIG. *First Gentleman and Opposite Lady:* Forward, count 2; swing half round with left hands, facing partners, count 2; chassez to right, count 2; half turn with left hands, count 2; the above repeated, count 8. *All:* Polka to right, count 2; polka step to centre and back, count 2; the last 4 bars danced 4 times in all, requiring additional 12 counts. The whole figure is performed 4 times, commenced by each gentleman in succession.—3D FIG. *First Gentleman:* Leads lady on his left to centre, count 2; leads opposite lady to centre, count 2; leads lady on his right to centre, count 2; lastly his own partner to centre, count 2. *Four Ladies:* Join hands around gentleman, swing to left, count 4. *Four Gentlemen:* Turn partners to places, count 4. *Four Couples:* To the centre, count 4. *All:* Waltz to places, count 4. *Four Couples:* To centre, count 4. *All:* Waltz to places, count 4. — 4TH FIG. *First Couple:* To centre and swing half round, count 4; separate, cross right hands with side couples, turn to left, count 4. *First Gentleman:* And lady forward and back, count 4; turn left hands to places, count 4. *Head Couples:* Cross over and turn in opposite places, count 4. *Side Couples:* The same, count 4. *Head Couples:* The same to places, count 4. *Side Couples:* The same, count 4. Performed 4 times, each couple taking the lead successively. — 5TH FIG. *First Gentleman and Opposite Lady:* Forward and back, count 4. *Head Couple:* Salute and separate to sides, count 4. *All:* Forward and back, count 4; forward and form a star, count 2; balance, count 2. *Gentleman:* Forward to next ladies and balance, count 4; forward to next ladies and balance, count 4; repeat twice, count 8. *All:* Waltz round, count 16. Performed 4 times, each gentleman and opposite lady leading off in rotation.

PLAIN QUADRILLE. — 1ST FIG. *Head Couples:* Right and left, count 8; balance, count 8; ladies' chain, count 8; balance, count 8. *Repeat. Side Couples:* Same twice. —2D FIG. *Head Couples:* Forward 2; forward and back, count 4; cross over, ladies inside, count 4; chassez to partners, count 4; cross over to places, ladies inside, count 4; balance, count 8. *Repeat. Side Couples:* Same twice. —3D FIG. *Head Couples:* Right hands across, count 4; left hands back, count 4; balance in centre, count 4; half promenade to opposite places, count 4; 2 ladies forward and back, count 4; 2 gentlemen forward and back, count 4; forward 4 and back, count 4; half right and left. count 4. *Repeat. Side Couples:* Same twice.—4TH FIG. *Head Couples:* Forward 4 and back, count 4; forward 4, first lady cross over, count 4; forward 3 and back, count 4; forward again, ladies cross over, count 4: forward 3, count 4; forward again, count 4; 4 hands half round, count 4; half right and left, count 4. *Repeat. Side Couples:* Same twice. — 5TH FIG. *All:* Promenade, count 8. *Head Couples:* Forward 2, same as in *2d Fig.*, count 16; balance, same as in *2d Fig.*, count 8. *Repeat. Side Couples:* Same twice. *All:* Chassez.

PRINCE IMPERIAL. — As usual in all quadrilles, the first 8 bars of music are employed by the gentlemen saluting first their own partners, then the lady on their left. 1ST FIG. *Head Couples:* To the right and salute, count 4; take side ladies and go opposite, count 4; ladies' grand chain, without gentlemen, count 8. *All:* Chassez to right and left, count 4; turn partners, head couples at opposite places, count 4. *Head Couples:* Repeat as they stand. *Side Couples:* Entire figure once. — 2D FIG. *First Gentleman and Second Lady:* Forward, count 2; turn both hands, and both face first lady, count 2; cross over and turn with left hands, count 4. *Head Couples:* Forward and back, count 4; half ladies' chain, count 4. *All:* Chassez and turn corners, right hands, count 4; turn partners, left hands, to places, count 4. This figure is danced 4 times, each gentleman and opposite lady commencing in turn.—3D FIG. *First Couple:* Forward, count 2; gentleman back to place, leaving lady facing him in centre, count 2. *Second Couple:* Same, count 4. *Third Couple:* Same, count 4. *Fourth Couple:* Same, count 4. *Four Ladies:* Join hands back to back, 1

turn to left, count 4. *Four Gentlemen:* Complete the ring and salute, count 4. *All:* Balance as they are, count 4; turn partners to places, count 4. Perform 4 times, each partner leading off in turn. — 4TH FIG. *Head Couples.* Forward and back, count 4. *First Lady and Second Gentleman:* To sides, count 4; forward 6 and back, twice, count 4; foward 2 and back, count 4; forward 2, salute, and face partners, count 4; 4 hands, half round, with sides, count 4; half right and left to places, count 4. *Head Couples:* Repeat. *Side Couples:* Same twice. —5TH FIG. *Four Ladies:* To the right, 4 times, count 16. *First Gentleman:* And opposite lady. forward and back, count 4; forward and swing to face partners, count 4. *Head Couples:* Chassez to right and left, count 4; turn partners to places, count 4. *Head Couples:* Repeat the whole figure with second gentleman and opposite lady. *Side Couples:* Same twice.

SARATOGA LANCERS.—This set is similar to the regular *Lancers*; the difference lies in the modification of the figures to allow as many as possible to join in the dancing. 1ST FIG. *Head Couples:* Forward and back, count 4; balance and turn opposite partners, count 4. *All:* Allemand, count 4. *Repeat. Side Couples:* Same twice. — 2D FIG. *All:* Forward 4 and back, count 4; forward and ladies to centre, count 4; chassez and turn partners to places, count 4. This figure is performed 4 times.—3D FIG. *All:* Forward and back, count 4; forward and salute, count 4; ladies' grand chain, count 8. The whole figure 4 times. — 4TH FIG. *Head Couples:* To the right, salute, count 4; to the left, salute, count 4; 4 hands round, count 2; to opposite places, count 2; half right and left to places, count 2. *Repeat.* Head couples first to left, then to right. *Side Couples:* Same twice. —5TH FIG. *All:* Right and left half round, count 8; swing partners half round with right hands, and right and left back to places, count 8. *First Couple:* Promenade, count 8. *All:* Fall in and march, count 4. *Gentlemen and Ladies:* In opposite lines forward and back, count 4; forward and turn partners to places, count 4. Performed 4 times, each couple leading off in turn. *All:* Half right and left and back, count 8.

WALTZ LANCERS. — The *Glide* or *Waltz Lancers* consist of the corresponding figures of the original set, curtailed to allow of the introduction, at intervals, of the waltz movement. 1ST FIG. *Head Couples:* Forward and back, count 4; forward and turn opposite partners, count 4; waltz, count 16. *Side Couples:* The same. — 2D FIG. *Head Couples:* Forward and back, count 4; forward, ladies face partners, count 4; chassez and turn partners to places, count 8. *All:* Waltz, count 16. *Repeat. Side Couples:* Same twice. — 3D FIG. *Head Couples:* Forward and back, count 4; forward and salute, count 4; waltz, count 16. *Repeat. Side Couples:* Same twice. — 4TH FIG. *Head Couples:* To the right, salute, count 4; to the left, salute, count 4; waltz, count 16. *Repeat. Side Couples:* Same twice. — 5TH FIG. *All. First Couple:* Waltz, count 8. *All:* Chassez across, count 8. *First Couple:* Promenade, count 8. *All:* Forward and back, count 4; forward again, turn partners to places, count 4. *Repeat. Side Couples:* The same twice, ending with right and left all round. At the close of the waltz movements all form in 2 lines; ladies in one line, gentlemen in the other, as in the *Fig. 5* of the *Lancers.*

THE GERMAN.

REMARKS. — It is of importance to have a leader or conductor who is familiar with and able to impart the details of each figure with precision, and to insure success he must be obeyed promptly. He alone gives the signal to the orchestra, designates what figure must be performed, and when it shall be commenced and ended, and prompts those who are at fault. He is for the time an autocrat; but he should exercise his power with judgment, avoid all appearance of pretension, and should seem to indicate rather than direct. The ladies and gentlemen composing the German should lighten the duties of the leader as much as possible; they should give attention and preserve silence while he explains the figures, and during the performance of a figure, none, except those participating in it, should dance or promenade in any portion of the room. The leader, with his partner, is seated on the right, and the other couples on his left. He, with his partner, is the head. Each gentleman places his partner on his right. To preserve regularity, the same place or seat should be maintained by each throughout. At the beginning of each figure the leading couple make the *Tour de Valse*, and may be followed by as many couples as the leader indicates. He signals for dancing to cease by clapping his hands or sounding a whistle, and the couples stop as soon as they can reach their seats. The leader designates each figure, and it is danced by all the couples successively from right to left. The German may be composed of any number of couples, but in a large party the leader should seat himself in the centre, and select dancers from each end of the circle alternately; this shortens the dance and prevents it becoming tedious. In case the ladies should be in the minority, the gentlemen who have not been fortunate enough to secure a partner, are permitted to engage any of the ladies for a single figure without any formal introduction. Ladies who have no cavaliers are in the special care of the leader, who either dances with them or presents to them some of the gentlemen for casual figures. People invited to assist at a German are such as would form a social party, and ceremonious deportment is unnecessary. In the choice of figures the leader must be governed by the number of couples and their ability. Some of the figures are exceedingly amusing, and if entered into with a proper spirit of co-operation, may be made the means of a great deal of well-bred hilarity. In any of the following figures, the term waltz refers to any of the round dances that may have been selected as appropriate for the figure.

ALTERNATE MOULINET. — The first 4 or 6

couples make the *Tour de Valse*. The gentlemen who retain the left hand of their partners, form a *moulinet* by crossing left hands, and make a complete turn. At a signal (still retaining the left hands of their partners), they make an exchange of places, gentlemen turning behind and placing ladies in front, and the ladies form the moulinet, by crossing their right hands in the centre; in this position they make a complete turn in the opposite direction. At a signal they change, this time turning in front, and again describe a circle in moulinet. The figure terminates in a general waltz.

ARBOR.—4 or more couples perform a *Tour de Valse*, and afterwards form a circle with joined hands, all facing outwards. An equal number of couples join hands in another circle outside the first one and facing inwards. The gentlemen of both circles join hands above, and the ladies join hands below, the gentlemen raising their arms high enough to allow the ladies to pass beneath them. The ladies all pass around hand in hand in the passage way between the two rows of gentlemen. When the signal is given, the gentlemen lower their arms and each dances with the lady he has entrapped.

ARCADES.—All the couples waltz for a short time, then join hands, raising the arms as much as possible, so as to form a sort of arch; the end couple then separate and waltz round the room, stopping when they reach the end of the line, and joining hands to form another arch. This figure is animated and graceful when rapidly executed.

BASKET OF EIGHT. — 4 couples perform an introductory *Tour de Valse*, ending in the centre of the room; the 4 gentlemen join hands back to back, and the 4 ladies join hands in a ring, inclosing the gentlemen and facing them. All dance round, the gentlemen to the right and the ladies to the left; at a signal, the ladies raise their arms, and allow 1 gentleman to pass under each pair of uplifted arms, still retaining hold of hands and forming a basket. In this position they dance in a ring once round; all let go of hands and execute a grand chain once round, closing with a waltz by the couples as they find themselves.

BASKET OF VEGETABLES. — An immense basket, filled with vegetables, cut out of cardboard, and made to represent leeks, carrots, potatoes, etc., is placed in the centre of the room, and similar vegetables are given to the ladies, who pin them as trophies to their bodices. The gentlemen are supplied with card-board forks, covered with silver paper, which they plunge into the basket and hook out some vegetable. Each dancer then seeks the lady who wears the corresponding vegetable, and waltzes with her, holding the fork in his hand.

BASKET, RING AND FLOWER. — The first couple perform the *Tour de Valse*. The gentleman then presents to his partner a basket containing a ring and a flower, and retires to his place The lady gives the ring to one gentleman, the flower to another, and the basket to a third. The gentleman who receives the basket must dance alone, holding it in his hand; the one who has the ring may choose a lady to dance with him, and the one who has the flower is to dance with the lady who presented it to him. When they have danced several times round the room they resume their seats and the next couples continue.

CORNET BOUQUET.—The cornet bouquet is attached to a cornet, and is composed of little bunches of flowers. The leader puts his mouth to the instrument and sings some popular air, and when he has finished singing a gentleman rises and detaches one of the little bouquets, which he gives to a lady; she immediately opens the paper which is wrapped round the stock, and which always contains some comical head-dress, with which she adorns her partner's head, after having fastened the bouquet of flowers to her bodice.

CROZIER.—A gentleman stands in the middle of the room, holding a crozier of silver paper, and to which are attached ribbons of different colors, which are held by six dancers. The leader then takes six ladies, who form a circle round the six cavaliers, who turn very quickly in one direction, while the ladies turn in another. At a signal they stop, and each gentleman dances with the lady opposite to him, still holding the ribbon and waltzing around the crozier. The same figure is repeated, the ladies holding the ribbons.

DOUBLE VIS-A-VIS.—The first 4 couples perform a *Tour de Valse*, afterwards arranging themselves in two lines, facing one another, the first and third couples forming one line, and the second and fourth couples the opposite. Then the first and third couples half right and left with opposite couples, and balance back to places. The couples then quarter face round so that the first and second couples will be opposite the third and fourth. Again half right and left with opposite couples, and balance to places.

FIGURE OF EIGHT.—Two chairs are placed in the centre of the room, 5 ft. apart. The first couple lead off and pass behind a chair, and then repass behind the other chair, so as to describe the figure eight. This is done without retarding the waltz; each couple in turn repeat the same figure.

FLAGS.—The leader provides himself with 10 pairs of flags of different patterns; he hands a set of exact duplicates to his partner, and they make a *Tour de Valse*. He then presents his flags to different ladies, and his lady hands her duplicates to as many gentlemen. Each gentleman seeks for, and makes a *Tour de Valse* with the possessor of the flag similar to the one presented to him. Having waltzed once around the room, each gentleman hands his flag to another lady, and his partner hands her flag to another gentleman, and the search for partners and valse are repeated, until all have danced.

LABYRINTH.—All the couples form a ring, and turn to the left. At a signal the leader quits the hand of the lady to his left, and continuing to turn to the left, enters the circle, forming a *colimacon* (snail), while the lady moves to the right, outside the others. A circular space must be maintained, to waltz within it. In this position the leading couple set out by waltzing, following the windings of the labyrinth formed

by the general chain coiled upon itself, until they arrive at the last couple, and then take a place in the chain. As a new couple arrives, it takes its place next to the last arrival. When all in turn have arrived, finish with a *Tour de Valse*.

LITTLE ROUNDS. — The first 3 or 4 couples lead off with a *Tour de Valse*. Each gentleman selects a gentleman, and each lady a lady. The gentlemen place themselves 2 by 2, one couple behind the other, leaving a space of 4 ft. between the couples. The ladies form in the same manner, but face in the opposite direction, so that the first 2 gentlemen and first 2 ladies of each column face each other. The first 2 gentlemen and first 2 ladies join hands and turn to the left, making a complete circle, and, without stopping, the 2 gentlemen raise their arms so as to permit the 2 ladies to pass under. The 2 first gentlemen are now face to face with the next 2 ladies, and the first 2 ladies with the next 2 gentlemen, and the figure is repeated until the ends of the column are reached. After passing out of the end of the column, the gentlemen form a line at right angles with the column on one side, and the ladies form directly opposite and facing them, thus: When the two lines are completed as above, all forward and back during 8 bars; then forward again, and each gentleman takes the opposite lady and makes a *Tour de Valse*. The remaining couples perform the same figure, 3 or 4 couples at a time.

MAZE.—4 couples perform a *Tour de Valse*, and then form a quadrille. 4 other couples take up positions, so that a new couple stands behind each one of the couples that form the quadrille. The figure commences by the 4 inside ladies crossing right hands; they move entirely round, giving left hands to partners, and swinging round to places. While the inner couples are thus engaged, the 4 outer couples waltz half round, outside the quadrille, to opposite places. Then the inner couples waltz entirely round, resuming their places, but facing outwards. All chassez at places; turn at corners with right hands and turn partners with left hands to places. All the gentlemen then waltz to seats with the ladies standing opposite them.

INVERTED COLUMNS.—3 couples commence by a *Tour de Valse*. At a signal from the leader each gentleman selects another gentleman, and each lady chooses another lady. The first, second and third gentlemen arrange themselves in line, the 3 newly chosen ladies forming in the same line to the right of the gentlemen. The first, second and third ladies form in line opposite to and facing their respective partners, the 3 chosen gentlemen continuing the line to the left of the ladies, and each facing one of the chosen ladies. The figure is commenced by the gentleman next to the third lady in the ladies' line, giving his right hand to the third gentleman, his left hand to the second gentleman, his right hand to the first gentleman, whose place he takes at the head of the gentlemen's line. The third gentleman performs a similar chain with the 2 other chosen gentlemen, taking his position at the bottom of the line. The third lady and the first chosen lady next perform a similar figure, bringing the partners facing each other again; then all forward once and waltz.

MILITARY FLAGS.—10 pairs of flags, say 2 of each nation, are distributed by the leader and his partner. 4 lines of 4 each, alternately gentlemen and ladies, are formed with an officer in front of each. These lines march once round the room in regular file, and then march a second time round, coming last up the centre of the room. As each file reaches the head of the room, the gentlemen march to the left in single file; the ladies in the same manner to the right; halting on opposite sides of the room, and facing half round, gentlemen facing ladies. The corresponding pairs of flags then become partners for a dance.

NINE PINS. — An extra gentleman takes a position inside of the circle, and is known as the "Nine Pin." Opens with hands all around; Nine Pin then turns each lady in succession; ladies and gentlemen circle alternately around Nine Pin; back to places, and grand chain, Nine Pin joining in. At the sound of the cornet or stoppage of music, whoever is unfortunate enough to be without a partner (right hand to ladies in every instance), is considered Nine Pin, and must take his position inside of circle.

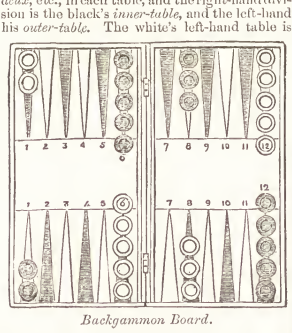
PYRAMID.—The first 3 couples begin with a *Tour de Valse*. The 3 ladies choose 3 other ladies. The 3 gentlemen then select 3 other gentlemen, who join hands in a line, the leader on the right. The line of gentlemen is conducted entirely around the first lady, then round the next 2, and then round the next 3. The movement is then repeated in reverse order until the leader arrives in front of the first lady, with whom he waltzes, and each of the other gentlemen takes the nearest lady.

THE GAME OF ALL GAMES.

GAMES.

SKILLED.

BACKGAMMON.—Played by two persons with dice, upon a board or table divided into 2 parts, upon which there are 12 points of one color and 12 of another; usually blue and red. Each player has 15 men, black and white, placed as in the diagram. The left-hand division is named the inner table, or home, and the right-hand division the outer table. The points are called by their French names, *ace* (one), *deux* (two), *trois* (three), *quatre* (four), *cinque* (five), *six* (six). That division in which are placed 5 white men and 2 black, is called the table of the *white*, and *vice versa*. That division between the boards is called the bar, and the 1st point on the other side of the bar is called the bar point. If the black be placed into the right-hand table, 2 men are placed upon the ace-point in the adversary's table, 5 upon the sixth point in his outer table, 3 upon the fifth point in your outer table, and 5 upon the sixth point in your inner table. The points are named alike, *ace, deux*, etc., in each table, and the right-hand division is the black's *inner-table*, and the left-hand his *outer-table*. The white's left-hand table is



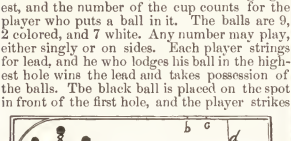
Backgammon Board.

his inner, and the right-hand his outer-table. The object of the game is to bring your men round into your own inner-table; and this is accomplished by throws of the dice. The game is determined by the chances of the dice, 2 of which are thrown by each player alternately. According to the numbers thereon are the points to which the men are moved in "measured motion" always toward the ace corner. Such man or men can only be placed on points not in possession of your adversary; 2 or more men on any point have possession of that particular point. But though you may not place your men on any of these points, you may pass over them. One man left alone on a point is called a blot, and may be taken up by opponent, if the throw of his dice calls for that point. It is placed on the division bar of the table until the owner can enter it again, by throwing a number on the dice which is not covered, or is merely blotted on the enemy's table. As only single men can be captured, 2 or more men being unassailable, the player should endeavor to secure as many points as possible by 2 or more men, thus preventing the adversary from entering any more. No man on the side of the player who has a man to enter can move until it is entered, and even if both parties have men to enter, they must go on throwing the dice until a number is turned up corresponding with a vacant or blotted point, the game remaining in *statu quo* until the men are entered. If 2 numbers are thrown, only one of which enables a man to enter, the other goes for naught, and if there be more than 1 man to enter, and only 1 number giving the privilege of entry appears on the dice, the game remains in *statu quo* till a proper number be thrown. When doublets (2 dice with the same number upwards) are thrown the player has 4 moves instead of 2. The route of each of the player's men is through the adverse inner table over the bar, through the opponent's outer table, round into their own outer table and over the bar home. Having brought the men home, the player for every number thrown removes a man from the corresponding point. Should the adversary be waiting to enter any of his men which have been hit, care should be taken to leave no blots or uncovered points. If a low number is thrown, and the cor-

responding point holds no men, they must be played up from a higher point. If one player has not borne off his first man before the other has borne off his last, he loses a "gammon," which is equivalent to 2 games. If each player has borne off, it is reduced to a hit, or game of 1. If the winner has borne off all his men before the loser has carried his men out of the adversary's table, it is "backgammon," and usually held equivalent to 3 games. A knowledge of the game can be acquired by playing, or studying these instructions, with a board before the learner. The rigbt of first play is determined by each one throwing dice, the highest number leading.

BAGATELLE.—Played on a table smaller than that for billiards, cushioned and semicircular at one end, and with cups instead of pockets, set flush with the table, into which the ivory balls are driven with the cue. These pockets are 9 in number in the small table, which is about 10 ft. long, and are set equidistant from each other, 1 in the centre and the others arranged around it, at the semicircular end of the table. Playing is done from the other end in the larger table, 12 to 14 ft. long; the cups are 15 in number, each numbered, the centre being highest, and the number of the cup counts for the player who puts a ball in it. The balls are 9, 2 colored, and 7 white. Any number may play, either singly or on sides. Each player strings for lead, and he who lodges his ball in the highest hole wins the lead and takes possession of the balls. The black ball is placed on the spot in front of the first hole, and the player strikes

Smaller Bagatelle.



Larger Bagatelle.

from the balk at the black ball, and endeavors to put it, his own, or both balls, into a hole or holes. The black ball counts double. The striker's ball must be placed within the balk line, and is struck with the cue at the black ball. The remainder of the balls are then driven in the same manner, and the sum total of the holes made is the player's score. Any number of rounds may be played previously agreed upon. The side obtaining the highest score wins. Any ball rebounding beyond the balk line, or forced over the board, is not played again during that game.

French Game.—The game is usually 100 up, and may be played by 2 or more players; 2 or 4 usually. The score is taken, as in *La Bagatelle*, from the figures marked within the cups. The red ball is placed on the spot, and he who has the break strikes at it with the other colored ball. If he succeeds in holing a ball he goes on till he fails; his adversary then plays, and so on alternately till the number determined on is obtained. He who first gets that number wins. While either of the colored balls remains out of a hole it must be played at, and he who fails to strike it, forfeits 5 to his adversary. If both reds are holed, the nearest white ball, if any, must be played on. Missing a white ball counts 1 to the adversary. Knocking a ball off the table is a forfeit of 5, though in some rooms no penalty is inforced. If a ball lies over a hole and does not immediately fall into it, the adversary may say; "I challenge that ball;" when, if it drops into the cup (from the vibration of the room or table, etc.), it must be replaced.

Mississippi.—Played by means of a bridge placed across the board, and a couple of cushions against the side. Each player strikes his ball against one of the cushions, to make it rebound on to the bridge, each arch of which bears a number. When the ball passes through the bridge, the player reckons the number of the arch to his score; and he who gains the highest number in 2 or more rounds wins.

Trou Madame.—Played the same as Mississippi, except that the balls are played direct at the bridge from the string, without the small cushions.

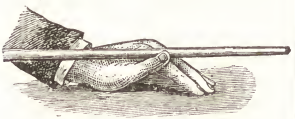
Carom Game. —Consists entirely of caroms, and may be played any number up. It is played with 3 balls. There is not much art in making caroms on a bagatelle board.

Irish Game.—Consists of caroms and winning hazards only. It is played with 3 balls, the carom counting 2, and the hazard as many as is marked on the cup. If the player's own ball falls into a hole, it counts to his adversary.

There are 2 or 3 other games on the bagatelle board, but they are too simple to need explanation.

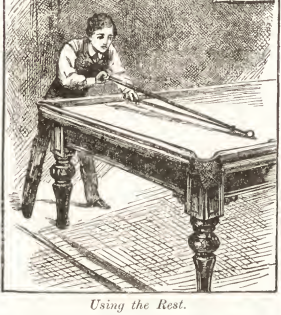
BILLIARDS. — Played upon a rectangular table. The size for match games is 5 ft. in width by 10 long, but smaller sizes are sometimes preferred. The proportion of length to breadth is as 2 to 1. The "pocket" table is seldom used, except in 15-ball pool. The preference in this country is for the carom table. The game is played with ivory or composition balls, propelled by a cue or mace. The standard size of the balls is $2\frac{3}{8}$ in. in diameter. The cue is a tapering maple or ash stick, 4 ft. 6 in. to 5 ft. in length, measuring 1 to $1\frac{1}{2}$ in. at the butt, and $\frac{1}{2}$ to $\frac{5}{8}$ in. at the tip; its weight, 12 to 21 oz. The mace (seldom used) has a boxwood head, flat, and is $1\frac{1}{2}$ in. sq., with smooth under surface, which slides over the cloth in pushing the ball. Inserted in this head is a light rod, 5 ft. in length. In using the cue, the thin end is allowed to rest between the thumb and forefinger of the left hand. The butt-end of the cue is grasped with the right hand 2 in. from the extremity. When the cue-ball is beyond reach, the player may use an instrument called the "bridge" or "rest," a slender ash rod affixed to a cross-head of bridge shape, with notches in its upper side, in which the cue rests for use. The following are the most popular games of billiards in the U. S.:

American 4-ball carom game, French carom or 3-ball game, 15-ball pool, pin pool, and the following 3 variations of the French carom game:



Position of the Hand in Playing.

Cushion caroms, balk-line, champions.' The last 2 are seldom played except by professional players, and for that reason a description is not here given.



Using the Rest.

American Four-Ball Game.—4 balls are used; 1 dark red, 1 light red, 1 white, and 1 white with a black point, from which it is called the spot ball. At the beginning of the game the red balls are placed at the spots marked *A* and *B* in diagram. One player takes the white, the other the spot-ball, and the question of the first play is decided as follows: The players place their

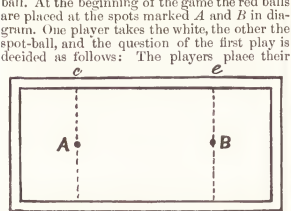


Diagram of Billiard Table.

balls as they choose at the head of the table, both being inside of an imaginary line, *c d*, drawn through the point *A*, called the string; they play against the cushion at the other end; he who succeeds in making his ball on rebounding from it approach the nearer to the head cushion from the vicinity of which he played, leads. The loser in stringing for the lead places his ball near the foot of the table, and inside on an imaginary line *e f*, drawn through the point *B*; and the play begins by the leader's playing from within the string on the ball of his antagonist. After the first shot no regard is paid to the string, to its corresponding limit at the foot of the table, or to the spots, unless one of the balls is accidentally knocked off the table, when, if it be a player's ball, its owner must play next time from within the string, and if it be a red ball, it must be placed on its appropriate spot. A carom, striking in a single play (either directly or by rebounding from the cushions, more than 1 ball) on a red and white ball, counts 2 in the regular rules of the game; the 2 reds counts 3, and on all the balls 6. These methods of counting are frequently varied; it being common to count every carom 3, or, more often, to count each carom 1. The game is won by the player who first makes a certain number of points; 100, 50, 34, 21, or whatever number of points may have been previously agreed upon.

French Game.— Played in all tournaments and public exhibitions, and of late years is the only game recognized by experts. It is played with 3 balls, 2 white and 1 red. The red is placed on the spot assigned to the deep-red in the American 4-ball game. At the commencement 1 of the white balls is placed on the light-red spot, connected with which is a described radius of 6 in. The other white ball, being in hand, may be played from any part of the semicircle, which answers for what in the 4-ball game is known as "the string." And whenever this cue-ball is in hand, the player has the right of playing it. The number of points to constitute a game is left to the option of the players. The game is begun by stringing for the lead, as in the American game. Should the play fail to count, his opponent then makes the next play, aiming at will at either ball on the table. A carom will count 1 for the player. A penalty of 1 is counted against the player for every miss. A ball forced off the table is put back on its proper spot. Should the player's ball jump off the table after counting, the count is good; the ball is spotted, and the player plays from the spot. If, in playing a shot, the cue is not withdrawn from the cue-ball before the cue-ball comes in contact with the object-ball, the shot is foul; the player loses his count, and his hand is out. If balls are disturbed through the medium of any agency other than the player, they must be replaced and the player allowed to proceed. If, in the act of playing, the player disturbs any other ball than his own, he cannot make a counting stroke, but may play for safety. Should he disturb a ball after having played successfully, he loses his count on that shot; his hand is out, and the ball so disturbed is placed back as near as possible in the position which it formerly occupied, the other balls remaining where they stop. Should a player touch his own ball with the cue or otherwise previous to playing, it is foul; the player

loses one, and cannot play for safety. If the player, after having touched his ball, gives a second stroke, then the balls remain where they stop, or are replaced in their former position at the option of his opponent. When the cue-ball is near another, the player shall not play without warning his adversary that they do not touch, and giving him time to satisfy himself. When the cue-ball is in contact with another, the balls are spotted, and the player plays with his ball in hand. Playing with the wrong ball is foul. However, should the player using the wrong ball play more than one shot with it, he shall be entitled to his score just the same as if he had played with his own; as soon as his hand is out, the white balls must change places, and the game proceed. The object-balls shall be considered crotched, whenever the centres of both lie within a 4½ in. square at either corner of the table. When the object-balls are so within said square, the 3 counts are allowed, except one of the object-balls or both be forced out of it. In case of failure by the player, his hand is out, and the next player goes on to play with the balls in position as left by last player.

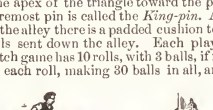
Fifteen-Ball Pool.—Played on a table with 6 pockets, one at each corner, and 1 on each side midway between the head and foot of the table. It is played with balls numbered from 1 to 15, and 1 white ball not numbered; the latter the cue-ball, and the player plays with it from within the string at the head of the table, at the opening of the game, at any of the numbered balls, and afterwards as he finds it on the table, his object being to pocket as many of the numbered balls as he can. Before commencing, the 15 numbered balls are placed in the form of a triangle; the ball numbered 15 is placed at the apex, pointing up to the head of the table, resting as nearly as possible on the spot known as the deep-red spot in the 3 or 4 ball carom games. The other balls are placed in the triangle so that the highest numbers are nearest the apex, the lowest numbers forming the base. The string line occupies the same place on the table as it does in the 4-ball carom game. The numbers on the balls count for the players who pocket them fairly.

Pin Pool (*New York Game*).—Played by 2 or more persons in the following manner: There are 5 small wooden pins set up in the centre of the table, diamond-like; the one at the apex next the head of the table is No. 1, the one to the right No. 2, the one to the left No. 3, the one next the foot No. 4, and the one in the centre No. 5; and they are placed about 2½ in. apart. The usual way of designating them is, by marking the numbers on the cloth next to the spot which each pin occupies, and the rotation of the players is determined by the small numbered balls. After this is determined, each player has another small ball, with a number on it, dealt to him by the game-keeper. The red ball is then placed on its appropriate spot, 5 in. from the lower cushion, midway between the two corner pockets; and he who has ball No. 1 plays from the string; No. 2 then plays from the string with the other white ball; No. 3 succeeds No. 2, and can play with, or at, any ball on the table. The player must first strike a ball with his own ball, before he knocks down the pins, otherwise it is no count. There are 3 balls used, 1 red and 2 white. The object is to knock down as many pins as will count 31, by adding the pins so knocked down, and the number on the private ball together, and he who first makes this 31 wins the pool. For example, if the number on the private ball be 10, it will then be necessary for the player to make the number count 21 by the pins. In many other parts of the United States 4 balls are used, and the game varies in many respects from the New York game. The number on the private ball is kept secret from the other players, although a skillful player may form a pretty correct idea of the number of the player's private ball, by the strokes and angles played by the striker.

Cushion Caroms. — Played with 3 balls (2 white and 1 red). The billiard table has 3 spots in a line, dividing the table lengthwise, running from the centre of the head cushion to the centre of the foot cushion; one of those spots, cutting the line in 2 equal parts, is called the centre spot, and the other 2 are situated half way between the centre spot and the head and foot cushions. The spot at the head is called the white spot, and the one at the foot the red spot. The centre spot is only used when a ball forced off the table finds both white and red occupied. In beginning, the red ball and one white are placed on their respective spots; the other white remains in hand and is placed near the white spot previous to the opening stroke in the game. The player can take any position within a radius of 6 in. of the white spot on or within a line parallel with the head cushion; but he must strike the red ball first before a count can be effected. The game is begun by stringing for the lead as in the *American Game*. If the player fails to count, his opponent then makes the next play, aiming at either ball on the table. Each cushion carom counts 1, and a penalty of 1 is counted against the player for every miss. A ball forced off the table is put back on its proper spot. If the ball jump off the table after counting, the count is good, and the ball is spotted. If the player disturbs any ball but his own, he cannot make a count. If he disturbs a ball after playing successfully, he loses his count, his hand is out, and ball disturbed is placed in its former position. When the cue-ball is in contact with either or both of the object-balls, it is optional with the player to spot the balls and play as at the opening of the game, or to play away from the balls, and count from a cushion. When the player's ball is in contact with a cushion, it may be played to rebound from the cushion, and if it comes in contact with the 2 object-balls, before or after striking another cushion, the stroke is a valid cushion carom; but if the player aim directly at the object-balls when his ball is in contact with a cushion, without making the cue-ball rebound from the cushion or take another cushion before effecting the carom, it is no count. The following are considered foul strokes: 1. Strokes made except with the point of the cue. 2. When the cue is not withdrawn from the cue-ball be-

fore the latter comes in contact with an object-ball. 3. Playing at a ball inside or on the string line, or when in hand playing from any position not within the 6 in. radius. 4. If, in striking, 1 foot does not touch the floor. 5. Striking while a ball is in motion. 6. Touching the cue-ball more than once. 7. Playing directly at any ball in fixed contact. 8. Marking the cloth as a guide to playing. 9. Playing with the wrong ball; but if the player use the wrong ball more than once, he is entitled to his score, but as soon as his hand is out, the white balls must change places, and the game proceed.

BOWLING, or TEN PINS.—Played on smooth platforms, 60 ft. in length and 4 in width, called "alleys," at the end of which the pins, 10 in number, are set up in a triangular arrangement, with the apex of the triangle toward the player. The foremost pin is called the *King-pin*. At the end of the alley there is a padded cushion to stop the balls sent down the alley. Each player in the match game has 10 rolls, with 3 balls, if requisite, to each roll, making 30 balls in all, and the



Bowling Alley.

game is kept on a slate or black-board, with 10 divisions for each player, each division representing the aggregate number of pins knocked down with the balls of that division. If a player knock down all the pins with one ball, it is called a 10-strike, and entitles him to a *double-spare*, or two spare balls, and he may score what he makes with the 2 first balls of the next division, in addition to the 10 already obtained; thus, if he make 9 with the next 2 balls, he scores 19 in his first division, and then counts in the second division what he may make with the 3 balls. If a player knock down the 10 pins with 2 balls, it is called a spare, and he counts, in addition to those 10, the pins knocked down by the first ball of the following division.

CARDS.—The terms made use of in playing cards are as follows; *Shuffling*. Mixing the cards, as is proper before every new deal. Each player has a right to one shuffle; the dealer has the last, and then the player to his right is to cut. He cannot substitute a shuffle for the cut, and require the dealer to deal from the shuffle. —*Cutting*. Lifting from the top of the pack a portion of the cards, which must be more than a trick, generally from $\frac{1}{4}$ to $\frac{3}{4}$ of the pack, and placing that portion under the remainder.—*Cutting for the Deal*. Each person lifts a few cards from the pack, and shows the undermost card of the parcel lifted; and whoever shews the lowest card (which is an ace in this case) is entitled to deal. If 2 have cards equally low they each drop 2 or 3, and the person showing the lowest deals. It is usual in large companies, instead of cutting, to deal 1 card to each, and the person getting the lowest is dealer. The exceptions to the above are in the games of All-Fours and Sixty-Six, in which the highest cut has the deal.—*Dealing*. Distributing the cards, by giving to each player in succession, from the top of the pack, 1, 2, or 3 cards at a time, according to the game played, the dealer beginning with the person on his left hand, and going round.—*Faced Card*. A card lying in the pack face up, so as to be seen in dealing, and in most games renders a fresh deal necessary. — *The hand* of cards is the portion which is given to each player. — *Elder Hand*. The person who *leads* or plays the first card; and the suit to which the card he plays belongs is called the *suit led* in that trick. —*Trick*. The cards played in a round, which consists of as many cards as there are individuals playing. The card which ranks highest of those played takes the trick, provided it be of the suit led; but the cards rank differently in value at different games.—*Trump*. The card turned up after the players have got their portions, and in games where all the cards are dealt out it belongs to the dealer. The cards of the suit to which the trump card belongs are called trumps, and the smallest card of that suit ranks higher in value than the best of any other suit. The *suits* in a pack of cards are 4 in number. Spades and clubs (black), and hearts and diamonds (red), each consisting of 13 cards: Ace, king, queen, knave, ten, nine, and so on, down to two. —*Renouncing*. Playing a card of a different suit from that led. If a trump card is played, it is called *trumping suit*. Severe penalties are annexed to renouncing or trumping suit, if a player holds a card of the suit led, and it is in this case termed *revoking*.

All-Fours, or *Seven-Up*.—Two persons play with a complete pack of cards. 6 cards are dealt out, and the 13th is turned up for the trump. There are 4 chances of scoring points; 1 is scored for each chance. Should the 4 fall into the hands of one player, he has *All-Fours*. He who can score 10 points first wins. The 4 chances are, high, low, jack and game. High signifies the best trump out; low the smallest trump dealt (this is always scored by the person to whom it is dealt); jack is the knave of trumps (when he is turned up as the trump card, the dealer scores). Game is scored by the player who can count the greatest number from the following cards in his tricks: 4 for ace, 3 for king, 2 for queen, 1 for knave, and 10 for ten. It is the object of each player to keep his own court cards and tens, and get those of his opponent. The player who lays down high or low trumps may ask if it be high or low. Also, if a player is not satisfied with his cards, he may say, "I beg," and the dealer is obliged to give him a point, or else deal out 3 more cards to each player, the 7th card being trump. But should this prove to be of the same suit, 3 more must be dealt till the suit is changed. This request can only be made once.

Cassino.—Played by 2, 3 or 4 persons. The dealer and partners are determined by cutting. The dealer gives 4 cards, 1 at a time, to each; either regularly as he deals, or by 1, 2, 3 or 4 at a time; lays 4 more face up on the board, and after the first cards are played, 4 others are dealt to each, until the pack be concluded; but

it is only in the first deal that any cards are to be turned up. The deal is lost, if, in the first round, before any of the cards are turned upon the table, a card is faced by the dealer; but if a card happen to be faced in the pack before any of the said 4 be turned up, then the deal must be begun again. Each plays 1 card at a time, with which he may not only take every card of the same denomination upon the table, but also all that will combine. A 10 takes not only every 10, but also 9 and ace, etc.; and if the player clear the board before the end of the game, he scores a point. Whenever a player cannot pair or combine, he puts down a card. The number of tricks must not be examined or counted before all the cards are played; nor may any trick but the last won be looked at, as every mistake must be challenged immediately. After the pack is dealt out, the player who obtains the last trick sweeps all the cards remaining unmatched on the table. It sometimes happens that the points are not set up, and that neither player gains anything in the deal; but the smaller number is subtracted from the larger, both in cards and points, and if they both prove equal the game is recommenced, the deal being taken in rotation. When 3 play, the 2 lowest add their points together and subtract from the highest; but if their 2 numbers added together amount to or exceed that of the third player, then neither scores. The following terms are used in the game: "Great cassino," the 10 of diamonds (containing 2 points); "little cassino," the 2 of spades (reckoning 1 point); the "cards," when a person has a greater share than his adversary, which counts 3 points; the "spades," when one has a majority of that suit, which counts 1 point; the "aces," each one of which stands for 1 point; and the "lurched," when a player's opponent has won the game before he has gained 6 points.

Cribbage.—There are several varieties of the game, such as "five-card," "six-card," and "eight-card" cribbage, the first and second being more common. Court cards and tens count as 10 each, and all the rest count for the number of spots upon them. The players may be 2, 3, or 4. The board is oblong, but for a 3-hand game is triangular, pierced with rows of holes, in which pegs are inserted to mark the points each player makes. The score is 61. The deal determined, the cards are shuffled by the dealer, who then lays them on the table on his opponent's side of the cribbage-board, which is usually placed on the table between two players. The non-dealer then cuts the pack into 2 parts, and with the undermost half the dealer distributes 5 cards each, beginning with his adversary. The dealer then places the remaining cards on the other heap, and the pack remains undisturbed till the crib cards are discarded. Each player looks at his hand and throws out 2 cards, it being imperative that the non-dealer throws first. The elder hand (the non-dealer) puts the cards on the table by taking up any number, not fewer than 3, without exposing the faces; the dealer lifts the topmost card of the lot left on the table; the non-dealer replaces the cards he cut, and the dealer puts the top card face up on the whole. The discarded and the exposed cut card (the turn-up) form the *crib*. The number scored in the crib belongs to the dealer; the deal being taken alternately. If a knave happens to be the turn up, the dealer takes "two for his heels." The turn-up is reckoned in making up the score of each player's hand, as well as of the crib. When the cards are played out, the non-dealer proceeds to count and take for his hand, reckoning the cards every way they can be varied, and including the turned-up card. For every 15, as queen and 5, 9 and 6, 8, 3 and 4, etc., 2 points; pair, 2 points; pair royal, 6 points; double pair royal, 12 points; sequence, or flush, or both, according to the number; knave of the same suit as the turn-up, 1 point. The dealer proceeds to reckon first his hand, and then his crib in the same way, and each marks the number of points gained. The main difference is to get 31, and then abandon the remaining cards; at the 6 card game the whole are played out. There are more points made in the play, while, at 5 cards, the game is often decided by the loss or gain of 1 point.

Euchre.—Played with 32 cards; all below 7 spot being rejected, except the ace. The cards rank in value as in most other games: Ace, king, queen, jack, ten, etc., excepting that jack of trumps, called the *right bower*, is the highest card of the hand; and the other knave of the same color, called the *left bower*, is the card of second importance. The other 2 jacks are inferior in value to the ace, king and queen. 4 persons constitute the complement, and partners are determined by dealing and turning up 1 card to each; those receiving the 2 lowest, and *vice versa*, being associated. Players usually cut for deal, and he who cuts the lowest card is entitled to the deal. The dealer deals 2 cards to each at the first round, beginning at the left, and then dealing an additional 3 cards in the same order. After 5 cards have been dealt, the dealer turns up the top card on the pack, called the trump. After the first hand, the deal passes to each player in rotation. When the trump is turned, the first person to the left of the dealer looks at his cards. If he thinks he can secure 3 tricks, he will say, "I order it up," and the dealer then takes the card turned up, and discards one from his hand; and the card taken up becomes the trump. If the eldest hand has not enough strength to order it up, he will say, "I pass," and then the partner of the dealer has to determine whether he will "pass" or "assist." If he has enough, with the help of the card his partner has turned, to make 3 tricks, he will say, "I assist," and the card is taken up. If he passes, it goes to the third hand, who proceeds as the eldest hand. Should all the players pass, the dealer announces what he will do, and if he thinks he can take 3 tricks, he says, "I take it up," and immediately discards his weakest card, placing it under the remainder of the pack, and instead of the card thus rejected he takes that turned up, which remains the trump. It is not considered *en regle* for the dealer to remove the trump card until after the first trick has been taken, unless he needs it to play. It is let lay, that every one may see what the trump is. It is always the

dealer's privilege to discard any one card in his hand, and take up the trump card; and this holds good whether he is assisted by his partner, is ordered up by his adversaries, or takes it up himself. This gives the parties having the deal an advantage equal to one trick. Should the dealer not be confident of winning 3 tricks, he says, "I turn it down," and at the same time places the turn-up card face down on the pack. Should all the players decline to play at the suit turned up, and the dealer turn it down, the eldest hand is entitled to make trump what he chooses (excepting the suit turned down.) If the eldest hand is not strong enough in any suit, and does not wish to make the trump, he can pass again, and so it will go in rotation, each having an opportunity to make the trump in his regular turn, to the dealer. If players and dealer should decline making the trump, the deal is then forfeited to the eldest hand. The eldest hand, after the dealer has discarded, opens the game, and leads any card. The person playing the highest card takes the trick, and he in his turn is obliged to lead. In this manner the game proceeds, until the 5 cards in each hand are exhausted. Players are required, under penalty of the loss of 2 points, to follow suit. If they cannot, they may then throw away a small card or trump. The game consists of 5 points, the parties getting that number first being winners, and the points are indicated by the number of tricks taken by the players. If all the tricks are taken by one side, it constitutes what is termed a *march*, and entitles the parties to a count of 2. It is necessary to take 3 tricks to count 1 or make a point. Taking 4 tricks counts no more than 3. If the elder hand order up the trump and fail in securing 3 tricks, it is called being *euchred*, and entitles the opponents to a count of 2; or if he make the trump after the original one has been turned down, and does not secure 3 tricks, he is also euchred, and it counts as before. Any 2 cards are used for counters that will, when combined, make 5 or more, such as the deuce and tray, or 4 and tray.—*With the Joker.* Played exactly as 4 hand euchre, with the addition of the odd card contained in every euchre pack, called the *joker* or *white face*, and which takes rank above right bower. If this happens to be turned for trump, the dealer turns the next card for trump. — *Set Back Euchre.* Differs from the regular game in the manner of counting. The players start at 5 points, and count only the score lost as a point, each winning point reducing the score, and the one first reaching zero being accounted winner. Other games can be played in the same way, taking as the starting point the number of points considered game in each.

Poker.—Draw poker is played with 52 cards and by any number of persons from 2 to 6. Before the dealer deals, the player next to his left, called the *ante-man* or *age*, must deposit in the pool an *ante* not exceeding ¼ the limit agreed upon, called a *blind.* The deal is performed by giving 5 cards to each, 1 at a time, beginning with the player to the left. After the cards have been dealt, the players look at their hands, and each in rotation, beginning with the player to the left of the age, determines whether he will go in or not. Any player who decides to play for the pool, must put into the pool double the amount of the ante, except the player holding the age, who contributes the same amount as his original ante. This makes the blind good, and all interested in that hand will have contributed alike. Those who decline to play throw their cards face down in front of the next dealer. Any player, when his turn, and after making the ante good, may increase the ante any amount within the limit of the game; the next player, after making good the ante and raise, may then raise it any amount within the limit, and so on. Each player as he makes good and equals the other players who are in before him, may increase the ante, if he chooses, compelling the others to equal that increase, or abandon their share of the pool. Each player who raises the ante, must do so in rotation, going round to the left, and any player who remains in to play, must put in the pool as much as will make his stake equal to such increase, or abandon all he contributed. Another feature introduced when betting upon the original hand, is the *straddle.* The straddle is nothing more than a double blind. For example: A, B, C, D and E play, A deals. B, the player holding the age, antes 1 chip. C can straddle B's ante by putting in the pool 2 chips, provided he does so before the cards are cut for the deal. D may double the straddle, that is to say, straddle C, and so on up to the age, provided the bets do not exceed the limit. In the above instance, supposing C only to straddle, it would cost D, E and A each 4 chips to go in, and B 3 and C 2 chips. Each straddle costs double that of the preceding one. The straddle does not give the player the age, it only gives him first opportunity to be last in before the draw; that is, the player to the left of the last straddler, after looking at his hand, and before the draw, must be the first to declare whether he will make good the straddle, and so on, in rotation, up to the player who made the last straddle. After the draw, the player to the left of the age must make the first bet, provided he remains in. A good player rarely straddles. When all are in who intend to play, each player has the right to draw any number of cards, from 1 to 5, or he can retain his cards as dealt to him. If a player draws cards, he must discard a like number from his hand previous to drawing, and the rejected cards must be placed face down near the next dealer. The dealer asks each in rotation, beginning with the holder of the age, how many cards he wants, and when the player has discarded, he gives the number requested from the top of the pack. When the other hands have been helped, the dealer, if he has gone in and wants cards, helps himself. When all hands are filled, the player to the left of the age has first say, and he must either bet or retire from the game, forfeiting what he has already staked. The same with the other players, in rotation, up to the age. When a player makes a bet, the next player must *see him, i. e.,* put in the pool an equal amount, or *go better, i. e.,* make the previous bet good, and raise it any amount not exceeding the limit, or he must pass out. This

continues until some one player drives the others out of the game, and takes the pool without showing his hand, or until the other players who remain in see the last raise (no one going better), and *call* the player who made the last raise. When a *call* is made, the players remaining in show hands, and the strongest hand takes the pool. The following is an example illustrating the mode of betting before and after the draw: The limit is 30 chips, and A, B, C, D and E are the players. A deals. B, holding the age, antes 1 chip; C goes in and puts up 2 chips; D makes good and raises 10 chips, putting in 12 chips; E passes out of the game: A makes good, and sees D's raise, putting in 12 chips; B makes good, sees D's raise, and goes 5 chips better; this costs him 16 chips; C passes out and abandons the 2 chips already put in; D sees B's raise, and bets the limit better, contributing 35 chips; A sees D, and deposits 35 chips; B also sees D, and puts 30 chips in the pool. A, B and D now each have 47 chips in the pool, which, together with the 2 abandoned by C, make a total of 143 chips. After the hands are filled, B holding the age, and C having passed out, it becomes D's say, *i.e.*, D's turn to declare what he will do. D determines to stake 5 chips; A sees D's bet and goes 30 chips better, and puts up 35 chips; B sees A, and deposits 35 chips; D makes good, putting up 30 chips, and calls A. Each of the players now have 82 chips in the pool, which, including the 2 chips which C forfeited, make a total of 248 chips. They show hands, and A having the best hand, captures the pool. If all the players pass up to the age, the latter takes the pool, and the deal ends. The value of the hands is as follows, commencing with lowest: *One Pair.* (Accompanied by 3 cards of different denominations.) If two players each hold a pair, the highest pair wins; if the two are similar, the highest remaining card wins. *Two Pair.* (Accompanied by a card of another denomination.) If two each hold 2 pairs, the highest pair wins; if the 2 pairs are similar, the player whose remaining card is the highest wins. *Triplets* (three cards of the same denomination, not accompanied by a pair.) The highest triplets win. Triplets beat two pair. *A Straight* (a sequence of five cards not all of the same suit.) An ace may either begin or end a straight. For example: Ace (highest), king, queen, knave, ten, is a straight, and the highest straight. Five, four, three, two, ace (lowest), is a straight, and the lowest straight. An ace cannot occupy an intermediate position, thus: King, queen, ace, two, three, is not a straight. If more than one player holds a straight, the straight headed by the highest card wins. A straight will beat triplets. Straights are not always played; it should be determined whether they are to be admitted at the commencement. If agreed that straights are to be counted, a straight flush outranks 4 cards of the same denomination, 4 aces for instance. *A Flush* (5 cards of the same suit not in sequence). If more than 1 player holds a flush, the flush containing the highest card wins; if the highest cards tie, the next highest in these two hands wins, and so on. A flush will beat a straight and triplets. *A Full* (3 cards of the same denomination and a pair). If more than one player holds a full, the highest triplet wins. A full will beat a flush. *Fours* (4 cards of the same denomination accompanied by any other card). If more than one player holds fours, the highest fours win. When straights are not played, fours beat a straight flush. *A Straight Flush* (a sequence of 5 cards all of the same suit). If more than one player holds a straight flush, the winning hand is determined in the same manner as the straight. When straights are not played, the straight flush does not rank higher than a common flush; but when straights are played, it is the highest hand that can be held, and beats 4 of a kind. When none of the foregoing hands are shown, the highest card wins; if these tie, the next highest in these two hands, and so on. If, upon a call for a show of hands, two or more parties interested in the call hold hands identical in value, and those hands are the best out, the parties thus tied must divide the pool, share and share alike. — *Old-Fashioned Game.* The foregoing is a description of modern draw poker, now almost universally played in this country; but some players, who object to a compulsory blind, which the ante of the player holding the age really is, prefer the old game of draw poker, which differs from the modern game in the following particulars: The dealer opens the hand by putting up a fixed ante before dealing, which is not, in strict sense, a bet or a blind. The age alone has the privilege of going a blind, provided he does so before the cards are cut for the deal, but this is optional. Previous to the draw any player may pass and come in again, provided no bet or blind has been made before he passes. If, previous to the draw, the players, including dealer, pass without making a bet, the hand is ended, and the eldest hand puts up an ante and deals. This contingency is not likely to occur often.

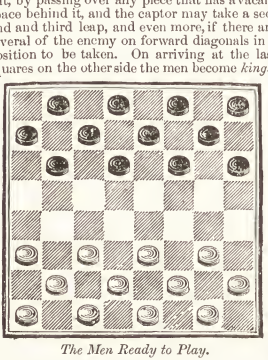
Sixty-Six.—Played with 24 cards: Ace, ten, king, queen, knave, and 9 of each suit, the cards ranking in value in order named above, trumps being the superior suit. When played by two, commence by cutting for deal, which belongs to the player who cuts the highest card, valued in accordance with their rank in the game, ace being highest and the ten next. The cards are cut by the eldest hand, after having been shuffled by the dealer, who then gives each 6 cards, 3 at a time, commencing with the eldest hand, turning up the next or 13th card for trump, which is laid on the table. A misdeal must be dealt over by the same dealer. The player having 9 of trumps may exchange it for the trump card turned up at any time after he has won a trick; this is called discarding. The eldest hand leads first, after which the lead belongs to the winner of the previous trick. After each trick each player draws a card from the top of the talon (cards remaining in the pack); the winner of the previous trick first, and the loser next; continuing this until the talon is exhausted or one of the players closes. The game consists of 7 points, and the player who first scores that number wins. The points are made in the following manner: The player who counts 66 first scores 1 point towards game; if he makes 66

before his opponent counts 33, he scores 2 points; or before his opponent wins a trick, 3 points. The cards count as follows to the winner of the trick containing them: Ace counts 11, ten 10, king 4, queen 3, knave 2, nine has no value. When a player has in his hand a king and queen of the same suit, he may, when it is his turn to lead, play the one, and, showing the other, announce 20 points, which are good, although he may lose the trick. He may not count these 20 points unless he has taken, or until he takes, a trick. The king and queen of trumps count 40. In the 3 handed game the deal passes in rotation to the left, the dealer giving the other two players their 6 cards, commencing with the eldest hand, but none to himself; and, when the round is finished, counts to his score the same number of points made by the winner of that round; but he cannot count his seventh point with the hand he dealt.—*Four-Handed Sixty-Six.* A modification of Sixty-Six for 4 players, and is the most popular 4 handed game played by the Germans, who call it *Kreutz Mariage.* The seven and eight of each suit are added to the 24 cards used in Sixty-Six, making 32 in all. The game is commenced by any one of the 4 persons proposing to play, dealing the cards round, face up, until an ace falls to one of them; the dealing is then continued to the 3 others, until another ace falls; the holders of the 2 aces are to be partners in the game, and play against the other two. The player to whom the first ace falls becomes dealer for the first round, the deal afterwards passing in rotation to the left. The deal is conducted as in whist; the last card turned up for trump, which is the property of the dealer, who takes it up in his hand after the first trick. The play follows in the same manner as at whist, except that a player, unable to follow suit, must trump if he can. The last trick counts 10 points to the winners of it. There is no announcing or discarding as in Sixty-Six. The score of the game is 7 points, as follows, the value of the cards counting the same to the winners of the tricks containing them as in Sixty-Six. If, at the end of the round, the winning partners count 66 or more, but not over 100, they score 1 point towards game; if over 100, but less than 130, 2; if they take every trick, 3. Whichever party captures the ten of trumps, scores a point and wins the game, if they have already scored 6 points. If, at the end of a round, both parties count 65, neither score, but the winners of the next round add 1 point to whatever they then make. When trumps are led, a player must play to take the trick, if he can.

Whist.—The players are 4, 2 of whom are partners against the other 2, the choice being decided by cutting the cards; the 2 who cut the highest are partners, and the 2 who cut the lowest are partners. The latter may choose their seats, and the lowest has the deal. Partners sit opposite each other. In cutting, the ace is lowest. Each player has a right to shuffle once before each deal, the dealer having the final shuffle; but it is not necessary for more than one partner on each side to shuffle. The pack is cut by the person on the right hand of the dealer, who puts the pack together again, and deals the cards round one at a time, beginning with his left-hand opponent. The last card is turned up and called a trump. The players then sort their hands, and the first card played is by the person at the dealer's left, called an elder or leader, and the others proceed and follow suit if they can. This completes the first trick, and the cards are taken by the side that wins and placed face down. A player who cannot follow suit may play any card. The player of the highest trump card wins the trick when he cannot follow suit. The winner of a trick is the leader for the next, and so on till the 13 tricks are played. The cards rank in value as follows: Ace, king, queen, knave, ten, and so on, down to two, the lowest in each suit; but any card of the trump suit is better than any card of another suit, and takes the trick in which it has been played. No intimations of any kind between partners during the playing of the cards are admitted, except in the case of a revoke, the partner is allowed to ask him whether he is sure he has none of that suit in his hand. Every trick above 6 which each party takes in the course of playing reckons one point towards game. The ace, king, queen, and knave of trumps are called honors, and each reckon on 1 point towards the game of the party to whom they are dealt. But one party having 3 of them counts only 2, and the other party none. If each party has 2, the honors are divided, and neither party reckons any. 10 is game; and if one party has made 9 points towards game they are not allowed to count honors, though they hold all the 4. If they have 8 points, and one of the partners holds 2 honors, he may ask his partner, at any time before he plays in the first round, but not afterwards, "Can you one?" meaning, have you an honor? If he has, he says, "Yes," or "I can;" and on both showing that they have 3 honors between them, the game is terminated in their favor without playing that hand. The points are marked or scored at the end of each hand, either by the holes in a cribbage-board, or with 4 counters. When one party is out, or has 10, before the other has made 5 points, it is called a double game; if before they can reckon 1, it is called a triple game; and the losing party is said, in either of these cases, to be *lurched. A Rubber* is the best of 3, or 2 out of 3 games; and the points of the rubber are, a single game, 1 point; a double game, 2 points, and the rub 2 points; so that 6 points may be gained in one rubber, namely, 2 doubles and the rub. When triple games are admitted, they reckon for 3 points each, thus allowing the possibility of 8 points being gained in one rubber.

CHECKERS, or DRAUGHTS.—Played by two persons. The pieces, or men, are 24 in number, 12 of each color. The board is placed between the players, each having an upper white corner on his right hand. On beginning, the men are placed in 3 rows on the white squares at the opposite ends of the board. The men can only be moved forward one square at a time, and from one white square to another. They must move diagonally, and never cross a black square. The aim of each is to reach the farthest squares

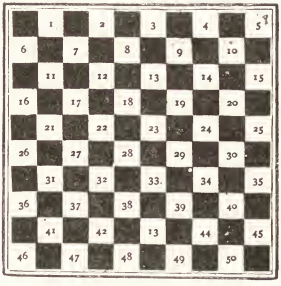
on the opposite side, and to take as many of the antagonist's pieces as possible. The men take in the direction in which they move, right or left, by passing over any piece that has a vacant space behind it, and the captor may take a second and third leap, and even more, if there are several of the enemy on forward diagonals in a position to be taken. On arriving at the last squares on the other side the men become *kings*,



The Men Ready to Play.

and can then move backwards or forwards. To get a man crowned is of the first importance, as the more pieces a player has thus invested with the privilege of forward and backward movement, the greater are his chances of winning.

Polish Game.— Played upon a board of 100 squares, with 40 men, 20 black and 20 white. When played upon the ordinary board, 24 men are used, 12 white and 12 black. As in the common game the men move forward one square at a time, except in taking a piece, when they move forwards and backwards. The kings (sometimes called queens) may move several squares at a time, and, if the passage be free, the whole length of the board. The men are generally placed on the white squares, though it is immaterial whether they are placed on black or white. The board should so stand that each player has a double corner on the right hand: The black squares, 41 and 46, and the white, 45 and 50. In this way the board is divided into 2 parts, the black men occupying 20 squares from No. 1 to 20, and the white men an equal number, from 31 to 50, leaving between the men of the two players two rows of vacant squares on which the front men are played. As a rule, between players of equal strength, the game is drawn when one of the players is reduced to a king and the other to 3 common men, as there is no stroke by which the latter can win. When one at the end of a game has a king and a man against 3 kings, the best way is to sacrifice the man as soon as possible, because the game is more easily defended with the king. If the game is embarrassed, open it by giving man for man or 2 for 2; if a dangerous stroke is in preparation, avoid it by exchanging man for man; if it is requisite to strengthen the weak side of your game, it may be managed by exchanging; if you wish to acquire an advantageous position, a well managed exchange will produce it; it is by exchanges that one man keeps many confined,

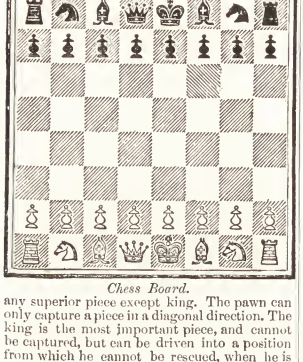


Polish Draughts.

and that the game is won. When 2 men of a color are so placed that there is an empty square behind each, and a vacant square between them where his adversary can place himself, it is called a *lunette*, and is much more likely to occur in the Polish than in the common game. In this position one of the men must be taken, because they cannot both be played nor escape at the same time. The lunette frequently offers several men to be taken on both sides, as it is most frequently a snare laid by a skillful player; for it is not to be supposed that the adversary, if a practiced player, would expose himself to lose. Before entering the lunette, look at your adversary's position, and calculate what you would do in a similar game.

CHESS.—The board resembles an ordinary draught board, so placed that each player has a white square at his right hand. Each has 16 pieces, arranged as in the illustration. The rooks occupy the corner squares; next to them, on each side, is placed a knight; then a bishop. The king and queen occupy the two centre squares of the first row; and the 8 pawns are placed in front on the second row. The queen stands always on a square of her own color. The rook moves in straight lines, backwards or forwards, right or left. The rook, bishop and queen may move one or more squares in their proper direction. The bishop moves diagonally to right or left, backwards or forwards, but cannot move to another color from that on which it was first placed. The queen moves in any direction, and may move more than one square. The knight is required to move two squares (one backwards, forwards or sideways, the other diagonally), but may pass over and past friend or foe to gain his position. The pawn can only move one square straight forward, except the first move, which may embrace two squares. When a pawn attempts to make this move of two squares, if it passes over a square commanded diagonally by an opposing pawn,

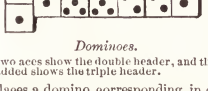
this opposing pawn may take it *en passant*, and move to the commanded square. When a pawn reaches the 8th square he may be exchanged for



Chess Board.

any superior piece except king. The pawn can only capture a piece in a diagonal direction. The king is the most important piece, and cannot be captured, but can be driven into a position from which he cannot be rescued, when he is said to be *checkmated*, which is the object of the game. He can move only one square at a time, but in any direction, and the player who succeeds in bringing him within the line of the movement of, or upon a square commanded by, any one of his pieces, puts the king in check, from which he can only free himself by moving out of the range of the adversary, or by interposing one of his pieces, or by capturing the piece giving check. Castling the king is a combined movement of king and rook, and can be made only when neither of these pieces has been moved and no piece intervenes between their positions; provided also that the king be not in check at the time of castling; and that no square over which the king may have to pass, be commanded by an adverse piece or pawn. The king may then castle in the manner following: On castling with king's rook, move king to knight's square and rook to king's bishop's square. To castle with queen's rook, move king to queen's bishop's square, and rook to queen's square; that is to say, in each case you move king two squares towards the rook with which you propose to castle, and place rook on that square over which the king may pass. In this game the captured piece is removed, and the opponent's piece substituted instead of jumping over. When a king, though not in check, is required to move, and cannot move without being placed in check, he is said to be stale-mated, and the game is considered drawn.

DOMINOES.—The dominoes are placed on the table, face down, and each player takes up one at hazard, to settle which is to have the *pose* or right of playing first; the highest number of points decides this; they are then put back among the rest, and are well shuffled. The two players choose 7 dominoes each, ranging them upright in a line on the table, with faces toward them, so that each may see his own. Thus the players will have taken up 14 out of 28 dominoes. The other 14 remain on the table, face down, to form a reserve. The winner of the pose puts down on the table, face up, the domino that suits him best. The adversary places a domino corresponding in one of its numbers with that placed by his adversary; the single numbers being placed lengthways, the doubles transversely; and so the game proceeds, till the player who won the pose has expended all his dominoes, his adversary having one left, say six-three. In this case the first player will count 9 toward the game, that being the number of points in his adversary's hand. The game is won by the player who first scores 100. The dominoes are shuffled again, the second player has the pose, and the game continues with a fresh deal. After two or three dominoes have been placed by the two players, one of them is unable to match any of those in his hand with the numbers at each end of the row on the table. In that case he passes, and his adversary plays instead of him, and continues to do so until the first player can again make use of one of his dominoes. If both players are compelled to pass, neither of them having a domino that will suit, they turn their hands face up, and the one who has the smallest number of points counts all his adversary's points toward his own game. This is called the block game. The rule for the player who has the pose is to play out the number which occurs most frequently in your game. For instance, if the number 4 occurs four times in your hand, the chances are that your adversary will have only one, or, perhaps, none at all of the same number, and he will thus be compelled to pass, and you will gain a turn. It is good to get rid of the higher numbers as soon as possible, for in case of a block, he who has the lowest number of points wins. Get rid of the doubles, also, for they are the hardest to place. The game of dominoes is one of mingled skill and chance. Nothing can avail against a lucky hand; but the combinations of the game give scope for a good deal of ingenuity. Sometimes, with two players, "drawing" is resorted to; that is to say, when one of the players cannot follow suit, he takes a domino at hazard, from the reserve; and if this will not do, a second, and so on, till his purpose is answered; this is called the draw game. Generally the game is confined to two; but four, five, or even six may join it, each playing on his own account, or divided into sides. In the latter case, the partners sit opposite to each other, the players having first drawn for partners, in the same way that they would for the pose, and the two high-



Dominoes.

The two aces show the double header, and the double ace added shows the triple header.

est playing against the two lowest. The play is from left to right, and the side of the first player who is out wins, counting to its score the number of points still held by the opposite party. In this game there may be drawing or not, according to agreement. If the players don't draw, and, on a block occurring, and the dominoes being turned up, both sides are found to have the same number, the deal counts for nothing.

Bergen. — Each player draws 6 pieces from the pool. The lowest double leads at the beginning, and is called a double-header. After that the parties lead alternately right to left. If no one has a double when his turn comes to lead, he plays his lowest piece. When a player sets down a piece, which makes the extremities of the line the same, it is called a double-header. If one of the extremities be a double, and the next player can lay a piece that will make the other extremity of the same value, or if a double can be added to one end of a double-header, it makes a triple-header. If a player is not able to match, he draws one piece from the pool and plays. If he is still not able to play, the next plays or draws, and so on, alternately. If domino is made, the one who makes it wins the hand. If it be blocked, they count, and the lowest wins; but if the lowest holds a double and his opponent none, the opponent wins. Or, if there be 2 with doubles, and 1 with none, the last wins. If there be a double in each hand, the lowest double wins. If there be more than one double in any one's hand, and all have doubles, the one with the least number of doubles wins, without reference to the size of the doubles he holds. Thus, if a player holds 2 doubles, though they be the double-blank and double-ace, and his adversary hold but one double, though it be the double-six, the latter wins. The game is 10 when 3 or 4 play, and 15 when 2. A hand won by either domino or counting, scores 1. A double-header led or made, counts 2; a triple header, 3. When either party is within 2 of being out, a double-header or a triple-header will count him but 1; and if he be within 3 of being out, a triple header will count 2. A prudent player will retain the doubles as long as possible to make triple-headers.

Bingo. — Played similarly to the card game of Sixty-Six. The rank of the pieces is the same as in other domino games, except that blanks count as 7 spots. The double blank, called *Bingo*, counts for 14 spots, is highest, and will take the double of trumps. The game is played by 2, and is commenced by drawing for the lead, and he who draws the lowest has the lead. Each player draws 7 pieces, after which the eldest hand turns up another piece, the highest spot on which is trumps. The eldest hand leads, and the play is conducted as Sixty-Six at cards. The game consists of 7 points, made in the following manner: The player who first counts 70 scores 1 point towards game; if he makes 70 before his opponent has counted 30, he scores 2 points; if before his adversary has won a trick, 3 points. If bingo capture the double of trumps, it adds 1 point to the winner of the trick. The pieces count as follows to the winner of the trick containing them: Double trumps, 28; the other doubles, and all the other trumps according to their spots; the six-four and three-blank are good for 10 each, whether trumps or not; the other pieces have no value. If a player have 2 doubles in his hand, he can, when it is his turn to lead, play 1, show the other, and announce 20 points, which are added to his count as soon as he has won a trick. If he hold 3 doubles, he counts 40; for 4 doubles, 50; for 5 doubles, 60; for 6 doubles, 70. If bingo be among the doubles held, it adds 10 more to the count.

Euchre.—Usually played by 4. The pieces rank as follows: The double of the trump-suit is the right bower, and the next lower double is the left bower. There is an exception to this rule, for when blank is the trump, it being impossible to have a lower double than the double-blank, the double-six is adopted, and becomes left bower. In this instance the lowest double is right bower, and the highest double is left bower. After the right and left bower, the value of the dominoes is governed by the number of spots following the trump. For instance, if six is trump, the double-six is right bower, and the double-five is left bower, followed by six-five, six-four, six-tray, and so on down to six-blank. If ace be the trump, the double-ace is right bower, and the double-blank is left bower; the ace-six is next in value, the ace-five is next, and so on down to the ace-blank. When the blank is trump, the double-blank is right bower, and the double-six left bower; the next trump in importance being blank-six, the next blank-five, and so on down to blank-ace, the lowest trump. When a suit is not trump, the value of the pieces take rank from the double of the suit in regular order, downward. At the beginning of the game the players draw to decide who shall turn up trumps; he who draws lowest is termed dealer. When the dominoes have again been shuffled, each player draws five pieces, beginning with the eldest hand; the dealer then turns up one of the remaining pieces for trump. That portion of the domino which has the highest number of spots determines the suit of trump. If six-ace be turned, six is trump suit. After the first hand the privilege of turning trump passes to each in succession. The eldest hand does not have the lead unless he exercises the privilege of ordering up, or making the trump. Only the player who takes the responsibility of the trump, that is, he who takes up, orders up, assists, or makes the trump, has the right to lead; with this exception, domino euchre is like the card game.

Matador.—Differs from all other games. Each player, instead of matching the pieces, must make up the complement of 7. For instance, a five requires a two to be played to it, because 2 added to 5 make 7. On a six, an ace must be played; on a four, a three-spot, and *vice versa*. There is no piece capable of making a seven of a blank; to obviate this there are 4 matadors, the double-blank, and the 3 natural seven-spots, namely, six-ace, five-two, and four-three. These 4 matadors can be played anywhere, at any time, and are the only ones which can be played on a

blank. Each player, at the commencement, draws 3 pieces; the one who has the highest doublet commences; or, if neither have a doublet, then the highest piece. If double-four lead, the player, whose turn it is next, must play a three to it; or, failing to have a three in his hand, must draw till he gets one. Supposing it to be a three-five, the end spots will be a four and a five; the next player must then either play a three on the four, or a two on the five, and so on. This game may be played by 2, 3, or 4. When 2 play, there must be 3 pieces left undrawn, to prevent each from knowing his opponent's hand. When more than 2 engage, all the dominoes may be drawn. The player who makes domino first, counts the spots on the other hand, or hands, and scores them towards game, which is 100 or more, as agreed on. If domino be not made before the drawing is ended, and a player cannot play in his turn, he must pass, and await his turn, but he must play if he can; failure to do so, deprives him of any count he may make with that hand. In playing, a doublet counts only as a single piece; for instance, double-six is a six, and can only be played on an ace-spot, or on double-ace; but, if left in hand after domino is called, it counts 12 points to the winner. If the game be blocked, and neither player can make domino, then the one whose hand contains the least number of spots wins, but his own hand does not count. Blanks are valuable; the double-blank being the most valuable of all the matadors. As it is impossible to make a seven against a blank, if you hold blanks you may easily block the game and count. When you have the worst of the game, and at other times, guard against your adversary's blanks, and prevent him from making them, which you may do by playing only those dominoes which fit with the blanks already down. Never play a blank at the lead, unless you have a matador or a corresponding blank. Keep back your double-blank till your opponent makes it blanks all; you can then force him to play a matador, or compel him to draw till he obtains one.

Muggins.—Each draws 5 pieces. The highest double leads; after that they lead alternately. The count is made by fives. If the one who leads can put down any domino containing spots that amount to 5 or 10, as the double-five, six-four, five-blank, tray-deuce, etc., he counts that number to his score. In matching, if a piece can be put down, to make 5, 10, 15 or 20, by adding the spots contained on both ends of the row, it counts to the score of the one setting it. Thus a trey being at one end and a five at the other, the next player in order putting down a deuce-five would score 5; or, if double-tray was at one end, and a player was successful in playing so as to get double-deuce at the other end, it would score 10 for him. The player who makes a count must instantly announce it when he plays his piece, and if he fails to do so, or if he announces the count wrongly, and any of his opponents call "Muggins," he is debarred from scoring. If a player cannot match, he draws from the pool the same as in the draw game, until he gets the piece required to match either end, or exhausts the pool. As in the Draw or Block game, the first one who plays his last piece adds to his count the spots his opponents have; and the same if he gains them when the game is blocked, by having the lowest count. But the sum thus added to the score is some multiple of 5 nearest the actual amount. The number of the game is 200, if 2 play; but 150 if there be 3 or more players.

Tiddle-a-Wink.—If 6 or more play, each takes 3 dominoes. The double-six is then called for, and the person holding it leads. If it is not out, the next highest double is called, and so on downwards until a start is made. In this game, he who plays a double, either at the lead or at any other part of the game, is entitled to play again if he can, thus obtaining 2 turns instead of one. The game then proceeds in the ordinary way, and he who plays out first, cries out "Tiddle-a-wink," having won. In the event of the game being blocked, he who holds the lowest number of pips wins.

MINOR GAMES.

ADVICE GRATIS. — Each player is provided with a slip of paper, on which he is to write a piece of advice, either original or a proverb. The papers are then folded and shaken up in a hat. Each person draws 1, and reads it aloud, first declaring, without seeing it, whether the advice is good, uncalled for, or mistaken.

BLINDMAN'S BUFF.— A person has a handkerchief bound over his eyes to blind him, and he tries to chase the other players, either by the sound of their footsteps or their subdued merriment, as they scramble away endeavoring to avoid being caught by him; when he can manage to catch one, and guesses who he is, the player caught must in turn be blinded, and the game be repeated. A modified way of play it is as follows: The party take hands and form a circle. In the midst stands Mr. Buff, blindfolded, and with a short, thin stick in his hand. The players keep running round in a circle, singing, while Buff approaches gradually, guided by their voices, till he manages to touch one of the circle with his stick. Then the dancers stop and become silent. The player who has been touched must take the end of the stick in her hand, while Buff holds the other, and she must distinctly repeat 3 times after him, any word he chooses to name; "Good morning," or "Good night," for instance, disguising the voice as much as possible. The blind man tries to guess the name of his captor. If he succeeds, the person caught becomes blind man; if not, Buff must try again.

BOUTS RIMES.—A number of slips of paper are distributed, and each person writes 2 words that rhyme. The slips are then collected and

read aloud, and each is then required to write a stanza introducing all the rhymes. Sometimes the whole of the rhymes are supplied by the leader.

CONSEQUENCES.—A round game, to play at which the company must be seated at a table. Each player has before him a long, narrow piece of writing paper, and a pencil. At the top of the paper each writes the quality of a gentleman. "The fickle," for instance, "the insinuating," "the handsome," "the ugly," or any epithet that may occur to the mind; but no one must see what their neighbors right or left have written. The top of each paper is folded down to hide what has been written, and each passes his paper to his neighbor on his right. On this he writes a gentleman's name; if that of one of the company, so much the better. Again the papers are passed to the right, after being folded over; the beauty of the game being that no one may write 2 consecutive sentences on the same paper. The quality of a lady is now written. Fold and pass the paper; the lady's name; then where they met; what he said to her; what she said to him; the consequence; and what the world said. The papers are now unfolded in succession and the contents read.

COPENHAGEN.—Procure a long piece of tape or twine, sufficient to go round the company, who stand in a circle, holding in each of their hands a part of the string; the last takes hold of the 2 ends. One remains standing in the centre of the circle, who is called "the Dane," who must endeavor to slap the hands of one of those holding the string before they can be withdrawn. Whoever is not sufficiently alert, and allows the hands to be slapped, must take the place in the centre, and, in his turn, try to slap the hands of some one else. Kissing the person caught is also frequently a part of the game.

DICE.—In all dice games, unless different arrangements be previously made, the highest throw wins. Each player throws the dice 3 times, and the sums of the spots uppermost at each throw are added together and placed to the score of that player. Ties are thrown over again, if it be necessary to establish any result.

Draw Poker.—Played with 5 dice; each player having 1 throw, with the privilege of a second if he desires it. In the first throw all 5 dice must be thrown; the player can leave all, or as many as he pleases, on the table, then gather up such as do not satisfy him, and throw them again. The throws rank as in the card game, beginning with the lowest; 1 pair, 2 pairs, triplets, a full hand, four of the same. The highest throw is 5 alike, ranking in the order of their denomination, from 6 down to 1; so that 5 sixes make an invincible hand; this can only occur in the dice game, while a flush occurs only in the card game. It should be understood that six is the highest and ace the lowest, the intermediate numbers ranking accordingly.

Going to Boston.—Played with 3 dice, which are thrown precisely as in *Multiplication.* The difference is in the counting; the result of the last throw being added to, instead of serving for a multiplier of the sum of the 2 remaining on the table.

Help Your Neighbor.—Played with 3 dice, and may be played by 6 persons, as follows: The players throw in regular rotation. The first player, or number one, throws 2, 4, 6, and as he has not thrown one, the number corresponding to his own, he scores nothing; but 6 being highest thrown, number six scores 6 points. The second player throws 2, 3, 5; he counts 2, and helps his neighbor five to 5 points. The third throws fours, so he gets nothing, while his neighbor four, scores 4 points; the raffles counting 4 instead of 12. Number four throws 1, 3, 3, making nothing for himself, but 3 for number three, or the third player. Number five throws 3 fives, which counts him 5 points. Number six throws 3 aces, which count him nothing, but enables number one to score 1 point. In this way the game proceeds, until some one wins by making the number of points agreed upon. When the game is played for a pool made up by the joint contributions of the players, the first out wins; but if for refreshments, the last player out loses.

Multiplication.—Played with 3 dice and 3 throws, as follows: The first throw is with 3 dice; the highest one is left on the table, and the other two taken up and thrown again; the higher one is left, and the lower one taken up and thrown again. The spots on the 2 left on the table are added together, and their sum multiplied by the spots on the third, or last die thrown; and this total placed to the score of the thrower. Thus we will suppose the player to throw as follows: First throw, three, two, and five; the five will be left on the table, and the three and two returned into the dice-box for the second throw, four and six; the six will remain on the table, and the four replaced in the dice-box. Third throw: Three. This will count 33; thus, the sum of five and six, the dice remaining on the table after the first and second throws, is 11; this sum multiplied by 3, the result of the third throw, makes 33.

Raffles.—3 dice are used, thrown by each player until he succeeds in throwing 2 alike; the first throw made containing a pair, counts its number of spots to the thrower's score. Triplets, or 3 alike, take precedence of pairs, so that 3 aces (the lowest triplet) will beat 2 sixes and a five. This is sometimes played differently, triplets counting only as pairs; thus, 3 fives would be reckoned as 15 points, and would be beaten by 2 fives and a six.

Round the Spot.—Played with 3 dice, thrown 3 times, the sum of the spot being thus reckoned, those spots only count which lay around a central spot, viz.: the three and five, the three spot counting for 2, and the five-spot for 4; thus it will be seen that six, four, two and ace do not count, and a player may throw 3 times and count nothing.

Vingt-un.—Played with a single die, each throwing it as many times as is necessary to get the sum of the spots equal to, or as near as possible, but not over 21. Throwing 22 or more bursts the player, depriving him of further participation for that round. The thrower of 21, or

failing that, the nearest to it, wins the game; but where a forfeit is played for, the player who fails the most in approaching the 21 loses the game. We will suppose B playing at Vingt-un, and throws as follows, viz.: Six, four, ace, and five; he now has 16, and should his next throw be a five, he will be just 21; but if his last throw, instead of five, had been six, it would have burst him, as he would be 22.

EARTH, AIR AND WATER.—One of the players is furnished with a handkerchief, which he throws suddenly and unexpectedly at another, crying out the name of "earth," "air," or "water," whichever he likes, and then counting 10 as rapidly as he can. Before he has come to 10, the person at whom the handkerchief is thrown must name a creature that inhabits the element thus mentioned, or, failing to do this, pays a forfeit. If the question is put very abruptly, and the number quickly counted, the players will often be unable to get out their reply quickly enough, and the forfeits come in merrily. The best way is to look at one person, and then unexpectedly throw the handkerchief at another.

EMPEROR OF MOROCCO. — One of those games in which the art consists in preserving gravity under every provocation to laugh. Two of the players, generally one of each sex, advance with measured steps into the middle of the room, and ceremoniously salute each other, and the following dialogue takes place, the speakers being compelled to look one another full in the face: *First player:* The emperor of Morocco is dead. *Second player:* I'm very sorry for it. *First player:* He died of the gout in his left great toe. *Second player:* I'm very sorry for it. *First player:* And all the court are to go into mourning and wear black rings through their noses. *Second Player:* I'm very sorry for it. They then bow again and retire to their places, while another pair comes forward to go through the same impressive dialogue; and so on, till the game has gone all round the circle, a forfeit being the penalty for the slightest approach to a giggle.

EYE-PEEPING. — Two holes are made in a screen. The performers stand behind it and place their eyes in the holes, while the persons in front guess to whom they belong.

THE FAMILY COACH. — Each in a company represents something connected with a family coach. One begins to relate an anecdote, and each time he mentions the family coach, all the players rise from their seats and turn round. When he mentions harness, wheels, pole, or any other part of the equipage, the persons representing those parts rise, each, at the mention of his name and turn round; failing to do this, they pay a forfeit.

FORFEITS.—*To act the dumb servant.* Performed by acting out the answers to the questions put by the master of the ceremonies; as, "How do you make bread?" "How do you make soup?" etc. — *Bite 3 in. off the poker.* Take the poker, hold it 3 in. from your mouth, and bite. — *Count 60 without saying 7.* Done by counting 6, the number next to 7, etc. But it is difficult to avoid mistakes. — *Hold the candle, and beg some one to kiss the candlestick.* The owner of the forfeit is herself the candlestick. — *Compliments under difficulties.* Pay 6 compliments to 6 different persons, avoiding the use of the letter *l* in every one. — *Kiss the one you like best in the room without hurting any one's feelings.* Do this by kissing every one. — *To sit upon the fire.* Do this by writing "the fire" upon a piece of paper and sitting on it. — *Kiss a book inside, outside and in the middle, without opening it.* Done by kissing the book in the room, outside the room, and in the middle of the room. — *Kiss one another rabbit-wise.* Done by each little girl taking an end of the same piece of string into her mouth and nibbling it until their lips meet, without either one dropping the string. — *To perform the egotist.* The victim is required to propose his own health in a flowery speech, and to sing the musical honors as a solo. — *To perform a Grecian statue.* A boy's forfeit, done by mounting on a chair or table, when each one of the company advances in turn and puts him in a different attitude, in which he remains until changed by the next person. — *To go out of the room with 2 legs and come in with 6.* Done by leaving the room and bringing in a chair on the return. — *To shake a dime off the forehead.* The owner of the forfeit is told that he will have to shake a dime off his forehead. The dime is inclosed in a damp handkerchief, and pressed hard against his forehead, but he is not allowed to put his hands up to his head. Feeling the impression of the dime, he will have no doubt that it has been fastened on, and not suspecting its removal in the handkerchief, he will begin shaking his head from side to side, and even rubbing it against pieces of furniture to get rid of what is not there.—*To push a chair through a finger ring.* This is done by putting the ring on the finger and pushing the chair (any other object will do as well) with the finger. —*To put a newspaper upon the floor in such a way that 2 persons can stand upon it and not be able to touch each other with their hands.* By putting the paper in the door-way, one half inside and the other half outside of the room, and closing the door over it, the two persons can easily stand upon it, and still be beyond each other's reach.—*To place a straw (or other small article) on the floor so that one cannot jump over it.* May be done by putting it close to the wall of the room.—*To pinch your own arm below the elbow.* This is a catch, and may be done by pinching the wrist of the right arm with the left hand.—*To put yourself through a keyhole.* Write the word "yourself" upon a piece of paper, and push it through the keyhole.—*To ask a question that cannot be answered in the negative.* Ask "What does *yes* spell?" *To play the judge.* Consists in sitting on a chair in a conspicuous part of the room, and listening with gravity to the complaints brought by the rest of the company, who try, by all kinds of ridiculous reports and artifices, to upset the stolidity of the learned gentleman on the bench.— *To put one hand where the other cannot touch it.* Grasp the right elbow with the left hand.—*The knight of the rueful countenance.* The knight whose forfeit is to be redeemed is marched

slowly round the circle of company by his squire, who kisses the hand of every young lady (and the cheeks of all under a certain age), wiping the mouth of the knight after each salute. If the knight's countenance relaxes from a rueful expression into a smile, his forfeit is not returned until he has gone through some other task. — *To blow a candle out blindfold.* The victim having been shown the position of the candle, is securely blindfolded, and after having been turned round once or twice, is requested to go and blow it out. — *Prison diet.* A glass of water and a teaspoon are brought into the room, the person who has to undergo "prison diet" is blindfolded, and a teaspoonful of cold water administered to him by any of the others, until he guesses who is feeding him. — *Pay each person in the company a compliment, and then spoil it.* This exercises the wit of the performer, and enables him to take a little harmless revenge on those of his friends who have been harassing him. To one, for instance, he says, "You have a finer voice than any one in this present company; but he adds, as the person addressed bows to the compliment, "it's a pity that you never give it any rest." To another, "You have certainly a great amount of wit, only you always exercise it at the expense of your friends;" and to a third, "Your eyes are certainly very bright, and that is the reason why they are always searching for their own reflection in the looking-glass ?" and so on till you have finished your round. — *The German band.* This is a joint forfeit for 3 or 4 players, each of whom is assigned some imaginary instrument, and required to personate a performer in a German band, imitating not only the actions of the player, but the sound of the instrument.—*The three salutes.* Bow to the wittiest in the room, kneel to the prettiest, and kiss the one whom you love best.

FOX AND GEESE.—A capital preparation for those who wish to become good draught or chess players. 1. The form of the board is shown in *Fig. 1.* The geese are represented by white pegs (or by pins, if the players draw their own board on a card), and the fox by a red or black one. The geese are 17 in number, ranged as in the diagram; while the fox stands in the centre of the board. The geese may be moved in the direction of the lines, one hole at a time. Their object is to block up the fox in a corner, or to surround him; while he, on his side, can take any goose which has not another in the hole

Fig. 1.

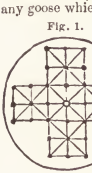
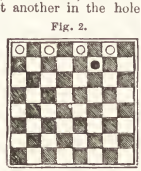


Fig. 2.



Fox and Geese.

behind it. If the fox can clear so many geese off the board that not enough are left to block him up, he wins; but if the geese are skilfully worked, they must win, by penning reynard into a corner. — 2. Another method of playing is with 4 white men, representing the geese, and 1 black one representing the fox. The geese are ranged on the 4 white squares nearest one player, and the fox may be placed where his owner pleases. The best place for him is that marked in *Fig. 2*, as he can maneuver in a very puzzling way. The geese can only move forward, but the fox moves either way. The object of the geese is to pen up the fox, and the fox has to break through. If the game is properly played, the geese must win, the secret being to keep them all in a line. The fox tries to prevent this, and if he can succeed in doubling the geese, or getting one to stand before another, he is nearly sure to pass through them.

"HOW D'YE LIKE YOUR NEIGHBOR?"—The company sit in a circle round the room, with a clear space in the middle. The chairs are placed close, and the number of chairs is one less than that of the players; for instance, if 13 players, 12 chairs. The chairless person stands in the middle of the room, and addressing one of the company, says: "Master Jones, how do you like your neighbor?" Jones may answer, "Very well indeed;" or, singling out 2, he may say, "I prefer Master A to Miss B," or "Miss A to Mr. R." If he likes both of his neighbors "very much indeed," all the players change places; if, on the contrary, he prefers Master A to Miss B, the 2 whom he names change, the others sitting still; it is the object of the person in the middle to get into one of the chairs while the changing is going on; and if he can succeed, the person left seatless must stand in the middle, and ask the players how they like their neighbors; if not, the first player has to take up his position again, and the game goes on.

"HOW, WHEN, AND WHERE DO YOU LIKE IT?"—One of the company retires, while the rest fix on some article or object. The person who has gone out is then recalled, and proceeds round the circle, asking each player in succession, "How do you like it?" Supposing the thing thought of to be money, the first may answer, "In abundance," the second "Ready," and so on. The questioner tries to gain from the answers given some clue to the nature of the thing thought of. The second question, "When do you like it?" will help him. One of the players may reply, "When I have to pay my bills;" another, "When I want a new coat," etc. The third question is certain to help a judicious questioner: "Where?" "In my pocket," one will reply; another, "At my banker's," etc. Some one is sure to drop a hint which will set the guesser upon the track. Three guesses are allowed. If he succeeds, he must point out the player whose answer gave him the clue, and the latter pays a forfeit, and goes out to be puzzled. Failing to guess in 3 trials, the first player must try another question. The art of the game consists in choosing words with more meaning than one, such as cord (chord); then the answers may be varied in a puzzling manner.

HUNT THE FOX.—Take partners and stand opposite each other in line. The one at the

head is the fox; her partner is the hunter. At a signal she starts and runs or dances down the line, her partner following. She can pass through the line as she pleases, the players standing far enough apart to allow her to pass. The hunter must follow the course of the fox; if he varies, he must pay a forfeit. When the fox is caught the first couple goes to the foot, and the next goes through the same. It adds to the jollity of the game to keep time to some tune like "Fisher's Hornpipe."

HUNT THE RING. — A long tape, with a ring strung on it, is held by the players, as they stand in a circle, with one in the middle. They pass the ring rapidly from hand to hand, and it is the business of the player in the midst to hunt the ring, and try to seize the hands that hold it; while the players make his task difficult by pretending to pass the ring to each other, when it may really be in quite another part of the circle. The person in whose hands the ring is found has to take his turn in the middle.

"I LOVE MY LOVE WITH AN A." — A well-known game, but it must be kept up briskly; for if too much time be allowed the interest flags at once. The company sit around, and each has to love his or her love with a different letter. The first (we will say a lady) begins, "I love my love with an A, because he's amiable; I hate him with an A, because he's arrogant. He took me to the sign of the 'Artichoke,' and treated me with apples and ale." "I love my love with a B," continues the second, "because she's beautiful; I hate her with a B, because she's bounceable. I took her to the sign of the 'Brown Bear,' and treated her with bread and butter, and beer." "I love my love with a C," says a third, "because he's candid; I hate him with a C, because he's captious. He took me to the sign of the 'Cart-Horse,' and treated me to curds and cream." And so the game goes on through all the letters of the alphabet. Instead of going regularly round the circle, it is better that each should have the power, after "loving his love," to call upon any one of the rest to continue the game. This gives additional interest from the unexpectedness of the summons.

INITIALS. —Any number of players can join, each one of whom tells the initials of his or her name, which the others can write on a slip of paper, if they do not prefer trusting to memory. Each invents an initial sentence, using the letters of one of the names. This sentence may be humorous or sensible, complimentary or the reverse. When all have prepared one or more sentences, the leader begins by addressing any person he pleases with a remark formed upon his initials, and each player follows his example, using the same letters. This attack is kept up indiscriminately on the person addressed by the leader, until he can answer the person who last addressed him before another of the players can say another sentence in the letters of his name, in which case the others all turn their remarks on the one thus caught.

JUDGE AND JURY.—A judge and jurors are selected; then the other players take the names of some historical personages. The judge calls up a player and questions her as to her reign or life. For any mistake in answering, the player must pay a forfeit to the jury, who inflict due punishment upon her for her lack of memory.

MAGIC MUSIC. — One of the players is sent out of the room, and a handkerchief, a pair of gloves, a brooch, or other small article, is hidden. The signal is then given for the banished one to return; and a lady or gentleman acquainted with music takes up a position at the piano. It is for the musician to indicate, by the strains of the piano, when the seeker is approaching the object hidden. As he recedes from it, the music falls to a low tone and a mournful cadence; as he approaches it, the notes swell out loud and clear, and burst into a triumphal strain as he lays his hand on the prize. If properly managed, the music may be made to have almost magnetic power. Another way, is to set the seeker some task to perform, instead of finding the handkerchief; say, for instance, he is to take a book from a bookcase, and present it to a lady. As he walks round the room, the music increases in sound as he approaches the book-case, but falls as he passes it. This tells him in what locality his task is. He takes a book, and the music sounds loudly and joyously. He begins to read—no! the music falls at once; he is faltering in his task. He carries the book round the room. As he approaches the lady, the notes burst forth loudly again, concluding with a triumphant flourish as he presents the volume to her with a gallant bow. In case of failure, a forfeit is exacted, and each player must have a task set him or her in turn.

PUSS IN THE CORNER.—4 players take up their positions at different corners, the 15th player standing out, and being known as puss. The 4 players change corners among themselves as frequently as possible, but so as to prevent puss from getting into any one of the corners. The player left without a corner becomes puss.

QUESTIONS AND ANSWERS.—All take partners and sit opposite each other. One person whispers a different question in the ear of each of those on one side of the room, and another person gives an answer to each on the opposite side. The first couple commence; one asks the question whispered to him, his partner gives the answer whispered to her. A lady should direct the gentlemen, and a gentleman the ladies. Each side asks the questions alternately; the side that was first to ask the questions being next to give the answers.

QUINZE. — Played by 2 with a full pack of cards. The cards are shuffled by both, then cut for deal, which falls to him who cuts the lowest. The dealer may shuffle them again. The ace is the lowest. When this is done the adversary cuts them, after which the dealer gives one card to his opponent and one to himself. Should the dealer's adversary not approve of his card, he is entitled to have as many cards given to him, one after the other, as will make 15, or come nearest to that number, which are usually given from the top of the pack. For example, if he should have a two and draw a five, which amounts to 7, he must go on in ex-

pectation of coming nearer to 15. If he draw an eight, which will make 15, he, as being eldest hand, is sure of winning. But, if he overdraw, and make more than 15, he loses, unless the dealer should do the same; which circumstance constitutes a drawn game, and the stakes are doubled; in this manner they persevere until one of them has won the game, by standing and being nearest to 15. At the end of each game the cards are packed and shuffled, and the players again cut for deal. The value of the cards is according to the number of their spots, ace counting for 1 only, and all the court cards being reckoned as 10 spots, following the same method as adopted in cribbage, as far as the numerical value of court cards is concerned. This game may be played by more than 2; but when a larger number play, Vingt-un, in more points than one, is generally considered preferable.

TIP. — Pour out from a paper package of assorted candy and small toys about as many pieces as the number of players, making the heap as nearly as possible in the middle of a designated space within easy reach of all. One of the party is blindfolded, and another touches an article in the pile, in order to point it out to all excepting the one whose eyes are closed. The player then opens her eyes, and is allowed to select one at a time and keep for her own all she can obtain without taking the piece that has been touched. Sometimes a player selects the tip first, in which case she gains nothing, for the moment she takes the tip she must give it up, and the turn passes to the next player on her right.

PART 6.

MISCELLANY.


Armand Sielcher

"TOO NUMEROUS TO MENTION."

MISCELLANY.

ACIDS, Injuries from.—1. Strong acids applied to the skin cause intense pain and destruction of the tissues with which the liquids come into contact, the extent of the injury varying, of course, with the amount of acid applied. When the injury has been caused by sulphuric, nitric or hydrochloric acid, apply dilute ammonia, chalk, carbonate of magnesia, or the plaster from the ceiling stirred in water. After an hour or so apply carron oil (olive oil and lime water in equal parts) on lint. For carbolic acid, apply olive oil.—2. For injuries from caustic alkalies, as strong ammonia and potash, apply a dilute acid, as vinegar; subsequently use olive oil, 1 part; carbonate of bismuth, 2 parts; spermaceti, 1 part; white wax, 1 part.

ALABASTER, To Polish.— 1. Rub first with dried shave-grass (equisetum), and afterwards with finely powdered and sifted slaked lime formed into a paste with water; then finish off by friction with powdered French chalk, until a satiny luster is produced.—2. Polish first with pumice stone, and then with a paste made of whiting, soap, and milk or water; and lastly, with dry flannel.

ALLOY, Of Cobalt and Copper.—M. Guillemin has formed a number of alloys of cobalt and copper. They are all red, have a fine fracture, and are much more tenacious than copper—even as high as from 50 to 100 per cent more so, according to the proportion of cobalt. Five per cent of cobalt is enough to give an alloy of great resistance.

AMBER, To Bend.—Drop it into hot beeswax. After it has been immersed for a few minutes, remove it, and, holding it before the fire, bend it to the desired shape.

AMBER, Imitation.— Dissolve shellac in an alkaline lye, then pass chlorine through the solution until the whole of the shellac is precipitated. After washing in water, this must be melted and kept over the fire until it runs *clear*, taking care that it does not burn; it should then be poured into moulds of the size of the pieces required.

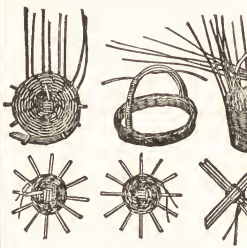
APPENDICITIS.—This is one of the most important of affections of the intestines. It occurs chiefly among the young, and far more among males than females. It is a disease of the "vermiform appendix," which is a small spiral extension from the bottom of the ascending colon, being an organ the origin or use of which science has not yet been able to explain. It is considered possible that it is a shrunken remnant of an organ formerly useful when man was in a savage state. Patients afflicted with appendicitis have usually been constipated. Foreign bodies, passing through the intestines, rarely lodge in it, and are seldom the cause of trouble, notwithstanding a popular impression to the contrary. There are much more apt to form in it oval bodies, resembling date stones, composed of a mixture of mucus, feces and lime salts. Sometimes the appendix may become diseased and disappear entirely, without any serious illness. Typhoid fever and consumption frequently bring on appendicitis. Some cases have followed the lifting of a heavy weight, a fall or a blow. In unfavorable cases, inflammation progresses to perforation of the peritonitis (inflammation of the abdominal cavity), suppuration and abscess. In many cases, the first indication of serious trouble is an acute, agonizing pain. Perforation of the abscess into various organs near by may occur, as into the bowel, the pleura, the bladder, etc. *Treatment:* This is so serious an affection that the services of a physician must be depended upon, and not amateur advice or self-treatment. Surgeons do not operate until imperatively necessary. They first resort to rest, opiates and enemas. An ice bag is placed against the seat of inflammation. If the abscess can be limited, it may disappear without an operation. When the general symptoms become severe, with increase in fever and pulse, or when a tumor is felt to be associated with these serious indications, the surgeon must act. After operation and recovery, the appendix being removed, the disease cannot return.

BAKING POWDERS.—1. Tartaric acid powder, 8 oz.; bicarbonate soda, 9 oz.; rice flour, 10 oz.; a teaspoonful to every 1 lb. flour.—2. Bicarbonate soda, 1 lb.; farina, 1 lb.; powdered alum, ¾ lb.; carbonate magnesia, ½ oz.; dry in oven separately; magnesia may be put on the

flour; tartaric acid may replace the alum.—3. Bicarbonate soda, 16 oz.; tartaric acid, 14 oz.; carbonate magnesia, 6 oz.; farina, 12 oz.; rub through a sieve.—4. Bicarbonate soda, 16 oz.; dry tartaric acid, 8 oz.; rice flour 12 oz.—5. Dry carbonate soda, 8 oz.; dry tartaric acid, 6 oz.; carbonate magnesia, 2 oz.; tumeric powder, 1 oz.; the soda and acid are properly dried before mixing, or the powder spoils by keeping; preserve in stoppered bottles.—6. Bicarbonate of soda, 4 oz.; tartaric acid, 3 oz.; farina, 16 oz.; mix together; by farina is meant any cheap farinaceous material—wheat, rice, or sago flours, etc. To make the packets requires a piece of wood, say 6 in. long for small packets, and the exact size in thickness and width that the packet is to be. The end of this piece should fit into a block of wood and go through it. Take the paper and fold it on the end of the stick, and close it at the end so as to make a square bag; now put the stick with the paper on it into the block, and withdraw the stick, leaving the paper in the block. It is more convenient to measure the powder than to weigh it. Put the powder in a small tin-plate funnel, and shake it into the paper; remove the funnel, and fold down the other end of the paper, flatten the folds with the end of the square stick, and push the packet out of the block. The whole operation of making the packet should take a very short time.—7. Tartaric acid, ½ lb.; bicarbonate soda, 12 oz.; starch, 12 oz.; dry each thoroughly previous to admixture, which is effected by passing through a fine sieve repeatedly; pack the powder down tightly, to prevent the absorption of moisture, —8. (*Goodall's.*) Rice flour, 2 parts; mixture of tartaric acid and bicarbonate soda, each, 1 part. —9. (*Horsford's.*) One powder contains acid phosphate of lime and magnesia mixed with a certain amount of flour; the other is bicarbonate soda.—10. Mix together, perfectly dry, 83 parts, by weight, of bicarbonate soda, and 188 parts of acid tartrate of potash (cream of tartar.)—11. (*Green's.*) Tartaric acid, 35 lbs.; sesquicarbonate soda, 56 lbs.; potato flour, 1 cwt.; mix as before.—12. (*Delforte's.*) Powdered tartaric acid, ¼ lb.; powdered alum, ½ lb.; bicarbonate soda, ¾ lb.; farina, 1 lb.; dry separately by a gentle heat; mix, and further add of sesquicarbonate of ammonia (in powder), 3 oz.; lastly, closely pack it in tinfoil.—13. Bicarbonate soda, 4 oz.; cream of tartar, 9 oz.; fine starch, 7 oz.; dry separately and mix thoroughly. It must be kept from moisture.

BARBER'S ITCH.—1. (*New Idea.*) Resorcin, 1 oz.; glycerine, 1 oz.; water, 1 oz.; lac sulphur, 1½ oz.; cologne, ½ oz.; alcohol, 4 oz. Apply several times a day with a soft sponge. Bathe the parts every morning with hot water. To make the preparation more pleasant, dissolve the sulphur in ½ oz. ether before adding to the mixture.—2. Resorcin, 1½ dr.; glycerine, 3 dr.; rose water, ½ oz.; lac sulphur, ½ oz.; triple extract lavender, ½ oz.; bay rum, q. s. to make 4 oz.; mix. Apply to the parts affected twice a day with a soft sponge.

BASKET-MAKING.—The majority of baskets are made of willows. French willows are firm, clean rods; Dutch willows are soft and pithy; English willows are tough and leathery, and therefore are strongest. The rods are cut from



Basket-Making.

the root of the trees, then soaked in water or boiled; the latter treatment turns the canes a light brown color After the willows have been stripped of their bark, they are exposed to the sun and air, and then placed in a dry situation. The implements required are few, and the process of weaving simple. Common baskets are made by crossing strong willows, and weaving them together with smaller pieces, for the bottom. Thinner pieces are inserted between those first crossed, as the weaving progresses. When the bottom is finished the ends are turned up to form the sides, and the smaller pieces are woven in as before.

BASKETS, Home-Made.—A way to make good baskets at home, and pretty and cheap, too, is out of corn-husks—thick, outer husks for strong baskets, and for lighter and finer ones the white inner parts are the best to use. These must be wrapped an hour or so in a damp towel, and then cut into strips of equal width. Make an ordinary braid with 6 or more strips, which may be doubled, or even trebled for greater strength. Thread a needle with heavy, waxed linen thread, and, having dampened the braid, form it into an oval, 5 or 6 in. long and 3 wide, for the bottom of the basket, and sew the adjoining edges of the braid together, as in a straw hat, but don't overlap them. Go on coiling and stitching for the sides of the basket, widening the opening until the basket is deep enough. The handles are made of a heavy, 3-stranded braid, which is sewed all around the top of the basket just inside, and looped at the middle of each side. For ornament, wind the handles with gay colored ribbon or braid, put a box-phiting of the same around the top and work a bunch of flowers on one side in bright worsteds, with long stitches. The opposite side may have a letter or a name.

BAY RUM.—1. Bay oil, 1 oz.; oil pimento, ½ oz.; alcohol, 2 gals.; water, 4 pts.—2. Bay oil, 10 dr.; pimento oil, 1 dr.; acetic ether, 2 oz.; alcohol, 3 gals.; water, 2½ gals.; mix, and after 2 weeks' rest filter.—3. A cheap bay rum can be prepared by saturating a ¼ lb. block of mag-

nesium carbonate with oil of bay; pulverize the magnesia, place it in a filter and pour water through it until the desired quantity is obtained, then add alcohol. The quantity of water and of alcohol depends on the desired strength and quantity of bay rum.—4. Bay rum is made by digesting the leaves of the bay plant, an aromatic plant grown in the West Indies, in rum, and subsequent distillation. An imitation is made as follows: 3½ fl. dr. oil of bay; ½ fl. dr. oil of pimento; 1 fl. oz. acetic ether; 1 gal. alcohol; 3 qts. water; mix, and after 2 weeks' repose filter.

BEESWAX, To Separate Honey from. — Put honeycomb and all in a tin pan upon a moderately warm stove, adding a tablespoonful of water to each lb. of honey. Stir occasionally with a piece of wire until the contents of the pan are in a liquid condition. Do not allow boiling to begin. Remove the pan from the fire and set it aside to cool. The cake of wax, to which all impurities will adhere, may then be carefully lifted off with a knife.

BELTING, Leather, to Determine Value of.—A cutting of the material, about .03 of an inch in thickness, is placed in strong vinegar. If the leather has been thoroughly acted upon by the tannin, and is hence of good quality, it will remain for months even immersed without alteration, simply becoming a little darker in color. But, on the contrary, if not well impregnated by the tannin, the fibers will quickly swell and, after a short period, become transformed into a gelatinous mass.

BELTS, Leather, Slipping of, to Prevent.—The slipping of belts is a great annoyance, not always remedied by tightening.—1. When a ready remedy is demanded for a slipping belt, the powder known as whiting, sprinkled sparingly on the inside of a belt, is least harmful of any similar application.—2. Powdered resin is bad, as it soon dries the leather and cracks the belt, while it is difficult to get it out of the leather; whereas whiting may be wiped off or washed out with water.—3. The use of water on belts, preliminary to oiling is good. The belt should be washed on shutting down at night—or Saturday, after the close of work, is better—and then the oil applied when the belt is partially dry. Never wash or oil a belt while stretched on the pulleys. If iron-faced pulleys were always lagged with leather, there would be little complaint of the slipping of belts. But often this slipping is due to too much strain on the belt; there is economy in running wide belts—wider than is the usual practice. Many a 3-in. belt has to do duty for a 4-in. belt to the annoyance of the operator and the ruin of the belt.—4. A piece of rubber belting fastened around the belt pulley of an engine, will keep the belt from slipping.—5. Use a piece of beeswax rubbed on the inside of the belt or on the pulleys, as a temporary remedy in cases of emergency, though with proper size belts and pulleys, properly put in, there should not ordinarily be any slipping.

BELTS, Military, to Whiten.—First brush the belt over with a mixture of linseed oil, 4 oz.; precipitated oxide of zinc, 1 oz.; and dry over a stove at a heat not over 160° Fah. When thoroughly dry, roughen by means of pumice powder and apply another coating. Dry as before, and varnish with amber or copal varnish.

BENZINE, To Deodorize.—1. Shake repeatedly with fresh portions of metallic quicksilver. Let it stand for 2 days, then rectify, or shake with plumbate of soda (oxide of lead dissolved in caustic soda), then rectify.—2. Digest litharge in strong solution of soda, and shake the benzine up with this.—3. Shake repeatedly with plumbate of soda, made by dissolving oxide of lead in caustic soda, and rectifying. Simply shaking with charcoal and filtering will partially remove the odor.

BEVERAGES, Frozen.—1. (*Coffee.*) Prepare 2 qts of strong, clear coffee, and sweeten to taste. When cold, put it in the freezer and turn the crank until it is like soft mush.—2. (*Tea.*) Prepare 1 qt. of tea, sweeten to taste, and when cool add a little lemon juice; freeze until mushy. — 3. (*Eggnog.*) Beat 2 eggs until light and creamy; add 2 tablespoonfuls of sugar and beat again; add 2 tablespoonfuls of wine or brandy, and 1 cup of cream or milk. Put in the freezer, and turn the crank until half frozen.

BICYCLISTS, Protector for, against Dogs. — The experience of a Brooklyn druggist, who put to flight 2 burglars in his store by throwing ammonia in their faces, and who so badly crippled one of the fleeing wretches that he was finally overtaken by the police, recalls the fact that some genius has invented an ammoniacal protector for bicyclists against vicious dogs. It may not be news to those who ride bicycles that there is a remedy of this kind put up in convenient rubber bulbs for handy use. It is called Ki-yi, and the apparatus is so arranged that by the pressure of an air bulb a stream of ammonia is directed into the face of the pursuing canine. A bicycle rider who has used the remedy says that in more than one instance he has been able to knock a dog completely over by one straight whiff of the stuff directed into its open mouth.

BIRDLIME.—Boil the middle bark of the holly, gathered in June or July, for 6 or 8 hours in water, until it becomes tender; then drain off the water, and place it in a pit under ground, in layers with fern, and surround it with stones. Leave it to ferment for 2 or 3 weeks, until it forms a sort of mucilage, which must be pounded in a mortar, into a mass, and well rubbed between the hands, in running water, until all the refuse is worked out; then place it in an earthen vessel, and leave it for 4 or 5 days to ferment and purify itself. Birdlime may also be made from mistletoe berries, the bark of the wayfaring tree and other vegetables, by a similar process. Should any of it stick to the hands, it may be removed by means of a little oil of lemon bottoms, or turpentine. It is used to rub over twigs to catch birds or small animals. It is said to be discutient when applied externally.

BISCUIT, Maryland Beat.—1 qt. sifted flour; 1 large tablespoonful of lard; 2 gills of water; 1 teaspoonful of salt; 2 gills of milk. Mix together salt and flour; rub the lard into the

flour evenly with the hands. Have the milk and water in a pitcher, and add it gradually to the flour, stirring and kneading all the time. Add only enough to moisten the flour, as the dough should be very stiff; knead 5 minutes; beat the dough well with a rolling pin for 30 minutes. (Little machines come for the purpose of making beaten biscuit, which facilitate the operation.) Then form, with the hands, into small, round biscuits, about ½ an inch thick. Prick in 3 places with a fork, and set them in a moderately quick oven for 20 to 25 minutes. The outside should be light brown, the inside white, flaky and delicious.

BLACKBOARD COVERING. — (*Bergmann's.*) Prussian blue, chrome green, equal parts; gilder's sizing, alcohol, equal parts, sufficient. Mix the powders, and add sufficient of the liquid to the consistency of cream. Use large still brush; cover quickly. In an hour's time, give second coat. In a day or two smooth the surface with hair cloth. It gives a velvety surface which will never look gray, as that made with lampblack.

BLACKING, Liquid.—1. The well-known liquid blacking of Day & Martin is prepared in the following manner: Very finely ground animal charcoal or bone black, is mixed with sperm oil till the two are thoroughly commingled. Raw sugar or molasses, mixed with a small portion of vinegar, is then added to the mass. Next a small measure of dilute sulphuric acid is introduced, which, by converting into sulphate a large proportion of the lime contained in the animal charcoal, thickens the mixture into the required pasty consistence. When all effervescence has subsided, but while the compound is still warm, vinegar is poured in until the mass is sufficiently thinned; then it is ready to be bottled for the market.—2. (*Without Vitriol.*) Take of ivory black (in very fine powder), 2 lbs.; molasses, 1½ lb.; sperm oil, ¼ pt.; mix; then add of gum Arabic, 1 oz., dissolved in strong vinegar, ½ pt.; mix well; the next day further add of good vinegar, or strong sour beer, 3 to 4 pts. (or q. s.); stir briskly for ¼ hour, and again once a day for a week. Excellent.

BLEACHING COMPOUND.—3 parts by measure of mustard seed oil; 4 parts melted paraffine; 3 parts caustic soda, 20° Be., well mixed to form a saponaceous compound. Of this, 1 part of weight and 2 parts pure tallow soap are mixed, and of this mixture 1 oz. for each gal. of water is used for the bleaching bath, and 1 oz. caustic soda, 20° Be., for each gal. is added, when the bath is heated in a close vessel, the goods entered, and boiling "until sufficiently bleached."

BLISTERS.—When arising from friction or other irritation, they should be pricked with a needle, and emptied of their contents by pressure; but the skin should on no account be broken. The following preparation may then be gently rubbed into the part: Spermaceti, 1 part; olive oil, 1 part; subnitrate of bismuth, ½ part. The part must be protected from friction, or a disagreeable sore will probably result. This is especially necessary when the blister is situated on the heel. One method of protecting it in this situation is to first place over it a piece of court plaster, and over this a good thick piece of cotton wool, at least twice the size of the blister; this should be kept on by strips of adhesive strapping. Another plan is to thickly spread a small piece of lint with the preparation recommended, to place this over the blister, and over this cotton wool.

BLUING, For Laundry Use.—1. Dissolve indigo sulphate in cold water and filter.—2. Dissolve good cotton blue (aniline blue 6 B) in cold water.—3. Dissolve fine Prussian or Berlin blue with ½ part oxalic acid in water; or use ferrocyanide of potassium, 1-12 part, in place of oxalic acid.—4. Dissolve 7 oz. of yellow prussiate of potash in 2.1 pts. of water. Make a solution of sesquichloride of iron which shall contain 1 part of the solid salt by weight to every 10 parts of water by weight. Take equal volumes of the 2 solutions, and add to each twice its volume of cold concentrated solution sulphate of soda. Finally, mix the two solutions thus obtained. The solid Prussian blue will immediately precipitate. This may be put upon a filter and washed, being kept exposed to the air for perhaps 15 or 20 days. The excess of soluble salts will first be washed away, and then the latter washings will dissolve the blue, forming a deep blue liquid, which may be used for preparations of bluing for clothing. It is, however, better to buy the soft Prussian blue than to attempt to prepare it on a small scale. 1 oz. of soft Prussian blue powdered, and put in a bottle with 1 qt. of clear rain water, acidulated by ¼ oz. of oxalic acid, is a good preparation. A very small portion suffices for a large amount of clothing. —5. (*Disinfective.*) Mix together 16 parts of Prussian blue, 2 parts of carbolic acid, 1 part of borax, and 1 part of gum Arabic into a stiff dough. Roll it out into balls as large as hazel nuts, and coat them with gelatin or gum, to prevent the carbolic acid from escaping.—6. (*Liquid Washing Blue.*) Water, 15 parts; dissolve in this 1½ parts indigo-carmine. Add ¾ part gum Arabic.

BOILERS, Filter for Removing Grease from.—A filter for removing grease, which often passes into boilers with the feed-water, consists of a metallic chamber or filter-box, in which are a series of gratings, and between these gratings are placed layers of wire gauze and flannel of a special texture, which forms the filtering medium. The feed-water from the donkey pump enters the filter-box on one side, passes upward through the filter-cloths, and thence out to the boiler, the scum passing away through another outlet. By this means it is found that all grease and greasy matter, as well as other impurities, are arrested by the filter-cloths, which can be readily taken out for cleaning, or renewal. The filter is equally applicable to land and marine boilers.

BOILERS, Incrustation of, Prevention of.—Water from wells, springs and streams holds in solution chloride of sodium, carbonate of lime, sulphate of lime, etc., besides vegetable matter. The carbonic acid, which holds the carbonate of lime, etc., in solution, being driven off by boiling, the latter forms an incrustation which adheres to the boiler, becoming thicker and

thicker, and, being a non-conductor of heat, it requires 60 per cent more fuel to raise the water to any given temperature when the scale is $\frac{1}{8}$ in. thick; the conducting power of scale compared with that of iron being 1 to 37. The red scale formed from water impregnated with salts of iron, is still more destructive to boilers. In no way can the evil be averted except by boiling the water; but this is sometimes impracticable, although many feed-water heaters are in operation. A number of substances are used to prevent incrustation, of which the following will serve as types:—1. Charcoal has a great affinity for anything that causes incrustation. That made from hard wood is best, broken in lumps of $\frac{1}{4}$ to $\frac{1}{2}$ in.; and the dust sifted out; 2 bush. will protect a boiler of 30 horse-power for 3 weeks when running, after which the old coal should be removed and fresh used.—2. Throw into the tank from which the boiler is fed, a quantity of rough bark, such as tanners use, sufficient to turn the water a brown color; if you have no tank, put into the boiler $\frac{1}{2}$ to 1 bush. of ground bark when you blow off; repeat every month, using $\frac{1}{2}$ the quantity after the first time.—3. Add a small quantity of muriate of ammonia, about 1 lb. for every 1,500 or 2,000 guls. of water evaporated. It will soften carbonate of lime and other impurities deposited during evaporation.—4. Potatoes and other vegetable substances introduced into the boiler are effectual in preventing incrustation, and animal substances, such as refuse skins, still more so.—5. Cow's feet, with shanks attached, are recommended as a preventitive; 2 in a large boiler are sufficient; and those who wish to do business economically, can get oil for lubricating cheaply by boiling the feet and shanks a few hours in a kettle, setting it aside to cool, and then skimming off the oil and using the feet for the boiler afterwards. To get rid of the hair on the shanks, use lime, etc., as done by tanner.—6. Sal soda, 40 lbs., gum catechu, 5 lbs., sal ammoniac, 5 lbs., is recommended for removing scale; 1 lb. of the mixture being added to each barrel of water in the tank; after scale is removed, use sal soda alone. By the use of 10 lbs. of soda per week, a boiler 26 ft. long, and 40 in. in diameter was cleaned from scale equal to a new one.—7. A rapid, but not good plan to scale boilers, is to throw in a few wood shavings along the bottom of the boiler and set them on fire; the heat expands the scale more than the shell of the boiler; as the heat cannot reach the latter, the scale is loosened; what remains must be removed with a hammer and chisel.—8. Potatoes 1-50 weight of water, prevent adherence of scale.—9. Twelve parts salt, $2\frac{1}{2}$ caustic soda, $\frac{1}{8}$ extract of oak bark, $\frac{1}{2}$ of potash.—10. Pieces of oak wood suspended in boiler and renewed monthly, prevent deposit.—11. Two oz. muriate of ammonia in boiler twice a week prevents incrustation and decomposes scale.—12. Coating of 3 parts black lead, 18 tallow, applied hot to inside of a boiler every few weeks, prevents scale.—13. 13 lb. molasses fed occasionally into an 8-horse boiler prevented incrustation for six months.—14. Mahogany or oak sawdust in limited quantities. The tannic acid attacks the iron, and should therefore be used with caution.—15. Slippery elm bark has been used with some success.—16. Carbonate of soda.—17. Chloride of tin.—18. Spent tanners' bark.—19. Frequent blowing off.—20. Paraffin oil has been used with excellent results in locomotive boilers.—21. Marine boilers are sometimes protected from corrosion by a very thin wash of Portland cement inside. —22. The use of glycerine is recommended to prevent incrustation in steam boilers. It increases the solubility of combinations of lime, and especially of the sulphate. It forms with these combinations soluble compounds. When the quantity of lime becomes so great that it can no longer be dissolved, nor from soluble combinations, it is deposited in a gelatinous substance, which never adheres to the surface of the iron plates. The gelatinous substances thus formed are not carried with the steam into the cylinder of the engine. Employ 1 lb. of glycerine for every 300 or 400 lb. of coal burnt. —23. For a 5-horse power boiler, fed with water, which contains calcic sulphate, take: Catechu, 2 lb.; dextrine, 1 lb.; crystallized soda, 2 lb.; potash $\frac{1}{2}$ lb.; cane sugar, $\frac{1}{2}$ lb.; alum $\frac{1}{2}$ lb.; gum arabic, $\frac{1}{2}$ lb.—24. For a boiler of the same size, fed with water which contains lime: Turmeric, 2 lb.; dextrine, 1 lb.; sodium bicarbonate, 2 lb.; potash, $\frac{1}{2}$ lb.; molasses, $\frac{1}{2}$ lb.; alum, $\frac{1}{2}$ lb.—25. For a boiler of the same size, fed with water which contains iron: Gamboge, 2 lb.; soda, 2 lb.; dextrine, 1 lb.; potash, $\frac{1}{2}$ lb.; sugar, $\frac{1}{2}$ lb.; alum, $\frac{1}{2}$ lb.; gum arabic, $\frac{1}{2}$ lb.—26. For a boiler of the same size fed with sea water: Catechu, 2 lb.; Glauber's salt, 2 lb.; dextrine, 2 lb.; alum, $\frac{1}{2}$ lb.; gum arabic, $\frac{1}{2}$ lb. When these preparations are used add 1 qt. of water, and in ordinary cases charge the boiler every month, but if the incrustation is very bad, charge every two weeks.—27. For boilers of 100 horse power fed with river water, use the following, which should be renewed whenever the boiler is emptied: Crystallized soda, 18 lb.; dextrine, 18 lb.; alum, 6 lb.; sugar, 6 lb.; potash, 3 lb.—28. For the same sized boiler, fed with sea water: Soda, 24 lb.; dextrine, 24 lb.; sugar, 12 lb.; alum, 3 lb.; potash, 3 lb.

BOOKS, To Preserve.—In certain parts of China and elsewhere, books are extremely liable to be attacked by insects. They first destroy the glue used in the backs of books, and gradually perforate the whole volume. Cockroaches, too, disfigure the covers by eating away patches of the glazing. The remedy for both these nuisances is easy: Corrosive sublimate, 5 drm.; creosote, 60 drops, rectified spirit, 2 lb. This mixture, a violent poison, is applied with a brush in the joint of the book at every six or seven pages, and as a preventitive of the ravages of cockroaches, the cover of the book is varnished with a thin, clear spirit varnish. In binding books, it would be only necessary to add a small quantity of the above mixture to the glue used, and to give a coating of spirit varnish to the cover, to secure complete protection from the attacks of insects of all kinds.

BOOKS, To Repair.—The first thing is to se-

cure the loose leaves. Odd leaves can be fixed in with paste or thin glue. If a whole section is loose, first sew it with stout thread, leaving long ends at the back, and then tie these ends to the part that goes before and the part that follows. A sheet of paper glued on the back will fix it in its place, letting a little glue go in before and after the sewed section. If the book has slipped out of the cover, leaving the cover intact, the best way is to strip all the paper off the back (not sides) of the cover, leaving the cloth (or leather, as the case may be) bare; then glue the back of the quires, and stick them on the cloth. This, with or without new end papers, will complete the job. This makes what is called a tight back; but it will open fairly well if all the padding is taken out, as directed above, and will make a strong binding. If only one cover is torn off, it can be fastened on thus: Raise the leather of the cover from the millboard with a penknife to the depth of ½ in. (or less if book is small). Get a piece of cloth, about 1 in. wide, and glue this into the opening made; do the same with the back of the book, and put in the remaining ½ in. of cloth with glue, and the job is done. They are not handsome, but are always strong.

BOTTLES, Oily or Greasy, to Clean.—Pour into them a little strong sulphuric acid; after they have been allowed to drain as much as possible, the bottle is then corked, and the acid caused to flow into every portion of it, for about five minutes. It is then washed with repeated rinsings of cold water. All traces of oil or grease left will be removed in a very expeditious manner, and no odor whatever will be left in the bottle after washing.

BREATH, Offensive. Remedy for.—Causes: The primary are constitutional, the proximate are an unhealty state of mucous membrane of the mouth, gullet and stomach. It is weak and inactive, and its cells are not properly cast off and renewed, the external layers being slowly disintegrated. Another proximate cause is the retention of undigested food in the stomach. Treatment in the main must be constitutional. —1. The odor may be corrected by washing out the mouth with Condy's fluid, and by taking the following draught twice a day: Chlorate of potash, 15 gr.; water, 1 oz.—2. *Smoker's Breath, etc.* Do not smoke bad tobacco, which leaves an abominable odor about the person and contaminates the breath almost beyond immediate remedying. The same may be said of bad cigars. The following is an old formula for removing the odor of tobacco from the mouth after smoking; it is to be used as a wash: calcium chloride, 2 drm.; water, 1 oz. Agitate for half an hour and filter. Then add, rectified spirit, 1 oz.; rose water. ½ oz. For sore tongue, the simplest remedy is to wash out the mouth with glycerine, 1 part; powdered chalk, 1 part; water, 8 parts. This will of course require to be shaken up before using. The following formulas are commended by various authors as to the several sources of fetid breath, the active materials for disinfecting being one of the following articles: Carbolic acid, chlorine water, potassium permanganate, thymol, salicylic acid, camphor, borax.—3. Camphor water; water, equal parts use as a mouth wash.—4. Thymol, 10 gr.; alcohol, 1 oz.; borax, 30 gr.; water, 19 oz.—5. Potassium permanganate, 8 gr.; water, 8 oz.—6. Chlorine water, 1 oz.; glycerine 2 fl. oz.; water, 14 oz.—7. Salicylic acid, 120 gr.; glycerine, 2 fl. oz.; water, 6 oz.—8. Borax, 240 gr.; water, 1 pt.—9. Chlorinated lime, 120 gr., sodium carbonate, 160 gr.; water, 6 oz.; alcohol, 2 oz.; rose water, 12 oz. Dissolve the sodium carbonate in 2 oz. of water, rub the chlorinated lime to a paste with water, adding in all 4 oz.; mix in a 12 oz. bottle, adding the alcohol. After the reaction, separate the clear solution, and add to the rose water.—10. Salicylic acid, sodium bicarbonate, saccharine, each 60 gr.; alcohol, water, each 4 fl. oz.; oil of peppermint, 5 drops. Of this solution, use two teaspoonfuls to a wineglass of hot water, and use as a gargle twice daily.

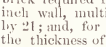
BRICK-MAKING.—Brick consists of clay earth, sometimes mixed with coal ashes, chalk and other substances, and then molded into a rectangular form. The different kinds may be divided into three classes, as follows: *Walling brick*, made of coarse stiff clay, requiring sand to be mixed with it to be worked with facility; *fire-brick*, of clay containing considerable silicate of alumina, and free from lime or iron; they are made by exposing them to intense heat in kilns; *paving brick*, of clay containing a great amount of silica, which causes them to become hard; *black brick* are made by dipping ordinary brick in coal tar. There are 2 methods of burning brick, as follows: *Clamp-Burnt.* Brick burnt in stacks of 500,000 to 1,000,000, with the fuel interspersed among them so that every brick may be exposed to the action of the fire. If the fire is too strong, it causes the brick to fuse and run together, and form hard, irregular masses called clinkers, but if the fire is not strong enough the brick will be soft and unfit for building purposes. About 1-10 of every clamp is lost by unequal firing and breakages; the brick also vary in color. When sufficiently baked they are divided into classes as follows: Cutters, fine close-grained brick, rather soft, and suited to work requiring cutting; picked stocks, of a uniform red tint; hard, for paving; common or ordinary brick; grizzles, or soft brick.—*Kiln-Burnt.* Called *malm* brick, made of fine clay; contains considerable carbonate of lime; great care is taken to prevent air getting to the brick while baking. These are slowly burnt in kilns; they are better for ornamental purposes, being of buff color, but not as desirable as clamp-burnt. Brick kilns are made as follows: A number of arches are built up contiguously, so as to form a solid mass; then covered with a dry wall of baked brick, the lower courses being one brick thick, and the rest ½ brick. At the bottom, a vacancy is left between the wall and the face of the arch which gives a batter to the covering wall, and affords a draught. Arch-irons, having an opening of about 1 sq. ft. are inserted in the opening, and the whole smeared over with clay.

BRICK WALL, To Estimate Number of Brick in.—First multiply the breadth by the height of

the wall in feet, obtaining the number of square feet; then obtain, in the same manner, the total amount of surface occupied by the openings or doors and windows in the wall; deduct this from the superficies of the whole wall; then, if the wall is only the thickness of one brick laid flat, or 4½ inches, multiply by 7, and the result will be the number of brick required for the wall; if it is to be a 9 inch wall, multiply by 14; if a 13 inch wall, by 21; and, for every width of brick added to the thickness of wall, add 7 to the multiplier, and so on.

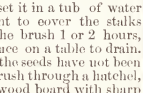
BRICKWORK, White Coating on, to Prevent.—This efflorescence which is such a disfigurement, can usually be prevented by adding oil to the mortar at the rate of 1 gal. to the cask of lime. Linseed oil or any oil not saline will do. If cement is used, an extra gallon of oil must be used. When incrustations are once formed, nothing can be done except to wash with dilute hydrochloric acid.

BROOM-MAKING.—1. Take a quantity of dry brush and cut off the stalks 6 in. from the brush.



Hatchel.

Then set it in a tub of water sufficient to cover the stalks up to the brush 1 or 2 hours, and place on a table to drain. When the seeds have not been all removed, draw the brush through a hatchel, which is a piece of hard-wood board with sharp notches sawed in one end of it, and nailed to the bench. Fasten a stout string to the ceiling; make a loop for the foot near the floor, or for a lever, one end of which passes under the bench, the other to be pressed by the foot when in use. Now take enough brush to make the broom, putting the best brush on the outside, arranging evenly. Grasp the bunch firmly, wind the string around it as shown in the figure, pressing the lever to bind closely. Then roll this string close to the bunch; take the binding string, or wire either, double it, allowing the end to project at the left hand side, wind tightly to the right. When wound pass the string through the loop; grasp the other end and pull the loop end of the string under the coil. Now cut both ends close to the coil and the knots are concealed. Then flatten the broom between a couple of short boards in a vise, or, fasten 2 boards together at one end with leather nailed to each, the other ends fastened, when in use, by strings. When flattened, thread an iron, steel, or hard wood needle 6 to 8 in. long; fasten one end of the cord, then pass the needle back and forth through the brush, advancing a little each time. Repeat 2 or 3 times, fasten the thread securely, and the broom is ready for handling. Sharpen the handle; force it into the centre of the neck of the broom and fasten it by driving a nail through the coil on each side. Clip the bottom.—2. Tack one end of a 2 ft. string to the handle, 3 in. from the lower end; tie the other round a stick, which place under the feet as shown in the figure. Lay the brush on, a piece at a time; turn the handle to hold them, lifting all the time. Put on and wind 3 layers; then begin another row a little nearer the end of the handle, and then another, using the longest and finest brush for the last layer. Wind the cord tightly a few times around the whole, and fasten the end with a carpet tack. To make the broom flat put more brush upon 2 opposite sides. Sew as above described. Wire is better than string.



Winding Arrangement.

Winding the Broom.

Binding String.

Flattening Board and Needle.

BRUISES.—A bruise is the discoloration caused by the extravasation of blood from ruptured vessels, and is due either to a blow or violent compression. Apply ice or some cold object as soon as possible after the injury. Pressure will also be of service. This method of treatment should be continued for at least two hours. The appearance of a bruise may by somewhat disguised by first covering it with a paste compound of prepared chalk 1 part; glycerine 1 part. This should be gently worked into the part and the excess wiped off. Over it 1 layer of flexible collodion should be spread by means of a brush. This will make the part of a white color.

BRUSH-MAKING.—Insert the bristles in a firm support, which holds them properly and at the same time serves as a handle. Most brushes are manufactured of the bristles of the hog. First sort the bristles according to color: they are divided into black, gray, yellow, white and lilies; the last being white are preferred for tooth and shaving brushes. Then assort according to size, by passing a bunch, held in the hand, between a row of steel points, like the teeth of a comb, which catch the coarser kinds. By using a succession of combs of increasing fineness the bristles are separated into as many heaps as desirable. The brush used by house painters is made by taking a bundle of bristles and tying them firmly around their root ends; this bundle is then strongly bound between the prongs of a forked stick and covered with a coating of glue and red lead. Another method is to arrange the bristles around the small end of a conical stick, the small ends of the bristles pointing to the larger end of the stick; the bristles are secured by twine and placed in a socket with hole in the bottom to let the handle pass through; this is driven home till the large end is buried in the centre of the bundle, tightening the fastenings, when the brushes are further secured by saturating the ends with glue. Other brushes are made

by inserting little tufts of bristles into holes bored in rows into a stock of wood, etc. The operators sit around a table, each with a clamp attached to its edge for holding the stock board and each supplied with a fine brass wire, which is held in the right hand, and an apron full of bristles. A loop of the wire is passed through a hole in the stock, and, a number of bristles being laid in it, the wire is pulled tight, causing the bristles to double and be drawn into the hole. The same process is repeated with the next hole, and so on, until all are filled and held tightly in place by the wire; then clipped with a pair of shears gauged to cut the length of bristles required.

BRUSHES, To Soften. — Steep the brushes for twenty-four hours in good benzole, and then if necessary purify by washing them with soap and warm water.

BRUSHES, To Stiffen.—Immerse the bristles for a short time in cold alum water

BUGS, Bed, to Destroy.—1. Rub the joints of the bedstead with equal parts spirits of turpentine and kerosene oil, and where there are many, the cracks in the surbase of the room. Filling up all the cracks with hard soap is a good remedy.—2. Take everything out of the infested room, plug up all the windows tightly, close all chimneys, and empty about 1 oz. of powdered sulphur on a pan of hot coals, placed in the middle of the floor. Shut the doors and cover all cracks; let the sulphur burn as long as it will. Where the room is large, it is a good plan to fasten a bit of tin tube to the bottom of the pan, and to this connect enough small rubber pipe to lead out of the nearest door. By blowing into the end of the pipe with the bellows, the sulphur will be caused to burn more quickly by the draught created, and to give a denser smoke. After the sulphur has burned out, paint all the cracks in the floor and around the mop board with a strong solution of corrosive sublimate, and treat the furniture to the same before replacing it. A room frightfully infested has been completely freed by this plan.—3. Mixtures such as equal parts of turpentine and kerosene oil are used; filling up the cracks with hard soap is an excellent remedy. Benzine and gasoline will kill bedbugs as fast as they can reach them. A weak solution of zinc chloride is also said to be an effectual banisher of these pests.—4. When they have made a lodgment in the wall, fill all the apertures with a mixture of soft soap and Scotch snuff. Take the bedstead to pieces, and treat that in the same way.—5. A strong decoction of red pepper applied to bedsteads will either kill the bugs or drive them away.—6. Put the bedstead into a close room and set fire to the following composition, placed in an iron pot upon the hearth, having previously closed up the chimney, then shut the door; let them remain a day: Sulphur, 10 parts; saltpeter, powdered, 1 part. Mix. Be sure to open the door of the room 5 or 6 hours before you venture to go into it a second time.—7. Rub the bedsteads well with lamp oil; this alone is good, but to make it more effectual, get 10 cents worth of quicksilver and add to it. Put it into all the cracks around the bed, and they will soon disappear. The bedsteads should first be scalded and wiped dry; then put on with a feather.—8. Corrosive sublimate, 1 oz.; muriatic acid, 2 oz.; water, 4 oz.; dissolve, then add turpentine, 1 pt.; decoction of tobacco, 1 pt. Mix. For the decoction of tobacco boil 2 oz. of tobacco in 1 pt. of water. The mixture must be applied with a paint brush. This wash is a deadly poison.—9. Rub the bedsteads in the joints with equal parts of spirits of turpentine and kerosene oil, and the cracks of the surbase in rooms where there are many. Filling up all cracks with hard soap is an excellent remedy. March and April are the months when bedsteads should be examined to kill all the eggs.—10. Distilled vinegar, or diluted wood vinegar, 1 pt.; camphor, ½ oz.; dissolve. —11. White arsenic, 2 oz.; lard, 13 oz.; corrosive sublimate, ¼ oz.; Venetian red, ½ oz. (Deadly poison.)—12. Strong mercurial ointment, 1 oz.; soft soap, 1 oz.; oil of turpentine, 1 pt.— 13. Gasoline and coal oil are both excellent adjuncts, with cleanliness, in ridding a bed or house of these pests.—14. Benzine or gasoline will kill these pests as fast as they can be reached. By using a spring bottom oiler the fluid can be forced into all the cracks and crevices. As the fluid is inflammable, contact with fire must be avoided. The room should be well aired.

BURNS, Treatment of.—1. White lead paint has been found, after trying almost every plan of treatment hitherto proposed, to be the best and cleanest application. Mix as for painting, but considerably thicker, and apply with a brush. A very neat and satisfactory dressing in superficial burns consists in coating the surface with mucilage and then covering it with powdered lycopodium.—2. A saturated solution of picric acid applied to a burn or scald will not only remove all pain, but will prevent the formation of sores, and will bring about a complete cure in a few days. This solution should be kept on hand by all managers of iron works and engineering shops, where accidents from burning are frequent, and not uncommonly fatal. The solution is perfectly stable, cheap and free from any odor or toxic properties. It produces a temporary yellow discoloration of the skin, which can be entirely removed by the application of boric acid.

BUTTER, To Color.—1. Use a little annatto; if pure it is not injurious.—2. The coloring matters commonly employed are annatto and turmeric, or extracts of these; but there are also a number of butter-coloring compounds or mixtures sold for this purpose. For some of these it is claimed that they will not only impart the desired color to butter, but will keep it sweet and fresh for an indefinite time. The following are a few of these coloring compounds in use at present: (*Rorick's Compound.*) The materials for 1,¢90 lb. of butter are: Lard, butter, or olive oil, 6 lb.; annatto, 6 oz.; turmeric, 1 oz.; salt, 10 oz.; niter, 2-5 oz.; bromochloralum, 3½ oz.; water, q. s. The lard, butter, or oil is put into a pan and heated in a water bath. The annatto and turmeric are then

stirred into a thin paste with water, and this is gradually added to the fatty or oily matters kept at a temperature of about 110° F. The salt and nitre are next stirred in, and the mixture heated to boiling. The heating is continued for from 12 to 24 hours, or until the color of the mixture becomes dark enough. The bromochloralum is then introduced, and the mass is agitated until cold when it is put up in sealed cans.—3. (*Bogart's.*) Annattoine, 5 oz.; turmeric (pulverized), 6 oz.: saffron, 1 oz.; lard oil, 1 pt.; butter, 5 lb. The butter is first melted in a pan over the water bath and strained through a fine linen cloth. The saffron is made into a ½ pt. tincture, and, together with the turmeric and annattoine, is gradually stirred into the hot butter and oil and boiled and stirred for about fifteen minutes. It is then strained through a cloth as before and stirred until cold.—4. (*Dake's.*) Heat a quantity of fresh butter for some time with annatto, by which means the coloring matter of the butter is extracted, and straining the colored oil and stirring it until cold.

BUTTER, To Increase Yield of.—Instead of 100 pounds a week from 12 cows, it is claimed that by adding one teaspoonful black pepsin to each gallon of cream, 230 pounds excellent butter can be produced. Some say that pepsin butter is half cheese and urge that as an argument against it; of course the black pepsin does unite all the cheese that milk contains with the butter, but it is still claimed the butter looks, tastes, keeps and sells as well as any butter and is more healthful, and that is all the farmer wants.

BUTTER, To Test for Oleomargarine.—Stir a little—half a teaspoonful or less—of the suspected butter in enough sulphuric ether to dissolve it. By the time the grease is dissolved the ether will have been evaporated, and the residuum will show, to smell or taste, whether it is butter, lard, or tallow. 5 cents' worth of ether will suffice for several tests.—2. The sale of oleomargarine at grocery stores is now enormous. The prejudice against it has largely died out and some people say they prefer the flavor. Unless you buy high-priced butter, you don't get anything much sweeter or more wholesome than the very best artificial substitute. There are two infallible tests. If genuine butter is cut with a sharp knife, a water-like fluid comes out of both sections in small drops, and if it is pressed, or more strictly compressed, moisture will ooze out. If there is no moisture after either of these tests, the compound is oleomargarine and nothing else.—3. A clean piece of white paper is smeared with a little of the suspected butter. The paper is then rolled up and set on fire. If the butter is pure the smell of the burning paper is rather pleasant; but the odor is distinctly tallowy if the "butter" is made up wholly or in part of animal fats.

BUTTERMILK, To Make.—The following is a novel way of procuring delicious buttermilk without the labor of churning. The milk is permitted to sour and partially skimmed so as to allow enough cream to render it rich. It can be taken from the ice box, provided you wish it cold, and simply beat it a few moments with an egg beater (one with a handle is preferable) and you have as fine buttermilk as can be made under any process.

CALCIMINING.—1. Soak 1 lb. of white glue overnight, then dissolve it in boiling water and add 20 lb. of Paris white, diluting with water until the mixture is of the consistency of rich milk. To this any tint can be given that is desired.—2. (*Lilac.*) Add to the calcimine 2 parts of Prussian blue and 1 part vermillion, stirring the mixture thoroughly and taking care to avoid too high a color.—3. (*Brown.*) Burnt umber.—4. (*Gray.*) Raw umber, with a trifling amount of lampblack.—5. (*Rose.*) Three parts vermillion and 1 part of red lead, added in very small quantities until a delicate shade is produced.—6 (*Lavender.*) Make a light blue and tint it slightly with vermillion.—7.(*Straw.*) Chrome yellow, with a touch of Spanish brown.—8. (*Buff.*) Two parts of spruce, or Indian yellow, and one part of burnt sienna.—9. (*Blue.*) A small quantity of Prussian blue will give a soft azure tint. Dark blue is never desirable. Delicate tints in the foregoing varieties of colors are always agreeable and tasteful, and so great care must be taken that they are not too vivid. The tints will always appear brighter than in the calcimine pot, and this fact must be kept in mind when adding the coloring powders.

CANDLES, Transparent, to Make.—A French chemist makes a new kind of candle by dissolving 5 parts of colorless gelatine in twenty parts of water, adding 25 parts of glycerine and heating until a perfectly clear solution has been formed. To this is added 2 parts of tannin dissolved by heating in 10 parts of glycerine. A turbidity is produced which should vanish on further boiling. The boiling is continued until the water has been driven off. The mass is then cast into ordinary glass candle molds. The candles obtained in this way are as clear as water and burn quietly, and without spreading any odor.

CANING CHAIRS.—Splints are cut in long slips of equal width and thickness. An end of a long strip is fastened to one corner of the chair bottom; the strip is then passed backward and forward across the seat of the chair, over the rounds in one direction and under in the other, until the seat is covered. The bottom is then covered by passing splints in the opposite direction, except that on the upper side the splints are passed over and under the transverse strips, thus weaving the splints together and forming the bottom of the chair.

CASKS, To Cleanse.—1. Put a few pounds unslaked lime in the barrel, add water and cover. In a short time add more water and roll the barrel. Rinse with clean water.—2. Have the casks well scrubbed with boiling water, in which a little soda ash has been dissolved. If they are not wanted for immediate use, let them stand exposed to the air, one head out, for a month. There is no greater purifier than the atmosphere; then head up, slightly steam, blow off, and send to cellar to

be filled. If wanted for use, scrub, then gently fire until well hot through, steam, etc., as before. They should all be tested for sweetness, by chipping and smelling, before being headed up. If not wanted for use, when finished put about a pint of bisulphite of lime and water, 1 to 4 of water, and they will keep good in a cellar for 12 months.

CATARRH, or HAY FEVER, Remedy for.—1. For catarrhal or hay fever troubles a compound of lunaline, which is an oleaginous substance of about the consistency of vaseline, and made from the oil of sheep's wool, with menthol and cocaine, makes a remedy that gives instant relief. It may be applied with the finger or on a feather to the nasal passages. These are harmless but sure remedies, and are the best known.—2. A wash made of witch-hazel and cocaine should be applied to the nasal passages when the dreadful asthma comes on. It will stop the wheezing in no time, and then hay fever will have lost all its terrors.

CATERPILLARS, To Destroy.—There are no fewer than nineteen insect enemies of the grape, and of these, seven or eight assume the caterpillar form at some stage of their development. If the fruit has not been formed, they may as a general thing be destroyed by sprinkling the vines with a solution of Paris green or London purple with water, say a heaping tablespoonful of the former to 2 gal. of the latter. The vines may be dusted with a mixture of the poisons and plaster of flour, in the proportion of 1 to 100. After the fruit has formed, a kerosene soap emulsion sprinkled on the vine would be destructive to the pests without endangering human life. Take about 4 lb. of common yellow bar soap, 1 gal. of kerosene and 1 gal. of water; heat the mass over the stove, stirring it till it forms a homogeneous thick yellowish liquid, then remove the mixture from the stove and continue the stirring until it becomes cool. This should be largely diluted with warm soft water, and it will be permanent. Pyrethrum powder mixed with plaster is also used to good effect, sprinkled on the vines.

CELLULOID, To Make.—A roll of paper is slowly unwound, and at the same time saturated with a mixture of 5 parts sulphuric acid and 2 of nitric, which falls upon the paper in fine spray. This changes the cellulose of the paper into fine pyroxyline (gun cotton). The excess of acid having been expelled by pressure, the paper is washed with water until all traces of acid have been removed; it is then reduced to pulp, and passes to the bleaching trough. Most of the water having been got rid of by a strainer, the pulp is mixed with from 20 to 40 per cent, of its weight of camphor, and the mixture triturated under millstones. Coloring matter having been added in the form of powder, a second mixture and grinding follows. The pulp is then spread out in layers on slabs and from 20 to 25 layers are placed in a hydraulic press, separated from one another by sheets of blotting paper, and subjected to a pressure of 140 atmospheres until all traces of moisture have been got rid of. The plates obtained are broken up and soaked for 24 hours in alcohol, the matter then passed between rollers heated to between 140° and 150° Fahr., whence it issues in the form of sheets. Celluloid is made to imitate amber, tortoise-shell, coral, malachite, ebony, ivory, etc., and besides its employment in dentistry, is used to make mouth-pieces for pipes and cigar-holders, handles for table-knives and umbrellas, combs, shirt fronts and collars, and a number of fancy articles.

CELLULOID COLLARS AND CUFFS, To Whiten.—1. If the coloring does not disappear when the affected portions are rubbed with a woolen cloth and a little tripoli, and then polished with a clean woolen rag, the injury is a permanent one.—2. Cream of tartar is excellent. Use with a little water.

CEMENTS.—1. (*Strong and Handy.*) One of the strongest cements and very readily made, is obtained when equal quantities of gutta percha and shellac are melted together and well stirred. This is best done in an iron capsule placed on a sand bath, and heated either over a gas furnace or on top of a stove. It is a combination possessing both hardness and toughness—qualities that make it particularly desirable in mending crockery. When this cement is used, the articles to be mended should be warmed to about the melting point of the mixture, and then retained in proper position until cool, when they are ready for use.—2. (*For Bicycle Tires, etc.*) In 10 oz. carbon bisulphide dissolve 20 oz. enoutchouc; 10 oz. gutta percha; and 5 oz. fish glue. Bind the tire well with cord until set.—3. 2 parts of pitch and 1 part of gutta perch are melted together. Use hot.—4. (*For China.*) The best cement for china is Russian isinglass dissolved in pure soft water by soaking twelve hours and boiling some time at a high heat. The fractures must be free from dust or grease, and brushed with the isinglass while hot and thick, then tied to keep their place, and left 24 hours to dry. This is colorless and does not leave the yellow tinge of many of the popular china cements of commerce. Where a handle has been knocked off a cup or ewer the crack left after mending may be disguised by penciling over it a band of color to suit the decorations, or by a plain line of white or gilding. Vases may be retouched in the same way. The color when mixed with oil and fine varnish, will stand all common usage. Gilding is most easily done by the novice with a pencil and mixture of powdered gold in isinglass size, the way monks used to illuminate their parchment.—5. (*Transparent for Glass.*) Dissolve 1 part of India rubber in 64 parts of chloroform; then add gum mastic in powder, 14 to 24 parts, and digest for two days with frequent shaking. Apply with a camel's hair brush.—6. (*For Broken Ivory.*) Chipped spots in Parian may be filled with a plaster of parian dust and oyster lime, of the finest sort, mixed with the white of eggs, and smoothed with the bowl of a spoon. Dark red or black Etruscan wares need a little vermillion and burnt sienna in the cements ordinarily used to prevent unsightly

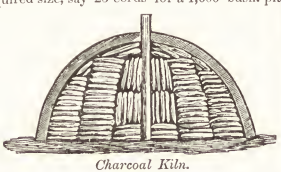
white streaks or joints. Malachite, agate and azurine, when broken, may be cemented with sulphur, melted at a low heat so as not to change its color, in which different pigments are stirred to give it proper tints like the stones.—7. (*Letter-fixing.*) Copal varnish, 15 parts; drying oil, 5 parts; oil of turpentine, 2 parts; liquefied glue (made with the least quantity of water), 5 parts; melt together in a water bath, and add fresh slaked lime (perfectly dry, and in very fine powder), 10 parts. Used to attach metal letters to plate glass in shop windows.—8. (*For Lamps.*) Common alum melted in an iron spoon over hot coals forms a very strong cement for joining glass and metal together. It is a good thing for holding glass lamps to their stands or for stopping cracks about their bases, as kerosene does not penetrate it. Housekeepers ought to keep this in remembrance, for sad accidents may be prevented by its use.—9. (*For Marble.*) A common cement for marble is made of 2 parts white virgin wax, 1 part white rosin, with 1½ parts of marble dust, which is to be found at any stonecutter's. The wax and rosin are melted, the powder sifted in, afterward the whole is well kneaded in water to mix the ingredients thoroughly. See that the parts to be joined are clean and dry, heat them; heat the cement and apply quickly and plentifully, tying the parts together until solid. The cement which oozes at the fracture may be dressed down like marble. Colored stone may be retouched with pigments ground in damar varnish to carry the veins across the cement line. —10. (*For Ornaments.*) The sticky juice of the marsh mallow root mixed with the finest chalk forms a cement for onyx, ground glass or pottery. Derbyshire or Niagara spar is mended with 7 parts of white rosin and 1 of wax, melted with a little powdered spar. Chipped places can be filled with a paste of this kind and smoothed to a level.—11. (*Pozzuolana.*) A kind of earth thrown out of volcanoes, of a rough, dusty, granular texture; its most important property consists in making a cement when mixed with ½ its weight of lime and water, which hardens very suddenly, and is more durable under water than any other. Manganese is found to be a valuable ingredient in water cements. 4 parts of gray clay are to be mixed with 6 parts of the black oxide of manganese, and about 90 of good limestone, reduced to fine powder the whole to be calcined and cooled, to be worked into the consistence of a stiff paste, with 60 parts of washed sand.

CEMENT FLOORS.—The French, who have carried the art of hardening plaster to where it is utilized for flooring, either in the place of wood or tile, use 6 parts of good quality of plaster intimately mixed with 1 part of freshly slaked white lime finely sifted. This mixture is then laid down as quickly as possible, care being taken that the trowel is not used on it for too long a time. The floor should then be allowed to become very dry, and afterward be thoroughly saturated with the sulphate of iron or zinc, the iron giving the strongest surface, the resistance to breaking 20 times the strength of ordinary plaster. With sulphate of zinc the floor remains white, but when iron is used it becomes the color of rusted iron, but if linseed oil, boiled with litharge, be applied to the surface, it becomes of a beautiful mahogany color. Especially is this the case if a coat of copal varnish is added.

CHAPS.—The effect of cold is to diminish the caliber of the cutaneous blood vessels by producing contraction of their coats. Hence there is a lessened supply of blood to the skin and a lessened nutrition, accompanied by a decreased secretion of the cutaneous glands. The deficient secretions must be replaced by an outward application. The following formula will be of service;—1. White wax, 1 part; borax, 3 parts; juice of bitter almonds, 1 part; oatmeal water, 3 parts.—2. Milk, 1 part; chalk, 2 parts; glycerine, 1 part.—3. Spermaceti, 2 parts; white wax, 1 part; glycerine, 1 part, chalk, 3 parts; oatmeal water, 2 parts.—4. (*Chaptal's Water for Chapped Breasts.*) Sulphate of alumina, 1 drm.; sulphate of zinc, ½ oz.; borate of soda, 4 gr.; rose water, 6 oz.—5. (*Cracked Hands.*) Various receipts are given for this. Camphor, 60 gr.; boric acid, 30 gr.; lanoline, white vaseline, of each ½ oz.; to make an ointment.—6. Anoint your hands with glycerine after washing and while they are still damp. If used without some water it has a drying tendency. Vaseline is no good.—7. Mix a powdered ball of sal-prunel with 2 oz. of vaseline, and rub well in.—8. Hands may be kept smooth in cold weather by avoiding the use of warm water. Wash them with cold water and soap.—9. (*Camphor Ice.*) Oil of sweet almonds, 2 oz.; spermaceti, 4 oz.; white wax, 2 oz.; camphor, ½ oz.; melt them over a water bath, run in molds of proper size and form.—10. Expressed oil of almonds and rose water, each, 1 lb. White wax and spermaceti, each, 1 oz. Camphor, 2 oz. Oil of rosemary, 1 drm. Melt together. Glycerine may be substituted in part for the oil and rose water.—11. (*Pomatum for Chapped Lips.*) Lard, 16 parts; cacao oil, 24 parts; spermaceti, 8 parts; yellow wax, 3 parts; alcanna root, 1 part. The substances are fused for a quarter of an hour at a gentle heat, then strained through a cloth and mixed with oil of lemon, oil of bergamot, of each 1-6 part; oil of bitter almonds 1-15 part; when the mass is poured into suitable vessels to cool.

CHARCOAL, To Make.—Charcoal is a form of carbon containing the incombustible portions of wood from which it is prepared, and some volatile ingredients. Oak and alder make the best; next, birch of all kinds, pine, bass-wood, poplar and spruce, hemlock is least desirable, as it makes snapping coal. The object of its preparation is its superior heat-making properties as compared with wood. The greater portion offered for sale is burned in kilns, but in thickly wooded regions much is made by charring in pits. To make a quantity of charcoal, a level place is prepared for the foundation of the pit. A chimney is then made by driving stakes of the desired height arranged in a circle

18 in. in diameter. The wood is cut 4 ft. long and hauled to the pit, large sticks being split. It is not necessary that the wood be dry, though the more seasoning the better the results. The first sticks are set up against the chimney; the next against these; then others on top; and so on, all leaning a little toward the centre until the pile has attained the required size, say 25 cords for a 1,000 bush. pit.



Charcoal Kiln.

When the pile is finished, the outer surface is filled in with chips and sticks, and the whole covered with branches, twigs, leaves, straw or moss, upon which sods or moistened earth are laid together with fine charcoal waste of previous burnings, the depth of the covering varying from 6 to 8 in., and the whole being smoothed and spatted down. Draught holes 2 or 3 in. in diameter and 4 ft. apart, are made in the covering at the bottom. A fire is kindled in the bottom of the chimney from the top, and when well burning the chimney is filled with wood and covered like the rest of the pit. Watch must be kept that the wood does not burn too rapidly, this is shown by the appearance of blue smoke; a steam-like vapor rises from the vents when the process is going on properly. When this smoke is seen, the fire is smothered by packing in green wood at the threatened point, and covering closely with straw and earth; a 1,000 bush. pit will be charred in 10 or 15 days. As the process proceeds, fill up some of the holes and open others, according as the burning progresses. Channels are made under the heap for the tarry matters which run out from the wood towards the close of the process. When completed, the coal is raked out with long-toothed iron rakes, at night, as then any remaining spark of fire can be detected and promptly extinguished by throwing coal dust or moistened earth on it. After the uncharred brands are removed the coal is ready for market.

CHEWING GUM, To Make.—Take of balsam tolu 4 oz.; white resin 16 oz.; sheep suet 1½ oz., more or less; melt together. Of above mixture take 2 oz.; white sugar, 1 oz.; oatmeal 3 oz. Soften and mix on a water bath. Roll the pieces in finely powdered sugar or flour to form sticks, etc., as desired. Paraffin with a little olive oil and glycerine may be melted together for a chewing gum. The exact mixture will vary with the season, etc.

CHILBLAINS, Cure for.—Prevention is better than cure for chilblains as for everything else. A very hot foot-bath every night for a month, followed by the most vigorous rubbing, will usually cure cold feet and set the blood in good circulation in the extremities. But if the chilblains come they may be successfully treated in several ways. A good ointment is made of castile soap melted in a little rum. If from rubbing the skin be broken the rose salve is very healing. Camphor ice cures some chilblains, and the various cerates are suited to those of other people. Peppermint essence, cologne and alcohol are recommended to allay the stinging and burning of a frost bitten heel. —2. For frost bites rub the affected parts with pure oil of peppermint. It will also prevent the after effect of chilblains. Care should be taken to use only the pure oil, and not the essence of peppermint, as the essence will not have the desired effect.

CHIMNEYS, Lamp, to Prevent Cracking.—Put the chimneys into cold water and gradually heat it until it boils, then let it as gradually cool.

CIDER, Cheap, to Make.—Mix well together 10 gal. cold water; 7½ lb. brown sugar; ¾ lb. tartaric acid; add the juice expressed from 2 or 3 lb. dried sour apples, boiled.

CIDER, To Preserve.—A pure, sweet cider is only obtainable from clean, sound fruit, and the fruit should therefore be carefully examined and wiped before grinding. In the press, use hair cloth or gunny in place of straw. As the cider runs from the press, let it pass through a hair sieve into a large open vessel that will hold as much juice as can be expressed in one day. In one day, or sometimes less, the pomace will rise to the top, and in a short time grow very thick. When little white bubbles break through it, draw off the liquid through a very small spigot placed about 3 in. from the bottom, so that the lees may be left behind. The cider must be drawn off into very clean, sweet casks, preferably fresh liquor casks, and closely watched. The moment the white bubbles, before mentioned, are perceived rising at the bunghole, rack it again. It is usually necessary to repeat this three times. Then fill up the cask with cider in every respect like that originally contained in it, add a tumbler of warm, sweet oil, and bung it up tight. For very fine cider it is customary to add at this stage of the process about ½ lb. of glucose (starch sugar) or a smaller portion of white sugar. The cask should then be allowed to remain in a cool place until the cider has aequired the desired flavor. In the meantime clean barrels for its reception should be prepared as follows: Some clean strips of rags are dipped in melted sulphur, lighted and burned in the bunghole, and the bung laid loosely on the end of the rag so as to retain the sulphur vapor within the barrel. Then tie up ½ lb. of mustard seed in a coarse muslin bag, and put it in the barrel, fill the barrel with cider, add about ½ lb. of isinglass or fine gelatine dissolved in hot water.

CIDER, To Keep Sweet.—When the cider has reached the flavor required, add 1 to 2 tumblers of grated horseradish to each barrel of cider.

CIGARETTES, To Make.—Cigarettes may be rolled in the hand or made by a machine, by

which paper and tobacco are fed in at one end, and from the other come out cigarettes. When the tobacco is brought in, it is placed on a sieve-table, set in motion by machinery; this sifts out sand and foreign bodies, operators standing on each side of the table to catch all bad leaves or stems. It is next thrown upon a ventilator, which winnows out the dust; then spread in layers on terraces where the sun can dry it; after which it is dropped into casks, and subjected to intense hydraulic pressure; then conveyed beneath a huge fly wheel, set with sharp blades, that chop it to pieces. It is again ventilated, winnowed, and sujected to a finer cutting apparatus, until it is reduced sufficiently; after which it is spread out on a floor and sprinkled with an aromatic liquid; once more dried; when it is ready for the paper envelopes. The paper is passed beneath a press which stamps it, and is then cut with a mechanical knife.

CIGARS, To Flavor.—1. Ordinary cigars may be scented by moistening with a strong tincture of cascarilla to which a little gum benzoin and storax is added; or the leaves which are to form the cigars may be soaked for a short time in a strong infusion of cascarilla, and then dried by a gentle heat. A small quantity of camphor, together with oils of cassia and cloves, is sometimes added to the tincture mentioned.—2. By simply inserting very small shreds of cascarilla bark between the leaves of the cigar, or in small slits made for the purpose.

CIGARS, To Make.—The leaf is stalked or stripped of its midrib, and damped before it passes into the hands of the roller. The envelope is cut from a smooth, unbroken leaf. It is laid flat on a table and the edge wet with a little gum water; the small pieces of leaf are then laid on it and rolled up in it, the gummed edge of the wrapper sticking it tight. One end is pointed by twisting it with the fingers and the other end is cut square.

CIGARS, To Smoke.—With a sharp knife cut off a transverse section $\frac{1}{4}$ in. from the small end, if you would avoid being troubled with particles of tobacco between your lips while smoking. Avoid licking the cigar; it spoils the excellence of the outer leaf on which much of the flavor depends. Light the end thoroughly. Do not commence to smoke a cigar half-lit. Keep it out of a draft; it is difficult to taste the fragrance of delicate tobacco in the open air. Smoke gently, and avoid burning down one side, for then all flavor is lost. If a cigar go out it may be relit without disadvantage, but a cigar lighted after becoming cold is generally nauseous.

CLEANING MIXTURE.—(*For silk, woolen and cotton fabrics.*) It is said that it will not change their color nor injure the texture. Take a pint of clean and clear soft water, and into it grate 2 good sized potatoes. Strain through a coarse sieve into a gallon of water and let the liquid settle. Pour the starchy fluid from the sediment and it is ready for use. Rub the articles gently in the liquid, rinse thoroughly in clear water, dry and press.

COAL OIL, Uses for.—Headlight oil is double refined petroleum, or refined kerosene. It is purer and cleaner than the cruder and cheaper oils, and has not so strong an odor. It is for this reason better for household purposes, although kerosene is as good in other respects.—1. For laundry work the oil is becoming well-known. The clothes are put to soak over night in warm soap suds. In the morning clean water is put in the boiler, and to it is added a bar of any good soap, shred fine, and two and one-half tablespoons of headlight or kerosene oil. The clothes being wrung from the suds, the finest and whitest go into the scalding water in the boiler and are boiled 20 minutes. When taken from the boiler for the next lot, they are sudsed in warm water, collars, cuffs and seams being rubbed if necessary. Rinsed and blued as usual, they will come forth beautifully soft and white. Knit woolen underwear, woolen socks, etc., may safely be washed in this way. The secret of washing successfully by this method is the use of plenty of soap and warm water to suds the clothes. If too little soap be used the dirt will "curdle" and settle on the clothes in "freckles." A teaspoonful of headlight oil added to a quart of made starch, stirred in while it is hot, or added to the starch before the hot water is poured upon it, will materially lessen the labor of ironing and will give to clothes either white or colored, especially muslins or other thin wash goods, a look of freshness and newness not otherwise to be attained. For cold starch, add a teaspoonful of oil for every shirt to be starched. Rub the starch well into the article, roll up tightly, and leave it for $\frac{3}{4}$ of an hour, then iron.—2. To clean windows and mirrors, add a tablespoonful of headlight or kerosene oil to a gallon of tepid water. A polish will remain on the glass that no mere friction can give.—3. If windows must be cleaned in freezing weather use no water at all. Rub them with a cloth dampened with kerosene; dry with a clean cloth and polish with soft paper.—4. A few drops of kerosene added to the water in which lamp chimneys are washed will make them easier to polish.—5. To break a glass jar or bottle evenly, put a narrow strip of cloth, saturated with kerosene, around the article where it is to be broken. Set fire to the cloth and the glass will crack off above it.—6. Tarnished lamp burners may be rendered almost as bright as new by boiling them in water to which a teaspoonful of soda and a little kerosene has been added. Then scour with kerosene and scouring brick and polish with chamois or soft leather.—7. To clean iron work rub with a cloth dampened with kerosene.—8. To prevent rust on stoves put away for the season, black them before putting away with blacking diluted with kerosene, or rub them thoroughly with kerosene alone.—9. To clean zinc, oil cloths and white paint, rub them with a cloth dipped in kerosene, and dry with a clean cloth.—10. To clean brass stair rods, brass bedsteads and other brasses, rub with kerosene and rotten stone put on with a soft cloth, and polish with a dry cloth, soft paper

or chamois.—11. To remove rust from kettles or other ironware, rub with kerosene and let them stand. Keep a day; then wash with hot water and soap, repeating if necessary.—12. To remove rust from flatirons, soak them in, or rub them with kerosene, and polish with scouring brick.—13. To remove rusty screws, drop kerosene upon them; in a few minutes they can be moved.—14. To take rust from steel implements, cover with kerosene for forty-eight hours, then scour with air-slacked lime until the stain disappears.—15. To remove paint from any kind of cloth, saturate the spot with kerosene and rub well; repeat if necessary.—16. To remove fruit stains, saturate the stain with kerosene, rub thoroughly with baking soda and leave in the sun.—17. To renew woodwork and furniture, varnish with black varnish, plentifully diluted with kerosene.—18. To soften leather hardened by repeated wettings, rub it well with kerosene.—19. To clean sewing or other machines, oil all the bearings plentifully with kerosene, operate the machine rapidly for a moment, rub the oil off and apply machine oil.—20. To remove dandruff, rub kerosene well into the roots of the hair; the dandruff can then be combed or washed out easily.—21. To make the hair grow, apply headlight oil or kerosene to the roots of the hair twice each week, rubbing it in well with the tips of the fingers. This will often produce a growth of hair when all other means fail.—22. To relieve chilblains, soak the feet in hot water and rub them with kerosene, or with kerosene and lime water.—23. To relieve calloused feet rub them frequently with kerosene.—24. To relieve the pain of rheumatism, rub the afflicted joint with kerosene.

CLOCKS, To Clean and Oil.—If it is a clock that the oil will not injure—of metal, wood, china or marble—place it in a bowl and pour about a pint of kerosene into the back. Place it face downward and let it stand over night. Even if the face be of paper and gets completely soaked with the oil, it will do no harm. The kerosene will evaporate within a few days and leave it perfectly clean. If, after this treatment, the clock will not go, it is because there is something radically wrong with it. Some essential part must be broken. The theory is very simple. The kerosene cleans the works and removes any clog of oil and dust that may be interfering with the machinery.

CLOTHES, To Prevent Fading.—Soak the clothes that fade over night in water in which has been dissolved 1 ounce of sugar of lead to a pailful of rain water.

COAL, To Make Last.—Coal over which has been sprinkled a strong solution of salt will last much longer than it otherwise will—what will be saved in coal will more than pay for the salt and the trouble. Use a pound of salt in each two quarts of water. Hot water dissolves the salt more readily than cold, though either will do. The salt in some way adds a lasting ingredient to the coal. Salt was the main constituent of the various coalines so extensively advertised some years ago, and by which so much money was made. Any one can try the experiment in a small way. First see exactly how long one scuttle full of coal will last. Next try the same amount of coal, over which the solution of salt has been sprinkled.

COCKROACHES, To Destroy.—Among other things, cinnamon is said to possess irresistible attractions for the cockroach palate, and there is a scandal to the effect that those whose business it is to reduce the cinnamon sticks to a powder are not very careful to separate the spice from the insects—which sometimes constitutes nearly half the contents of the bags—but tumble them together into the mill. This passion for cinnamon can be utilized readily to capture them. Select a tin dish with fairly deep and steep sides; put a little cinnamon on its bottom; set it in a favorite haunt of the insects; place sticks or strips of pasteboard from the edge of the dish to the floor, so as to lead up. The next day the dish will be found full of roaches, who cannot climb back on the slippery sides of the tin dish. Destroy them and set the trap again.

COFFEE, Adulterated, Tests for.—Artificial coffees can be detected in unground samples by a careful examination and separation of all beans which do not have a portion of the flue membrane with which they were originally invested still adhering in the cleft. The suspected beans should be cut open and the structure examined. The uniform structure of the artificial coffee is very distinctive, and after comparison with that of genuine coffee can never be mistaken for the latter. Pure ground, roasted coffee will float on cold water, coloring it very slightly and slowly, while the bogus coffee, chicory, roasted cereals, etc., sink, coloring the water quickly. Chicory is very easily detected by this test, since the particles in sinking leave a trail of color behind them. Cereals, when "light roasted," may escape detection by the water test, but they respond readily to iodine, giving the characteristic reaction for starch. A hot water extract of the adulterated sample containing cereals, or other starch bodies, when filtered, cooled, acidulated with sulphuric acid and decolorized by permanganate of potassium, will show a blue color on the addition of tincture of iodine. Chicory contains no starch, hence if the water is quickly colored and iodine does not give the characteristic reaction, chicory is probably present. The microscopic examination will reveal the presence of starches, if cereals, acorns, peas or beans constitute the adulterant.

COLD, Remedy for.—Trinitrate of bismuth, 6 drachms; pulverized gum Arabic, 2 drachms; hydro-chlorate of morphia, 2 grains. This is used as a snuff, creates no pain, and causes the entire disappearance of the symptoms in a few hours.

COLD SORE, Remedy for.—This complaint, generally known as "breaking out," attacks the margins of the lips, and most frequently accompanies a cold in the head. It is too well known to need description. *Treatment:* Oxide of zinc, 10 parts; oxide of bismuth, 20 parts;

powdered starch, 20 parts; oxide of iron, 2 parts; silica, 20 parts; oxide of aluminum, 8 parts; oxide of magnesium, 10 parts; powdered chalk, 10 parts. The above should be mixed into a fine powder, and then be made into a paste with an equal quantity of glycerine; this should be gently rubbed into and spread over the parts nightly.

COLOR, To Revive. — Plush goods and all articles dyed with aniline colors, faded from exposure to light will look bright as ever after being sponged with chloroform. The commercial chloroform will answer the purpose very well, and is much less expensive than the purified.

CORK, To Prepare for Bottles. — 1. Before being manufactured into stoppers, the cork is charred on each side. It is readily cut and is obtainable in sheets and squares, which can be flattened with the aid of moisture and pressure, or bent with that of heat and pressure. The knife for cutting should be broad in the blade, and kept sharp, for cork blunts the edge of the knife very soon. There are 2 kinds of cork, the white and the darker kind. The white is smooth, has a fine grain, and cuts with precision. Good corks act effectually in the exclusion of air, and do not absorb the liquid. If you have a batch of imperfect corks, dip them into a mixture composed of $\frac{3}{4}$ virgin wax and $\frac{1}{4}$ beef suet, and dry in the oven. Ordinary corks are squeezed with an instrument before they are forced into the necks of the bottles, so as to allow for their swelling; but corks prepared with this mixture require no squeezing. To insure non-evaporation through corks after they are driven, cover them with wax.—2. Paraffine is fused in a suitable vessel, the dry corks immersed therein by means of a perforated disc; the air is now easily expelled from the pores of the corks, which after about 5 minutes are removed and cooled; they may be cut and bored like wax, are easily driven into bottles, readily removed, retain their smoothness and are gas-tight.

CORK, To Soften.—Steam thoroughly, or boil it in water 1 hour or more.

CORKS, Substitutes for Glass Stoppers.—Corks that have been steeped in vaseline are an excellent substitute for glass stoppers. They are not in the least affected by acids, the fumes of chemicals do not decay them, nor do they become fixed in the bottles, from long disuse. In short, they have all the good qualities of the glass stopper without any of its disadvantages.

CORNED BEEF. — To each gallon of water add 1$\frac{1}{2}$ lb. salt, $\frac{1}{2}$ lb. of sugar, $\frac{1}{2}$ oz. saltpeter, and $\frac{1}{2}$ oz. potash. Boil, skim, and when cold pour over the meat.

CORNS AND BUNIONS, To Cure.—A corn is an abnormal growth of the epidermis, which increases in two directions—outwardly forming a callosity; inwardly dipping into the true skin. There are two kinds, hard and soft. The hard generally form over some projecting point of bone; the soft form between the toes. Causes: Irritation by pressure or friction, as from wearing tight shoes. A piece of cotton wool should be placed between or under the toes, as the case may be, to relieve the spot from friction. *Treatment:*—1. Salicylic acid, 30 gr.; cannabis Indica (Indian hemp), 5 gr.; castor oil, $\frac{1}{2}$ drm.; collodion, $\frac{1}{2}$ oz.; mix and apply morning and evening for four days. Then soak the feet in warm water. If this be done faithfully, the corns are removed without any difficulty. The result is a clear, light green solution. There should be no difficulty in its preparation. To prevent it from evaporating, keep the solution in a stoppered bottle. Be sure and use the Indian hemp, and not the American article; the latter is not easily soluble.—2. For bunions and corns Cannabis Indica and glycerine, equal parts, painted on the bunion or corn and bound around with Canton flannel, adding a few drops of the liquid to the flannel where it comes in contact with the affected parts will soon restore to health.—3. An inflamed bunion should be poulticed, and larger shoes worn. Iodine, 12 gr.; lard or spermaceti ointment, $\frac{1}{2}$ oz., make a capital ointment for bunions. It should be rubbed on gently two or three times a day.

COTTON DUCK, To Make Mildew-Proof. — Saturate the cloth in hot solution of soap, $\frac{1}{4}$ lb. to the gal. of water; wring out and digest 12 hours or more in a solution of $\frac{1}{2}$ lb. alum to 1 gal. water.

CRYING BABY, To Stop.—In the midst of its screaming press your finger gently and repeatedly across the cartilage of the nose, and inside of three minutes it will be sound asleep.

CURRY POWDER.—1. Coriander seeds, 20 parts; black pepper, 3 parts; cayenne pepper, 1 part; turmeric, 6 parts; cummin seeds, 6 parts. Reduce to powder and mix.—2. The following recipe is the closest approach to a Singapore curry powder that can be obtained outside of the tropics: One cocoanut and one lime sliced; cardamons, thoroughly ground, 2 oz.; cinnamon, thoroughly ground, 2 oz.; chillies, thoroughly ground, 1 oz.; coriander seed, thoroughly ground, 4 oz.; black pepper, thoroughly ground, 4 oz.; mustard seed, thoroughly ground, 2 oz.; turmeric, thoroughly ground, 5 oz.; ginger, thoroughly ground, 4 oz.—3. (*Ford's.*) Turmeric, 12 oz.; coriander seed, 12 oz.; ginger, 12 oz.; black pepper, 12 oz.; capsicums, 9 oz.; cardamons, 6 oz.; cummin seed, 6 oz.; mint, 3 oz. These should be ground separately into fine powder, and weighed after being ground. Mix thoroughly by sifting all together.

DAMPNESS, Remedy for. — 1. (*Apartments, Storage Cellars, etc.*) A recent test of it on a wholesale scale demonstrated its practical superiority to the fresh lime, sulphuric acid, etc., usually advised. The materials are common salt and sawdust, which are ever obtainable—as fresh lime is not, and not dangerous, as sulphuric acid is—and do the work completely and rapidly. First lay a rather thick layer (about 1 inch) of sawdust on the floor; upon this a similar layer of salt. The salt takes the moisture, and the sawdust absorbs it.—2. (*Walls.*) $\frac{3}{4}$ lb. of mottled soap to 1 gal. of water. This composition to be laid over the brick

work steadily and carefully with a large flat brush, so as not to form a froth or lather on surface. The wash to remain 24 hours, to become dry. Mix ½ lb. alum with 4 gal. water; leave it stand 24 hours, then apply it in the same manner over the coating of soap. Let this be done in dry weather.

DIAMONDS, To Test.—It doesn't require an expert to tell whether a diamond is genuine or not. The test is very simple, and it can be made in any place and in a moment. All you need is a piece of paper and a lead pencil. With the latter make a small dot on the paper, then look at it through the diamond. If you can see but one dot you can depend upon it that the stone is genuine, but if the mark is scattered, or shows more than one, you will be perfectly safe in refusing to pay 10c for a stone that may be offered you at $500. A blue stone may be tested by a bath in alcohol. Many yellow stones are made blue by an application of analine, and this is overcome by the alcohol.

DIAMONDS, Value of.—Diamonds averaging ¼ carat each, $60, per carat; ¾ carat each, $80; 1 carat each, $100; 1¼ carats each, $110; 1½ carats each, $120; 1¾ carats each, $145; 2 carats each, $175. In other words the value of the gem increases in the geometrical ratio of its weight. Four diamonds weighing together 2 carats are worth $120; but one diamond weighing just as much is worth $350. Stones weighing over 2 carats are about the same price per carat as two-carat stones; they should be dearer, but they are not, simply because the demand for them is limited. If the demand for diamonds was as imperative as the demand for beef or flour, the geometrical ratio would again come into play, and five-carat stones would be valued in the thousands.

DISINFECTANTS.— The following instructions for disinfection are intended especially for yellow fever districts, but are equally applicable in other classes of contagious diseases. No reliance can be placed on disinfectants simply because they smell of chlorine or carbolic acid, or possess the color of permanganate, and that, in general, proprietary disinfectants with high-sounding names are practically worthless, as they either have no value whatever or, if of value, cost many times as much as they are worth, and cannot be used in sufficient quantity. Explanations.—Disinfection is the destruction of the poisons of infectious and contagious diseases. Deodorizers, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not necessarily have an odor. Disinfection cannot compensate for want of cleanliness or of ventilation.—1. (*Disinfectants to be Employed.*) Roll sulphur, brimstone, for fumigation.—2. Sulphate of iron, copperas, dissolved in water in the proportion of 1½ lb. to the gal.; for soil, sewers, etc.—3. Sulphate of zinc and common salt, dissolved together in water in the proportions of 4 oz. sulphate and 2 oz. salt to the gal.; for clothing, bed linen, etc. Note.—Carbolic acid is not included in the above list for the following reasons: It is very difficult to determine the quality of the commercial article, and the purchaser can never be certain of securing it of proper strength, it is expensive, when of good quality, and experience has shown that it must be employed in comparatively large quantities to be of any use; it is liable by its strong odor to give a false sense of security.

DISINFECTANTS, How to Use.—1. (*In the Sick Room.*)—The most available are fresh air and cleanliness. The clothing, towels, bed linen, etc., should at once, on removal from the patient, be placed in a pail or tub of the zinc solution, boiling hot if possible, before removal from the room. All discharges should either be received in vessels containing copperas solution, or, when this is impracticable, should be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution. Unnecessary furniture—especially that which is stuffed—carpets, and hangings, when possible, should be removed from the room at the outset; otherwise, they should remain for subsequent fumigation and treatment.—2. Fumigation with sulphur is the only practicable method for disinfecting the house. For this purpose the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans supported upon bricks, set it on fire by hot coals, or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionally increased quantities.—3. Premises, cellars, yards, stables, gutters, privies, cesspools, water closets, drains, sewers, etc., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containing about 60 lbs. of copperas in a barrel of water.—4. (*Body and Bed Clothing, etc.*) It is best to burn all articles which have been in contact with persons sick with contagious or infectious diseases. Articles too valuable to be destroyed should be treated as follows: *a.* Cotton, linen, flannels, blankets, etc., should be treated with the boiling hot zinc solution, introducing piece by piece, securing thorough wetting, and boiling for at least half an hour. *b.* Heavy woolen clothing, silks, furs, stuffed bed covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, pockets being turned inside out, and the whole garment thoroughly exposed. Afterward they should be hung in the open air, beaten, and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.—5. The corpses should be thoroughly washed with a zinc solution of

double strength, then wrapped in a sheet wet with the zinc solution, and buried at once. Metallic, metal-lined, or air-tight coffins should be used when possible, certainly when the body is to be transported for any considerable distance.

DRAWINGS, To Fix.—1. Immerse the drawing in skimmed milk. A special fixative is sold for the purpose by dealers in art materials. Collodion, if very thin, might be used with advantage; often used for manuscripts.—2. Flow with very thin collodion.—3. 2 tablespoonfuls of rice boiled in 1 pt. or ½ pt. of water; strain, and pass the drawing quickly through the liquid; use a large flat dish for the liquid.—4. Prepare water starch, in the manner of the laundress, of such strength as to form a jelly when cold, and then apply with a broad camel hair brush, as in varnishing. The same may be done with thin cold isinglass water or size, or rice water.

DRINKING, Excessive, to Break off.—Anticipate the craving by supplying food in some acceptable form—a cup of hot cocoatine being an excellent substitute for, or addition to, more solid food; a cup of soup made from Liebig's extract is also useful in the same way. As an addition to food, and to supply the craving for bitter (experienced by drunken persons), an infusion of bark is said not only to afford that, but to create an actual distaste for alcohol in any form. The infusion of bark is made by pouring a pt. of boiling water upon an oz. of coarsely powdered bark, and allowing it to stand near the fire in a covered vessel for five or six hours; dose, a wineglassful two or three times a day. An infusion of quassia is also useful in the same way, made thus: Quassia chips, ¼ oz.; cold water a pt.; dose, the same as the infusion of bark. A teaspoonful or two of Malt extract may be added to either infusion if liked.

DUBBING, To Make.—Resin, 10 lb.; tallow, 5 lb.; train oil, 5 gal.

EARACHE, Cure for.—1. Wet a piece of cotton with equal parts of chloroform and laudanum, place in the ear, and cover up.—2. Put five drops of chloroform on a little cotton or wool in the bowl of a clay pipe, then blow the vapor through the stem into the aching ear.

EBONY, Artificial.—1. 60 parts of charcoal obtained from seaweeds previously treated with dilute sulphuric acid, and dried, and mixing it with 10 parts of liquid glue, 5 of gutta percha, and 2½ of India rubber, care having been taken to mix the two latter substances with coal oil tar to render them gelatinous, then 10 parts of coal tar, 5 of pulverized sulphur, 2 of powdered alum, and 5 of powdered resin are added, and the mixture heated to 300° F. After having been cooled a substance is obtained which is equal in many respects to genuine ebony wood, but is far less expensive, and capable of receiving a finer polish. It can only be prepared on a large scale.—2. The wood is immersed for 48 hours in a hot saturated solution of alum, and then brushed over several times with a logwood decoction prepared as follows: Boil 1 part best logwood with 10 parts of water, filter through linen and evaporate at a gentle heat until the volume is reduced one half. To every quart of this add from 10 to 15 drops of a saturated solution of indigo, completely neutral. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdigris in hot concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained.

EGGS, To Pack and Keep.—1. Dip the eggs into a solution of 2 oz. gum Arabic in a pint of cold water, let them dry and pack in powdered, well burned charcoal.—2. *Packing Liquid.* Lime, 1 bushel (shaked with water); common salt, 2 or 3 lb.; cream of tartar, ½ lb.; water, q. s. to form a mixture strong enough to float an egg. Used to preserve eggs, which it is said it will do for two years, by simply keeping them in it.—3. In the common "liming" process a tight barrel is half filled with cold water, into which is stirred shaked lime and salt in the proportion of about ½ lb. each for every pail or bucket of water. Some dealers use no salt, and others add a small quantity of niter—¼ lb. to the half barrel of pickle. Into this the eggs, which must be perfectly fresh and sound, are let down with a dish, when they settle to the bottom, small end down. The eggs displace the liquid, so that when the barrel is full of eggs it is also full of the pickle. Eggs thus pickled, if kept in a cool place, will ordinarily keep good for several months. Long storage in this liquid, however, is apt to make the shells brittle and impart a liny taste to their contents. This may be in a great measure avoided by anointing the egg all over with lard before putting in the pickle. Eggs thus prepared are said to keep perfectly for 6 months or more when stored in a cool cellar.—5. Melt 4 oz. clear beeswax in a porcelain dish over a gentle fire and stir in 8 oz. of olive oil. Let the resulting solution of wax in oil cool somewhat, then dip the fresh eggs one by one into it so as to coat every part of the shell. A momentary dip is sufficient, all excess of the mixture being wiped off with a cotton cloth. The oil is absorbed in the shell, the wax hermetically closing all the pores. It is claimed that eggs thus treated and packed away in powdered charcoal in a cool place have been found after two years as fresh and palatable as when newly laid.—6. Paraffine, which melts to a thin liquid at a temperature below the boiling of water, and has the advantage of being odorless, tasteless, harmless, and cheap, can be advantageously substituted for the wax and oil, and used in a similar manner. Thus coated and put into the lime pickle the eggs may be safely stored for many months; in charcoal, under favorable circumstances, for a year or more. 7.—Dry salt is frequently recommended as a good preservative packing for stored eggs, but practical experience has shown that salt alone is but little better than dry bran, especially if stored in a damp place or exposed to humid air. —8. A mixture of 8 measures of bran with 1 of powdered quicklime makes an excellent pack-

ing for eggs in transportation.—9. Water glass—silicate of soda—has recently been used in Germany for rendering the shells of eggs non-porous. A small quantity of the clear sirupy solution is smeared over the entire surface of the shell. On drying, a thin, hard, glassy film remains, which serves as an admirable protection and substitute for wax, oil, gums, etc. Eggs thus coated and stored in charcoal powder or a mixture of charcoal and bran would keep a very long time.—10. In storing eggs in charcoal the latter should be fresh and perfectly dry. If the eggs are not stored when perfectly fresh they will not keep under any circumstances. A broken egg stored with sound ones will sometimes endanger the whole lot. In packing, the small end of the egg should be placed downward; if in charcoal or other powder they must be packed so that the shell of one egg does not touch that of another, the interspaces being filled with the powder. Under all circumstances stored eggs should be kept in as cool a place as possible. Frequent change of temperature must also be avoided.

ELECTRIC BATTERIES, To Recharge.—This is sometimes exceedingly simple, but requires neatness and care. First, carefully disconnect the wires, observing closely exactly how they were attached and to what parts of the battery. Then rinse and clean out the carbon cup, the jar and the zinc. If the zinc is worn out, buy another from any electrical supply store. Replace all in the same position as before. Fill jar about half full of clear water; then take about six ounces of commercial sal ammoniac, which can be bought from any drug store, and place it in the jar; connect the wires again with care and neatness to exactly the same places as before, seeing that they do not touch anything but the points of attachment and that the attachments are not reversed from what they were before.

ENAMELLED CLOTH.—1. Cotton cloth of the best quality is used. The cloth is taken from a bale and wound upon a large cylinder preparatory to receiving its first coat. It is then passed between heavy iron rollers, from the top one of which it receives its first coating of composition, which consists of linseed oil, lampblack, resin, and a few other ingredients boiled together until they reach the consistency of melted tar. In many places the covering is spread by a knife under which the web passes. From between the cylinders it is carried to a drying frame, the shape of a reel, and subjected to a high temperature in the drying room, heated by steam pipes. After the drying process, the rough places are made smooth by rubbing with pumice stone and water. The cloth is then passed through the same operation as before; rolling, drying and rubbing, repeated from 3 to 5 times, or until required thickness has been laid. After the last scrubbing down, the fabric is taken to another department, varnished, and again passed through the heater. The cloth is next passed between heavy rollers, which cover its surface with regular indentations resembling the grain of leather, and it is then ready for market. It is used as a substitute for leather, in the covering of carriage tops, upholstering of furniture, covering of trunks and traveling bags, and in garments, etc., as a protection from water.—2. The art of enameling fabrics, as practiced in Paris seems to be a very simple matter. The enamel is prepared exactly as for copper and and the material usually chosen is a satinet or other colored tissue. This is treated with successive coats of India rubber, dissolved in benzine to the consistency of a syrup, until the cloth is water-proof. The enamel is next put on in a pattern by means of a much thicker solution of the rubber. The outer rim of enamel is cut away after the fashion of lace by hand or by a sharp punch. Another new material, said to be water-proof, is parchment cloth. This is understood to be prepared by taking cotton, linen or hemp tissue direct from the loom and without any finishing material in the yarn, and passing it through fine paper pulp. Then it is run between rolls and afterward immersed for 5 to 35 seconds in a mixture of 100 parts sulphuric acid to 16 parts of water. Afterward it is passed through lead-covered rolls, washed thoroughly and neutralized in dilute ammonia. After the alkaline bath it is washed once more and submitted to a high pressure between steel plates, being finally dried in a calender.

ENGRAVINGS, Old, to Clean.—1. Place them, one or two at a time, in a shallow dish, and pour water over them until they are completely soaked or saturated with it. Then carefully pour off the water, and pour on to the prints a solution of chloride of lime (1 part liquor calcis chloratæ to 39 parts of of water). As a general rule, the stains disappear as if by magic, but occasionally they are obstinate. When that is the case, pour on the spot pure liquor calcis chloratæ, and if that does not succeed add a little dilute nitro-muriatic acid. As soon as they are clean they must be carefully washed with successive portions of water until the whole of the chlorine is got rid of. They should then be placed in a very weak solution of isinglass or glue, and many collectors color this solution with coffee grounds, etc., to give a yellow tint to the print. They should be dried between folds of blotting paper, either in a press or under a heavy book, and finally ironed with an ordinary flat iron to restore the gloss, placing clean paper between the iron and the print. Grease stains are much more difficult. Benzine is best. Small grease spots may be removed by powdered French chalk being placed over them, a piece of clean blotting paper over the chalk, and a hot iron over that.—2. Instead of carbonate of soda, use the bicarbonate, in slight excess, for decomposing chloride of lime. The reaction is very violent, and Javelle water is easily separated from the precipitate produced. Old engravings, wood-cuts and all kinds of printed matter that have turned yellow are completely restored by being immersed in it only for one minute, without the least injury to the paper, if the precaution is taken to thoroughly wash the article in water containing a

little hyposulphite of soda. Undyed linen and cotton goods of all kinds, however soiled or dirty, are rendered snowy white in a very short time by merely placing them in the liquid mentioned. For the preparation of Javelle water, take 4 lbs. bicarbonate of soda, 1 lb. of chloride of lime; put the soda into a kettle over the fire, add 1 gallon of boiling water, let it boil from 10 to 15 minutes, then stir in the chloride of lime, avoiding lumps. When cold the liquid can be kept in a jug ready for use.

EUCHRE, Progressive.—A series of games of euchre played by three or more sets of four persons each. The table nearest the front door is said to be at the head of the row, and the corresponding one at the other end of the room is said to be at the foot. The players being thus seated four at a table, one of those at the head table strikes a bell, and the game begins. Everybody plays as fast as he or she can, and while each is striving to make as many points as possible before the bell is tapped, and is of the opinion that he holds enough trumps to gain the five tricks, you can play alone against your opponents. Should you gain them you are entitled to four points. The excitement is great until the sound of the bell announces that a couple at the head table have finished their game. Immediately all the other players stop playing, and the winners at each table change places and take the table next above them, the ultimate object being to get to the head table. The losing couple at the head table go down to the foot, and at every table the partners change, so that your partner in the previous round becomes your enemy in the round now beginning. The game continues in this way until the time previously chosen by the host or hostess has expired. This time is usually two hours or two hours and a half, when the final reckoning is taken, and the prizes are awarded. To the lady and gentleman who have won the most points a prize apiece is awarded, and this may be of any description or cost, although good taste seems to dictate that its pecuniary value be not large. To the lady and gentleman, on the other hand, who have lost the most while sitting at the lowest table, a mock prize apiece is awarded, consisting, say, of a cheap doll, fantastically dressed, or other ludicrous exponent of unsuccesssful effort.

EYES, Watery, Treatment of.—The eyes are tender, cannot bear a strong light, and there is an abundant secretion of tears. *Treatment:* If acute, that is, coming on suddenly and from some injury due to dust, etc., they should be bathed in—1. Warm water, 1 part; poppy decoction, 1 part. Chronic cases are best treated by astringents, as—2. Sulphate of zinc, 1½ gr.; water, 1 oz.—3. Alum, 2 gr.; water, 1 oz.—4. Sulphate of copper, 1½ gr.; water, 1 oz.—5. Nitrate of silver, 1 gr.; water, 1 oz.—6. Acetate of zinc, 1½ gr.; water, 1 oz.—7. Diacetate of lead, 11 gr.; water, 1 oz. The subsequent treatment of acute cases, after the inflammation has subsided, may be similar to that of the chronic. Rectified spirit, 1 part, and water, 8 parts, may be used as a lotion to chronic cases. (*Eye Waters*).—8. Distilled vinegar, 1 fl. oz.; distilled water, 9 fl. oz. Mix. In simple chronic ophthalmia, weak and blear eyes, etc.; also to remove minute particles of lime from the eyes. One-half fl. oz. of rectified spirit or 1 fl. oz. of good brandy is often added and improves it where there is laxness of the membranes.—9. Sulphate of zinc, 20 gr.; distilled water, ½ pt.; dissolve. An excellent astringent eye water, for chronic ophthalmia and in ordinary ophthalmia, as soon as the inflammatory symptoms subside; also in weak, lax, watery, irritable eyes. etc., If there be much pain and irritability, 5 or 6 grains of acetate of morphia (not hydrochlorate) or 2 fl. dr. of wine of opium may be added. —10. Alum (crushed small), 10 gr.; sulphate of zinc, 10 gr.; distilled water, ½ pt.; dissolve. Use, etc., as the last.—11. Acetate (sugar) of lead, 10 to 12 gr.; distilled vinegar, 1 teaspoonful; distilled water, ½ pt.; dissolve. Use, etc., as No. 9, particularly for children.

FEATHERS, To Bleach.—1. It is also possible to bleach the feathers in a bath of 1 part barium peroxide in 100 parts of water at 86° F. (30° C.) Leave forty-eight hours in this solution, wash, pass through weak acid bath, and wash.—2. Feathers may be bleached by exposure to the vapor of burning sulphur (sulphurous acid) in a moist atmosphere, but it is usually necessary to remove the oily matters from them before they can be satisfactorily so bleached. This may be accomplished by immersing them for a short time in good naphtha or benzine, rinsing in a second vessel of the same, and thoroughly drying by exposure to the air. This treatment does not injure the feathers.

FEET, Care of.—A person will never be in good health and never do his best work if his feet are constantly cold. Grave diseases of the throat and lungs are caused by cold feet alone, and these troubles are always aggravated by a frigid condition of the lower extremities. If proper footwear does not give relief, consult a physician, for the chances are the system is "run down" and radical measures are necessary. In nine cases out of ten, however, the foot covering is to blame, either because of its shape or its material. Save in warm weather and for low-cut shoes leather, as ordinarily prepared, has serious objections. It lacks two prime qualities—porosity and capacity for absorption —being in this respect too much like rubber. No foot can remain either comfortable or healthy if kept in a perpetual bath of its own emanations and excretions. Leather, especially that of the more porous varieties, may be tolerated for the outside, but for cold weather it should always be lined with woolen, cloth, or, better, with wool felt. In fact, for all cold climates and for winter wear in all climates where there is any winter, a footgear made from all-wool felt approaches the ideal. According to modern notions any illness in one part of the body may be occasioned by some irritating cause far removed from the seat of the trouble. Just how this is cannot always be clearly explained, but that such connection does sometimes exist is beyond dispute. In the matter

under discussion, if the nerves of the whole body are irritated by a tight shoe or the extreme coldness of the extremities makes extra demand upon the blood supply, there is neither nerve force nor blood enough left for other functions.

FEET, Lotion for.—1. Permanganate of potash, 15 parts; distilled water, 1,000 parts. The feet to be washed twice a day with the lotion. They are then to be carefully dried, and powdered either with potato starch or lycopodium. —2. (*Offensive.*) This condition is caused by excessive sweating of the feet, and the sweat, being confined, does not evaporate, and so decomposes. *Treatment:* The feet should be washed daily in cold water, and afterward rubbed thoroughly dry; the water may contain ½ oz. powdered alum to the quart. Also at least once daily; especially after exercise, lave the feet with a solution of chlorinated lime, or permanganate of potash, 80 gr.; water, 1 pt. Also before putting on the socks or stockings the feet should be thickly powdered, especially between the toes, with chlorinated lime, 1 part; prepared chalk, 1 part; starch powder, 1 part. The socks or stockings should be of thin flannel.

FERTILIZERS.—1. (*Huxtable.*) Crude potash, 28 lb.; common salt, 1 cwt; bone dust and gypsum, each 2 cwt.; wood ashes, 15 bu. For either corn, turnips or grass.—2. (*Johnstone.*) Sodium sulphate (dry), 11 lb.; wood ashes, 28 lb.; common salt, ¾ cwt.; crude ammonium sulphate, 1 cwt.; bone dust, 7 bu. As a substitute for guano.—3. (*Liquid.*) Dissolve 25 lb. guano in 5 gal. of water. For use add 2½ oz. of this solution to 5 gal. water.—4. Sheeps' dung, ½ peck to 15 gal. of water; sulphate of ammonia, ⅛ oz. to every gal.—5. (*From Soot.*) Save the soot that falls from the chimneys when the latter are cleaned. Twelve qt. soot to 1 hhd. water makes a good liquid manure, to be applied to the roots of plants.—6. To produce 50 bushels of corn more than the natural product to the acre, use nitrogen, 64 lb., in the form of sulphate of ammonia.—7. Potash, 77 lb., in the form of chloride of potash.—8. Phosphoric acid, 31 lb., in the form of muriate of superphosphates.—9. To grow 1 ton of hay to the acre more than the natural product, use nitrogen, 36 lb., in the form of sulphate of ammonia. —10. Potash, 31 lb., in the form of chloride of potash.—11. Phosphoric acid, 12 lb., in the form of superphosphate.—12. To produce 100 bushels of potatoes per acre and their usual proportion of tops more than the natural proportion of the land, and other quantities proportionally, use nitrogen, 21 lb., in the form of sulphate of ammonia.—13. Potash, 34 lb., in the form of sulphate of potash.—14. Phosphoric acid, 11 lb., in the form of superphosphate.— 15. To produce 25 bushels of oats and the usual proportion of straw per acre more than the natural product of the soil, and in proportion for other quantities, use nitrogen, 10 lb., in the form of sulphate of ammonia.—16. Potash, 31 lb., in the form of chloride of potash.—17. Phosphoric acid, 8 lb., in the form of superphosphate.—18. To produce 1,500 lb. of dried leaf tobacco with the usual proportion of stalk more than the natural yield per acre of land, use nitrogen, 149 lb., in the form of sulphate of ammonia.—19. Potash, 172 lb., in the form of sulphate of potash.—20. Phosphoric acid, 16 lb., in the form of superphosphate.—21. Lime, 160 lb., in the form of sulphate of lime (lime plaster). These mixtures should be sown over the land broadcast when the ground is well prepared, before planting, and not put in the hills, so that the roots may seek the food and not concentrate and thereby cause the plants to burn up.—22. (*Cheap, from Fish.*)—Pass fish refuse through mincing machine and expose in layers 3 in. deep in a kiln heated to 300° F. until properly dried.—23. (*Cotton, Vegetable and Orange.*) An orange fertilizer should have the following composition: ammonia, 3.25 pr. ct.; available phosphoric acid, 3.50 pr. ct.; potash, 14.50 pr. ct. Cotton fertilizer: ammonia, 2.50 pr. ct.; available phosphoric acid, 7.50 pr. ct.; potash, 4 pr. ct. The formula for the vegetable fertilizer varies with the kind of vegetable which is cultivated: Ammonia, 5 pr. ct. to 7 pr. ct.; available phosphoric acid, 6 pr. ct.; potash, 8 pr. ct. to 12 pr. ct.—24. A cheap fertilizer consists of sulphate of ammonia, 60 lb; nitrate of soda, 40 lb.; ground bone, 250 lb.; plaster, 250 lb.; salt, ½ bu.; wood ashes, 3 bu.; stable manure, 20 bu. Apply the above amount to six acres. Labor in preparing included, it costs about $15. It is said to give as good results as most of the commercial fertilizers costing $50 per ton.—25. (*Fertilizing Powder.*) Bone dust, 9 parts (very fine); plaster Paris, ½ part; sulphate ammonia, ½ part. Steep the seed in the drainings of a dunghill; drain, but while still wet, sprinkle with the powder and dry.—26. One of the very best fertilizers is composed of lime and salt water. Wherever it has been used it has been found superior to almost any fertilizer on the market, and the preparation is very simple. Slack the lime to a thin plaster with a strong solution of salt in water. The muriate of lime is one of the hydroscopic or water absorbing substances known among chemists as reagents, and when it exists in the soil the warmth of the sun, especially during a dry summer, has much less influence. In countries subject to drouth this treatment of the soil is invaluable; and there are very few places to which it is not adapted. Salt is a good fertilizer in itself, as is lime, and the combination is superior to anything else that can be used, and is cheaper than almost anything else that can be bought for the purpose.

FIRE EXTINGUISHERS.—1. (*Vienna Fire Extinguishing Agent.*) A solution of 5 parts ferrous sulphate (copperas); 20 parts ammonium sulphate; 125 parts water.—2. Alum, 24 pr. ct.; ammonium sulphate, 52 pr. ct.; ferrous sulphate, 4 pr. ct.—3. Boric acid, 16 parts, by weight; alum, 24 parts; ferrous sulphate, 20 parts: dissolve in 160 parts of water. The solution is slowly poured into a cold solution of sodium hyposulphite 24 parts by weight; water glass, 40 parts; water, 640 parts.—4. (*Johnstone's.*) Make a mixture of equal parts

of pyrolusite (manganese dioxide); potassium chlorate; potassium nitrate. Moisten with water glass and press into a block. Place the block in a pasteboard box. Several boxes connected by fuses, are suspended from the ceiling of a room.—5. (*Bucher's.*) 59 parts saltpeter; 36 parts of sulphur: 4 parts of charcoal; 1 part of oxide of iron.—6. One of the best solutions for the extinction of incipient fires consists of crude calcium chloride 20 parts; salt 5 parts; dissolved in water, 75 parts. Keep at hand and apply with a hand pump. —7. (*Hand Grenades.*) Fill thin, spherical bottles of blue glass with a solution of calcinm chloride, salammoniac or borax.—8. Take 20 lbs. of common salt and 10 lbs of sal ammoniac (muriate of ammonia) and dissolve in 7 gal. of water. When dissolved it can be bottled and kept in each room in the house, to be used in an emergency. In case of a fire occurring, one or two bottles should be immediately thrown with force into the burning place so as to break them; the fire will certainly be extinguished.—9. Flour is an excellent thing to extinguish the flames of burning gasoline. Sprinkle it on the burning oil and the fire will immediately go out.

FLAVORINGS, Fruit.—Among the juicy fruits are strawberries, raspberries, blackberries, cherries and currants; among non-juicy fruits are the apples, pears, peaches, quinces, apricots, and plums. Mash the juicy fruits in a basin to a pulp. Place on the fire and make scalding hot. Now pour into a hair sieve and allow the juice to strain through. Put into bottles and securely tie down. Place these bottles in a caldren of cold water and boil for twenty minutes. Remove from the fire and allow to remain in the caldron until cold. Then set away for use. In the case of non-juicy fruits, such as apples, pears, peaches, etc., put the fruit into a basin. Cover with water and boil to a pulp. Now place on a hair sieve and allow to drain without any pressing. Observe now that it is only the liquor which passes through the sieve without pressing which is to be used for flavoring purposes. What remains in the form of pulp is not adapted for these uses. Now put the juice obtained as above into bottles, and proceed to treat as already laid down for the juicy fruits. The foregoing processes are to be gone through with in the case where the extracts are to be kept transparent and clear, as for sirups, cordials and beverages. In case the flavorings are to be used for any purpose where transparency or clearness is not desirable, such as for ice creams, fruit ices, or bonbons, then use not only the clear fluid, but the pulp of the fruit also. Save and utilize everything of the fruit except the skins and seeds. This pulp is to be treated as already laid down. As thus obtained and preserved our confectioners can supply themselves with a quantity of perfectly pure extracts of all their favorite fruits, and which can always be at hand, for flavoring every description of pastry, cakes, pies, tarts, puddings, creams, ices and beverages, and at any season of the year. Especially when there is any one in the house who is sick or feverish, cordials may be flavored with these delightful sub-acids—these remedies and restoratives of kind mother Nature herself—such as will shoot through all the veins of the most debilitated and infirm the most delicious sensations of happiness and hope.

FLIES, To Destroy.— 1. ½ teaspoonful of black pepper, finely ground, should be mixed with double the quantity of brown sugar, and the compound to be moistened with cream. The flies will generally eat greedily of this mixture if placed where they can easily reach it, but it will be their last meal, for the least taste of it is to a fly rank poison. If watched they will often be seen to drop dead within a few feet of the plate which they have just left, and some of the healthiest eaters do not live to leave the plate.— 2. Pour a little simple oxymel (an article to be obtained at the druggists) into a common tumbler glass, and place in the glass a piece of cap paper, made into the shape of the upper part of a funnel, with a hole at the bottom to admit the flies. Attracted by the smell, they readily enter the trap in swarms, and by the thousands soon collected prove that they have not the wit or the disposition to return.

FLOOR DRESSINGS AND CARE.—1. A good dressing for the diming-room, hall or kitchen floor is the following; it dries hard, glossy, and will not scratch: 1 pint of good coach varnish, 1 pint of boiled oil, ½ pint of turpentine; mix.— 2. (*Waxing Hard Wood.*) Take 1 lb. of the best beeswax, cut it up into very small pieces, and let it thoroughly dissolve in 3 pt. of turpentine, stirring occasionally if necessary. The mixture should be only a trifle thicker than the clear turpentine. Apply it with a rag to the surface of the floor, which should be smooth and perfectly clean. This is the difficult part of the work, for if you put on either too much or too little, a good polish will be impossible. The right amount varies, less being required for hard, close grained wood, and more if the wood is soft and open grained. Even professional waxers are sometimes obliged to experiment, and novices should always try a square foot or two first. Put on what you think will be enough, and leave the place untouched and unstepped on for twenty-four hours, or longer if needful. When it is thoroughly dry, rub it with a hard brush until it shines. If it polishes well, repeat the process over the entire floor. If it does not, remove the wax with fine sandpaper and try again, using more or less than before, as may be necessary, and continue your experimenting until you secure the desired result. If the mixture is slow in drying, add a little of the common driers sold by paint dealers, japan, for instance, in the proportion of 1 part of the drier to 6 parts of turpentine. When the floor is a large one, you may vary the tedious work of polishing by strapping a brush to each foot and skating over it.—3. Linseed oil, 100 parts; litharge, 10 parts; the best yellow wax, 75 parts; tallow, 7 parts; molasses, 90 parts; lampblack, 50 parts; oil of turpentine, 140 parts; alcohol, 17 parts; shellac, 2½ parts; aniline vio-

let, 1 part. Boil the litharge for an hour with linseed oil, then add the melted wax and tallow and the molasses. Heat the whole to a temperature of 230° F. over a water bath until all the water has evaporated; then add the coloring matter.

FLOUR, Self-Raising.—The following are the compositions of several of these powders in extensive use:—1. Bicarbonate soda, 23 oz.; burnt alum, 19 oz.; starch, 57 oz.—2. Bicarbonate soda, 24½ oz.; sesquicarbonate soda, 2½ oz; starch, 47 oz.; burnt alum, 26½ oz.—3. Bicarbonate soda, 31 oz.; burnt alum, 29½ oz.; starch, 39 oz.

FREEZING PIPES.—1. (*To Prevent.*) Glycerine is one of those substances that always seem to be lending themselves to new and unsuspected applications. It is found that the freezing of water in the pipes of hydraulic machinery—a very serious source of trouble in the winter months—is entirely prevented by the simple expedient of mixing a small percentage of glycerine with the water in the pumps. This precaution is now taken in the operation of the hydraulic jacks on all the ships of the English navy.—2. (*To Open.*) Directly it begins to freeze there is a demand on plumbers to open frozen pipes. It is strange that in nineteen cases out of twenty it is the escape pipe from the sink, and not the supply pipe, that freezes, although the latter is always full of water. Pipes indoors seldom freeze, and more than half the time the escape pipe is blocked with rubbish. The bend is generally half full of fragments which have been forced through the trap holes. Then, when it gets very cold the greasy water that is poured down settles quickly, and the whole becomes a congealed mass, which is only tightened by attempts to force water through it. Boiling water, in which as much sal soda as it will take has been dissolved, should be poured down, or if the pipe is full of cold water the next best thing is to get as much soda into it as possible. This will soften the mass below and make it as soluble as soap, and in a few hours all will pass away. This beats trying to thaw out a lead pipe with a red-hot poker, which process is equivalent to killing a man to avoid hurting him. A lead pipe will melt under such circumstances before enough heat can be got through it to dissolve ice if there is any there.

FROZEN PUDDING.—Any rich ice-cream highly flavored with wine, brandy, Jamaica rum, or maraschino, and made quite thick with a variety of fruits, nuts, etc., and served with a cold, rich sauce, may be called a "frozen pudding." Sometimes the cream is moulded in cake-lined moulds, or served in a hollow loaf of cake (a cake with the inside cut out, leaving an inch thickness of crust on the bottom and sides) and ornamented with whipped cream. Follow the receipt for ice-cream with gelatine. While the cream is cooling prepare the fruit and nuts, and make the sauce. Use 1 lb. of assorted French fruit; or 1 pt. of brandy peaches; or 1 lb. of mixed raisins, currants, and citron; use figs and dates if you like, or use half fruit and half nuts, almonds, walnuts, or pistachios; or use half fruit and half crumbs of macaroons, dry cake, etc. French fruit should be cut fine and softened by soaking in hot syrup. Canned fruit should be drained and sprinkled with sugar. Dried fruit should be washed, picked over, stoned or seeded, and cut fine. Raisins should be steeped in boiling water, enough to cover, till swollen and tender, then drained, seeded, and cut in quarters. Citron should be shaved in small, thin slices, and if very hard, steeped before cutting. Mix half the fruit and nuts with the frozen cream. Butter a melon mould slightly and line it with lady fingers or thin sponge cake. Fit it in tightly, then sprinkle a layer of mixed fruit over the cake. Pack the frozen cream in nearly to the top, then the remainder of the fruit, and cover with cake. Cover closely and bind a strip of buttered cloth round the edge of the cover, or cover the edge thick with butter. Pack in ice and salt for one or two hours. When ready to serve dip quickly into warm water and turn out carefully and serve with a sauce.

FRUIT, To Crystallize.—Make a syrup of 1 lb. of sugar and ½ pt. of water, stir until the sugar is dissolved, then boil quickly about three or four minutes. Try by dipping a little in cold water. If it forms a small ball when rolled between the thumb and finger it has attained the desired degree, known as the ball. Throw the fruit to be conserved a little at a time into this syrup, let it simmer for a moment, lift with a skimmer, draining free from all syrup. Sprinkle sugar thickly over boards or tin pans, place the fruit over it in a single layer, sprinkle over thickly with granulated sugar and place in the oven or sun to dry. When dry, make a syrup as before, and just before it reaches the ball degree add the fruit, stir with a wooden spoon until it begins to grain and sticks to the fruit. When cold, sift off the sugar and put out again to dry. When dry, place in boxes in layers between sheets of waxed paper. Keep in a cool, dry place.

FRUITS, Frozen.—1. (*Apricots.*) Cut one can of apricots into small pieces, add 1 pt. of sugar and 1 qt. of water. When the sugar is dissolved, freeze. When it begins to harden, add 1 pt. of whipped cream, measured after whipping. This is delicious without the cream. Peaches, pine-apples, cherries, and strawberries are delicious when frozen. Vary the amount of sugar as the fruit requires. These differ from the sherbets in that the fruit is cut in small pieces and not sifted. They may be made with equal parts of fruit and water, with sugar to taste, and a little cream, or not, as you please.—2. (*Tutti Frutti.*) This form of ice should always have a mixture of fruits, as its name implies. It is usually made by mixing fruits with sherbets or water ices. But some confectioners serve a mixture of cream ices and fruits as "Tutti Frutti," and others arrange layers of cream ices and water ices, each having fruit in them, and serve it under the same name. *a.* To one quart of water ice allow ½ lb. of any firm canned fruit, carefully drained

from the syrup, cut into dice, and sprinkled with powdered sugar. Make either of the receipts for water ice, and when frozen mix the prepared fruit with it and let it stand till firm enough to serve. Or use ½ lb. of assorted French fruit, cut fine and soaked till soft in ½ cup each of sugar and water made boiling hot. Or use half fruit and half nuts, almonds, walnuts, or pistachios. Chop the nuts fine, and soak them with the fruit in the hot syrup. Drain them before using. *b.* Make either 1 qt. of lemon ice and one of raspberry or grape sherbet, or make one of orange and one of pineapple. Line a two-quart melon mould with part of one kind of sherbet, and mix the fruit and nuts with the other variety. Pack this in the center of the mould and cover with the remaining sherbet. Keep the mould in salt and ice until wanted. *c.* Make 1 qt. of ice-cream after either receipt, and flavor with lemon, wine, maraschino, or pine-apple. When partly frozen, add 1 lb. of French fruit. Use a mixture of cherries, plums, apricots, pears, strawberries, angelica, Canton ginger, Chinese oranges, etc., or use figs, dates, raisins, currants, and citron.

FUEL.—1. (*Patent.*) This cement used for the agglomeration of coal dust and the manufacture of patent fuel, consists of coal tar, gluten and starch. The quantities of these substances vary according to the quality and property of coal dust. About 2 pr. ct. of this mixture (say containing 2½ parts tar, 1 part gluten, ½ part starch) would be suitable for coal dust of an average quality of bituminous coal.—2. (*Solid Petroleum.*) Fuel bricks of crude petroleum are extensively used in the Italian navy, and are made as follows: The mixture, which is made in the proportion of 1¾ pints of petroleum, 10 per cent of rosin, 5½ ounces of powdered soap and 11½ ounces of caustic soda, is heated and stirred at the same time. Solidification begins in about ten minutes, and the operation must then be carefully watched. If there is a tendency to remain liquid a little more soda is added. After the mixture has been stirred until the mass becomes nearly solid, the thick paste is poured into the molds, which are placed for ten or fifteen minutes in a drying-stove. The briquettes, which are of the same size and form as those largely used in France and Germany, are then cooled, and are ready for use in a few hours. The addition of 20 per cent of wood sawdust and 20 per cent of clay or sand makes the briquettes both cheaper and more solid. In trials made at Marseilles on several tug boats the petroleum briquettes furnished about three times as much heat as coal briquettes of the same size. They were burned in the ordinary boiler furnace, without any special preparation, gave out very little smoke, and left little or no ash. The advantages claimed for the petroleum briquettes are absence of smoke and a large reduction in bulk of fuel which must be carried, as compared with coal, while the risks attending the carrying of liquid fuel are avoided.

FURNITURE, Bruises in, to Remove. — Wet the part with warm water, double a piece of brown paper five or six times, soak it and lay it on the place; apply on that a hot flatiron till the moisture is evaporated. If the bruise be not gone, repeat the process. After two or three applications, the dent or bruise will be raised level with the surface. If the bruise be small, merely soak it with warm water, and apply a red hot poker very near the surface; keep it continually wet, and in a few minutes the bruise will disappear.

GILDING, Tarnished, to Improve.—Heavy tarnished gilding may be improved by going over the work with strong parchment-size and gold powder, touching bare spots, or by painting the frame entirely over with enamel color. The darkened gilding was covered with a thick coat of white paint, which relieved the eye. Gilding and mirrors sometimes are too much for the nerves taken together with the gay colors of modern drawing rooms.

GLASS, To Cut.—1. Glaziers use for cutting glass a diamond splinter mounted in a holder. —2. To cut glass vessels in a neat manner, heat a rod of iron to redness, and having filled the vessel, the exact height you wish it to be cut, with oil of any kind, gradually dip the red hot iron into the oil, which, heating along the surface, the glass chips and cracks right round, when you can lift off the upper portion clean. —3. A good plan for cutting glass is to use a piece of iron, heated to redness, an angle or corner of which is to be applied to the tube at the point where it is to be cut, and then, if the fracture is not at once effected, plunge suddenly into cold water.—4. After having made a notch with a file or the edge of a flint, introduce into it a very little water, and bring close upon it the point of a wire, previously heated to the melting point. This application of heat and moisture obliges the notch to fly round the glass.—5. For tubes of great diameter, employ a fine iron wire stretched into a bow; or, the glass cutter's wheel; with either of these, assisted by a mixture of emery and water, cut a circular trace round a large tube, and then divide it.—6. Glass may be easily cut with scissors by keeping it level in the water while the scissors are being dextrously applied; to avoid risk, begin the cutting by taking off small pieces at the corners and along the edges, and so reduce the shape to that required, as, if any attempt is made to cut the glass all at once to the shape, it will most likely break just where it is not wanted. Some kinds of glass would cut much better than others, the softer glass being the best for this purpose. The scissors need not be at all sharp, as their action does not appear to depend on the state of the edge presented to the glass. When the operation goes on well the glass breaks away from the scissors in small pieces in a straight line with the blades. This method has often been of service when a diamond has not been at hand, for cutting ovals and segments, and though the edges are not so smooth as might be desired, yet it will answer in a great many cases.—7. (*Bottles.*) Turn the bottle as evenly as possible over a low gaslight flame for about 10

minutes; then hold in water, and the sudden cooling will cause a regular crack to encircle the side of the heated place, allowing the portions to be easily separated.

GLASS, To Drill.—1. Take a common drill, run a little fast; do not press; the weight of the drill press is enough; drill from both sides, keeping the glass and drill wet with turpentine; be careful when the 2 holes meet not to let the drill catch. After a hole is made large enough for a small round file, file to the desired size, keeping file and glass wet with turpentine.—2. Stick a piece of putty on the part where you wish to make the hole. Make a hole in the putty the size you want, the hole reaching to the glass; into this pour a little molten lead, when, unless very thick glass, the piece will drop out.—3. In drilling glass and porcelain, or to cut them after a design, there are difficulties which lead to failure. Some adopt this plan: Discs of soft metal 5.5 to 9.8 inches in diameter are covered with diamond dust. These discs are mounted on arbors which revole at a high rate of speed. Glass or porcelain can be cut by the discs in a few seconds after any design. Cylinders constructed on the same principle drill holes in hard substanees quickly. The instruments do a great deal of work without showing any deterioration.

GLASS, Frosted, with Figures.—For the production of such, glass crystal or finished glass, no matter whether hollow or plate, is taken, the surface of which must be frosted. Upon this surface a thick, watery solution of ordinary glue is spread. In the case of plate glass it is advisable to spread this coat about 1-6 inch thick and as uniformly as possible. It is then dried at a moderate temperature of about 31-37° C. After perfect drying the glue coat contracts and becomes cracked. The edges of these cracks turn upward and the scales of glue formed thereby show the desire to peel off. The glue having entered the pores of the frosted glass surface, the glue scales, in peeling off, carry small splinters of the frosted glass surface with them, whereby bright, shining, shell-like indentations are formed. The peeling off of the glue and the tearing off of the glass splinters connected with it takes place irregularly, sometimes in closely adjoining, longer stripes, sending out broader or narrower leaf-like branches, which form a pattern similar to fern, as is seen in the ice on a window pane. The best results of this working method are obtained in the summer, when the glass articles treated with the glue are simply exposed to the rays of the sun, which cause the glue coat to peel off within three or four hours. The glue scales can be collected and dissolved by boiling in water. The glass splinters sink to the bottom, while the upper, pure solution of glue is poured off and used again.

GLASS, Soluble.—1. Silica, 1 part; carbonate of soda, 2 parts; fuse together.—2. Carbonate of soda (dry), 54 parts; dry carbonate of potassa, 70 parts; silica, 192 parts; soluble in boiling water, yielding a fine, transparent semi-elastic varnish.—3. Carbonate of potassa (dry), 10 parts; powdered quartz (or sand free from iron or alumina), 15 parts; charcoal, 1 part; all fused together. Soluble in five or six times its weight boiling water. The filtered solution, evaporated to dryness, yields a transparent glass, permanent in the air.—Melt 1½ lbs. white sand, free from alumina and carbonate of lime; 1 lb. carbonate of potash, containing a small proportion chloride of potassium, and 1-10 lb. powdered charcoal. Mix well, and melt in a large crucible until homogenous.

GLAZING.—Sashes are primed before glazing; the glass laid in with the crown or convex side out; the tins driven in with a glazing hammer; four tins to each glass on the long sides, ¼ distance from the corners. If tins are put in the centre, they are apt to break the glass, especially in cold weather. In good work and medium sized glass, after glazing, and putty being well set, fill spaces on the inside. Use putty soft, or it will press the glass out. Bedding, for superior work and large glass, is the best. Glaze the rabbet with soft putty, and press the glass down into it close, pressing on the edges only; then glaze as usual. Where the molding of the sash is to go outside, the crown side of the glass should be out. The line of the putty should come even with the line of the molding on the other side of the glass.

GLUES.—1. (*Insoluble.*) In order to render glue insoluble in water, even hot water, it is only necessary, when dissolving glue for use, to add a little potassium bichromate to the water and expose the glued part to the light. The proportion of bichromate will vary with circumstances; but for most purposes, about 1-50 the amount of glue will suffice.—2. (*Liquid.*) Break a good quality of glue into bits, put into a bottle and cover with whisky. Let stand three or four days, when it will be ready for use without the trouble of heating. The bottle must be kept tightly corked to prevent evaporation.—3. Dissolve in 100 kilogrammes of water, 60 kilogrammes of borax; add to the solution when boiling 4 kilogrammes of 90 per cent. calcined potash, and then add this mixture while boiling to 1450 kilogrammes of hot glue liquor having a density of 12° Baume.—4. With any desired quantity of glue use ordinary whisky instead of water. Break the glue in small fragments and introduce these into a suitable glass vessel, and pour the whisky over them. Cork tightly, and set aside for three or four days, when it will be ready for use. The whisky must not be too strong, and a little heat is generally required.—5. (*For Mending Wood.*) White wood carvings are best mended with glass glue. Walnut is best mended with dark glue; any chipped places filled with putty, which is then stained to a proper depth with raw linseed oil mixed with vandyke brown, burnt sienna or burnt umber. This takes weeks to dry, and the carving should be protected from dust.—6. (*For Leather to Cardboard.*) To attach leather to cardboard dissolve good glue (softened by swelling in water) with a little turpentine and a sufficiency of water in an ordinary glue pot,

and then having made a thick paste with starch in the proportion of two parts, by weight, of starch powder for every 1 part, by weight, of dry glue, mix the compounds and allow the mixture to become cold before application to the cardboard.—7. (*Spalding's.*) To 1 lb. of common glue put 3 pts. of water; soak for 10 hours; melt; then pour in 1 qt. of crude wood naptha, and 3 oz. of unrefined glycerine; mix thoroughly. The above is for wood, binding, and heavy purposes. For paste add to the above 1 gal. of the naptha and 2 gals. of water. The above is based on 1 lb. of glue.

GOLD. Substitute for.—It is produced by alloying 94 parts of copper with 6 parts of antimony, the copper being first melted and the antimony afterward added. To this a quantity of magnesium carbonate is added to increase its specific gravity. The alloy is capable of being drawn out, wrought and soldered just as gold is, and is said to take and retain as fine a polish as gold. Its cost is a shilling a pound.

GREASE SPOTS, In Cloth, to Remove.—Grease spots in cloth may be taken out by applying a solution of salt in alcohol.

GUM, Artificial.—10 kilogrammes linseed are boiled in 80 kilogrammes sulphuric acid and 100 litres of of water for three or four hours. The liquid is then filtered, and four times its volume of alcohol is added. The precipitate is collected, washed and dried. The product is amorphous, colorless, insipid, and gives, with water, a thick mucilage.

HAIR.—1. (*To Bleach.*) A recipe stated to bleach human hair white instead of blond or yellow. Mix 1 lb. hydrogen peroxide with 1 oz. ammonia; mix 4 oz. hydrogen peroxide with 1 oz. cream of tartar dissolved in 1 oz. soda. Blend the two solutions and steep 1 lb. of the hair in it for three hours. Then wash in clean water with "soapine," in a bath of pottery or clay, and thoroughly dry. Repeat the process fifteen or sixteen times, but thoroughly mix and shake up the hair after the twelfth and every succeeding time. Finally draw the hair through a solution of blue aniline and alcohol.—2. A hot dilute solution of nitric acid is most effectual. Brown hair, when carefully treated, is turned the most brilliant golden, resembling golden spun glass. The method employed is to put the hair in a porcelain dish with dilute NO_2HO (about 1 part strong acid to 10 of water), then gradually heat, and soon as the required shade is obtained, take out and wash. If the acid is too strong, or the heat too great, the fiber of the hair is spoiled. Dark brown hair acquires generally a reddish color, and black hair will turn nearly white.—3. (*To Curl.*) Olive oil, 1 lb.; oil of origanum, 1 drm.; oil of rosemary, 1½ dr.—4. (*Bandoline.*) Iceland or Irish moss boiled in water, strained and perfumed.—5. Boil in 2 lb of water until it is reduced one-half, 1 teaspoonful quince seed, 2 tablespoonfuls flaxseed, a pinch white mustard seed. Perfume with oil of almonds.—6. Two tablespoonfuls flaxseed, 3½ pt. water. Boil 5 minutes.—7. Heat 3 oz. isinglass in 2 lb. water, until dissolved. Add 4 oz. alcohol. Perfume with oil of almonds.—7. Put 2 parts powdered gum tragacanth in 60 parts rose water. Digest for three days. Strain and perfume with essential oil of rose.—9. (*Beard Promoter.*) Croton oil 12 drops; sweet oil of almonds, ½ oz. troy. Mix and rub on skin twice a day. If too irritating, double the amount of sweet almond oil. It is poisonous.—10. (*Eau de Quinine.*) A favorite hair wash that is much used in Berlin and Liepzig contains 2 grm. balsam of Peru; 6 grm. castor oil; 60 grm. rum; 35 grm. water; 5 grm. tincture of red chinchona. Its constituents are at least harmless, which can be said of but few of our American preparations for the hair.—11. (*Quinine Hair Tonic.*) Quinine sulphate, 20 gr.; tincture of cantharides, 2 fl. dr.; fld. ext. of jaborandi, 2 fl. dr.; alcohol, 2 fl. oz.; glycerine, 2 fl. oz.; bay rum, 6 fl. oz.; rose water—enough to make 15 fl. oz.

HAIRBALLS, In Horses.—Prof. T. V. Colville, botanist in the Department of Agriculture at Washington, has rendered good service to practical botany by examining the hairballs found in the intestines of some dead horses, in cases where the death was supposed to be from feeding on crimson clover, Trifolium incarnatum. He finds the mass forming the balls is made up of hairs, which, under a microscope are exactly like the hair found on the calices of mature crimson clover. He concludes that the death does occur from this cause, as the owners of the horses believe. The whole subject is interesting and deserves further investigation. These balls, occasionally found in the stomach and bowels of horses, have hitherto been regarded as coming from horses licking themselves. The balls are supposed to be made up of their own hair. But as they do not take this hair all at once, it is not clear how it takes on the perfectly globular form, often several inches in diameter. Prof. Coville notes that some of these balls have been found to be composed of the beards or awns of grain. Careful records of this do not appear in usual works of reference. As these are extremely brittle, it would seem difficult to have them wound into balls. In like manner, it seems difficult to understand why a plant hair should not be as dissolvable by the gastric juice as well as a piece of straw, or the chaff of the grain on which the awns grow. But Prof. Coville reports three balls in the bowels, that must have been a long time previously being formed in the stomach. A remarkable feature of the case is that all the hairs are said to be so arranged in the ball that the larger ends are directed toward the center of the ball. As some of these balls, if made of plant hairs in this way, must have been weeks, if not months in the construction of a ball, 3 or 4 inches in diameter, and which is described as almost as solid as wood, the attendant phenomena seem so little in accord with the general knowledge of things which should have some connection therewith, that there seems a wide field yet left for original discovery.

HAMS, To Cure.—1. Few persons understand the proper ingredients and exact proportions

to make a suitable pickle for curing hams. This information will doubtless prove of value. The desideratum is to cure the meat so that it will keep in hot weather, with the use of as little salt as possible. Pickle made in the following manner, it is believed, will accomplish this: 1¾ lb. salt—coarse or alum salt is best; ½ oz. saltpeter; 1 pt. molasses or 1 lb. brown sugar; 1 teaspoonful saleratus; let these be added to 1 gal. of water, and the amount increased in the same proportions to make the quantity required. Bring the liquor to a boil, taking care to skim just before it begins to boil. Let the pickle cool, and pour it over the meat until entirely covered. The meat should be packed in clean, tight casks, and should remain in the pickle six or seven weeks, when it will be fit to smoke. Green hickory wood is the best article for this purpose. Shoulders prepared in the same way are nearly as good as hams. This pickle is just the thing to make nice corned beef, or corned beef tongues; or any lean meat for drying.—2. To 1 gal. water, take 1½ lb. salt; ½ lb. sugar; ½ oz. saltpeter; ½ oz. potash. In this ratio the pickle can be increased to any quantity desired. Let these be boiled together until all the dirt from the sugar rises to the top, and is skimmed off. Then throw it into a tub to cool, and when cold, pour it over your beef or pork, to remain the usual time—say four or five weeks. The meat must be well covered with pickle, and should not be put down for at least two days after the killing, during which time it should be slightly sprinkled with powdered saltpeter, which removes all the surface blood, etc., leaving the meat fresh and clean. Some omit boiling the pickle, and find it to answer well, though the operation of boiling purifies the pickle by throwing off the dirt always to be found in salt and sugar.—3. Take a large cask (if possible one between 100 and 120 gal.), and after covering the bottom with salt, lay in a ham with the skin side to the bottom, then sprinkle another layer of salt, put in another ham, etc., till the cask is full. A fluid is then made of the proportions of 3 gals. water; 4½ lb. salt; 2 lb. brown sugar; 1½ oz. saltpeter; 1 oz. saleratus. When this is skimmed, scalded, and has gotten cold, it is poured over the hams until it covers them entirely. They should remain in this pickle for from thirteen to fourteen weeks.

HARNESS DRESSING. — The government harness dressing is as follows: One gal. neatsfoot oil; 2 lb. Bayberry tallow; 2 lb. beeswax; 2 lb. beef tallow. Put the above in a pan over a moderate fire. When thoroughly dissolved add 2 qt. castor oil; then, while on the fire, stir in one oz. lampblack. Mix well and strain through a fine cloth to remove sediment, let cool, and you have as fine a dressing for harness or leather of any kind as can be had.

HATS, To Bleach.—To bleach Panama hats, wash the goods clean, and while slightly damp, expose to the fumes of burning sulphur in a closed vessel. To color one dozen hats, take 12 lb. logwood; 1 lb. sulphate of iron; and ¾ lb. verdigris. Digest the logwood for some time. Add the sulphate of iron and the verdigris. Dip the hats into the bath several times and hang in the open air. By the peroxidizement of the iron with the atmospheric oxygen the hats will be more completely blackened. When fully dried wash in running water.

HAT, Silk, to Restore Gloss to.—When a silk hat becomes wet, or from other causes has lost its smoothness and gloss, cleanse it carefully from all dust, then with a silk-handkerchief apply petrolatum evenly, and smooth down with the same handkerchief until it is dry, smooth and glossy. This will make a silk hat look as good as new.

HEADACHE, Causes and Cure of.—1. The ordinary headache which is so extremely common among the inhabitants of our Atlantic seaboard towns is the outcome of conditions affecting the nerves through impoverished blood containing poisonous matter absorbed from badly digested food. So-called liver torpidity and the catarrhal affections due to our changeable climate also aid in effecting its spread. Nervous exhaustion, due to irregular and fast living, plays an important part in its causation. Nervous strain, especially of the eyes, and inflamed tissues about the internal bones of the nose are special causes. Nerve irritation, which is but poorly understood by the general reader, is a prolific cause of so-called nervous headache. There is no more dangerous practice than to treat headache pain blindly with drugs. Of course, outdoor exercise is the best possible thing for permanent cure. It is very easy to relieve most forms of headache by means of the coal tar derivatives, of which so many are in the drug market. These form the basis of the many headache cures found on the druggist's shelves. Their use is not entirely without danger, for they are powerful heart depressants if taken in doses of any considerable size. A hot bath, a stroll in the fresh air, shampooing the head in weak soda water, or a timely nap in a cool, quiet room will sometimes stop a nervous headache. When overfatigued from shopping or sightseeing a sponge dipped in very hot water and pressed repeatedly over the back of the neck between the ears will be found exceedingly refreshing, especially if the face and temples are afterward subjected to the same treatment. Neuralgia is caused, not only by cold air, but by acidity of the stomach, starved nerves, imperfect teeth, or by indolence combined with a too generous diet. Heat is the best and quickest cure for this distressing pain. A hot flatiron, passed rapidly and deftly over several folds of flannel laid on the affected spot, will often give relief in less than ten minutes, without the aid of medicine. Hot fomentations are of equal value; though when the skin is very tender it is more advisable to use dry heat, nothing being better for the purpose than bags of heated salt, flour or sand, which retain warmth for a long time. Cold water, applied by the finger tips to the nerves in front of the ear, has been known to dispel neuralgic pains like magic. When caused by acidity a dose of charcoal or soda will usually act as a corrective. Sick headache is accompanied by bilious

symptoms, and attacks usually come on when the person is overtired, or below par physically. This is a disease of the first half of life, and often stops of its own accord after middle age. A careful diet is imperative in every case; sweetmeats and pastry being especially pernicious.—2. The most general variety is that known especially as the nervous headache, which means that the nerves, exhausted by being called upon for more than they are able to perform, have rebelled, and, ceasing their action on the arteries, have left them full of blood, the heart still sending the blood to the head, but the arteries distended with the continual pressure, having become inelastic, and having lost the power to contract, and so dilating and making the pressure on the brain that is the cause of pain and stupor. The headache which seems to be rheumatic, and is the result of exposure to cold or draught or sudden changes, is best treated with hot applications, hot-water bags, and gentle friction of the place of pain, which readily relieve it for a time. But when the pain is persistent, keeping up its sharp torment day after day, it indicates an irritation of the finer filaments of the branches of nerves about the face and head that no mild household remedies may reach, and that require the physician's oversight. There are many ways of easing the nervous and congestive headaches. Perhaps the best way is not to have them—that is, by undertaking no more than the strength is equal to, by not wearing one's self out with too perfect or too laborious housekeeping, with too much care or study or work of any kind, by dismissing anxieties, by bathing, by living in sweet and fresh air, and by taking sufficient sleep. Although it is not possible at the time the headache is on in full force to make much movement, an almost sure impediment to its frequent recurrence is to be found in easy physical exercises which will call the blood from the dilated vessels of the head to warm the hands and to fill the arteries in the arms and legs and main body. A teacher of gymnastics can best avail here; but in the absence of such there are simple movements easily made which, if undertaken daily and continued for some time, will be of great use—the circular swinging of the arms extended crosswise, the raising and bending of the legs alternately, and stretching out first one and then the other horizontally in front while standing on the other, and swinging it in a circle, clasping the hands behind the head and leaning the body over sidewise to right and left. All this, pursued reasonably will take but a few moments morning and night, and will oblige the blood to forsake the head vessels, and thus give those time to assume their normal condition, and do much to prevent the habit of congestion.

HEKTOGRAPH.—1. The hektograph, or copying pad, is very useful in copying writing or drawings when only a limited number of copies is required. A practical hektograph may be prepared according to the following directions: Soak an ounce of Cooper's gelatine overnight in enough cold water to cover it well, taking care that all the gelatine is swelled. Prepare a salt water bath by dissolving 2 oz. of common salt in 1 pt of water. Heat 6 to 7 oz. of pure glycerine over the salt water bath to a temperature of 200° Fah. Pour off from the gelatine all the water remaining unabsorbed and add the gelatine to the hot glycerine. Continue the heating for an hour, carefully stirring the mixture occasionally, avoiding as much as possible the formation of bubbles or froth. Finally add 20 drops of oil of cloves to prevent decomposition. The composition is now ready for pouring into the vessel designed to hold it while in use. This vessel may be made especially for the purpose, or a shallow cake tin may be used. After the tin is filled with the composition it must be placed in a level position, in a cool place, free from dust, and allowed to remain for at least five hours. To prepare the pad for use it is necessary to pass a wet sponge lightly over the face of the gelatine and allow it to nearly dry before taking the first copy. If this precaution is neglected the face of the pad will be ruined by the first transfer. The writing or drawing to be copied must be made with hektograph ink, using a new steel pen. After the writing becomes dry it is placed face down on the pad and rubbed gently on the back to insure the perfect contact of every part. After remaining on the pad for about a minute remove the original and proceed to take the copies by placing the paper on the pad and removing it therefrom, always beginning at the corner. After taking the desired number of copies or when the impression is exhausted, the pad is to be washed lightly with a sponge wet in cold water. The pad is then allowed to dry before being used again. The washing is unnecessary when the pad is left unused for two or three days, as the ink will be absorbed so as not to interfere with making a new transfer. The pad unavoidably wastes away in use. If its surface should become uneven or should it be injured in any way, it can be restored by reheating it over the salt water bath and allowing it to cool as before described. Failure in making the hektograph results from either of the following causes: Inattention to the instructions; insufficient heating of the composition; use of too much glycerine, which prevents gelatinization. The obvious remedy for the last difficulty is to use less glycerine or more gelatine.—2. The following is a composition by Lebaeque: gelatine, 100 parts; water, 375 parts; glycerine, 375 parts; kaolin, 50 parts.

HICCOUGHS. Cure for.—1. Hiccoughs are the result of sudden spasmodic contractions of the diaphragm, causing jars of the abdomen and thorax. The sharp, inarticulate sound is produced by the tightening and vibration of the edges of the glottis. They sometimes appear during the evolution of complaints that are entirely different—such as disorders of the digestive tract, abscesses of the throat and in stenosis of the esophagus. They also appear in the diseases of the respiratory organs, in cases of poisoning and in nervous complaints

These are the rare forms, however, the more common being what are termed the emotional, appearing after a moral shock, a fright or some other emotion. Thus, when there is an epidemic of hiccoughs, it is connected, undoubtedly, with hysterical contagion, and is due to the nervous predisposition of the individuals attacked. Put five or six drops of nitrate of amyle on a lace handkerchief, to be pressed close to the patient's nose and kept there until relief follows. It has been applied in many cases, and it has always afforded great relief, if not bringing about absolute recovery. —2. A new method of stopping hiccough is said to have been accidentally discovered in a French hospital. It consists in thrusting the tongue out of the mouth and holding it thus for a short time.

HONEY, Artificial.—Five lb. white sugar; 2 lb. water; gradually bring to a boil and skim well. When cool add 1 lb. bees' honey and 4 drops peppermint. To make of better quality add less water and more real honey.

HONEY, To Purify.—1. Beat 5 lb. of honey with the white of one egg till it froths, add water until the mixture is of the consistency of syrup. Next boil until the white of egg can be skimmed off. Pour into a vessel which has a faucet near the bottom; let it settle for some weeks, then draw off the pure honey.—2. Soft water, 6 lb.; pure best honey, 3 lb.; white moist sugar, 20 lb.; cream of tartar, 80 gr.; essence of roses, 24 drops. Mix the above in a brass kettle, boil over a charcoal fire five minutes, take it off, add the whites of two eggs well beaten; when almost cold, add 2 lb. more honey. A decoction of slippery elm will improve the honey if it be added while cooling, but it will ferment in warm weather and rise to the surface.—3. Take 15 lb. of Havana sugar, 6 lb. water, 60 gr. cream tartar, 15 drops essence of peppermint, 4½ lb. honey; dissolve the sugar in the water over a moderate fire, take off the scum; dissolve the cream tartar in a little warm water, add, stirring; then add the honey heated to the boiling point, then the essence of peppermint. Stir a few minutes, let it cool.

HORN COMBS.—Separate the true horn from the bony core by soaking the horns in water 1 month or six weeks, according to the temperature; next saw off the tip of the horn, that is, the whole of its solid part, which is used for knife-handles, buttons, and sundry other purposes. The remainder of the horn is left entire or is sawn across into lengths, according to the use it is destined. Next immerse the horn in boiling water ½ hour; and, while hot, hold it in the flame of a fire, taking care to bring the inside and outside of the horn (if from an old animal) in contact with the blaze till it becomes soft; then slit it lengthwise by a strong pointed knife, and by means of 2 pairs of pincers, applied one to each edge of the slit, open the cylinder nearly flat; place these flats on their edges between alternate plates of iron, ½ in. thick and 8 in. sq. (previously heated and greased) in a strong horizontal iron trough, and powerfully compress them by means of wedges driven in at the ends; place these plates, one by one, on a board covered with bull's hide, and fasten them down by a wedge; then scrape them with a draw-knife having a wire edge turned by means of a steel rubber; when reduced to a proper thickness and smoothed they are polished (see *Horn, To Polish*). The combs are shaped by rasps and scrapers, after having been roughed out by a hatchet or saw; the teeth are cut by a double saw fixed in a back, the two blades being set to different depths, so that the first cuts the tooth only ⅛ down, followed by the other which cuts full depth; the teeth are then finished and pointed by triangular rasps.

HORN CUPS.—The horn being sawed the required length, is scalded and roasted as described; but instead of being slit and opened, is placed while hot in a conical mold of wood; a corresponding plug of wood is then driven hard in to bring the horn to shape. Here it remains till cold, and is then taken out and fixed by the large end on the mandrel of a lathe, where it is turned and polished inside and outside, and a groove or chine cut by a gauge tool within the small end for receiving the bottom. The horn is then taken off the lathe and laid before the fire, where it becomes flexible; a round, flat piece of horn, of proper size (cut out of a plate by means of a kind of crown saw) is dropped in and forced down till it reaches the chine, and becomes fixed in this situation, and water-tight by the subsequent contraction of the horn as it cools.

HORN, To Weld.—Pieces of horn may be joined by heating the edges until they are soft and pressing together until cold.

HORNS, On Cattle, to Prevent Growth of.—Use plain concentrated lye and apply it only once. Watch closely the calf's development, and as soon as the nob of a horn begins to swell the skin on the top of the head rub a little of the lye on the bulbs and then about twelve hours later put a good coating of grease on top of that. This method is a safe and reliable one for all farmers who desire to raise cattle without horns. The grease is applied to neutralize the effect of the lye and prevent its injuring the animal. Care must be taken also that the calf does not injure the cow's udder by bringing the lye in contact with it when sucking. The calves seem never to suffer at all from the application of the lye.

HORSERADISH, To Bottle.—Six tablespoonfuls scraped or grated horseradish; 1 tablespoonful white sugar; 1 qt. vinegar. Scald the vinegar; pour boiling hot water over the horseradish. Steep a week, strain, and bottle. Exposure to the air will discolor.

HORSE TRADING.—If a horse has its ears thrown back it is a sign of bad temper. If you want to buy a horse don't believe your own brother. Take no man's word. Your eye is your own market. Never buy a horse in harness. Unhitch him and take off everything but the halter and lead him about. If he has a corn or is stiff, or has any other like failing, you can see it. Now, a horse might have

bright eyes and not be able to see. Let him walk off by himself, and if he runs against anything he is blind. Another thing—a horse may go at a great pace and look ever so nice, and yet have fits, so that although you ought to back him before you buy, it isn't everything. Then, again, the horse may have a weak back. Touch him up with the whip. If he goes for a mile or two and then suddenly stops in the road his back's no good. After a rest he starts again, but he soon stops again for good and hardly anything will make him move. You can see the weak points in a horse better when he is standing than while moving. If he is sound he'll stand square and firmly on his limbs without moving—the feet flatly on the ground, with the legs plump and naturally poised. If the foot is lifted from the ground and the weight taken from it you may suspect some disease or at least some tenderness which will lead to disease. If the horse stands with his legs wide apart, or "straddles" with his hind legs, there's a weakness in his loins, and the kidneys are disordered. Heavy pulling bends the knees. If the horse has bluish, milky cast about the eyes he's moonblind, or something worse. A kicking brute generally has scarred legs, and a stumbling horse always has bruises about the knees. If you feel the skin of a horse and find that it is rough and harsh, and doesn't move readily to the touch, the horse is a heavy feeder and has a bad digestion. Never buy a horse that has anything wrong with his breathing apparatus. Place your ear at the side of his heart, and if you hear a wheezy sound don't have anything to do with him. Horses are much troubled with toothache. If you see a horse when standing lifting a foot now and then, and striking the ground, when no flies are around, ten chances to one he has bad teeth and is suffering.

HORSE, To Make Lively.—Fasten the horse by two short ropes, one attached to each side of its bit, so that it cannot move its head right or left, and cut the hair out of the inside of its ears with a pair of scissors. Sounds will appear to him to be about twice as loud for a few days as they have before, and noises in the city to which he has become entirely accustomed will throw him into a panic. He will jump and shy and back and run and fret and fume for apparently no reason at all but just youthful spirits, till he gets used to the change.

HYDROPHOBIA.—It is the part of wisdom to give a vicious dog, mad or not mad, a wide berth, both in the summer months and when the mercury is around the zero point. But it is encouraging to be informed by distinguished professors of medicine and surgery that hydrophobia is at best a theory; it belongs to a class of simulated diseases. It is said that the bite of a dog is no more dangerous than the scratch of a pin or the puncture of an infectious nail. Because of exaggerated printed and oral accounts the picture of hydrophobia is so stamped upon the public mind that the thought of it, after being bitten by a dog, throws imaginative people into panics of nervous excitement, in which they unconsciously reproduce its supposed symptoms. It is also said that there is no such specific malady as hydrophobia, and that there is not a case on record which can be conclusively proved to have resulted from the bite of a dog or any other cause. The records of the London Hospital showed 2668 persons bitten by angry dogs, but none of them developed hydrophobia. St. George's Hospital, London, treated 4000 patients bitten by dogs supposed to be mad, but not a case of hydrophobia. At the Pennsylvania Hospital, Philadelphia, only two cases which were supposed to be hydrophobia have occurred in 140 years. One of these was submitted to bacteriological tests, but the diagnosis of hydrophobia was not confirmed, and the municipal authorities refused to accept the death as one from that disease. At the Philadelphia dog pound, 150,000 dogs have been handled in the past twenty-five years, and many of the keepers and employes have been bitten, yet there has never been a case of hydrophobia. Much of the observation of suspicious dogs is made through optics disturbed by fear and by persons incompetent to interpret what they see. The testimony of medical men of wide experience is invariably to the effect that if hydrophobia develops in human beings at all, it is only on very rare occasions, and that the condition of hysterical excitement usually described as hydrophobia is merely a series of symptoms due to dread of the disease.

HYPNOTIZING.—With one hand a bright object, such as a faceted piece of glass, is held eight to twelve inches from the subject, so that there is a considerable convergence of the eyes, and rather above the level of the eyes, so that he is obliged to look upward. The subject is told to look steadily at the piece of glass, and to keep his whole attention fixed upon it. This position is kept up from five to ten minutes, during this time the pupils will probably dilate considerably, often assuming a slight rhythmic contraction and dilation; when this is the case the free hand is moved slowly from the object toward the eyes. If the subject is sensitive the eyes will usually close with a vibratory motion. In some cases the subject is then unable to open them, and the usual mesmeric phenomena can be obtained. If, when the operator brings his hand near the eyes of the subject, the subject, instead of closing them, follows the movements of the fingers, the whole proceeding is repeated, but the subject is told to close his eyes when the fingers are brought near them, but to keep them fixed in the same direction as before, and to continue to think of the object, and that only. The operator then for some minutes makes "passes," bringing his warm hands over and close to the subject in one direction. When the subject is inclined to pass into the cataleptic state an indication of his condition may be obtained by gently raising his arm; if he is beginning to be mesmerized, the arm remains in the position in which it is placed. If the arm falls, the mesmeric state may not infrequently be hastened on by telling the subject to keep his arm extended while he is still gaz-

ing at the subject, or while the passes are being made. And that is the whole process. The man thus mesmerized sinks from manhood to a highly complicated piece of machinery. He is a machine which for a time is conscious, and in which ideas can be excited by appropriate stimulation; any one acquainted with the machinery can set it in action.

ICE, To Store.—1. Build a round brick well, with a small grating for drain at bottom for the escape of water from melted ice. Cover the bottom with a thick layer of good wheat straw. Pack the ice in layers of ice and straw. Fix a wooden cover to the well.—2. Fire-brick, from its feeble conducting power, is the best material to line an ice-house with. The house is generally made circular and larger at the top than the bottom, where a drain should be provided to run off any water that may accumulate. As small a surface of ice as possible should be exposed to the atmosphere; therefore each piece of ice should be dipped in water before stowing away, which, by the subsequent freezing of the pieces into one mass, will remain unmelted for a long time.—3. A very cheap way of storing ice has been described. The ice stack is made on sloping ground close to the pond whence the ice is derived. The ice is beaten small, well rammed, and gradually worked up into a cone or mound 15 ft. high, with a base of 27 feet., and protected by a compact covering of fern 3 ft. thick. A dry situation and sloping surface are essential with this plan, and a small ditch should surround the heap, to carry rapidly away any water that may come from melted ice or other sources.—4. Put the ice on a dish and cover it with a napkin, then set the dish upon a feather bed or pillow, and place another bed or pillow on the top of it. In this way a few lbs. of ice may be kept for a week or more. Wrap the ice in a piece of old flannel, and if not required immediately bury it in the ground.

ICE, Strength of.—Ice 2 in. thick will bear infantry. Ice 4 in. thick will bear cavalry or light guns. Ice 6 in. thick will bear heavy field guns. Ice 8 in. thick will bear 24-pounder guns on sledges; weight not over 1000 lb. to a square foot.

ICE CREAMS.—1. *Almond.* Select the best paper shell almonds. Remove the shell and put them into boiling water for a minute, or until the skin can be rubbed off easily. Then drain, put them in cold water and remove the brown skin. Dry them on a towel. There should be a ½ lb. of the selected nuts. Pound them in a mortar, with a few drops of rose water and ½ of a cup each of sugar and cream, till like a fine paste. Make the Neapolitan ice-cream with a scant cup of sugar, and add to it when well chilled, a few drops of bitter almond extract, a teaspoonful of vanilla, and the nut paste. Mix it thoroughly, freeze again, and when hard let it stand two hours to ripen. Nut ice-creams require a long time to freeze and ripen, owing to their oily nature.

2. *Apricot.* 1 qt. can apricots; 1 qt. cream; 2 cups sugar; scald the cream and melt in it one cup of the sugar, then set away to cool, and freeze. Drain off the apricot juice and save it for pudding sauce. Rub the apricot pulp through a puree sieve. When the cream is partly frozen add the fruit pulp and freeze as usual.

3. *Banana.* Peel six ripe bananas, split, and remove the seeds and dark portion in the center. Rub the pulp through a puree strainer. Add to it the juice of 1 lemon, a saltspoonful of salt, and sugar to make it quite sweet. Add this pulp to either receipt for ice-cream, and freeze as usual.

4. *Biscuit Glace.* Ice-cream and sherbet are often served in small forms or in fancy paper cases, one case serving for each guest. Make and freeze the cream, and fill the paper cases with two kinds, either sherbet and plain ice-cream, or sherbet and tutti frutti, or sherbet and a mousse, or any combination that will be agreeable in flavor and harmonize in color. Pack the cases in a freezer can or a large plain mould, with a layer of stiff, white paper between each layer of cases. Keep the can in ice and salt till ready to serve. Serve on a lace paper napkin laid on a fancy plate. Sometimes the biscuits are covered with a meringue and colored slightly with a salamander just before serving. Small forms of various shapes, imitating birds, animals, fruits, vegetables, flowers, etc., may be obtained at kitchen furnishing stores, and used in moulding creams. When served garnished with spun sugar, the effect is very pleasing. The spun sugar may be obtained at a confectioner's; also the paper cases and napkins in various patterns and designs.

5. *Bisgue.* Bisque, as applied to ice-creams, means any ice-cream which has the addition of dried and sifted crumbs. Make a rich ice-cream, flavor it delicately with almond, coffee, vanilla, caramel, wine, or maraschino. Add 1 cupful of crumbs; either angel cake, sponge, or fruit cake; dried meringues or kisses; cocoanut cakes or macaroons; wine biscuit or graham wafers; or vanilla cigarette, or other fancy wafers.

6. *Caramel.* Put ½ cup of granulated sugar in a saucepan over the fire, and stir till melted and dark brown. Add ½ cup of boiling water and simmer ten minutes. Make either ice-cream you prefer, using only half the sugar given in the receipt. Add enough of this caramel to give the desired flavor and color. Caramel may be added to vanilla or coffee ice-cream. Whipped cream may be served with it, or stirred in when the caramel cream is partly frozen.

7. *Chocolate.* Make the foundation cream after either receipt, and whip 1 pt. of cream to serve with it. Heat 2 bars of sweetened vanilla chocolate with 2 table-spoonfuls of water, or enough to melt it. When smooth add gradually a little of the hot cream or custard, and strain through a fine strainer or cloth into the remainder of the cream. If unsweetened chocolate be used, add 2 table-spoonfuls of sugar to it while melting. Half of a level tea-

spoonful of Ceylon cinnamon may be mixed with the chocolate, or half an inch of stick cinnamon may be boiled with the cream or milk; it gives a rich, spicy flavor. Or you may have another variety by the addition of 1 table-spoonful of caramel.

8. *Coffee.* (*a.*) Make a ¼ of a cup of filtered coffee, or, if you have no filter coffee pot, put 2 heaping table-spoonfuls of fine ground coffee in a fine strainer placed in a bowl. Then pour through it ¼ of a cup of boiling water. Pour the liquid through a second time, and if not clear strain it through a fine cloth. Add this clear liquid to the hot cream or custard, and make the ice-cream after either receipt. (*b.*) Steep ¼ cup of coarsely ground coffee in 1 pint of cream or milk twenty minutes. Remove it; let it settle, and pour off carefully, then strain it and add it to the remainder of the cream or custard. This is sufficient for 1 qt. of ice-cream, made according to either receipt.

9. *Fruit.* (*a.*) ½ can apricots; 3 oranges; 3 lemons; 3 bananas; 3 cups sugar; 3 cups water. Put a puree strainer or sieve over a large granite pan or bowl, turn in the apricots and rub all but the skin through. Peel the bananas, remove the seeds and dark portions and sift the pulp. Pour the water in gradually to help the pulp go through the strainer. Squeeze the oranges and lemons, and strain through into the fruit pulp. Add the sugar, and when dissolved freeze as usual. From 1 cup to 1 pt. of cream may be mixed with the fruit just before freezing, but it is delicious without it, as the fruit pulp gives body to the frozen mixture. (*b.*) Prepare 1 pt. of any ripe, firm fruit, or canned fruit, drained, such as peaches, apricots, cherries, etc. Rub it through a puree strainer, and sweeten to taste; then stir in quickly 1 qt. of whipped cream. Freeze as usual.

10. *Lemon.* Make ice-cream by either receipt. Pare off all the rind from a lemon, cut it in halves, remove the seeds, and squeeze out the juice. If the rind and seeds are pressed with the pulp, much of their bitter flavor will be given to the juice. Strain the juice (there should be about 2 tablespoonfuls) and mix with it an equal amount of sugar. Boil until clear and stir it into the cream just before freezing. 1 tablespoonful of lemon extract may be used if preferred.

11. *Macaroon.* Dry 1 doz. stale macaroons, roll or pound them fine, and sift through a fine gravy strainer. Add them to ice-cream made after either receipt and flavored with extract of almond or sherry wine. Stir them in when the cream is partly frozen.

12. *Neapolitan.* (*a.*) 1 qt. cream; 4 eggs; 1 cup sugar; flavoring. Under this name may be included all the varieties made with eggs and cream. The foundation is the same for all the varieties taking their name from the flavoring used. Directions for preparing the flavoring will be found under each special head. (*b.*) Scald the cream; beat the yolks till thick and creamy, add the sugar and beat again. Beat the whites stiff, and beat them well into the yolks. Pour the hot cream into the eggs, and when well mixed, turn back into the double boiler and cook like a boiled custard. Stir constantly until the foam disappears and the custard has thickened enough to coat the spoon. Strain at once, and when cold add the flavoring and freeze. (*c.*) Make the custard as in (*b*), using the yolks only. Beat the whites until just foamy but not stiff, strain the hot custard into them, beating thoroughly. Or, add the beaten whites when the custard is partly frozen.

13. *Nut.* (*a.*) *Filbert, Hazelnut, or Chestnut.* Shell and blanch the nuts, then either boil till soft, mash to a pulp and press through a strainer; or, roast slightly, chop, pound to a paste and sift; pound again all that does not go through. Then cook the nut paste with the cream or custard. Allow 1 cup of nuts to either receipt for ice-cream. (*b.*) *English Walnut.* Shell, blanch, chop fine, sift, and stir into the cream when partly frozen. (*c.*) *American Walnut or Shellbark, and Pecan Nuts.* Shell, chop fine without blanching, sift, and stir them into the cream just before freezing, or as soon as thoroughly chilled. In using pecans, avoid taking any of the puckery brown substance which often adheres to the meat. Rinse them quickly in hot water and dry them before chopping. (*d.*) *Butternuts* and the three-sided cream nuts are too oily to use in ice-cream. Ice cream made with nuts should be salted more than other creams.

14. *Peach.* Pare 2 qts. of ripe, white peaches, cut them fine and mash quickly with a wooden masher; then add 1 cup of sugar and a few of the peach-stone meats, and keep it closely covered until the sugar is dissolved. Make the ice-cream after either receipt, and when the cream is thoroughly chilled strain the peach pulp through coarse cheese-cloth and stir it into the cream. Freeze as usual.

15. *Philadelphia.* 1 qt. cream; 1 scant cup sugar; flavor to taste. This is a name generally applied in this country to all ice-creams made with pure cream and no eggs. There are three ways of making this ice-cream. (*a.*) Mix the sugar and flavoring with the cream, and when the sugar is dissolved strain it into the freezer. This is the quickest and easiest method; the cream increases in bulk considerably and is of a light, snowy texture. (*b.*) Whip the cream until you have taken off a quart of the froth, mix the sugar and flavoring with the unwhipped cream, strain into the freezer, and when partly frozen add the whipped cream and freeze again until stiff. This gives a very light delicate texture to the cream. (*c.*) Heat the cream in a double boiler until scalding hot, melt the sugar in it, and when cold add the flavoring. This is considered by many the best method, as the cream has a rich body and flavor, and a peculiarly smooth, velvety appearance. It also prevents the cream from turning sour. The cream may be whipped first, and the froth removed until you have a pint; then scald the remainder of the cream with the sugar, and when cold add the whipped cream. Thin cream, or single cream, is rich enough for ice-cream, but it should be

all cream, not thick cream diluted with milk. When milk is used with thick cream, eggs or flour should be used to thicken the milk, or the milk should be well scalded with the cream.

16. *Pine-apple.* (*a.*) Drain off the juice from ½ can of grated pine-apple, mix with it 1 tablespoonful of lemon juice and 2 tablespoonfuls of orange juice. Mash the pine-apple pulp through a puree or gravy-strainer, taking only what will go through easily. Mix the sifted pulp with the juice and add sugar to taste. Mix this with partly frozen cream made after the receipt for Philadelphia ice-cream. (*b.*) Pare a fresh, ripe pine-apple, remove the eyes and core, then chop fine and sprinkle with ½ cup of sugar to 1 pt. of the fruit. Let it stand half-an-hour, then press through a strainer as much pulp as will go through. Add the juice of one lemon and more sugar if needed. Add this to ice-cream made like Neapolitan cream, and freeze as usual.

17. *Pistachio.* Shell, blanch and pound 4 oz. of pistachio nuts, as directed for almonds in the preceding receipt. Make the Neapolitan or Philadelphia ice-cream, and scant the proportion of sugar. Flavor it with a delicate flavor of vanilla and almond and add the pistachio paste. Color it a pale green with spinach coloring, by mixing the spinach sugar with a little of the cream till smooth. Use enough to give the desired shade, then freeze as usual.

18. *Plain.* 1 pt. milk; 1 pt. cream; 1 cup sugar; 2 eggs; 2 scant tablespoonfuls flour; 1 saltspoonful salt; 2 tablespoonfuls flavoring. Boil the milk and cream, reserving ¼ of a cup of milk. Mix the sugar, flour and salt thoroughly. Beat the eggs till light, add the cold milk and the sugar mixture, and when well mixed add the boiling milk. Turn back into the double boiler and cook twenty minutes. Stir constantly till smooth, and after that occasionally. Strain through a gravy strainer, add more sugar if needed, and when cold, add the flavoring. Freeze as usual. This is a good foundation for an inexpensive cream, and if a larger quantity be desired, more cream and sugar may be added with the flavoring. If the milk be boiling when the flour is added, and cooked thoroughly, there will be no taste of the flour. If you have no cream, use all milk, 4 eggs, and add 1 rounding tablespoonful of butter when you take the thickened milk from the fire.—(*With Gelatine.*) 1 qt milk; 1 pt. cream; 8 eggs; 1½ cups sugar; 1 saltspoon salt; ½ box Nelson's gelatine; lemon, coffee, wine, of any strong flavoring. Soak the gelatine in ½ cup of the measure of cold milk. Boil the remainder of the milk and cream. Beat the eggs till creamy, add the sugar and salt and beat again. Add the hot milk, then put into the double boiler, stir constantly, and cook till it thickens and coats the spoon. Add the soaked gelatine, and more sugar if needed, and when dissolved strain it and set away to cool. When cold, flavor highly with lemon, wine, or any flavoring strong enough to disguise the taste of the gelatine.

19. *Strawberry.* (*a.*) Sprinkle 2 cups of sugar over 2 qts. of strawberries. Mash them and let them stand half an hour, or until the sugar is dissolved. Meanwhile prepare the ice and pack the freezer. Turn the berries into a large square of cheese-cloth which has been placed over a bowl. Gather up the edges of the cloth, twist them, and squeeze as long as any juice or pulp will come. Then empty the pulp and seeds left in the cloth into a pan and pour on gradually about 1 pt. of milk, mix it well with the pulp, until the pulp is separated from the seeds. Squeeze again until perfectly dry. There should be nothing left in the cloth save a ball of seeds. The pulp will thicken the milk, and it is much nicer than the juice alone. Add to this pulpy juice as much cream as you may have, from 1 cup to 3 pts., and sugar to make it very sweet. The cream should be scalded and cooled. Freeze as usual. This is delicious, and a great improvement over that made by simply mashing the fruit, where the presence of the seed is objectionable. (*b.*) Allow 1 pt. of canned strawberry juice to 1 qt. of cream; sweeten to taste. If preserved strawberries are used, the juice of 1 lemon will be an improvement, as the berries are usually too sweet. The cream should be scalded, and when cold mixed with the juice. Freeze as usual.

20. *Vanilla* (*a.*) The simplest way to make vanilla ice-cream is to make either of the kinds given as a foundation, and, just before freezing, flavor with from 1 to 2 tablespoonfuls of the vanilla extract. The amount will depend upon the strength and purity of the extract. (*b.*) Make whichever foundation cream is preferred and use a quarter less than the sugar given in the receipt. Just before freezing add from 1 to 2 tablespoonfuls of vanilla sugar, or enough to give the flavor desired.

ICE HOUSE, To Build.—Lay a good stone foundation in lime mortar, as you would for any other building, raising it about 18 inches above the surface of the earth—10 feet by 15 feet is large enough for the necessities of almost any private family. Have your studs 12 inches broad by 2 inches thick—rafters the same—10 feet from the sills to the plates. Run a partition around the corner, that the entrance may be about 5 feet square—doors 2½ feet wide. Fill the space within the foundation wall 3 or 4 inches above the top of the sill with tan bark, so that it shall be at least 2 feet deep after being well stamped down. Then board the inside tight with well-seasoned boards (roof and side); nail on a board all round the outside and fill the space with tan bark well jammed in, and so proceed till you arrive at the ridge, making every space and vacancy tight with the bark. Afterwards shingle and clapboard as you like. Thatch, well put on, would probably be best, but shingles are well enough. The partition should be double, and a space of 6 inches filled with tan bark. The doors should be so constructed as to be filled 4 inches thick with bark. The whole, except the doors and casings, may be of rough hemlock lumber. This is much after the West India manner of build-

ing ice houses, where the ice is kept many months, always entirely above ground, with the thermometer averaging about 80 degrees Fahrenheit. Great care should be taken in packing ice, which should be well covered with straw, with water sprinkled over it, and stowed away during the coldest weather. The doors of the ice house should be left open during some of the coldest days and nights immediately succeeding, then close all tight.

INDIGESTION. To Cure.—Glycerine is recommended as a sure cure for indigestion. A small teaspoonful should be mixed in half a wineglassful of water, and taken with or immediately after each meal until the trouble is past, which, in an ordinary case, will be in two or three days' time, and in an obstinate one probably from ten to fifteen days. The treatment will have to be renewed if the indigestion manifests itself again.

INK. For Ticket Writing.—The following recipe is said to make a remarkably good quality of ink for ticket writing: Take 4 oz. of white wax and 1½ oz. of white soap. Melt, and when well amalgamated add of lampblack ½ oz. Mix well, heat strongly and add of shellac 1 oz. Again heat it, mix it well, cool and bottle for use. You will find that with this ink lines may be drawn from the finest to the fullest without danger of its spreading.

INK, To Remove.—1. (*From the Fingers.*) Rub vaseline well into the skin at the stained parts and then rub off with a piece of soft paper before applying soap. In this way the hands may be washed perfectly clean.—2. (*From Paper, Cloth, Etc.*) By the combined use of the two following fluids writing inks may be removed from paper, cloth, etc., without injury to the texture. Solution No. 1 consists of 2 qts. of distilled water, in which are dissolved 4 oz. of citric acid, and to which are added 6 oz. of a strong solution of borax. No. 2 consists of 2 qts. of distilled water, ¾ lb. of chloride of lime; after standing for five or six days filter, and add 6 oz. of strong solution of borax. To remove the ink spots, apply solution No. 1 thoroughly, after which the second composition should be applied in a similar manner, when the paper will be found to be again in a condition suitable for writing upon. —3. Sulphuric ether gently applied with cotton wool, away from the light, is effective for removing printer's ink from paper, if sufficient pains be taken. Put blotting paper beneath the one from which the ink is to be removed, and use clean, white blotting paper to absorb the color after each application of the ether.

INSECTS, To Destroy.—1. (*On Fruit Trees.*) The Arsenites—London Purple, Paris Green and White Arsenic—are of the greatest service against all mandibulate insects, as larvæ and beetles, and they furnish the most satisfactory means of controlling most leaf feeders and the best wholesale remedy against the codling moth. Caution must be used in applying them on account of the liability of burning or scalding the foliage. The poisons should be thoroughly mixed with water at the rate of from 1 lb. to 100-250 gal. water, and applied with a force pump or hand spray nozzle. In preparing the wash it will be best to first mix the poison with a small quantity of water, making a thick batter, and then dilute the latter and add to the reservoir or spray tank, mixing the whole thoroughly. — 2. When freshly mixed, either London purple or Paris green may be applied to apple, plum and other fruit trees except the peach, at the rate of 1 lb. to 150-200 gal., the latter amount being recommended for the plum, which is somewhat more susceptible to scalding than the apple. White arsenic does little if any injury at the rate of 1 lb. to 50 gal. of water. When allowed to remain for some time (two weeks or more) in water, the white arsenic acts with wonderful energy, scalding, when used at the rate of 1 lb. to 100 gal., from 10 pr. ct. to 90 pr. ct. of the foliage. The action of the other arsenites remains practically the same, with, perhaps, a slight increase in the case of London purple. —3. With the peach these poisons, when applied alone, even at the rate of 1 lb. to 300 or more gallons of water, are injurious in their action, causing the loss of much of the foliage. —4. By the addition of a little lime to the mixture, London purple and Paris green may be safely applied at the rate of 1 lb. to 125 to 150 gal. of water, to the peach or the tenderest foliage, or in much greater strength to strong foliage, such as that of the apple or most shade trees.—5. Whenever, therefore, the application is made to tender foliage or when the treating with a strong mixture is desirable, lime water, milky, but not heavy enough to close the nozzle, should be added at the rate of about 2 gal. to 100 gal. of the poison. Pure arsenic, however, should never be used with lime, as the latter greatly increases its action.—6. With the apple, in spraying for the codling moth, at least two applications should be made —the first on the falling of the blossoms, the apples being about the size of peas, and the second a week or ten days later; but the poison should never be applied after the fruit turns down on the stem, on account of the danger of the poison collecting and remaining permanently in the stem cavity.—(*To Clean Canary Birds of Mites.*) Put a clean white cloth over the cage at night. In the morning destroy the mites, which leave the bird, and will be found on the cloth. Take the cage apart and wash thoroughly.—8. (*In Water.*) Go to the nearest river or pond, and with a small net (a piece of old mosquito bar will do), collect a dozen or more of the small fishes known as minnows, and put them into your cistern; and in a short time you will have clear water, the wiggletails and reddish-colored bugs or lice being gobbled up by the fishes.

INSECTICIDES.—1. (*Kerosene Emulsion.*) One of the most satisfactory formulas is as follows: Kerosene, 2 gal.; common soap or whale oil soap, ½ lb.; water, 1 gal.; heat the solution of soap and add it boiling hot to the kerosene. Churn the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream which thickens upon cooling and should adhere with-

out oiliness to the surface of glass. For use against scale insects dilute 1 part of the emulsion with 9 parts of water. For most other insects dilute 1 part of the emulsion with 15 parts of water. For soft insects like plant lice the dilution may be carried to from 20 to 25 parts of water.—2. The milk emulsion is produced by the same methods as the above.—3. (*The Resin Washes.*) These insecticides act by contact, and also, in the case of scale insects, by forming an impervious coating which effectually smothers the insects treated. These resin washes vary in efficacy according to the insect treated. Experience has shown that the best formula for the red scale (*Aonidia aurantii* Maskell) and its yellow variety (*A. citrinus* Coquillett) is as follows: Resin, 18 lb.; caustic soda (70 per cent strength), 5 lb.; fish oil, 2½ pt.; water to make, 100 gals.; the necessary ingredients are placed in a kettle and a sufficient quantity of cold water added to cover them; they are then boiled until dissolved, being occasionally stirred in the meantime, and after the materials are dissolved the boiling should be continued about an hour, and a considerable degree of heat should be employed, so as to keep the preparation in a brisk state of ebullition, cold water being added in small quantities whenever there are indications of the preparation boiling over. Too much cold water, however, should not be added at one time, or the boiling process will be arrested and thereby delayed, but by a little practice the operator will learn how much water to add so as to keep the preparation boiling actively. Stirring the preparation is quite unnecessary during this stage of the work. When boiled sufficiently it will assimilate perfectly with water, and should then be diluted with the proper quantity of cold water, adding it slowly at first and stirring occasionally during the process. The undiluted preparation is pale yellowish in color, but by the addition of water it becomes a very dark brown. Before being sprayed on the trees it should be strained through a fine wire sieve, or through a piece of Swiss muslin, and this is usually accomplished when pouring the liquid into the spraying tank, by means of a strainer placed over the opening through which the preparation is introduced into the tank. The preparing of this compound will be greatly accelerated if the resin and caustic soda are first pulverized before being placed in the boiler, but this is quite a difficult task to perform. Both of these substances are put up in large cakes for the wholesale trade, the resin being in wooden barrels, each barrel containing a single cake weighing about 375 lb., while the caustic soda is put up in iron drums containing a single cake each, weighing about 800 lb. The soda is the most difficult to dissolve, but this could doubtless be obviated by first dissolving it in cold water and then using the solution as required. This insecticide may be applied at any time during the growing season.

INVALIDS, Concentrated Food for.—Bartholow's food, first made by Dr. Bartholow, of Philadelphia, is better known to nurses than others. It is a very concentrated food, useful in nourishing a patient who is on a liquid diet. It is made from one cupful of beef-tea, two level tablespoonfuls of sago, the yolk of an egg, a cupful of sweet milk and a little salt. The sago is given for the starch it contains, arrowroot and sago being the most easily digested forms of starch. In making the food first put the sago into the cup of milk and heat until the grain swells and thickens the milk. Stir the mixture frequently, and if you can not give it constant attention, cook in a double boiler. If scorched, the food will be a failure. When cooked the mixture should look clear. Take from the fire and stir in the cup of beef-tea, break an egg, drain off the white, and beat the yolk in the shell for economy's sake. Beat in the yolk of the egg, salt to taste and serve. Do not give the patient more than 2 oz. or ½ cupful at one feeding, and when you rewarm the food, put the required quantity in a cup and set it in a pan of hot water. Simmer until heated. The simmering point of water is 180° Fahrenheit. The temperature of rapidly boiling water is 212°.

IRON, Coating for.—A simple process for covering iron with a black coating similar to enamel, exceedingly evenly and regularly distributed over the surface of the metal, is described. In a vessel about 18 in. high enough powdered coal is placed to cover the bottom to a depth of about ¾ in. An inch higher than the coal there is a grating for supporting the article to be coated. When the contents of the vessel are in place the mouth is luted down and the vessel is placed on a brisk fire, which is maintained for about half an hour. When the vessel is removed, cooled and opened the iron articles, as a result of the action of the vapors generated in its interior, are seen to be covered with a fine, elastic and tenacious enamel.

IRON, To Render Malleable.—The continuous heating of cast iron for several days in a vacuum causes the metal to become malleable, and to have a uniformly black surface, dotted with black grains of amorphous graphite. The heating must not reach the melting point.

IRON WORK, Preservative for.—Red lead paint is the best preservative. Although red lead is a highly oxidizing substance, it produces a skin of the unoxidizable and protective black of magnetic oxide on the iron itself under the paint.

IVORY, Artificial.—1. Make a paste of isinglass, egg-shell in powder, and brandy; give it the desired color, and pour warm into oiled molds; leave the paste in the molds until hard. —2. Dissolve 2 lb. pure india-rubber in 32 lb. chloroform, and saturate the solution with purified ammoniacal gas; then distill off at a temperature of 185° F., and mix the residue with pulverized phosphate of calcium or carbonate of zinc; press into molds and cool.—3. 4 parts of shellac mixed with 16 parts of ammonia. Place in revolving cylinders for five hours at a temperature of 99.5° F. A complete solution of the consistency of a thin syrup will be the result. Add to this 20 parts

zinc oxide, mix thoroughly and grind in a color mill. The ammonia is driven off by heating. Press into molds.—4. The following is a description of a new process for making artificial ivory from the bones of sheep and goats and the waste of white skins, such as kid, deer, etc. The bones are macerated for ten or fifteen hours in a solution of chloride of lime, and afterward washed in clean water and allowed to dry. Then they are put with all the scraps of hide, etc., into a specially constructed boiler, dissolved by steam so as to form a fluid mass, to which is added 2½ pr. ct. of alum. The foam is skimmed off as it rises, until the mass is clear and transparent. Any convenient coloring matter is then added, and while the mass is still warm it is strained through cloth of appropriate coarseness and received in a cooler and allowed to cool until it has acquired a certain consisteney so that it can be spread out on the canvass without passing through it. It is dried on frames in the air, and forms sheets of convenient thickness. It is then necessary to harden it, which is accomplished by keeping it for eight or ten hours in an alum bath that has been used before. The quantity of alum necessary for this operation amounts to 50 pr. ct. by weight of the gelatine sheets. When they have acquired sufficient hardness, they are washed in cold water and let dry on frames, as at first. This material works more easily and takes as fine a polish as real ivory.—5. Mix 20 parts by weight of white shellac, 16 parts of ivory dust, 9 parts of acetate of lead and 10 parts of camphor. Heat these ingredients, dry, powder and press.—6. One of the disadvantages of celluloid is the fact that it burns very readily when a flame is applied; but a new compound, said to be fireproof, and suitable as a substitute for ivory, is thus made. A solution is prepared of 200 parts of casein in 50 parts of ammonia and 400 of water, or one hundred and fifty parts of albumen in 400 of water. To the solution the following are added: Quicklime, 240 parts; acetate of alumina, 150 parts, alum, 50 parts; sulphate of lime, 1,200 parts; oil, 100 parts. The oil is to be mixed in last. When dark objects are to be made, from 75 to 100 parts of tannin are to be substituted for the acetate of alumina. When the mixture has been well kneaded together, and made into a smooth paste, it is passed through rollers to form plates of the desired shape. These are dried and pressed into metallic moulds previously heated, or they may be reduced to a very fine powder, which is introduced into heated moulds and submitted to a strong pressure. The objects are afterward dipped into the following bath: Water, 100 parts; white glue, 1 part; phosphoric acid, 10 parts. Finally, they are dried, polished, and varnished with shellac.—7. Lactite is the name of the new product which hails from Norway, and is said to have for the starting point of its materials the article known as skim milk. It is readily combined with various coloring matters and is said to answer well as a substitute for ivory or celluloid, and is being adopted for similar purposes.

IVORY, Black.—Burn shavings and waste pieces of ivory from the ivory turners, in a covered crucible, till no smoke issues; cover close while cooling; then wash with diluted hydrochloric acid, then with water till no longer acid; dry, and heat in a covered crucible. It is of a deeper color than bone black, and is used as a pigment, tooth powder and to decolorize syrups and other liquids.

IVORY, To Gild.—Immerse it in a solution of nitro-muriate of gold; then expose it to hydrogen gas while damp; afterwards wash in clean water.

IVORY, To Make Transparent.—Cut ivory in pieces 1-20 in. and place in phosphoric acid sp. gr. 1.131, until transparent; then take from the bath, wash in water, and dry with a clean linen cloth. Dry in the air without heat, and soften under warm water.

IVORY, To Remove Cracks From.—Wash the ivory in soap and warm water with a brush till the cracks disappear; then place under glass.

IVORY, To Render Flexible.—1. Immerse in a solution of phosphoric acid until transparent; then take out, plunge into water, and dry with a soft cloth; it will become flexible as leather, but will resume its hardness when exposed to the sun.—2. Slice ½ lb. mandrake; put 1 qt. best vinegar with it; put the ivory into this mixture, and stand the vessel in a warm place 48 hours, and you will be able to bend the ivory to suit.

IVORY, To Silver.—Pound in a small piece of nitrate of silver in a mortar, add soft water to it, mix together, and keep in a vial for use. When you wish to silver any article, immerse it in this solution; let it remain until it turns deep yellow; then place it in clear water, and expose it to the rays of the sun. To depicture a figure, name, or cipher, on ivory, dip a camel's hair pencil in the solution and draw the subject on the ivory. After it has turned deep yellow, wash it with water, and place it in the sunshine, occasionally wetting it with pure water. In a short time it will turn of a deep black color, which, if well rubbed, will change to a brilliant silver.

IVORY, To Whiten.—1. Slake lime in water; put the ivory into it after decanting from the grounds, and boil it till white. To polish, set it in the turner's wheel; after having worked, take rushes and pumice stones, subtile powder, with water, and rub it till it looks smooth; then heat it by turning it against a piece of linen or sheepskin leather; when hot rub it over with a little whiting diluted in oil of olive; then with a little dry whiting alone, and finally with a piece of soft white rag.—2. First clean the ivory by boiling it with a paste composed of burned pumice stone and water. After cleansing place the article under a glass vessel, and expose it to the sun's rays until it assumes its original whiteness. The ivory should be kept moist with water while bleaching. If the first operation does not succeed perfectly, it should be repeated.—3. Mix a thin lime paste and heat over a moderate fire. Place the ivory in this paste, and leave it until it bleaches white, after which remove the paste, dry and polish.—

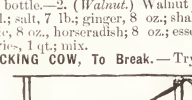
4. (*Piano Keys.*) The reason piano keys turn yellow is because they absorb the grease from the fingers; it will, therefore, be necessary to remove this. If a paste made from whiting and a solution of potash is laid on and allowed to remain for about twenty-four hours, the ivories will be restored very nearly, if not quite, to their original color, without removing them from the keys.

IVY. Poisoning from.—1. The effect of barely coming in contact with any portion of this innocent looking species of the genus Rhus is most severe and lasting, contrary to general belief. Not until a day has passed does the individual realize that he or she has been infected; but when it does appear it is sudden and unsuspected, a very short time elapsing between the first itch and the nasty-looking patches of small water blisters, surrounded by larger patches of inflamed skin. What makes things worse for the sufferers is that if he or she be tempted by the continued itching to scratch or rub the places, the whole body will soon become as badly diseased as the wrists and hands, where it usually first appears. And if the blisters be opened the watery matter oozes to other parts and scalds more blisters or papules, as they are known. Many believe that after once having in the system this poison; a second or third appearance will be suffered rather than a succession prevented. This is probably true; for cases have often been known where the persons once subjected thus were afraid even to drive along a suburban or country road for fear of another infection, not only by direct contact with the plant, but with the air so likely to be impregnated with the ethereal, poisonous oil of the plant. This is not superstition, nor mere fancy; sufficient proof has not been given to down the claim that the oil is volatile. After the first infection, if it be a severe one, the papules are liable to appear at almost any time and on any portion of the body, often between the fingers and toes, unnoticed by the patient, with but slight irritation of the surface of the skin. Rhus poisoning, that of poison oak or poison ivy, which are one and the same, is the most common form of what we call dermatitis venenata, or cases in which the skin receives the poison through accidental contact, from the use of vegetable, mineral or animal agencies in the processes of the arts and sciences, and from exposure to their irritative influences otherwise. The poisonous principle is called toxicodendric acid, found in the sap of the plant in the form of an oil. The effect depends largely upon the susceptibility of the person. The immunity of some people is truly remarkable. Many can with impunity handle the leaves and stems of the plant without experiencing the irritating, inflaming and blistering effects. On the other hand, many are so sensitive that the mere exposure to the volatile principle of the plant, yet not having come in contact with it, excites the most violent infection. The eruption of poison oak is generally of an eczematous nature, appearing in numerous papules or vesicles on an inflamed base. When it breaks out upon the face swelling takes place. Starting, as a rule, from the hands and wrists, it spreads rapidly up the arms, and then over the body and face. When the vesicles are ruptured from scratching or rubbing, the exposed surfaces become covered with crusts or scabs. Intense and aggravating itching is the marked characteristic of the eruption. This poison differs from others in general in its sudden appearance. The favorite treatment is that of alkaline lotions applied to the disturbed portions; bathing with a solution of bicarbonate of soda and water is exceptionally effective; some physicians find success in painting with sweet spirits of niter. After the acute inflammation has subsided an ointment containing camphor and carbolic acid is recommended. Another efficacious treatment is that of a wash of bromine solution together with internal applications of sulphide of calcium. For some time Harvard's scientists have been investigating poison oak, and have finally proven the poison to be in the form of an oil. But they claim that it is non-volatile, which is the opposite of the general and former opinion. There was a time when it was thought to be in the form of a powder or pollen, but that has now entirely been exploded. It is truly peculiar how some people become infected without, they claim, having come in contact with the vine. This oil, which contains an acid, toxicodendric acid, the poisonous principle, is found not only in the leaves and stems, but also in the aged portions of the vine. A solution of alcohol and water of acetate of lead (lead water) has been used effectually in preventing the progress of infection by removing the oleaginous poison from the skin. It is the alcohol which removes the poisonous matter from the surface of the skin before it has had time to take effect—twenty-four hours after contact is the limit of prevention. Where many make a mistake is in plain water to wash off any of the oily poison. Soap and water will have some good effect, but this solution is the only one recommended. No difficulty should be experienced in distinguishing the plant, nor its name and relation to other poisonous growths. The word "sumac" is the name of the plant genus Rhus; which includes the several poisonous and non-poisonous species of sumac and poison oak or ivy. Some make a difference between the oak and ivy mentioned, but this is not accepted. The distinction made is that one species grows on and along the ground and the other climbs. The plant has little rootlets or tendrils which enable it to climb. It is very bold and grows to heights exceeding the common ivy. Shady and moist places are its habitat; rocks, bushes, trees and even buildings are its supports. The leaves are of three leaflets, "rhombic ovate," variously notched and lobed, sometimes even entire; the flowers are in loose auxiliary panicles; the berries are pale brown. When bruised or cut it exudes a nasty juice which the air changes from its original milky appearance to a black varnish color.—2. A case of complete and immediate relief from the

effects of ivy poisoning is reported. The patient was swollen from head to foot, but in an hour after bathing in a solution of sodium hyposulphite was attending to business as if nothing had happened.

KETCHUP or CATSUP, To Make.—1. (*Mushroom.*) Sprinkle the trimmed tops with salt, stir them occasionally for two or three days, then slightly press out the juice; add to each gal. of this ½ oz. each of bruised mustard seed and cloves and 1 oz. each bruised allspice, black pepper, and gently simmer for an hour in a porcelain-lined iron vessel; cool, strain, and bottle.—2. (*Walnut.*) Walnut shell juice, 3 gal.; salt, 7 lb.; ginger, 8 oz.; shallots, 8 oz.; garlic, 8 oz., horseradish; 8 oz.; essence of anchovies, 1 qt.; mix.

KICKING COW, To Break.—Try the plan



illustrated. It is recommended as very efficient. Loop the rope around the leg first and bring it up to the front drawing it tight.

KINDLINGS, To Prepare.—1. Save the corn cobs for kindlings, especially if wood is not going to be plentiful next winter. To prepare them, melt together 60 parts resin and 40 parts tar. Dip in the cobs and dry on sheet metal heated to about the temperature of boiling water.—2. Dip the wood in melted resin. The following composition is sometimes used: 60 parts melted resin and 40 parts tar, in which the wood is dipped for a moment. Or, take 1 qt. of tar and 2 lb. of resin, melt them, then cool; mix as much sawdust with a little charcoal added as can be worked in. Spread out on a board and when cold break up into lumps the size of a hickory nut, and you will have enough kindling to last a good while.

LABELS, for Metal.—Paper pasted, gummed, or glued on to metal, especially if it has a bright surface, usually comes off on the slightest provocation, leaving the adhesive material on the back of the paper with a surface bright and slippery as ice. To overcome this it is suggested that the metal be first dipped into a strong and hot solution of washing soda, afterwards scrubbing perfectly dry with a clean rag. Onion juice is then to be applied to the surface of the metal, and the label pasted and fixed in the ordinary way. It is said to be almost impossible to separate paper and metal thus joined.

LABELS, Insoluble.—Lay a coat of strained white of egg over the label, and immediately put the vessel in the upper portion of a common steam pan, or otherwise expose it to a gentle heat till the albumen coagulates and turns opaque, and then take it out and dry it in an oven, at a heat of about 212° F.; the opaque white film will then become hard and transparent, and resist the action of oils, spirits and water. The labels on bottles containing acids or alkaline solutions, should be either etched upon the glass by fluoric acid or be written with incorrodible ink.

LABELS, Plant.—1. Common lead pencil on zinc labels are almost indelible and become more distinct with age.—2. Chloride of platinum solution, and better, sulphate of copper, may be used, and are perhaps somewhat more distinct.

LABELS, To Preserve.—1. (*Wooden.*) Thoroughly soak labels in iron sulphate, then lay them, after they are dry, in lime water.—2. The following method of preserving wooden labels that are to be used on trees or in exposed places is recommended: Thoroughly soak the pieces of wood in a strong solution of sulphate of iron; then lay them, after they are dry, in lime water. This causes the formation of sulphate of lime, a very insoluble salt, in the wood. The rapid destruction of the labels by the weather is thus prevented. Bast, mats, twine and other substances used in tying or covering up trees and plants, when treated in the same manner, are similarly preserved. At a recent meeting of a horticultural society in Berlin wooden labels, thus treated, were shown, which had been constantly exposed to the weather during two years without being affected thereby.—3. (*Zinc, Garden.*) For zinc plates, use with quill pens only. Dissolve muriate of ammonia and crude sal ammoniac in strong vinegar.—4. For large labels, dip your pen in concentrated sulphuric acid, and write on the zinc, previously greased; a sharp point of copper wire is better than the pen; quench in water; wash thoroughly from fluid when your writing is plain enough.—5. Dissolve about seventy-five cents' worth of chloride of platinum in hot distilled water, adding a very few drops of aqua regia. The liquid should be of a pale amber color; enough for hundreds of labels.

LACE, To Clean.—To clean the most delicate lace spread it out carefully on wrapping paper and then sprinkle it with calcined magnesia. Place another paper over it and then put it between the leaves of a book, or between two table leaves if the lace is a large piece. Leave it two or three days, then give it a gentle shake to remove the powder, and then the lace is fresh and clean, with every thread as good as it was. The magnesia can be had at any drug store.

LACQUER, Japanese.—The utility of Japanese lacquer as a preservative of surfaces of metal, wood and paper has never received the attention it deserves from engineers. The general idea that its application is one of art and is only adaptable to bric-a-brac is wholly erroneous. The Japanese use it for an infinite variety of purposes—acid tanks, coating the keels of ships, highly finished coach and decorative panels, and articles for domestic use resisting hot water, soap and alkaline solutions.

There is no reason why the lacquer tree should not thrive in this country. Its sap, which is used as the material for all lacquer work, is a natural essence and vastly superior to any varnishes used here. It is unlike even copal, which is an artificial mixture of rosin, fatty oils and turpentine. Japanese lacquer is a ready made product of nature that hardens into a mirror-like smoothness, never splits nor cracks, and is of great durability. The art lacquer work of Japan is essentially individual and ought not to be treated as an undistinguishable whole. There is a wide distinction between the ordinary lacquer tray or cabinet of commerce and the exquisite lacs of the great Japanese artists. Each of the great masters of lacquer has created a style of his own, and has founded a school of which the traditions have been kept alive by his successors for centuries. At the Centennial Exhibition of 1876 there were exhibited in the Japanese department plates, pans and other objects, evidently of a common quality of lacquer used by sailors and others for domestic purposes, also some samples of a finer grade in trays and cabinets which had been sunk in the sea over fifty years, and though covered with barnacles and other marine growths, were practically unharmed, so perfectly had they been protected by the lacquer. It seems almost incredible that so valuable an article, which can be produced as cheaply as maple sap, has remained comparatively unknown in this country and Europe, at least so far as applying it to the palpable protective purpose that nature evidently designed it for.

LA GRIPPE.—1. An infectious disease with great prostration, and often with discharges from the respiratory organs, stomach and intestines. Pneumonia commonly follows. Epidemics appear and spread rapidly over areas of country. The disease has been known for centuries under different names. The disease is believed to be due to a specific virus or bacillus, but at this writing it is not discovered, nor any specific remedy. In the young and strong, recovery is the rule; among the delicate and aged only do we see fatalities, and then only from the fever of profound depression. In many cases the attack closely resembles any ordinary cold, with slight fever, dryness, swelling, and increase in discharge from the nostrils. Striking features are great nervousness, headache, pains in the back and legs, and a general soreness, similar to the pains of dengue and small-pox. There may be marked delirium. Prostration follows, and weakness of the heart. The pulse is feeble and irregular. Death may result from heart failure. Mental disorders are common with severe attacks, besides great depression and inability for exertion. Affections of the respiratory organs are the most serious. Sometimes there will be bronchitis. But the gravest consequence is pneumonia. *Treatment:* The disease should always be regarded as serious and the patient confined to the bed. The patient should be supported with careful feeding and nursing. The bowels should be opened by calomel or a saline aperient. At night, 10 gr. of Dover's powder may be given. At the onset a warm bath is sometimes grateful, to remove the pains in back and limbs, and great care should be taken to have the bed well warmed, and after retiring a drink of hot lemonade should be given. If the fever is high and there is delirium, small doses of antipyrin may be given and an ice-cap applied to the head. But fever reducing medicines must be used with caution, as profound prostration sometimes develops. In cases where heart weakness develops, stimulants should be given, and, through convalescence, strychnine. When bronchitis or pneumonia result, they should be treated as directed in this volume. Convalescence may require weeks or months. A good nutritious diet, change of air and pleasant surroundings, are essentials.—2. A vigorous rubbing of all parts of the body with warm turpentine is suggested as a cure for the grip. It is said that it will cure in twenty-four hours, and that no medicine should be taken.

LARD, To Try.—1. Cleanliness is the great point in treating lard. The fat is freed from all adhering fleshy or discolored matter by cutting. It is then cut up into small pieces and washed until the water runs off clear. It is next melted by direct fire or steam coil until it becomes perfectly clear. It is run through close linen filters into the barrels, in which it is stirred until white and opaque, but only thickly fluid. The great point is when to cease stirring. It is then cooled and tightly covered. Air makes it rancid.—2. In preparing lard for the market, it should first be cut into pieces about the size of a walnut, and these should be allowed to stand in water for half an hour. Then work the material with the hands in five or six successive portions of water. Next pour off the water, melt the lard in a water bath, and strain through fine linen. In the first straining, it will be impossible to get rid of all the water; so that after cooling and draining, it will be necessary to remelt the lard and finally to filter it through paper in a warm closet.—3. Set a large kettle over a fire in some sheltered place, out of doors, on a still day. It will cook much quicker in large quantities. Put into the kettle, while the lard is cold, a little saleratus, say one tablespoonful to every 20 lb.; stir almost constantly when nearly done, till the scraps are brown or crisp, or until the steam ceases to rise, then there is no danger of its moulding; strain out into pans, and the first will be ready to empty into crocks when the last is strained.

LARD, To Keep Sweet.—Even during the warmest weather lard can be kept sweet by the following plan: When rendering (melting) it, throw into each kettle a handful of fresh slippery elm bark. No further preparation is necessary. No salt must be added to it at any time. The jars in which the lard is to be kept must be thoroughly cleansed.

LEAD, To Protect Against Corrosion.—The following is a process for the protection of lead against corrosion, which consists in coating it with a film of sulphide of lead. Take 16 grm. of solid caustic soda, dissolve it in 1.75

liters of water, and add to the liquid 17 grm. of nitrate of lead, or an equivalent of other lead salt, with 250 cubic centimeters of water; raise the temperature of the mixture to 90° C. If sufficient lead salt has been added the liquid will remain somewhat turbid after heating, and must then be rapidly strained or filtered through asbestos, glass wool, or other suitable material, into a convenient vessel. The filtered liquid is then well mixed with 100 cubic centimeters of hot water, containing in solution 4 grm. of sulpho-urea or thio-carbamide. If the temperature of the mixture be maintained at about 70° C., deposition of sulphide of lead or galena, in the form of a fine adherent film or layer, quickly takes place on any object immersed in or covered with the liquid, provided the object be in a perfectly clean condition and suitable for the purpose.

LEAD PIPE, To Protect.—The interior of a lead pipe can be covered with an incrustation of sulphide of lead by making a warm concentrated solution of sulphide of potash flow through it for ten or fifteen minutes. Pipes thus treated seem to be covered with grayish varnish, which prevents the water flowing through them from acting upon the lead.

LEATHER, Transparent, To Prepare.—After the hair has been removed from the hide, the latter, tightly stretched upon a frame, is rubbed with the following mixture: Glycerine (26 degrees B.), 1000 parts; salicylic acid, 2 parts; picric acid, 2 parts; boric acid, 25 parts. Before the hide is absolutely dry it is placed in a room which the rays of the sun do not penetrate, and it is saturated with a solution of bichromate of potash. When the hide is very dry, there is applied to its surface an alcoholic solution of tortoise shell, and a transparent aspect is thus obtained. This leather is exceedingly flexible. It is used for the manufacture of toilet articles, but there is nothing to prevent it from being used for foot-gear, and perhaps with fancy stockings shoes made of it would not prove unpleasing to the sight. They would at least have the advantage of novelty.

LEATHER-COVERED FURNITURE, Care of.—1. A leathered-covered easy chair and couch have been kept in excellent condition for years by rubbing the leather part occasionally with salad-oil and vinegar. Rub on a little of the oil with an old silk handkerchief, and with another give the leather a thorough polishing. If too much of the mixture is applied, or the rubbing is too light, the leather will be left in a sticky, oily condition.—2. Leather chair seats may be revived by rubbing with egg-white well beaten.

LEMONS, To Keep Fresh.—Lemons will be kept fresh for weeks if covered with water; the water must be changed often.

LEMONS, In Summer.—On hot mornings, when the appetite fails and the sight of food disgusts one, try sliced lemons for breakfast. Peel carefully, remove every particle of pith, slice down instead of across into a deep glass saucer and strew liberally with sugar.

LICE.—1. (*On Cattle.*) Take 1 pt. fish oil, pour it on the animal gradually, from the back of the horns to the root of the tail. To cure the cow itch or scratches: Paint the pastern joint well with white lead and oil; any kind of vegetable or animal oil will answer. Keep the cow haltered so she cannot lick her feet or go into water for one week. One application of each remedy is sufficient. On using the oil for lice a cow in seven days' time sheds her coat and in fourteen days' time a new and beautiful coat of hair takes its place; she takes on fat so very fast that in thirty days' time she will be ready to kill for beef, and good beef at that. This in all is thirty days from the time she has been served with the dose of oil on her back.—2. (*Chickens.*) Throw some leaves of the male persimmon into the nests on the hen house floor, and in less than one hour the house will be free from the vermin. To boil the leaves and sprinkle with the decoction will be as effective.—3. (*On Turkeys.*) Put a tablespoonful of sulphur in the nest as soon as the hens or turkeys are set. The heat of the fowls causes the fumes of the sulphur to penetrate every part of their bodies, every louse is killed, and, as all nits are hatched within ten days, when the mother leaves the nest with her brood she is perfectly free from nits or lice.

LIGHTNING RODS.—From what has been said it is evident that if we could make a path for the electricity from the clouds to the earth, it would act as a protection to any object (not too far distant) which did not conduct the electricity as well as it. As the electric fluid will leave any medium for one which offers less resistance to its passage, we can protect an object by making a conducting path, not all the way, but part of the distance from the earth to the cloud. This path must be made of material offering little resistance to its passage. Such a material is a conductor, and any substance that offers a great resistance to its passage is a "non-conductor." The best conductors make the best lightning protectors. The following is a list of the principal conductors and non-conductors:

CONDUCTORS.	NON-CONDUCTORS.
Metals.	Resin and Shellac are the best.
Charcoal.	Amber, Sulphur.
Plumbago.	Wax, Fat.
Pure Water.	Glass.
Moist Snow.	Silk, Wool, Hair, Feathers.
Steam and Smoke.	Cotton Paper.
Vegetables.	Dry Air, Baked Wood.
Animals.	India Rubber.

The conditions that determine a perfect lightning conductor are that it shall expose, in some prominent position on a building, a metallic point, and that it shall offer from this point to the earth little or no resistance to the current. Ordinary galvanized iron wire No. 4, $\frac{1}{4}$ in. in diameter, it is contended, is amply sufficient for any dwelling house. The precautions necessary are: 1. The conductor must be solid and continuous. There should be no joint, unless well-soldered. 2. The ground connection must be good. 3. Each conductor should have a

separate ground connection, but all should be connected together. It is unnecessary to insulate these. There should be no points or acute angle in the conductors—the straighter their course to the earth the better. It is safest to consider that the area protected by the conductor is equal to its height above ground. The following instructions are given: The rod should consist of round iron 1 in. in diameter; its parts in perfect metallic continuity, secured by coupling ferrules; coated with black paint, and terminate in a single platinum point. The shorter the course of the rod, the better; bendings should be rounded, and not in acute angles; fastened to the building by iron eyes, and insulated from these by cylinders of glass. The rod should be connected with the earth in contact with gas-pipes or water-pipes by a ribbon of copper or iron soldered to the end of the rod at one of its extremities, and wrapped around the pipe at the other. If impracticable, the rod should be continued horizontally to the nearest well, and turned vertically down until the end enters the water at its lowest level. The horizontal part of the rod may be buried in pounded charcoal and ashes. The rod should be placed on the west side of the building, and may be put up by a blacksmith. An easily constructed rod can be constructed thus: Get a coil of wire of the length required, and as large as telegraph wire; fasten one end over the chimney-top, run along the ridge and down the end of the house; fasten with blind-staples, and let the lower end terminate in moist earth or in a well, not a cistern. Among the essentials to be observed in attaching lightning conductors to houses, there should be no joint, unless it be a well-soldered one—chain-link rods, braided rope, tubing, etc., are to be avoided; the ground connection must be sound and good; each conductor, if there be more than one, should have a separate ground connection, but are also to be connected together, also to be connected with the lead roofing and all masses of metal in their neighborhood. It is not necessary to insulate these conductors, and there should be no points or acute angles in the conductor—the straighter and more direct its course to the earth the better. Telegraphic wire, $\frac{1}{4}$ in. in diameter, is claimed to be superior for this purpose, and is largely employed in England. It is also believed to be a safe estimate that the area protected by the conductor is equal to its height above the ground.

LIGHT. Substitute for.—The following ingenious contrivance to take the place of matches is used by the watchmen of Paris in all the magazines where explosives or inflammable materials are kept. Take an oblong vial of the whitest and clearest glass, and put into it a piece of phosphorus about the size of a pea. Pour some olive oil heated to the boiling point upon the phosphorus, fill the vial about $\frac{3}{4}$ full and then cork it tightly. To use the novel light remove the cork, allow the air to enter the vial and then recork it. This empty space in the vial will become luminous, and the light obtained is equal to that of a lamp. When the light becomes dim its power can be increased by taking out the cork and allowing a fresh supply of air to enter the vial.

LIME WATER, To Make.—To make lime water, agitate an oz. of pure caustic lime in a pt. bottle nearly filled with water and after the lime has subsided decant the clear liquid. Keep in a well stoppered bottle.

MALACHITE, Artificial.—Artificial malachite, which is susceptible to a fine polish, is made by precipitating a solution of sulphate of copper in the cold by carbonate of soda, or of potash. The precipitate, which is voluminous, should be allowed first to cohere, and is then dried and washed.

MALARIA. To Cure.—1. When the sunflowers ripen and the morning-glory vines begin to die in the back yards, then is the season of malarial and catarrhal troubles at hand. If people would let quinine alone and take one-grain doses, three times a day, of picrate of ammonia after each meal, and a wine-glassful of some laxative water in the mornings before breakfast, malaria would soon vanish. Picrate of ammonia can be put up in capsules, costs but little and does its work thoroughly, acting upon the liver and kidneys. A laxative is necessary in the mornings while taking the picrate, which should be continued about fifteen days.—2. Allow 1 pt. of water to one lemon—four lemons make sufficient for many a dose; cut up the lemons, rind, pulp and all, in the water and boil until the whole is reduced to 1 pt.; a teaspoonful before each meal is the dose.

MARBLE, Artificial.—1. In the production of this marble, slabs are made as follows: To $1\frac{1}{2}$ tons paper pulp, add a solution composed of 40 lbs. glue, $1\frac{1}{2}$ lbs. bichromate of potash, 50 lbs. alum, and 2 lbs. soluble glass or other silicate. This solution is mixed with the paper pulp, and the composition made into sheets by paper making machinery, the sheets being, however, subjected to more than ordinary pressure between rollers, so as to give great density; 2 or more sheets are now coated with the solution, and placed with their faces in contact, after which they are passed between pressure rollers, to cause their faces to become united and the whole homogeneous. The alum and silicate render the slab fire-proof to withstand the heat necessary during marbleizing, which latter is the same as ordinarily employed in marbleizing slate. The artificial marble has about the weight of poplar wood, is far more tough and durable than slate, and cannot be be dented or injured by ordinary use, while nothing but violence can break or bend a slab.—2. Soak plaster of Paris in a solution of alum; bake in an oven; then grind to a powder. In using, mix it with water, and to produce the clouds and veins, stir in any dry color you wish; this will become hard, and is susceptible of high polish.

MARBLE, To Cut.—This is done with the marble saw, which is a thin plate of soft iron, supplied, during its sawing motion, with water and sharp sand. The sawing of moderate pieces is performed by hand; that of large

slabs is done by a mill. Marble is generally cut up in the same direction in which it is quarried. Sometimes it is necessary to cut against the grain, which renders them more difficult to work. Some varieties of marble can only be sawn in the direction in which it is cut up. The marble worker is often obliged to rough hew and work without the help of the saw, casings, columns, and other articles with curved outlines; sometimes he re-works with the chisel badly executed sawings; he then squares each piece with the saw or chisel to the required dimensions, and finally mounts the marble upon its stone core, and sets up the work in its place. The working of moldings takes time and trouble; the first operation is to saw the arris, then to work with a notched chisel, making several successive groovings, on account of the contour and expansion, in which but small pieces of the material are taken, for fear of splintering; finish with small common chisels, sharp and well tempered. Cylindrical pieces, as round pedestals, columns, urns and vases, are worked with a chisel, and then, if portable, finished on a turning lathe.

MARBLE, To Polish.—If the piece is a plain surface, it is first rubbed by another piece of marble, with the intervention of two sorts of sand and water; first with fine river sand, and then with common house or white sand, which latter leaves the surface smooth for the process of gritting. The grit stone is rubbed on the surface with water alone; reducing it to that closeness of texture which fits it for glazing by means of a wooden block having a thick piece of woolen stuff wound tightly round it; the interstices of the fibres of this are filled with prepared putty powder, or peroxide of tin, and moistened with water; this being laid on the marble and loaded, it is drawn up and down the marble by means of a handle, being occasionally wetted, until gloss is produced. The polishing of moldings is done with the same materials, but with rubbers in shape according to that of the molding. The block is not used; in its stead a piece of linen cloth, folded to make a handful, which contains the putty and water. Sand rubbers to polish a slab of large dimensions should never exceed $\frac{2}{3}$ of its length, nor $\frac{1}{4}$ of its width; but if the piece of marble is small, it may be sanded itself on a larger piece of stone. Grit rubber are never larger than can be easily held in one hand; the largest block is about 14 in. in length and 4½ in. in breadth.

MARSHMALLOW DROPS.—Dissolve ½ pound of gum Arabic in 1 pint of water; strain and add ½ pound white sugar, and place over the fire, stirring constantly until the syrup is dissolved, and of the consistency of honey; then add gradually the whites of 4 eggs well beaten. Stir the mixture until it becomes somewhat thin and does not adhere to the fingers. Flavor to taste, and pour all into a pan slightly dusted with powdered starch, and when cool, divide into small squares.

MATCHES.—Matches consist of 2 parts, a stem and an igniting composition. In the case of common matches, the stem is made generally of soft pine, which is sawed in blocks to fit a machine. The wood, having been cut into the splints, is taken out and tied into bundles of 1,000, and then dried by being left in a heated chamber. The next process is to dip the ends in melted sulphur, commonly done by hand, the dipper giving to the bundle a twist which makes the ends spread out a little, so that they get coated all round with sulphur, and do not stick together in cooling. Each end is dipped in turn, and, when dry, the bundles are cut through the middle by a circular saw. Where sulphur is not used, the ends of the splints are carbonized by pressing them a moment upon a plate of red-hot iron, and then touched with melted stearine or paraffine, a small quantity of which is at once absorbed by the wood. The next step is to apply the material to be the source of fire. This composition is made into a pasty mass, the important ingredient being phosphorus. Chlorate of potash, a highly explosive substance, is free from some of the objections attaching to phosphorus, and it is substituted for it by some. Most, however, use a little of each. These are the 2 principal light-bearing ingredients. The rest are glue or gum, to give coherence; some find sand or pulverized glass, to give increased friction; and some substances which will readily give up a large amount of oxygen, as nitrate of potash, the peroxides of lead or manganese, and sulphide of antimony, to promote rapid ignition. Some mineral coloring matter is added, according to fancy.

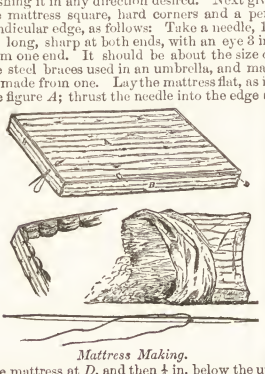
MATCHES, For Instantaneous Light.—Chlorate of potash, separately powdered, 6 dr.; vermillion, 1 dr.; lycopodium, 1 dr.; fine flour, 2 dr.; mix carefully the chlorate with the flour and lycopodium, avoiding friction, then add the vermillion, and mix the whole with a mucilage made with 1 dr. powdered gum Arabic; 10 gr. tragacanth; 2 dr. flour; 4 oz. hot water; mix; add sufficient water to bring it to a proper consistence, and dip in it the wood, previously dipped in a solution of 1 oz. of gum thus, and ½ oz. of camphor, in 6 oz. oil of turpentine.

MATCHES, Safety.—Chloride of potash, 4 to 6 parts; bichromate of potash, 2 parts; ferric oxide, 2 parts; strong glue, 3 parts; mix thoroughly, and use in the usual manner. Matches made by this method will not ignite on sandpaper, or by ordinary means, but require a surface especially prepared for them, as follows: Sulphide of antimony, 20 parts; bichromate of potash, 2 to 4 parts; oxide of iron, lead, or manganese, 4 to 6 parts; glass powder, 2 parts; strong glue or gum, 2 to 3 parts. This preparation is spread like paint, in a warm condition, on suitable paper, which is fastened on the boxes containing the matches.

MATS, To Make.—Flags, rushes, straw, cocoanut fibre, grass, rattan, strands of rope, and the inner bark of trees are used; they are also made from the inner bark of linden or basswood, made into strands and woven and twisted. Mats are usually 1½ to 2 yds. sq. In making straw mats, use 2 frames of board 3 in. wide and 1 in. thick and as large as the mat required. Have 5 or 6 pieces in each frame, running lengthwise. Place one frame on the ground

and cover with straw as high as 1 in., laying the straw at right angles with the cross-pieces; then fasten the other frame over the straw, and screw them together; having the cross-pieces in each frame opposite each other. Turn the frame upon edge and with 2 large needles, threaded with tarred twine, sew the mat by pushing one needle through the straw between the first 2 slats; the other needle is then pushed through at the same place, which thus makes a shoe-maker's stitch. Continue this until the mat is finished, and then remove the frames.

MATTRESS, To Make.—Make a top and bottom of ticking, the size wanted for the mattress, and sew them together, inserting $\frac{1}{8}$ in. piece of ticking between the edges. It is better to use only inside husks, split or whole, and the silks. The seam is left open in the centre $\frac{1}{3}$ way across the tick, the open end being turned over and drawn $\frac{1}{3}$ way back over the rest of the tick. The unturned end is then filled with husks, when the tick is drawn out full length, filled and sewed up, after which the husks are to be evened in the tick with a large wire or needle, running through the tick and pushing it in any direction desired. Next give the mattress square, hard corners and a perpendicular edge, as follows: Take a needle, 18 in. long, sharp at both ends, with an eye 3 in. from one end. It should be about the size of the steel braces used in an umbrella, and may be made from one. Lay the mattress flat, as in the figure *A*; thrust the needle into the edge of



Mattress Making.

the mattress at *D*, and then $\frac{1}{4}$ in. below the upper edge *C* at *E*, holding the needle horizontal as it passes into a depth of 8 in.; then elevate the point and bring it out at *A*. Do not pull it clear out, but leave the other point just under the top *A*, and carry it back again until it reaches the ticking *B*. Then depress it to a level with the point where intended, and bring it out through the edge $B\frac{3}{4}$ in. from where it entered and draw tight. This is to draw a roll of husks into the corner and hold it there. These stitches are continued all around the top and bottom, making the edges even. When this is done the husks are leveled, and the mattress is tacked like a comfort.

MEAT, Tough, to Make Tender.—If a tablespoonful of vinegar is added to the water in which tough meats or fowls are boiled, it will serve to make them tender.

MEAT, To Preserve.—It is said that putrefactive changes in meat are due to the decomposition of the water contained in the tissues. The means which have been found to arrest this decomposition are, first, a low temperature; second, a high state of desiccation; third, the application of antiseptics; fourth, the exclusion of air.—1. (*Antiseptic.*) The quarter carcasses are soaked for 24 to 36 hours in a solution composed of 3 parts borax, 2 parts boracic acid, 3 saltpeter, and 1 salt, in 100 parts water; they are then packed with some of the same. Before use they need 24 hours' soaking in fresh water. —2. (*Refrigeration.*) Subjection to a low temperature is a thoroughly effective way of preserving meat, but it can be considered only as temporary, decomposition ensuing when the cold state is abandoned. Nevertheless, its effects are sufficiently lasting to serve practical ends, and the process seems most likely to solve the problem of conveying large quantities of fresh meat to foreign countries. Numerous plans have been devised, all aiming at the production of a sufficiently low temperature at a remunerative cost. The principal are: —3. (*Harrison's.*) The meat is first frozen and is then packed in a chamber on board ship, the air of which is maintained in a thoroughly dry state, so as to keep up a slow but constant evaporation from the surface of the meat. The meat is placed in tanks, which are kept cool by directing a stream of brine among ice, and regulating the strength of the brine so as to produce the desired degree of cold. The ice and brine are kept in tanks above the meat, and from them streams constantly trickle over and around the meat tanks. The consumption of ice is less than 50 tons for 50 tons of meat, and the proportion decreases with larger quantities. The meat retains its full flavor and will keep good in a temperature of 63° to 68° F. (17° to 20° C.) for seventy or eighty hours after removal from the tanks. The drawback is the bulk of ice required.—4. (*Tellier's.*) The joints of meat are placed in a chamber; through which is passed a current of air charged with ether or other volatile substance, so as to reduce the temperature sufficiently low to preserve the meat without freezing its juices.—5. (*Mort and Nicolle's.*) In this process the freezing agent is ammonia solution under a pressure of 50 to 70 lb. a square inch. The freezing room is kept below 32.5° F. (0° C.) and the meat is frozen quite hard.—6. (*Poggiale's.*) A low temperature is maintained by the evaporation of methylic ether and circulation of chloride of calcium.—7. The process for curing meat by submitting it to the action of acetate of soda is very simple. Arrange the meat in a barrel, deposit about and on it powdered acetate of soda to about the quarter of the weight of the meat. In summer the action takes place immediately; in winter it is necessary to place the vessel in a room warmed to about 68° F. The salt absorbs the water of the meat; after 24 hours the pieces are turned and the lower placed uppermost. In forty-eight hours the action is finished and the pieces are

packed in barrels with their brine, or dry in the air. If the barrels are not full, it suffices to fill up with the brine made by dissolving 1 part (by weight) of the acetate of soda in three parts of water. The pieces may be of ordinary size, and when required for use may be freed from the salt by washing in running water. The dry acetate of soda may be recovered from the brine by evaporating off the water over a fire. —8. The composition of some of the preparations employed in commerce for the preservation of meat is as follows: (*Sozolithe.*) Sulphate of ammonia, 37.3 pr. ct.; sulphurous acid, 39.7 pr. ct.; soda, 21 pr. ct.; water, 2 pr. ct. —9. (*Concentrated Berlinite.*) Crystallized borax, 82.7 pr. ct.; boric acid, 9.8 pr. ct.; chloride of sodium, 7.5 pr. ct.—10. (*Poechel Berlinite.*) Chloride of sodium, 45.9 pr. ct.; nitrate of potash, 32.3 pr. ct.; boric acid, 19.3 pr. ct.; water, 2.5 pr. ct.—11. (*Minerva Chinese Preservative Powder.*) Chloride of sodium, 25 pr. ct.; boric acid, 17.7 pr. ct.; sulphate of soda, 38.8 pr. ct.; sulphite of soda, 9.2 pr. ct.; water, 9.3 pr. ct. —12. (*Australian Salt.*) Crystallized borax, 91 pr. ct.; chloride of sodium, 5.5 pr. ct.; with 0.5 pr. ct. of some hydrocarburet.—13. (*Ruger's Barmenite.*) Boric acid, 50 pr. ct.; chloride of sodium, 50 pr. ct.—14. (*The True Australian Meat Preservative.*) According to analyses of three specimens from different sources, this is bisulphite of lime. This is what is unwittingly employed in solutions by butchers, on summer afternoons, for painting their meat. It is sold to them under various fantastic names. The liquid is nothing but a solution of lime in sulphurous acid, and is used every day in brewing as a disinfecting agent. The bisulphite of lime, applied to meat, preserves it from the attack of flies and keeps it looking well. There is no danger attending the use of it, since a portion of the sulphurous acid volatilizes, and the sulphite changes into sulphate of lime, or plaster, which, as well known, is innocuous. A simple washing, moreover, suffices to remove the sulphite completely at the moment of preparing the meat. This preservative agent is particularly valuable during the heat of summer, and the use of it can be very safely recommended. In commerce, it is found in a more or less concentrated solution containing sulphite of lime, No. 1, 36.73 pr. ct.; No. 2, 11.04 pr. ct.; sulphurous acid, No. 1, 20.46 pr. ct.; No. 2, 30.04 pr. ct.

MEERSCHAUM, Artificial.—1. Made with fine stiffened plaster of Paris, baked a few hours and thrown warm into melted wax or linseed oil; the resemblance may be increased by a coloring solution of gamboge and dragon's blood.—2. Place a peeled potato in sulphuric acid and water, 8 parts of the former to 100 of the latter; let it remain in this liquid 36 hours; then dry with blotting paper and submit to pressure, so that when it becomes material it can be readily carved.—3. (*Viennese.*) Prepared by mixing 100 parts silicate of soda with 60 parts carbonate of magnesia and 80 parts native meerschaum or pure alumina. This mixture is then pulverized with care and passed through a sieve of fine silk or horsehair; add water, and boil it for 10 minutes; then pour the whole into molds, placed so that the water will separate easily.

MICE, To Destroy.—1. Use tartar emetic mingled with some favorite food. The mice will leave the premises.—2. Take 1 part calomel, 5 parts wheat flour, 1 part sugar, and 1-10 part of ultramarine. Mix together in a fine powder and place in a dish. This is a most efficient poison for mice.—3. Any one desirous of keeping seeds from the depredations of mice can do so by mixing pieces of camphor gum in with the seeds. Camphor placed in drawers or trunks will prevent mice from doing them injury. The little animal objects to the odor and keeps a good distance from it. He will seek food elsewhere.—4. Gather any kind of mint and scatter about your shelves, and they will forsake the premises.

MICROBES, To Destroy.—It is said that no living germ of disease can resist the antiseptic power of essence of cinnamon for more than a few hours. It destroys microbes as effectively, if not as rapidly, as corrosive sublimate. Even the scent of it is fatal, and a decoction of cinnamon ought to be taken freely by persons living in places affected by typhoid or cholera. There is nothing new in all this. In the oldest known medical prescriptions for infectious diseases cinnamon was a prominent ingredient, and it was in great request during the plague in London. There is no reason for doubting that the physicians of those days were as familiar with its medical properties as with its odor.

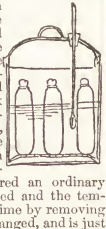
MILK, To Test for Water.—A German chemist furnishes a very simple procedure for testing the amount of water in milk. All that is required is a small quantity of plaster of Paris, say, 1 oz. This is mixed with the milk to a stiff paste and then allowed to stand. With milk of 1,030 specific gravity and a temperature of 60° F., it will harden in ten hours; if 25 pr. ct. of water is present, in two hours; if 50 per ct., in one hour and a half; and with 75 pr. ct. in thirty minutes. Skimmed milk which has been standing for twenty-four hours, and is of 1,033 specific gravity, sets in four hours; with 50 pr. ct. of water in one hour, and with 75 pr. ct. in thirty minutes. Heat should not be applied, as then the use of the thermometer would be required. This test is certainly very simple and not costly.

MIRRORS, Damaged, to Repair.—1. Pour upon a sheet of tin foil 3 dr. quicksilver to the sq. ft. of foil; rub with buckskin until the foil has become brilliant; lay the glass upon a flat table, face down; place the foil upon the damaged portion; lay a sheet of paper over the foil, and place upon it a piece of marble with a flat surface; put upon it sufficient weight to press it down; let it remain a few hours; the foil will adhere to the glass.—2. Remove the silvering from the glass around the scratch so that the clear space will be ½ in. wide; clean the space with a cloth and alcohol; near the edge of a broken piece of looking-glass mark out a piece of silvering larger than the space on the mirror; place a minute drop of mercury on the center of the patch, and allow it to remain a few minutes; clear away the silvering around the patch,

and then slide the latter from the glass; place it over the clear spot on the mirror, and gently press it down with a tuft of cotton. This is a difficult operation, and requires a little practice before trying on a large mirror.

MILK, To Sterilize.—The sterilization of milk for children, now quite extensively practiced in order to destroy the injurious germs which it may contain, can be satisfactorily accomplished with very simple apparatus. The vessel containing the milk, which may be the bottle from which it is to be used or any other suitable vessel, is placed inside of a larger vessel of metal, which contains the water. If a bottle, it is plugged with absorbent cotton, if this is at hand, or, in its absence, other clean cotton will answer. A small fruit jar, loosely covered, may be used instead of a bottle. The requirements are simply that the interior vessel shall be raised about half an inch above the bottom of the other, and that the water shall reach nearly or quite as high as the milk. The apparatus is then heated on a range or stove until the water reaches a temperature of 155° Fahrenheit, when it is removed from the heat and kept tightly covered for half an hour. The milk bottles are then taken out and kept in a cool place. The milk may be used any time within twenty-four hours. A temperature of 150° maintained for half an hour is sufficient to destroy any germs likely to be present in the milk, and it is found in practice that raising the temperature to 155° and then allowing it to stand in the heated water for half an hour insures the proper temperature for the required time. The temperature should not be raised above 155°, otherwise the taste and quality of the milk will be impaired.

The simplest plan is to take a tin pail and invert a perforated tin pie-plate in the bottom, or have made for it a removable false bottom perforated with holes and having legs half an inch high, to allow circulation of the water. The milk bottle is set on this false bottom, and sufficient water is put into the pail to reach the level of the surface of the milk in the bottle. A hole may be punched in the cover of the pail, a cork inserted, and a chemical thermometer put through the cork, so that the bulb dips into the water. The temperature can thus be watched without removing the cover. If preferred an ordinary dairy thermometer may be used and the temperature tested from time to time by removing the lid. This is very easily arranged, and is just as satisfactory as the patented apparatus sold for the same purpose. The accompanying illustrations show the form of apparatus described.



MIRRORS, To Silver.—1. A sheet of tin-foil the size of the plate of glass is evenly spread on a smooth and solid marble table; every wrinkle on its surface is rubbed down with a brush; a portion of mercury is then poured on, and rubbed over the foil with a piece of soft woolen stuff, or a hare's foot, after which two rules are applied to the edges, and mercury poured on to the depth of a silver dollar; any oxide on the surface is removed, and the glass, made clean and dry, is slid along over the surface of the liquid metal, so that no air, dirt, or oxide can remain or get between them. When the glass has arrived at its proper position, gentle pressure is applied, and the table sloped a little to carry off the waste mercury, after which it is covered with flannel and loaded with heavy weights; in 24 hours it is removed to a wooden table and further slanted, and this position is progressively increased during a month, until it becomes perpendicular.—2. A mixture is first made of nitrate of silver (in course powder), 1 oz.; ammonia, ½ oz.; water, 2 oz.; after standing 24 hours this is filtered (the deposit upon the filter, which is silver, being preserved); spirit or naptha, 3 oz., is added; 20 to 30 drops oil of cassia are then added; after remaining 6 hours longer the solution is ready for use. The glass to be silvered (first cleaned and polished) is placed in a horizontal position, and a wall of putty formed around it; the above solution is then poured over it to the depth of from ¼ to ½ in.; 6 to 12 drops of a mixture of oil of cloves and spirit of wine (1 part. by measure, of oil of cloves, to 3 of spirit of wine) are next dropped into it, at different places; or the diluted oil of cloves may be mixed with the solution before it is poured upon the glass; a larger quantity, in both cases, increasing the rate of the deposit. When the glass is silvered, the solution is poured off, as soon as the silver on the glass is dry, it is varnished with a composition formed by melting together equal quantities of beeswax and tallow. The solution, after being poured off, is allowed to stand 3 or four days, in a close vessel; as it still contains silver, and may be again employed after filtration, and the addition of fresh ingredients to supply the place of those used. 18 gr. nitrate of silver are sufficient for 1 sq. ft. of glass.

MOTH, Buffalo, To Destroy.—To any who has had experience with the insect variously known as the carpet bug or buffalo moth the following recipe will be invaluable, for it is said to be sure death to them: 1 oz. of alum; 1 oz. of chloride zinc; 3 oz. of salt. Mix with 2 qts. of water and let it stand over night in a covered vessel. In the morning pour it carefully into another vessel, so that all sediment may be left behind. Dilute this with 2 qts. of water and apply by sprinkling the edges of the carpet for the distance of a foot from the wall. This is all that is necessary.

MOLASSES, To Clarify.—Common molasses may be clarified and rendered much more palatable by heating it over the fire and pouring in sweet milk in the proportion of 1 pt. to a gal. of molasses. When the molasses boils up once, the albumen in the milk collects all the impurities in a thick scum upon the top, which must be carefully removed. and the molasses

is then fit for use. Bullock's blood is also used for this purpose, but milk is more agreeable in many ways for domestic use.

MIXTURES, Freezing.—In the production of ice or an extreme degree of cold, by saline mixtures, the salts should be crystallized, and as rich as possible in water, without being damp. They should be coarsely pulverized at the time of using, and not mixed until immediately before throwing them into the liquid ingredients. The mixture should be made in a thick vessel, well clothed, to prevent accession of external heat, and the substance to be acted upon should be contained in a thin vessel so as to expose it to the action of the mixture. The following table will be found useful in making ice:

FRIGORIFIC MIXTURES.

Ingredients.	Parts.	Thermometer Sinks from.	Deg. of Cold.
Snow or pounded ice	2	Any temperature to −5°	—
Chloride of sodium	1		
Snow or pounded ice	5	Any temperature to −12°	—
Chloride of sodium	2		
Sal Ammoniac	1		
Snow or pounded ice	12	Any temperature to −25°	—
Chloride of sodium	5		
Nitrate of ammonia	5		
Snow	8	+32° to −27°	59°
Hydrochloric acid, concentrated	5		
Snow	2	+32° to −50°	82°
Crystallized chloride of calcium	3		
Sal ammoniac	5	+50° to +10°	40°
Nitrate of potassa	5		
Water	16		
Nitrate of ammonia	1	+50° to +4°	46°
Water	1		
Nitrate of ammonia	1	+50° to +7°	57°
Carbonate of soda	1		
Water	1		
Phosphate of soda	9	+50 to −21°	71°
Nitrate of ammonia	6		
Diluted nitrous acid[1]	4		
Sulphate of soda	8	+50° to 0°	50°
Hydrochloric acid	5		
Snow	3	0 to −46°	46°
Diluted nitrous acid[1]	2		
Snow	2	−20° to −60°	40°
Sulphuric acid[2]	1		
Water	1		
Snow	1	0° to −66°	66°
Crystallized chloride of calcium	2		
Snow	1	−40° to −73°	33°
Crystallized chloride of calcium	3		
Snow	8	−68° to −91°	23°
Sulphuric acid	5		
Water	5		

MOLES, To Destroy.—1. Insert in the mole tracks or burrows a sufficient number of bits of raw beef soaked in a solution of strychnine. There is no doubt about the mole being a useful animal. It subsists mainly on grubs and worms, destroying vast numbers of cutworms, and other enemies to vegetation.—2. The ground mole, which is such a pest in lawns and gardens has a great liking for sweet corn. Soak sweet corn in a solution of strychnine, Paris green or arsenic, and strew the poisoned grain at intervals in runs made by the moles. They will eat it and be killed.

MORTAR, To Toughen.—A mortar that can hardly be picked to pieces is made as follows: Mix equal parts of lime and brown sugar with water, and be sure the lime is thoroughly air slaked. This mortar is equal to Portland cement, and is of extraordinary strength.—2. (*Impenetrable.*) Mix thoroughly ½ of fresh unslaked lime with ¾ of sand; and let 5 laborers make mortar of these ingredients, by pouring on water with trowels, to supply one mason, who must, when the materials are sufficiently mixed, apply it instantly as cement or plaster, and it will become as hard as stone. The lime used should be stone lime; previous to its use it should be preserved from the access of air or wet, and the plaster screened for some time from the sun and wind.—3. (*Khorussar or Turkish.*) One part powdered brick and tiles; 2 parts fine sifted lime. Mix with water to the desired consisteney, put on layers of 5 or 6 inches in thickness, between the courses of brick or stone. This mortar is used where great solidity is required in buildings.—4. (*Waterproof.*) Instead of slaking in the usual manner use a solution of copperas dissolved in warm water, and use only fine quartz sand.

MOSQUITOES, Remedies for.—1. Kerosene is effective in getting rid of mosquitoes. Pour a little coal oil in rain barrels, stagnant pools, and wherever water has collected. A teaspoonful is sufficient for a barrel of water.—2. To clear a room of mosquitoes, take a small piece of gum camphor in a tin vessel and evaporate it over a flame, taking care it does not ignite. A sponge dipped in camphorated spirits and made fast to the top of the bed-tend will be found serviceable in the sleeping room. Decoction of pennyroyal, applied to the exposed parts, will effectually keep off these troublesome insects.—3. A small amount of pennyroyal sprinkled around the room will drive away mosquitoes.—4. Burning a small amount of Persian insect powder in a room is said to be efficient in driving away mosquitoes.—5. (*Mosquito and Gnat Bites.*) Carbolate of lime, 10 gr.; water, 1 dr. It is said that a weak solution of carbolic acid—1 part in 50—used as a wash, will prevent their attacks. To alleviate the unpleasant sensation caused by the bite of the mosquito, various remedies have been suggested. Among them are oil of cloves, ammonia, bicarbonate of soda, chloroform, thymol and ordinary soap. Doctors say, we have in our own experience obtained more relief from solution of cocaine, 4 pr. ct., than from anything else.—6. (*Mosquito Oil.*) Oil of tar, 1 oz.; olive oil, 1 oz.; oil of pennyroyal, ½ oz.; spirit of camphor, ½ oz.; glycerine, ½ oz.; carbolic acid, 2 drm.; mix, shake well before using.—7. (*Mosquito Tincture.*) Eucalyptol, 10 parts; acetic ether, 5 parts; eau de cologne, 40 parts; tincture of insect powder (1 to 5 S. V. R), 50 parts; mix. For sponging the skin a mixture of 1 part of this with 3 to 6 parts of water may

be used. The tincture is also useful for spraying in apartments; for this purpose 1 part may be mixed with 10 parts water, and used in a spray producer.—8. The pain can be alleviated by bathing with warm water in which honey has been put. The proportion is 2 teaspoonfuls of honey to a pt. of boiling water.—9. A lotion made of menthol and alcohol will be found of great use in subduing irritation and swelling.—10. One dr. of pennyroyal and 1 oz. of eau de cologne washed over the skin often prevents their biting, and they are said to dislike the smell of scented verbena. In some seaside places there is a very troublesome insect, the sand-fly, that is so small as to be almost invisible. This bites the ankles unmercifully, as well as the hands, and can be warded off by the remedies given above and by not wearing open-work stockings. In all cases of severe stings it is well to keep quiet for a day or two, have a very light diet, avoid wine and spirits, and take cooling drinks.

MOTH, Coddling, To Exterminate.—The greatest enemy to our export apple is the "coddling moth." But the entire crop can be made wormless if the orchards of the United States will use the following receipts: Use Paris green at the rate of 1 lb. to 150 gal. of water. Weigh sufficient poison for the capacity of the land used and make it into thin paint with a small quantity of water and add powdered or quick lime equal to the weight of the poison used, mixing thoroughly. The lime takes up the free arsenic and removes the danger of scalding. Strain the mixture into the spray tank, taking care to pulverize and wash all the poison through the strainer. During the operation of spraying see that the liquid is agitated with sufficient frequency to prevent the settling of the poison. Let the first spraying follow within a week after the falling of the blossoms of either apple or pear, and follow this with a second treatment just before the fruit turns down on the stem, or when it is from a quarter to half an inch in diameter. The first spraying reaches the eggs laid by the moth in the flower end of the fruit shortly after the falling of the blossoms, and the second the later eggs laid by belated moths. Do not spray trees when in bloom, and if a washing rain immediately follows treatment repeat the application.

MOTHER'S MARKS, To Remove.—Nævus, commonly called mother's marks or port wine mark, is caused by the dilatation and increased growth of the small blood vessels of the skin. This may be arterial, venous or capillary. In size nævi vary from a pin's head to nearly the whole extent of the face. No patient should himself operate on a nævus greater in circumference than a small pea. The simplest method of removal is by means of a concentrated nitric or hydrochloric acid. A match or similar piece of wood should have one end bitten out into a form of brush; this should be dipped into the acid, and one large drop placed on the nævus, the skin around which should be thickly covered with lard. The acid should be brought into contact with the whole extent of the nævus. Then, over the scab formed, may be laid the following paste: Carbonate of bismuth, 1 part; glycerine, 1 part; extract of belladonna, 1 part; hydrocyanic acid, 1 part. The use of the acid causes a good deal of pain, but it is a very effectual method of removal. A certain amount of inflammation is sure to follow any operation on a nævus, but when the latter is of small extent this is seldom of a violent character and the formula given will prove a sufficient remedy. After three days the paste may be gently washed off with warm water, and the following preparation gently but effectually rubbed into the the scab, over which a thickish layer should be afterward placed and the whole covered by court plaster. Common cream, 1 part; white wax, 2 parts; glycerine, 1 part; spermaceti, 1 part. The scab should now be allowed to fall off without further interference. Another method of removing nævi is to keep them constantly moistened with a very dilute acid solution. One oz. dilute nitric acid to 4 oz. water. If an operation be objected to, and the patient wishes to hide the deformity, the following will be found a harmless effectual paint. If properly made it should dry like enamel and not crack: Wood charocal, 1 part; carmine, 1 part; chalk, 10 parts; glycerine, 3 parts; flexible collodion, 8 parts; rectified spirits, 2 parts. The color of this may be varied by the relative amounts of carbon, chalk and carmine used. Another and a simpler method is to powder the nævus, say of a white color, and then apply a layer of flexible collodion. The nævus should be moistened before the powder is applied.

MOTHS, To Exterminate.—1. Take equal parts of camphor and spirits of turpentine. Soak blotting paper in the mixture. Let the paper dry, then lay among furs or clothing.—2. Lupulin, 1 dr.; snuff, 2 oz.; camphor, 1 oz.; cedar sawdust, 4 oz; mix. This is to be used for sprinkling where the moths frequent.—3. Carbolic acid, gum camphor, each, 1 oz.; benzine, 1 pt.; dissolve the gum and the carbolic acid in the benzine. Apply by saturating a piece of blotting paper, or use it in form of spray by use of an atomizer.—4. The following is recommended for sprinkling among furs, clothes, etc., to prevent the ravages of moths: Patchouly herbs, 100 parts; valerian, 50 parts: camphor, 40 parts; orris, sumbul, each, 50 parts; oil of patchouly, otto of roses, each, 1 part. The various ingredients are broken up as small as possible, passed through a wide sieve to separate the coarser pieces; and freed from dust by a fine sieve. The oils are mixed with the orris root, and all the ingredients are then combined.—5. Powdered cloves, 50 parts; powdered black pepper, 100 parts; powdered quassia, 100 parts; sprinkle with oil of cassia, oil of bergamot, each, 2 parts; camphor, 5 parts; previously dissolved in ether, 20 parts; then mix with carbonate of ammonium, 20 parts; powdered orris, 20 parts.—6. (*Moth liquid.*) Spirit of wine, 500 parts; naphtaline, 10 parts; carbolic acid, 10 parts; camphor, 5 parts; essence of lemon, 5 parts; oils of thyme, lavender and savine (of each), 2 parts; this can

be used by sprinkling over furs, clothes, carpets, furniture, etc., or, better still, by application by a spray producer.—7. (*Moth and Roach Exterminator.*) Benzine is said to be more effective than anything else for exterminating moths, roaches, etc.—8. A little alum or borax solution in hot water injected into the cracks and applied by a cloth to the wood work in the vicinity of these hiding places is usually effectual.—9. Common salt is also very highly recommended.—10. (*In Furniture.*) There are two species of moths which infest furniture. One is a large fly of silvery white color; the worm of the same is shaped like a chestnut worm, and is familiarly known. It rarely infests furniture. The other is a small fly of a dark drab color; the worm is about ¼ of an inch long, and tapering from the head to the tail. It was first observed by upholsterers about thirteen years ago. This fly penetrates a sofa or chair, generally between the back and seats of sofas, or under the seats, where the vacancy among the springs affords a safe retreat. It may make a lodgment in one week after the furniture is placed in the house. If such should be the case, in two months the worm will appear; and the continual process of procreation in a few months increases the number to thousands. This moth has no season. It destroys in winter and summer alike, and is kept in active life by the constant heat of the house. We find at the same time, in the same piece of furniture, the fly, the worm, and the eggs; thus showing that they are breeding and destroying all the time. It does not eat pure curled hair, but fastens its cocoon to it, the elasticity of which prevents its being disturbed. The inside of furniture is used by it only for the purposes of propagation. The worm when ready for food crawls out and destroys the covering, if of woolen or plush material, and falling to the carpet, destroys it. It rarely cuts through plush from the inside, as it is of cotton back, but there are instances where the worms have cut up muslin on the outside back of sofas. There is no protection against them but continual care. New furniture should be removed from the walls at least twice a week in the spring and summer, and should be well whisked all round, and particularly under the seats, to prevent the fly from lodging. This is an effectual preventive, and the only one known.—11. Cayenne pepper.—12. Scotch snuff.—13. Camphor.—14. Turpentine, and all other remedies for protection from the large moth are of little or no avail against the furniture moths.—15. Saturation with alcohol will not destroy them when in a piece of furniture. If the furniture is infested, they may be removed by taking off the muslin from under the seats and off the outside ends and backs, where they congregate most, and exposing to the air as much as possible. Beat well with a whisk or the open hand, and kill all the flies and worms which show themselves. This done often will disturb them, and may make them leave the furniture, in their desire to be left in quiet. When the furniture is free from moths and is to be left during the summer months without attention, it may be protected by camphor in small bags or highly concentrated patchouly. The safest way is to have the furniture well whisked twice a week.—16. If the moths attack the carpet, spread a wet sheet on the carpet, and run a hot flat iron over it quickly; the steam will effectually destroy both worms and eggs.—17. (*Pleasant Perfume and Preventive against.*) Take of cloves, caraway seeds, nutmeg, mace, cinnamon and Tonquin beans, of each 1 oz.; then add as much Florentine orris root as will equal the other ingredients put together; grind the whole well to powder, and then put it in little bags among your clothes, etc. Almost anything aromatic will keep off moths. The common bog myrtle which grows so freely in swampy places, is an excellent antidote. A piece of linen, moistened with turpentine and put into the wardrobe or drawers for a single day, two or three times a year, is also a sufficient preservative against moths.—18. (*To Keep from Sleigh Robes.*) Alcohol, 1 pt.; camphor, ½ oz; dissolve. Spray with this liquid before storing.

MUCILAGE, Thin, to Make.—A paste that will not draw engravings when pasted down on paper must be thin. A mixture of equal parts of gum tragacanth and gum Arabic forms with water thinner mucilage than either one alone.

MUSK, Artificial.—1 molecule of water is removed from camphor by the action of melted zinc chloride or phosphoric anhydride, and the products of the reaction are submitted to fractional distillation. All that passes over between 180° and 230° C. is rectified over calcium chloride, and is mixed with 1 volume of amylic alcohol. The solution is introduced, a little at a time, into 5 times its volume of sulphuric acid of Nordhausen and 7 volumes of sulphuric acid of 66°. After agitating three or four hours the liquid is diluted with water and neutralized with sodium carbonate. It is again agitated with amylic alcohol and the amylic solution separated by decantation, agitated with lead acetate and the yellowish supernatant fluid decanted. Afterward it is evaporated by very gentle heat. The amorphous product thus obtained is treated with a mixture of equal parts of fuming nitric acid and sulphuric acid of 66° and then thrown into cold water. The precipitate, re-crystallized and purified, has the odor of natural musk.

NAILS, To Drive into Hard Wood.—Nails may be driven into hard wood without bending double if first dipped in lard or oil.

NESSELRODE PUDDING.—Shell 1 pt. of chestnuts, blanch and boil half an hour; then mash to a pulp, rub through a strainer and add them to the hot cream, made after the receipt for Neapolitan or Philadelphia ice-cream. When partly frozen, add 1 pt. of fruit, either of the varieties given in the *Ice Creams*. Mould in cake or not, as you please, and serve with whipped cream sauce. The chestnuts are the distinguishing feature of this pudding.

NETS AND SEINES.—Nets for fishing, snaring and gardening purposes are made of hemp, flax or cotton. They are extensively made by machines, allied in construction to those by which

stockings are woven. The selvages of nets so made are subsequently strengthened by the addition of several thicknesses of twine. Nets made of rope are used for naval purposes. In making nets there is a peculiar arrangement of a single thread by which meshes are formed and secured at each juncture by a knot, which prevents the enlargement or diminution of the meshes. In the making of a secure knot lies the difficulty of netting, but a little practice will enable the worker to overcome it. The implements required are ivory meshes of various sizes and a netting needle.

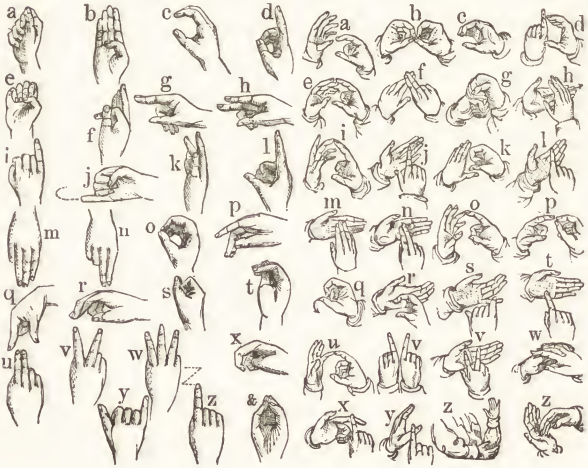
NEURALGIA, To Cure.—The most stubborn cases of neuralgia are apt to yield to a hot-water treatment. Wherever the pain is located there a hot-water bag should be applied. The suffering part should be wrapped in a blanket, and the unfortunate patient should be put to bed and covered with more blankets and induced to drink at least three cups of water as hot as the palate can stand. This treatment may seem severe, but is sure to bring relief.

NOISE, To Keep Out.—If the sufferer will take a bit of spermaceti ointment of about the size of a pea, tie it up in a small square of fine linen and place it deep in the ear, working it round till it takes the shape of the orifice, leaving the end to hang out, not a murmur of sound can be heard; the atmosphere is sweet and serene, the nerves are quite at rest, all exasperation is subdued, and when the noise is over, or the necessary season of quiet has been had, the little plug can be removed, the murmur of the world allowed to return, and no harm is done.

NICKEL, Solders for.—For fine or high grade nickel: Three parts of yellow brass, 1 part of sterling silver. For low grade nickel: Fifteen parts of yellow brass, 5 parts of sterling silver, 4 parts of zinc (pure or plate zinc). Melt the brass and silver with borax for a flux, and add the zinc in small pieces, stir with an iron rod, pour into a slab mould, and cool slowly, when it can be rolled thin for cutting.

OVEN, Test for Heat of.—A French authority on cooking gives these rules for testing the heat of an oven: Try it with a piece of white paper. If too hot, the paper will blacken or blaze up. if it becomes a light brown, it is fit for pastry; if it turns dark yellow, it is fit for bread and the heavier kinds of cake; if light yellow, the oven is ready for sponge-cake and the lighter kinds of dessert.

MUTE ALPHABETS.



THE first mute alphabet on the preceding page, is the "Single-Hand," and is that universally adopted in America by deaf mutes, having been imported from France, and being the system in vogue for Continental Europe. It is far preferable to the English "Double-Hand" system shown by its side, which is not much used in America, except outside mute circles. The "Full Length Figure" alphabet shown below is very rare and little used; but is valuable for communication across considerable distances. By the help of an opera or spy glass conversation can be carried on miles apart, and the system made useful for secret signaling in warlike operations, and for many other exigencies, as well as being highly amusing at any time.

Full Length Figure Alphabet.

OATMEAL-BAGS, For the Bath.—If you want to make your bath luxurious at slight expense, make a dozen oatmeal-bags. Take 5 lbs. of oatmeal, ground fine, ½ lb. of pure castile soap, reduced to powder, and 1 lb. of Italian orris-root. Cut a yard of cheese-cloth into bags about four inches square, sewing them on the machine, and take care not to leave any untied threads where a break may let the contents ooze out. Mix the soap, oatmeal and orris-root thoroughly, and fill the bags loosely. Sew up the opening in each, and lay them away to use as required. They are used as a sponge, dipped in warm water, making a thick, velvety lather and wonderfully softening the skin.

OLIVE OIL, To Test.—It is said that the following test will distinguish cotton-seed oil from olive oil: Take pure colorless nitric acid of 1.40 density and mix it with half the quantity of oil in a test-tube closed with an India rubber plug. After shaking it for several seconds, allow the tube to rest in a vertical position for five or six minutes. If olive oil is present the liquid is at first pale or colorless, changing to an ashy gray, with a slight yellowish hue. A coffee-brown color will be seen if cotton-seed oil is present. The reaction is delicate enough to detect an adulteration of 5 per cent. of cotton-seed oil.

ORANGE CAKE.—Rub thoroughly to a cream 2 cups of sugar and ½ of a cup of butter, adding 3 eggs beaten separately. Squeeze the juice of 2 large oranges into a cup, adding enough water to fill it. Stir this into the mixture, together with 3½ cups of flour, 2 even teaspoonfuls of cream of tartar, 1 of soda, and a little of the orange rind, grated. Bake in layer tins. For the filling, use 1 egg; yolk and white. Grate a little of the orange rind into this and the juice of ½ an orange, adding sugar enough to thicken.

ORANGES, Good, to Select.—There are over 30 varieties of sweet oranges, not to mention the natural stock, which is a larger and handsomer fruit than the sweet orange, and it is excellent for orangeade and marmalade, but, being very sour, is seldom shipped North. The medium sizes are apt to be the choicest, and probably the very sweetest orange that is marketed is the rusty-coated and rather ill-looking orange, which might be considered inferior by an amateur. The way to detect oranges is to "heft" them in your hands; pick out the thin-skinned heavy fruit, and you will be all right. The light-weight fruit is apt to be juiceless, a condition caused either by a slight freezing while on the tree, or more probably by the poverty of the soil in which it grew. All this applies to the sweet oranges. The "kid glove" oranges are grown in Florida from two stocks brought, respectively, from China and Tangiers. Hence they are called Mandarin and Tangarine oranges. Both are small; the skin is loose and easily removed, and the sections fall apart so readily that a lady can eat one without soiling her gloves, hence the name.

OZONIZED AIR, To Obtain.—The ozone is not prepared by chemical means—as ozone contains many impurities when prepared in this way—but by electricity, using a tube made by Siemens for the silent discharge. This tube should be an inch in diameter and a foot long, being operated with four Bunsen cells and an induction coil that would give a spark nearly an inch long when the battery is in good order. The ozone tube is connected with a chloride of calcium cylinder charged with eight inches of coarsely powdered chloride of calcium, between plugs of glass-wool. The air to be ozonized has to pass through this tube, which filters and dries it sufficiently—the former being of importance for the purity of the ozone, the latter for the quantity. The ozone thus prepared, when conducted into water recently distilled over permanganate of potash and then made slightly alkaline, shows no trace of nitric or nitrous acid.

PAINT.—1. (*Durable.*) A fire-proof and water-proof substitute for paint for use in boiler and engine rooms consists of 6 qts. of freshly slaked lime, well sifted, to which is added 1 qt. of rock salt and a gal. of water, the mixture being then well boiled and skimmed clean. To 5 gal. of this mixture are added 1 lb. of alum, ½ lb. of copperas (stirred in slowly), ¾ lb. of potash and 4 qts. of fine sand or hard-wood ashes, well sifted. To this may be added any coloring desired. It is said to be as durable as slate, and to be especially applicable to brickwork and similar surfaces.—2. (*Luminous.*) Nearly everyone has heard of luminous paint—the sulphide of calcium—but it is probable that comparatively few persons know much about the behavior of this interesting compound. When of good quality it is quite white, as seen by reflected light, but the light that is emitted by it in the dark, immediately after exposure to the direct rays of the sun, is quite blue, and the emitted light is of a lavender hue directly after subjection to the action of ordinary diffused daylight. Both of these colors, however, in a dark room rapidly fade into a white light that is more luminous. A greater luminosity is produced by a short and near exposure to an ordinary artificial light, or by being placed near a window, about sunset on a rainy day. The direct rays of a bright, full moon, falling on it for several minutes, have very little effect, making it barely visible in a dark room. After ten seconds' exposure to good, diffused daylight, which is as effective as an exposure of ten hours, this substance will give out considerable light for ten or twelve hours, and its luminosity will not entirely disappear in less than thirty hours. This great difference in the time required for the absorption and emission of light is quite remarkable, and it makes it seem as if the light emitted were many times greater than that absorbed.—3. (*Marine.*) A Scotchinventor recently brought to notice a new and valuable marine paint, the object of the article being a capacity of application in a cold state to the submerged and various other parts of ships or other craft, the effect being that of quick-drying, anti-fouling zinc and tallow paint. For the accomplishment of this purpose a composition has been devised, consisting of 40 per cent. of oxide of zinc, 12 per cent. of linseed oil, 28 per cent. of tallow and 20 per cent. of thinnings—

the latter substances being composed of 60 per cent. of shale naptha, benzoline, or other similar spirits, 30 per cent. of gum dammar and 10 per cent. of rosin; these proportions are alterable to suit different waters and conditions.—4. (*For Stoves.*) Paint the stove with paint made of powdered black lead and linseed oil, and polish in the ordinary way when dry. It may be left out in all kinds of weather without injury to the polish.

PAINT, To Remove.—1. Scraping or burning it off is extremely laborious, and too slow for general purposes. A more thorough and expeditious way is by chemical process, using for that purpose a solution of soda and quicklime in equal proportions. The solution may be made as follows: The soda is dissolved in water, the lime is then added, and the solution is applied with a brush to the old paint. A few moments are sufficient to remove the coats of paint, which may be washed off with hot water. The oldest paint may be removed by a paste of the soda and quicklime. The wood should be afterward washed with vinegar or an acid solution before repainting, to remove all traces of the alkali.—2. Wet the place with naptha, repeating as often as is required; but frequently one application will dissolve the paint. As soon as it is softened rub the surface clean. Chloroform, mixed with a small quantity of spirit ammonia, composed of strong ammoniac, has been employed very successfully to remove the stains of dry paint from wood, silk, and other substances.—3. (*From Floors.*) Take 1 lb. American pearlash; 3 lb. quick stone lime; slake the lime in water, then add the pearlash, and make the whole about the consistence of paint. Lay the mixture over the whole body of the work which is required to be cleaned, with an old brush; let it remain for 12 or 14 hours, when the paint can be easily scraped off.—4. (*From Wearing Apparel.*) Take fresh paint out of wearing apparel by rubbing with gasoline.—5. (*To Soften Putty and Remove Old Paint.*) Take 3 lb. of quick stone lime, slake the lime in water, and then add 1 lb. of American pearlash. Apply this to both sides of the glass, and let it remain for 12 hours, when the putty will be softened, and the glass may be taken out without being broken. To destroy paint apply it to the whole body of the work which is required to be cleaned; use an old brush, as it will spoil a new one; let it remain about 12 or fourteen hours and then the paint may be easily scraped off.—6. To remove paint from old doors, etc., and to soften putty in window frames, so that the glass may be taken out without breakage or cutting, take 1 lb. of pearlash and 3 lb. of quick lime; slake the lime in water, and then add the pearlash, and make the whole about the consistence of paint. Apply it to both sides of the glass, and let it remain for 12 hours, when the putty will be so softened that the glass may be taken out of the frame without being cut and with the greatest facility. To destroy paint, lay the above over the whole body of the work which is required to be cleaned, using an old brush (as it will spoil a new one); let it remain for 12 or 14 hours, when the paint can be easily scraped off.

PAINT BRUSHES, To Clean.—1. When a paint brush is stiff and hard through drying with paint on it, put some turpentine in a shallow dish and set on fire. Let it burn for a minute until hot, then smother the flame and work the pencil in the fingers, dipping it frequently into hot spirits. Rinse all paint brushes, pencils, etc., in turpentine, grease with a mixture of sweet oil and tallow, to prevent them from drying hard, and put them away in a closed box.—2. To soften brushes that have become hard, soak them 24 hours in raw linseed oil, and rinse them out in hot turpentine, repeating the process until clean; or wash them in hot soda and water and soft soap.

PAINTINGS, Old, to Line.—1. Take a piece of unbleached calico, stretch on a frame and size it with weak size. When dry, take ½ oz. spirits of turpentine, 1 dr. camphor; dissolve it in 4 oz. cold-drawn linseed oil, 2 oz. white lead, stiff ground do umber, 4 oz. finely washed and dried whiting. Mix all togcther; apply to the calico well, rubbing it in; after the second coat, pumice. Give the picture a coat, and pumice that; then coat both, and put them together upon a level board, face down, upon brown paper well sized. Well press, and rub the air out, to bring them in contact, and in a few days it may be tacked upon a frame.—2. Make a temporary stretcher; let it measure inside a little larger than the outside of the picture to be lined; on it stretch unbleached calico; trim the picture square, cutting off all old nails and ragged edges. Oil a piece of paper the size of picture with linseed oil, and lay it on a flat surface; lay the picture face down on the oiled paper, and coat it with glue or paste until there is sufficient to make it stick; then lay the unbleached calico on, rub well with the flat of the hand and iron it with flat iron till dry; take care to put a piece of paper between the calico and the iron, or it may stick. Be sure the iron is not too hot, and if it is a large picture, have two irons, one getting hot while the other is in use. When the picture is dry, it is ready for putting on the new stretcher, which should be one with two cross-bars.

PAINTINGS, To Preserve.—1. Many paintings suffer premature decay from the attacks of a species of acarus, or mite. To prevent this, add a little creosote dissolved in brandy or vinegar, or a few grains each of corrosive sublimate and sal ammoniac dissolved in a little water, to the paste and glue used to line the picture, as well as add a few drops of pure creosote, or of an alcoholic or ethereal solution of corrosive sublimate, to the varnish, when any is to be applied. If the destruction has already commenced, the painting should be at once carefully cleaned and re-lined, observing to employ one or other of the remedies mentioned.—2. The most appropriate and safe situation to keep paintings, is where there is a pure and moderately dry atmosphere. To protect pictures from the effects of damp, dip the canvas into a solution of silicate of potash, and after-

wards dry, previous to its being used. Impure air abounds in carbonic acid and sulphuretted hydrogen. It is the presence of the last in the air that blackens the lights, and causes most of the middle tints and shades to fade; exposure to damp produces moldiness and decay of the canvas. For this reason paintings should not be kept in the churches, nor suspended against heavy walls, especially in badly ventilated buildings. Excess of light acts injuriously on paintings, since it bleaches some colors and darkens others.—3. Pictures that have commenced to scale or crack may be preserved as follows: Mix equal parts of linseed oil and methylated chloroform, which pour over the painting if the colors are too brittle to bear the friction of a soft brush. After remaining on the painting a day or two, excess of oil may be removed by a piece of cotton wool or a soft brush, a fresh portion of the preservative applied, and the excess removed as before. The process must be repeated until the colors are firmly fixed, when the painting will bear friction, and may be submitted to the cleaning process or varnished. It is advisable to remove as much of the dirt as possible from the picture, by washing with soft water previous to the application of the fixing agent. The mixture will not restore the cracks in a painting, but simply fix the colors, and render the painting elastic. A mixture of 1 part of methylated chloroform, and 2 of linseed oil, is used for reviving the colors of paintings. A small portion is rubbed over the pictures after washing, with cotton wool, and on the following day the painting is wiped with a soft silk handkerchief. Oil and chloloform, when used in the proportion given, possess the property of restoring faded colors, and developing colors which have perished, to the eye, by age.

PAINTINGS, To Take Indentations from.—Subject the picture to pressure after being thoroughly wetted, after which it should be left to dry in some cool place.

PAPER, Blotting, for Removing Ink Stains.—Pass ordinary blotting paper or card through a concentrated solution of oxalic acid. Care must be taken that no crystals appear, which would injure the porosity of the paper. This will dry a blot and bleach the remainder of it.

PAPER, Luminous.—1. Prepared by adding phosphorescent powder and gelatine to the pulp. The proportions are: 10 parts water, 40 parts paper pulp, 20 parts phosphorescent powder (preferably slaked 24 hours), 1 part gelatine. I part saturated solution potash bichromate. This is waterproof.—2. 40 parts of paper pulp, 10 parts of water, 1 part of gelatine and 1 part of bichromate of potash, with 10 parts of phosphorescent powder, will make a paper which will shine in the dark, and which will be suitable for labels, signs, etc.

PAPER, To Remove Grease from.—Burnt Roche-alum and flour of brimstone, an equal quantity of each, reduce to a fine powder; wet the paper a little, put a small quantity over the greased place, and the grease will disappear.—2. Cover the stained paper with a sheet of blotting paper and pass an iron over it several times. When the paper is warmed, dip a small brush in the essential oil of well rectified spirits of turpentine heated almost to boiling point, and pass it gently over both sides of the paper, which must be kept warm. Repeat as many times as the quantity of grease in the paper or the thickness of the paper may render necessary. When the grease is removed, dip another brush in highly rectified spirits of wine, and draw it over the place and around the edges, to remove the border that would present a stain.—3. (See *Wall Paper, To Remove Grease from, 1*, in Household Cleaning.)

PAPER, Safety.—1. Paper having passed through a solution of glue with 5 per cent. potassium cyanate and antimony sulphide, is immersed in a dilute solution of magnesium or copper sulphate, and dried. Nothing written on this with ink prepared from galls and iron salts, can be destroyed by acids, etc., nor by erasing.—2. Paper may be prepared for bank checks and other documents so that any writing in ink once made thereon cannot be altered without leaving plainly visible marks, by passing the sheets through a solution composed of 0.015 gr. gallic acid to 1 gill distilled water.

PAPER, Smoothing Wrinkled.—Lay the paper face down on a sheet of unsized white paper; cover with another sheet of same, slightly damped, and iron with a warm flat iron.

PAPER, To Split.—1. Get a piece of plate glass and place on it a sheet of paper; let the latter be soaked. With care and dexterity the sheet can be split by the top surface being removed.—2. Paste a piece of cloth or strong paper to each side of the sheet to be split; when dry, pull the two pieces asunder, when part of the sheet will be found to have adhered to one and part to the other; soften the paste in water and remove from the cloth.

PAPER, To Water-Proof.—1. Add a little acetic acid to a weak solution of carpenter's glue; dissolve a small quantity of bichromate of potash in distilled water, and mix both together. The sheets of paper are drawn separately through the solution, and hung up to dry.—2. By plunging a sheet of paper into an ammoniacal solution of copper for an instant, then passing it between the cylinders and drying it, it is rendered impermeable to water, and may be boiled without disintegrating.—3. (*See Luminous.*)

PAPER, To Whiten.—1. Printed paper, stained or discolored, may be whitened by wetting it with pure clean water, then plunging it into a dilute solution of chloride of lime, passing it through water soured with hydrochloric acid, and then through pure water until every trace of acid is removed. This process may be improved by dipping into a weak solution of some antichlor, and washing before finally drying.—2. Expose the article, previously moistened, to the fumes of burning sulphur; then pass it through a vessel of pure water.

PAPIER-MACHE.—Formed of cuttings of white or brown paper boiled in water and beaten to a paste in a mortar; then mixed with a solution of gum Arabic in size, to give tenacity. It is variously manufactured by be-

ing pressed into oiled molds; afterwards dried, covered with a mixture of size and lamp-black and varnished.

PASTES.—1. (*Impervious.*) Soak ordinary glue in water until it softens; remove it before it has lost its original shape, and dissolve in ordinary linseed oil on a gentle fire until it acquires the consistency of a jelly. This paste may now be used for all kinds of substances, as, besides strength and hardness, it possesses also the advantage of resisting the action of water. —2. (*For Photographs.*) Cooking gelatine, 1 oz.; alcohol, 95 pr. ct., 10 oz.; glycerine, ½ to 1 oz.; soak gelatine in cold water for an hour or more, take out and drain off all the water which will go, add to alcohol in wide-mouthed bottle. Add ½ to 1 oz. glycerine, according as gelatine is of a hard or soft kind. Put bottle in hot water, with occasional shaking, until gelatine is quite dissolved. Will keep indefinitely, and has only to be heated when wanted for use.—3. (*Nelson's No. 1.*) Gelatine, 4 oz.; water, 16 oz.; glycerine, 1 oz.; alcohol, 5 oz.; dissolve the gelatine in the water, then add the glycerine, and lastly the alcohol.—4. (*Permanent.*) Arrowroot, 10 parts; water, 100 parts; gelatine, 1 part; alcohol, 10 parts; soak the gelatine in the water, add the arrowroot, which has first been thoroughly mixed with a small quantity of the water, and boil four or five minutes. After cooling add the alcohol and a few drops of carbolic acid or oil of cloves.—5. (*For Paper Labels.*) It is said that the following preparation is very useful for making a first-class mucilage for gumming large sheets of paper, which may be kept on hand ready for use; when wet they will stick well on glass: Starch, 2 dr.; white sugar, 1 oz.; gum Arabic, 2 dr.; to be boiled with a sufficient quantity of water.—6. Best Bermuda arrowroot, 1¾ oz.; sheet gelatine or best Russian glue, 80 gr.; water, 15 oz.; methylated spirit, 1 oz.; put the arrowroot into a small pan, add 1 oz. water and mix it thoroughly up with a spoon, or the ordinary mounting brush, until it is like thick cream; then add 14 oz. water and the gelatine broken into small fragments. Boil for four or five minutes, set it aside until partially cold, then add the methylated spirit and 6 drops of pure carbolic acid. Be very particular to add the spirit in a gentle stream, stirring rapidly all the time. Keep it in a corked stock bottle and take out as much as may be required for the time and work it up nicely with the brush.—7. (*Starch Paste.*) Pour cold water on good laundry starch to barely moisten it. Then stir in cold water until proper consistency is reached. Squeeze through canvas if not free from lumps. Starch paste should be freshly made for each batch of prints.—8. Allow four parts by weight of hard gelatine to soften in 15 parts of water for several hours, and then moderately heat until the solution is quite clear, when 65 parts of boiling water should be added while stirring. Stir in another vessel 80 parts starch paste with 20 parts cold water, so that a thin milky fluid is obtained without lumps. Into this the boiling gelatine solution should be poured while constantly stirring and the whole kept at a boiling temperature. When cool add to the whole 10 drops carbolic acid to prevent souring. This makes a very tenacious paste.—9. (*Casein Mucilage.*) Heat milk with a little tartaric acid, whereby casein is separated. Treat the latter while still moist with a solution of 6 parts borax to 100 parts water and warm gently while stirring, which will cause the casein to be dissolved. Of the borax solution enough should be used to leave only a little undissolved casein behind. —10. (*Good Mounting Paste.*) Add to 250 c. cm. concentrated gum solution, 2 parts gum to 5 parts water, a solution of 1 grm. sulphate alumina in 20 c. cm. water. Alum does not answer the purpose as well. The addition of the sulphate is effective, in that this gum is not so readily softened by moisture, and besides, wood can be fastened to wood by means of it. Its adhesive qualities are, in general, greater than those of pure gum Arabic.—11. Glue, 8 oz.; water, 8 oz.; nitric acid, 2½ oz.; dissolve the glue in the water by immersing vessel containing same in hot water. When solution is effected, add the acid. Effervescence will take place with the evolution of orange nitrous fumes. Now cool. It should be kept in a well stoppered bottle, and will remain permanently liquid.

PASTILS, Mouth.—1. They are largely used by smokers and persons with impure breath. The gilding or silvering is effected in the way usually adopted for pills, viz.: A leaf or two of gold or silver is placed in a gallipot; on this an appropriate number of pills or pastils, and then another leaf of the metal. The mouth of the gallipot is next covered with a piece of smooth writing paper, and on this the palm of the hand is placed, when a sudden and rapid circular motion is given to the whole for a second or two. Another method is to shake them, in a similar manner, with a little gold dust or silver dust. When pills are gilded or silvered immediately after being prepared, they are usually sufficiently moist or sticky to cause the leaf or dust to adhere; but should they be otherwise, they should be previously breathed on, or placed in damp air for a few minutes, or rubbed between the fingers or the palms of the hands, very slightly moistened with thin mucilage, so as to render them somewhat sticky, but not wet. Mouth pastils are preferably not coated until they are dry and hard, and hence generally require one or other of these modes of treatment. The products of the following formulæ are among those most highly esteemed:—2. Take of soft extract of licorice, ½ oz.; catechu, in fine powder, 1 oz.; white sugar, 1 oz.; gum tragacanth, ½ oz.; oil of cloves, 1 fl. drm.; oil of cassia, ½ fl. drm.; oil of nutmeg, essence of ambergris (royale), of each 12 drops; mix as before explained; beat the mixture to a firm uniform mass with eau de rose, or eau de fleurs d'oranges, q. s., and form it into 1 gr. or 2 gr. pills. Lastly, when dry, silver them. The stock of them should be kept in bottles or tin canisters, and only a sufficient number of boxes for present sale filled at once.—3. Take of fresh roasted coffee in fine powder, 1½ oz.; chocolate, do., 1½ oz.; white sugar, do., 1½ oz.; vanilla, do., 1 oz.;

charcoal, (recent), do., 1 oz.; mucilage of tragacanth, to mix q. s. The preceding, sucked *ad libitum*, are used to sweeten and perfume the breath; the last also acts by chemically deodorizing it. They are great favorites in the fashionable world among smokers.—4. Take of chloride of lime, good dry, 1 dr.; white sugar, powdered, 3 oz.; gum tragacanth, do., 1 oz.; mix; add of oil of cloves or peppermint, ½ fl. dr.; mix thoroughly and beat up the mass with rose water. This acts chemically as a disinfectant, deodorizer and bleacher, but should be only occasionally and sparingly used, as the chloride in them attacks the enamel of the teeth. One at a time is sufficient. The saliva should not be swallowed, and the mouth should be rinsed with water soon afterward.

PATENT LEATHER SHOES, Care of.—Patent leather is very delicate, especially when new, and in cold weather a very slight pressure will crack it, so that before putting on shoes of this leather they should be placed before the fire, not too close, for a short time, in order to make the leather pliant. Patent leather shoes should be rubbed to the shape of the foot with the hand and they will not then be so liable to wrinkle and crack when wearing. When they are getting dull and losing their gloss rub white of egg on them.

PARCHMENT, Paper.—1. To convert paper into vegetable parchment, immerse it a few seconds in a cold mixture of 1 volume of water and 2 volumes sulphuric acid; wash out rapidly by plunging into a quantity of cold water; then immerse it in water to which a small quantity of ammonia has been added; attach it to a frame while wet, or dry under a press, to keep it from contracting. Paper thus prepared is transparent, and can be used for copying by tracing, and as a substitute for parchment from sheep skin for diplomas, etc.—2. Immerse any paper of even fibre in a concentrated solution of chloride of zinc.

PARCHMENT, To Remove Wrinkles from.—Place the document, face down, upon a clean piece of blotting paper; beat to a froth, with a few drops of clove oil, the whites of several fresh eggs, and spread this over the back of the sheet with the fingers, and rub in until the parchment becomes soft; then spread out smoothly, cover with a piece of oiled silk, put on it a piece of smooth board with a weight, and place in a cool place 24 hours; then remove board and silk and lay on a piece of fine linen cloth; and press with a hot iron until all wrinkles disappear.

PEACH DUMPLINGS.—Boil eight large potatoes. When done drain and stand on the back of the range until they are thoroughly dry. Then beat with a silver fork until they are very light; then add ½ pt. of warm milk, 1 oz. of butter and saltspoonful of salt, and beat until the butter is melted and all the ingredients are well mixed together. Add enough flour to make a dough. Knead well and roll out on a well-floured pastry board. Lay a saucer on the dough and cut around it, using the dough about ½ in. thick. Pare and cut in halves 1 doz. peaches. Remove the stones and place the halves together. Place a peach in each round of dough and tie in pieces of well-floured cloth. Put into boiling water and boil for half an hour, watching carefully that the water boils constantly, otherwise the dumplings will be heavy. If you use a steamer, which is much better than boiling, knit rounds of white knitting cotton about the size of a saucer; put a string around the top and tie. Serve with rich cream or with hard sauce, made by creaming together ½ lb. of pulverized sugar with 2 oz. of butter, the well-beaten white of an egg and a tablespoonful of sherry wine, or you can use a teaspoonful of vanilla, if you prefer it. Grate a little nutmeg over it, and stand in a cold place (on ice if possible) for an hour before using.

PEARS, Desserts Made with.—1. Pears are a fruit easily prepared for winter use, and they are a general favorite at the table in whatever form they may appear. The pear, combined with other fruit, makes an attractive centerpiece. The golden Bartlett pear, the purple plum, the blushing peach and the pale green Niagara grapes, encircled by a vine or blossoms form a handsome combination.—2. A ripe, highly flavored pear may be peeled and sliced thin, as you would a peach, sprinkled with a little powdered sugar, and then covered with whipped cream. So served it makes an appetizing dish. Pears are also delicious when baked or stewed and served with rich cream poured over them.—3. One way of baking pears is thus: Wash the fruit, cut them into halves, and remove the cores. Lay the pieces in a porcelain or earthenware dish, arranging them in layers close together, and sprinkle each layer with sugar and just a suspicion of powdered cinnamon. Fill the dish to the top and pour over the whole a teacup of water. Cover the dish with an earthen plate and put the dish upon a grate in a slow oven and let it bake three or four hours, or the pears may remain in an oven with a slow fire all night, to be served for breakfast. An old-fashioned but good method is to sweeten baked pears with part molasses and part sugar.—4. For a compote of pears use firm fruit, not too ripe. Wash the pears, cut them into halves lengthwise, and carefully take out the core. Make a syrup in the proportion of 2 cups of sugar to 1 cup of water. When the syrup is boiling put in the pieces of pears and cook them until tender. Take them out with a skimmer and arrange them in a pyramid form, the stem end up, on a pretty dish. Slice an unpeeled lemon very thin and put it into the syrup. Let the syrup cook until it will be thick when cold, put the lemon slices over the fruit, and pour the syrup over the whole by the spoonful when a little cool, so that it will not all run to the bottom of the dish. Place the compote where it will become perfectly cold before serving.—5. An excellent way to serve pears in a pudding is thus: Wash and remove the cores and stems. Put them on a plate, place them in a steamer and cover them until they are tender, but not soft enough to lose their shape. Carefully lift the pears out and fill the space left by the core with small

bits of preserved ginger and syrup. Arrange the fruit on a plate that can be put into the oven. Sift some powdered sugar over them, and squeeze a little lemon juice over the whole. Cover the fruit with a thick meringue. Put the plate into a moderate oven and let it remain until the meringue is a delicate brown. This is a very palatable and wholesome dessert.—6. Pears may be made into a pudding with tapioca like peaches or apples, and with equally good results. Soak 1 cupful of tapioca over night in water enough to just cover the tapioca when it swells. In the morning add $\frac{3}{4}$ of a cup of sugar, a pinch of salt, the grated yellow rind of a lemon and half the juice. Peel and cut into halves ripe pears and take out the cores. Half fill a baking dish with the pears; pour the soaked tapioca mixture over them and bake until the pears are done. Serve this pudding partly cold with sweetened cream. If lemon flavoring is not desired, some pieces of cinnamon may be stuck in the tapioca; remove them before sending the dish to the table.

PENCILS, Black Lead.—The easiest way of producing, not only black lead, but all sorts of pencils, is by the following process: Take white or pipe clay; put it into a tub of clean water; soak 12 hours; then agitate until it resembles milk; let it rest 2 or 3 minutes and pour off the supernatant milky liquor into a second vessel; allow it to settle, pour off the clear and dry the residue on a filter; then add black lead sufficient. Powder it and calcine it at a white heat in a loosely covered crucible; cool, and carefully repulverize; then add prepared clay and prepared plumbago, equal parts; water to mix; make them into a paste and put into oiled molds of the size required; dry gradually, and apply sufficient heat to give the required hardness; then take carefully from the molds and place in the grooves of the cedar. The more clay and heat employed, the harder the crayon. The shade of black may be varied in the same way. Each mold must be made of 4 pieces of wood nicely fitted together.

PENCILS, Copying.—1. Pencils made to produce marks from which copies can be obtained in an ordinary copying press, have usually the disadvantage that the color fades soon. This may be overcome by preparing the pencils as follows: 10 lbs. best logwood boiled repeatedly with 100 lbs. of water, and the decoction evaporated to 100 lbs.; heat the liquid to the boiling point, and add small quantities of the nitrate of oxide of chromium till the bronze-colored precipitate formed at first is redissolved in a deep dark blue color. Now evaporate to the consisteney of a syrup and add fine levigated fat clay, 1 part for every 3 or $3\frac{1}{2}$ parts of the extract. To form a mass to manipulate, add a little mucilage of gum tragacanth. The quantity of nitrate of chromium must be in the right proportion to the extract; a surplus prevents easy writing, and a deficiency prevents easy solubility of the mass for copying. No other salt of chromium will answer. The nitrate is prepared as follows: 20 lbs. chrome alum, dissolved in 200 lbs. boiling water. To the solution gradually add a solution of carbonate of sodium of the same strength, till the hydrated oxide of chromium has been precipitated. After subsidence of the precipitate, the supernatant liquid is decanted and the precipitate washed with distilled water till the filtrate does not contain any traces of sulphate of potassium and sodium, as may be shown by the addition of a little solution of chloride of barium. To the precipitate collected on the filter successively add small portions of heated pure nitric acid, previously diluted by its own volume of distilled water, in such quantity that, on boiling, a small quantity of the hydrated oxide remains undissolved. The writing furnished by these pencils is transferable; it is of a penetrating black color. Alkalies and acids have no effect on the ink.—2. Faber's pencil for copying writing or designs is made of different degrees of hardness, combining the advantages of the best lead pencils. Four kinds are manufactured: No. 1, very soft, composed of 50 parts of aniline, 37.5 graphite, and 12.5 kaolin; No. 2, soft, 46 parts aniline, 34 graphite, and 24 kaolin; No. 3, hard, 30 parts aniline, 30 graphite, and 40 kaolin; No. 4, very hard, 25 parts aniline, 25 graphite, and 50 kaolin. These materials are pounded and mixed with great care, and afterwards made into a paste with cold water. After the paste has been well worked, it is passed through a wire screen, which divides it into strips of suitable dimensions. These are dried in an ordinary room, and afterwards fitted and glued into wooden cases like common lead pencils.

PENCILS, Indelible.—1. Buy a genuine Faber, No. 1; prepare the label (cedar is the best material), and on the part you wish to write, rub a little linseed oil and write before it gets dry. This writing will remain indelible for years. If a little Japan varnish is added to the oil, it is better. A little white lead might be used in the oil, but is not absolutely necessary.—2. Reduce nitrate of silver to an impalpable powder, add just enough lampblack to give it a black color and enough of a thick solution of gum Arabic in hot water to make the powder coherent. Rub these ingredients well together, form into thin sticks and dry.—3. Kaolin, 8 parts; finely powdered manganese dioxide, 2 parts; silver nitrate, 3 parts; mix and knead intimately with 5 parts distilled water, then dry the mass and inclose it in wood.—4. Mix 4 parts powdered pyrolusite with 16 parts of thoroughly dried alumina. Add to this a solution of 6 parts nitrate of silver in 10 parts distilled water. Rub and knead the mass thoroughly. Pencils are formed from this and dried. Used for marking linen.

PENCILS, Slate.—These are made either by cutting slate into thin sticks and rounding them, or by cutting them into fine square slips, and encasing them in wood as black lead pencils, etc.

PENCIL WRITING, To Fix.—Pencil writing may be fixed almost as indelibly as ink, by passing the moistened tongue over it. Even breathing slowly over the lines after writing, renders them less liable to erasure. Brushing the writing or a drawing with skim milk, will also act in the same manner.

PERPETUAL CALENDAR.—

FOR FINDING THE DAY OF THE WEEK CORRESPONDING TO ANY DATE OF THE CHRISTIAN ERA, TO A. D. 2099.

Explanation of Old and New Style.

Old Style to be used in general history up to the 4th of October, 1582. In English history up to the 2d September, 1752. Always in Russia and in countries following the Greek Church. *Rule:* Find in *A* the current year of the century, then in *B* on the same line and under the Century will be found the number of the Calendar of that year. In leap years, before the 29th of February, take the day next preceding that found by the Rule.

B. CENTURIES.

Old Style.	0	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
New Style.					15	16	
	17		18		19	20	

Examples:

	Year.	Date.	Calend.	Day.
Discovery of America by Columbus,	1492	Oct. 12	4	Friday.
Declaration of Independence,	1776	July 4	3	Thursd.
Battle of Waterloo,	1815	June 18	5	Sunday.
Queen Victoria began to reign,	1837	June 20	5	Tuesd.

A. *Current Year of the Century.* — *No. of Calendar.*

	04	10		21	27	32	38		49	55	60	66		77	83	88	94	2	3	4	5	6	7	1
	05	11	16	22		33	39	44	50		61	67	72	78		89	95	1	2	3	4	5	6	7
00	06		17	23	28	34		45	51	56	62		73	79	84	90		7	1	2	3	4	5	6
01	07	12	18		29	35	40	46		57	63	68	74		85	91	96	6	7	1	2	3	4	5
02		13	19	24	30		41	47	52	58		69	75	80	86		97	5	6	7	1	2	3	4
03	08	14		25	31	36	42		53	59	64	70		81	87	92	98	4	5	6	7	1	2	3
	09	15	20	26		37	43	48	54		65	71	76	82		93	99	3	4	5	6	7	1	2

1,	Th	Fr	Sa	**Su**	M	Tu	W
2,	W	Th	Fr	Sa	**Su**	M	Tu
3,	Tu	W	Th	Fr	Sa	**Su**	M
4,	M	Tu	W	Th	Fr	Sa	**Su**
5,	**Su**	M	Tu	W	Th	Fr	Sa
6,	Sa	**Su**	M	Tu	W	Th	Fr
7,	Fr	Sa	**Su**	M	Tu	W	Th

Jan.	1	2	3	4	5	6	7
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	29	30	31				
Feb.				1	2	3	4
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Mar.				1	2	3	4
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Apr.							1
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1,	Th	Fr	Sa	**Su**	M	Tu	W
2,	W	Th	Fr	Sa	**Su**	M	Tu
3,	Tu	W	Th	Fr	Sa	**Su**	M
4,	M	Tu	W	Th	Fr	Sa	**Su**
5,	**Su**	M	Tu	W	Th	Fr	Sa
6,	Sa	**Su**	M	Tu	W	Th	Fr
7,	Fr	Sa	**Su**	M	Tu	W	Th

May.		1	2	3	4	5	6
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June.					1	2	3
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July.							1
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	23	24	25	26	27	28	29
	30	31					
Aug.			1	2	3	4	5
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1,	Th	Fr	Sa	**Su**	M	Tu	W
2,	W	Th	Fr	Sa	**Su**	M	Tu
3,	Tu	W	Th	Fr	Sa	**Su**	M
4,	M	Tu	W	Th	Fr	Sa	**Su**
5,	**Su**	M	Tu	W	Th	Fr	Sa
6,	Sa	**Su**	M	Tu	W	Th	Fr
7,	Fr	Sa	**Su**	M	Tu	W	Th

Sept.						1	2
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	29	30	31				
Nov.				1	2	3	4
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Dec.						1	2
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	31						

PENCILS. For Writing on Glass.—The colors are mixed with the fats in warmed vessels, levigated with the same, and are then allowed to cool until they have acquired proper consistency for being transferred to the presses. In these the mass is treated and shaped similarly as the graphite in the presses for ordinary pencils:—*Black.* Lampblack, 10 parts; white wax, 40 parts; tallow, 10 parts.—*Blue, Dark.* Prussian blue, 15 parts; gum Arabic, 5 parts; tallow, 10 parts.—*Blue, Light.* Prussian blue, 10 parts; white wax, 20 parts; tallow, 10 parts.—*White.* Zinc white, 40 parts; white wax, 20 parts; tallow, 10 parts.—*Yellow.* Chrome yellow, 10 parts; wax, 20 parts; tallow, 10 parts.

PERFUME. Hygienic Value of.—A pretty and interesting story has been told by a French specialist of many months' hard wrestling with the secrets of scents, and especially of their influence on bacteria. He finds that many essential oils and other perfumes are powerful germ destroyers. One of his experiments was to take 100 bacteria and see how many would be destroyed in forty-eight hours when exposed at a temperature of 15 degrees Centigrade to various agencies. Essential oil of bitter almonds killed 99 of the micro-organisms, and oil of thyme the same number. Oil of cummin accounted for 95 per cent; mint, 93; wallflower, 92; neroli, 90; lemon, 88; lavender, 75; eucalyptus, 74; rosemary, 73; turpentine and camphor, only 66. Popular opinion would have placed eucalyptus, turpentine and camphor very much higher on the list; but, although the results given are somewhat different than might be expected, it must be remembered that the experiments were made with essences, and not with their spirituous or water decoctions—the perfumes of commerce. But it is satisfactory to know that many scents which have a great charm for the olfactory nerves of some people are now numbered among the useful allies of hygiene.

PHARAOH'S SERPENTS, Harmless, to Make.—A new method of making the curious chemical toys called Pharaoh's Serpents has been suggested. The black liquor which results as a useless product when coal oil is purified with sulphuric acid is to be treated with fuming nitric acid. The dark colored resinous matter which swims on the surface is then collected, washed and dried, when it forms a yellowish brown mass having about the consistency of sulphur which has been melted and poured into water. When this mass is ignited it undergoes such a wonderful increase in bulk that a cylinder 1 in. long will give a snake about 4 ft. in length.

PERSPIRATION, Remedies for.—1. When perspiration is excessive it may be regulated by using as a wash, once a day, not oftener, for about two minutes, liquor atropiæ, 2 dr.; water, 1 pt. The face and other parts may also be washed as often as desired with alum, 1 oz.; glycerine, 1 oz.; water, 10 oz.—2. (*For Excessive Perspiration of Hands or Feet.*) Carbolic acid, 1 part; burnt alum, 4 parts; starch, 200 parts; French chalk, 50 parts; oil of lemon, 2 parts; make a fine powder, to be applied to the hands and feet, or to be sprinkled inside the gloves or stockings.—3. By applying boric acid thoroughly to the feet, particularly about the nails, between and under the toes, and to the soles, two or three times a week or oftener, as the case may need, dressing them while there is a good coating of powder on the skin, sweating of the feet may be effectually relieved.—4. (*Prevention of.*) Acid tannic, 2 scr.; aqua rosal, ½ oz.; spt. vin. rect., 2½ oz.; aquæ, 3 oz.; use as a wash, each night and morning, with a soft sponge. The skin should be thoroughly cleansed with soap and warm water, and carefully dried, and then apply the wash as directed.—5. (*Foot Powder.*) An unfailing remedy for sweaty feet and bad odor of the feet: Powdered alum, 21 parts; maize meal, 1 part.

PHYLLOXERA, Remedy for.—The introduction of American plants to replace those destroyed by parasites in French vineyards has not arrested the use of insecticides for the protection of French vines still attacked by phylloxera, and for this purpose carbon bisulphide (either pure or dissolved in water), sulpho-carbonates, and submersion continue to be employed with more or less success. The carbon bisulphide is by far the more efficient, but is too volatile and does not diffuse with sufficient rapidity. When, however, it is mixed with vaseline, its volatility is reduced and its diffusibility is increased, the former proving advantageous in light and calcareous soils, the latter in heavy soils, in accordance with theoretical considerations. The vaselined sulphide is applied in the same way as the ordinary sulphide, depositing some at the foot of the vine stock and spreading the rest over the surface; this treatment is found to be effectual; with it phylloxera is no longer seen in the roots, vegetation is luxuriant, and numerous new rootlets indicate a decisive increase in vitality; the manuring on a test tract of land had not been altered for six years, therefore the improvement was solely due to the insecticide.

PHOSPHORESCENT SUBSTANCES.—Phosphorescence, or the emission of light without flame or sensible elevation of temperature, is a phenomenon exhibited in a greater or lesser degree by many substances—mineral, animal and vegetable—and is developed under a variety of conditions. In a few substances the light is developed by chemical change or a process of slow combustion, as in the case of phosphorus, from which the name phosphorescence has been derived. In others the substance suffers no appreciable change, only requiring exposure to a strong light to shine themselves when taken into the dark. The diamond and many mineral substances develop light in this way, and it is supposed that these substances have the property of absorbing light in the same way they do heat, and of slowly parting with it when taken into the dark, much in the same way that hot bodies part with their heat when removed from the source of heat. With some of these substances the application of heat causes the development of brighter light (though for a shorter time than would be otherwise required to exhaust the supply), and again, there are some substances, such as fluorspar, that ab-

sorb light, but do not give it out until heated. Many substances also become phosphorescent while crystallizing. The color of the light developed by many of these substances varies with their nature and the degrees of heat to which they have been exposed. A certain scale of light and color may, therefore, be produced by grouping together different substances or samples of the same substances previously heated at different temperatures.

PICTURES, To Frame.—Frame your pictures simply. The frame should not be noticeable except where it is needed for decorative purposes. Oils require the gold (not gilt) frame. The shadows in a gold frame are neutral and do not interfere with the color scheme of a painting. Aquarelles should be given usually a wide white mat, which will give the delicate tones a chance for life. A narrow white molding will never offend the eye. Do not use the natural wood in frames, except on architectural subjects or mechanical drawings; then they are consistent. Frame photographs either with a mat or without; this, of course, depends upon the size. The flat oak moldings stained a dark green and close up to the photograph is good, or use a gray or green mat passepartout. Engravings, etchings or drawings are more satisfactory in black frames. They seem to lend color to pictures in monochrome.

PICTURES, Newspaper, to Transfer.—The liquid to be used is made by dissolving 1½ dr. common yellow soap in 1 pt. of hot water, adding, when nearly cold, 3½ fl. oz. spirits turpentine, and shaking thoroughly together. This fluid is applied liberally to the surface of the printed matter with a soft brush or sponge (being careful not to smear the ink, which soon becomes softened) and allowed to soak for a few minutes; then well damp the plain paper on which the transfer is to be made, place it upon the engraving and subject the whole to moderate pressure for about one minute. On separating them a reversed transfer will be found on the paper.

PICTURES, Newspaper, to Make.—Most interesting of the processes employed in newspaper illustration, from the point of view of simplicity, is what may be termed the "chalk method." Take a thin bed of smooth chalk laid upon a metal surface, and draw upon it with a fine steel point any picture you may desire. The steel point will cut the lines of the picture out of the chalk to the metal, and thus you will have it in the shape of an intaglio. Make a stereotype from this intaglio, and you have your metal plate to print the picture from.—1. (*Drawing on a Bed of Chalk.*) Such is the idea of the chalk process. In applying it, instead of pure chalk various mixtures are used, such as plaster of Paris, which is merely chalk in another shape, with a certain proportion of a white Carolina clay. The stuff, pulverized and stirred up with water, is spread over a rectangular sheet of polished steel, as you would spread a slice of bread with butter, to an even thickness of about 1-32 of an inch. Now you are ready to begin operations as soon as you have baked the steel plate in an oven for a while, until the chalk layer has been rendered perfectly hard. It will hardly do for you to attempt to draw your picture directly upon the chalk, lest you make mistakes. The best way is to make your sketch on a piece of paper, and then, laying it down upon the chalk surface, go over the lines with a pencil point, which will indent the paper and leave marks beneath upon the chalk. Lift the drawing and you find under it, in the chalk, its reproduction. Now you apply your steel point directly to the chalk, cutting all the lines of the drawing down through the chalk to the surface of the steel plate. When you finish this operation the dark steel of the plate shows through the chalk in all the lines of the sketch. And these lines are perfectly clean and sharp, thanks to the keenness of the knife-like steel point employed. All you have to do for the rest is to pour molten lead over the chalk surface in a mould and let it get cold. The lines that are cut out of chalk will be reproduced in relief upon the lead, and thus you will have your metal engraving to print the newspaper picture from, mounting it for the purpose on an iron block, thick enough to make it level with the type.—2. (*Zinc Etching.*) Though so advantageous for its simplicity, the chalk method is not so good for fine work in the way of sketches and portraits as the "zinc process," so-called. The former, however, by reason of its cheapness, is most useful to provincial newspapers, which cannot afford the comparatively expensive photographic plant required by the latter. In the zinc process, to begin with, an ordinary photograph, reduced to the required size, is taken with a camera of the pen-and-ink sketch drawn on cardboard by the artist. Next a smooth plate of zinc is "flowed over" with an albumen solution that forms a sensitized skin on the surface; the glass negative of the picture is laid upon this zinc plate and the two are put together in the sunlight. What are to be the black lines of the printed drawings are, of course, white and transparent in the negative. The sunlight goes through wherever the negative is transparent, and has the effect of hardening the sensitized skin beneath, so that it clings tightly to the zinc. It requires only one minute to perform this operation. Now the zinc plate is taken and given a coating over the sensitized skin of lithographer's ink, rubbed on with a roller, after which the plate is washed. In all places where the sunlight has not struck the zinc, owing to the opacity of the glass negative, the sensitized skin readily washes off, together with the ink that covers it; elsewhere it clings. Thus, after the washing, the perfect drawing in ink remains upon the zinc plate. To make the ink lines harder the plate is brushed with powdered dragon's blood. Then it is plunged into a bath of acid, which eats away the zinc wherever it is not protected by the ink, so that when it is taken out the lines of the drawing are found all raised above the rest of the surface of the plate, like a map for the blind, and when mounted "type high" on a metal base, you have your "cut" ready to print from. The zinc method seems to be the most available for jour-

nals of the period. At all events, it is employed by a majority of the big newspapers of the country.

PICTURES, Old, to Restore Blackened Lights of.—Touch them with peroxide of hydrogen, diluted with 6 or 8 times its weight of pure water. The part must be afterwards washed with a clean sponge and water.

PICTURES, Old, to Remove Blisters from.—Puncture holes in the blister with a needle; rub rye flour paste gently over the swelling, allowing it to penetrate the holes. Carefully wipe the paste from the swollen parts, and soften them with a soft brush dipped in warm linseed oil. Several thicknesses of clean white paper being placed over the place, pass over the whole rapidly with a warm iron.

PIE, Banana.—1. Beat the yolks of 2 eggs very light with 1 cup of crumbled cake, ½ cup of sugar, butter the size of a walnut and a little rich cream. Flavor with lemon or vanilla, then stir in two large bananas cut in thin slices; pour the mixture into a pie pan lined with good paste and bake in a quick oven. While it is baking beat the whites of the eggs very light with a little rosewater and 3 tablespoonfuls of powdered sugar. Take out the pie, drop the meringue in clots over top of it and set back in the oven until it is a pale brown.

PLANTS, To Preserve Colors of.—A recent improved receipt for preserving plants with their natural colors is to dissolve 1 pt. salicylic acid in 600 parts alcohol, heat the solution up to boiling point in an evaporating vessel and draw the plants slowly through it. Shake them to get rid of any superfluous moisture and then dry between sheets of blotting paper under pressure in the ordinary manner. Too prolonged immersion discolors violet flowers, and in all cases the blotting paper must be frequently renewed. The novelty appears to be the salycilic acid.

PLASTER OF PARIS, Firmness of, to Increase.—Much of the inconvenience arising from the too rapid consolidation of plaster of Paris may be remedied by the simple addition to the mass of from 2 to 4 per cent. of marshmallow root, finely powdered. With this treatment it is found the plaster will not set for an hour at least; and, moreover, the mixture becomes so hard, on drying, that it may be sawn, filed or turned, and in this condition is applicable to the manufacture of dominoes, dice, and numerous other small articles. If the addition of the marshmallow root be carried to the extent of say 8 per cent., the time of setting is still further prolonged, and the hardness of the mass of plaster, when cold, greatly augmented. Such a composition may also, while still soft, be rolled out on a glass tube, and thin sheets be produced, which possess the advantage of not cracking when drying, and which may afterward be easily detached and polished by mere friction. It is found practicable to incorporate colors with the mixture, and by this means good imitations of some kinds of marble are produced by careful manipulation, or the sheets or slabs may be painted upon when dry, and rendered quite impermeable by a process of polishing and varnishing, the appearance being thus rendered quite attractive, and at a compartively small cost.

POLISHES, For Furniture.—1. One pt. 90 per cent. alcohol; ¾ oz. gum copal; ¼ oz. gum Arabic; 1 oz. shellac. Bruise the gums and sift them through a piece of muslin. Place the spirits and gums together in a vessel closely corked, near a warm stove, and frequently shake them; in two or three days they will be dissolved. Strain through a piece of muslin, and keep corked tight.—2. Shellac, 6 oz.; naphtha, 1 qt.; benzoin, ¾ oz.; sandarac, 1 oz.—3. Dissolve 1½ oz. shellac, ½ oz. sandarac, in ½ pt. naphtha. To apply the polish, fold a piece of flannel into a sort of cushion, wet it well with the polish, then lay a piece of clean linen rag over the flannel, apply 1 drop of linseed oil; rub your work in a circular direction, lightly at first. To finish off, use a little naphtha, applied the same as the polish.—4. Pale shellac, 2¼ lb.; mastic sandarac, each 3 oz.; spirits, 1 gal. Dissolve, and add copal varnish, 1 pt.; mix well by agitation.—5. Shellac, 12 oz.; wood naphtha, 1 qt.; dissolve, and add ½ pt. linseed oil.—6. Crush 3 oz. shellac with ½ oz. gum mastic, add 1 pt. methylated spirits of wine, and dissolve.—7. Shellac, 12 oz.; gum elemi, 2 oz.; gum copal, 3 oz.; spirits of wine, 1 gal.; dissolve.—8. Shellac, 1¼ oz.; gum juniper, ½ oz.; benzoin, ½ oz.; methylated alcohol, ½ pt.—9. One oz. each of gums mastic, sandarac, seed lac, shellac, and gum Arabic; reduce to powder, then add ½ oz. virgin wax; dissolve in a bottle with 1 qt. rectified spirits of wine. Let stand for 12 hours, and it is then fit for use.—10. One oz. gum lac, 2 dr. mastic in drops, 4 dr. sandarac, 3 oz. shellac, ½ oz. gum dragon. Reduce the whole to powder.—11. Yellow wax, 4 oz.; yellow soap, 2 oz.; water, 50 oz.; boil, with constant stirring, and add boiled oil and oil of turpentine, each 5 oz.—12. Soft water, 1 gal.; soap 4 oz.; white wax, in shavings, 1 lb. Boil together, and add 2 oz. pearlash. To be diluted with water, laid on with a paint brush, and polished off with a hard brush or cloth.—13. Wax, 3 oz.; pearlash, 2 oz.; water, 6 oz. Heat together, and add 4 oz. boiled oil and 5 oz. spirits of turpentine.—14. Raw linseed oil, 6 oz.; white wine vinegar, 3 oz.; methylated spirit, 3 oz.; butter of antimony, ½ oz.; mix the linseed oil with the vinegar by degrees, and shake well so as to prevent separation; add the spirit and antimony, and mix thoroughly.—15. Boiled linseed oil, 1 pt.; yellow wax, 4 oz.; melt, and color with alkanet root.—16. Acetic acid, 2 dr.; oil of lavender, ½ dr.; rectified spirit, 1 dr.; linseed oil, 4 oz.—17. Linseed oil, 1 pt.; alkanet root, 2 oz.; heat, strain, and add lac varnish, 1 oz.—18. (*French Polish Reviver.*) Linseed oil, ½ pt.; spirits of camphor, 1 oz.; vinegar, 2 oz.; butter of antimony, ½ oz.; spirit of hartshorn, ¼ oz.—19. Naphtha, 1 lb.; shellac, 4 oz.; oxalic acid, ½ oz. Let it stand till dissolved; then add 3 oz. linseed oil.—20. (*Red.*) 16 oz. oil of turpentine; 4 dr. alkanet; 4 oz. beeswax; digest the alkanet in the oil until sufficiently colored; then scrape the beeswax fine, and form a homogeneous mixture by digesting over a water-bath. For a pale polish, omit the

alkanet.—21. (*White.*) 1 lb. white wax; 32 oz. solution of potash; boil to proper consistency. (*For Fine Carved Wood.*) 8 oz. of linseed oil; 8 oz. of old ale; 1 egg (the white); 1 oz. of spirit; 1 oz. of spirits of salt; to be well shaken before using. A little is to be applied to the face of a soft linen pad and lightly rubbed for a minute or two over the article to be restored, which must afterwards be polished off with an old silk handkerchief. This will keep any length of time if well corked.—22. (*For Delicate Cabinet and Papier-mache Work.*) 32 oz. linseed oil; 8 oz. spirit; 8 oz. vinegar; 8 oz. butter of antimony; 8 oz. oil of turpentine; shake well before using, and apply with a woolen rubber.—23. 16 oz. oil of turpentine; 16 oz. rectified oil of amber; 16 oz. olive oil; 1 oz. oil of lavender; 4 dr. tincture of alkanet; mix. A cotton rubber is saturated with this polish, which is thus applied to the wood. The latter is then well rubbed with soft, dry, cotton rags and wiped dry.

POLISHES, For Shells.—1. Boil in a strong solution of potash; then polish with hydrochloric acid and putty powder.—2. Clean the surface with hydrochloric acid until the outer skin is removed. Wash in warm water, dry in sawdust and polish with chamois skin. If the shell is destitute of natural luster, rub with tripoli powder and turpentine applied with a chamois skin, and finally finish with olive oil.—3. Porcelainous shells are so hard as to require the apparatus of a lapidary to cut or polish them, but they are generally so smooth as to require no rough grinding. They may be polished by using a felt wheel and applying putty powder. Nacreous shells, or those of the pearl variety, may be filed and cut without a great deal of difficulty. Pieces to be turned are first roughly shaped on the grindstone, then turned and polished with pumice stone, putting on the final polish with rotten stone. Irregularly shaped pieces are filed and ground, then smoothed with pumice stone and water, and finished with rottenstone. The rottenstone is sometimes mixed with sulphuric acid full strength, or slightly diluted, to heighten the polish.—4. Rough shells are polished by first grinding them on a coarse stone, then smoothing them with pumice stone and water on a buffer wheel or with a hand polisher, and finishing with rottenstone.

POWDER, Luminous Face.—1. The blue and yellow rays of light falling upon the face and shoulders of ladies in full dress give them in the case of electric light often a ghastly appearance, and in the case of gas a sallow look. The separating of these rays, and thus lessening their effect, is easily done in chemistry by a solution of bichloride of potash. The electric light is especially rich in rays of violet, and these have a most unpleasant optical effect upon the human face. And to the avoidance of this effect a certain French student has recently been giving his attention, with the result that he has produced a face powder that is as delicate and fine as the popular article made from rice. The foundation of this luminous powder is sulphate of quinine, which has been dissolved in alcohol and is mixed with sulphate of zinc. It is called phosphorescent or fluorescent, because it retains its brilliancy for several hours in the hottest sun. In addition to being an adjunct of womankind to heighten beauty, it has been found to protect its user from the depressing effect of the sun. The face is first dampened by the lotion made from the quinine and alcohol and is then powdered with the sulphate of zinc. The powder wards off from the complexion the damaging colored rays that are in the spectrum, and thereby purifies the tint of the skin so that it is freed from all blemishes of nature or the artificial blemishes brought by the light, and becomes so pure almost as to be transparent.—2. The power of sulphate of zinc to absorb sunlight and give it back in the dark has been revealed. Poudre de riz made with this mineral gives a soft luminosity to a fair young face. A lady cyclist dusted all over with this powder is in herself a lamp on a pitch dark night. The luminous pigment is not liable to be spoiled by damp, by carbolic acid, or by any weak acid. It resists rain if united to some strongly adhesive body. There is a house in the Rue de Longchamps where a windowless set of rooms is lighted with it. The lady of the house receives there her friends at "5 o'clocks."

PRINTING, Sizes of Type.—The various sizes or bodies of type, and the proportion which they bear to each other are approximated in the following examples; but as each foundry varies the faces to suit itself, some faces are more extended and others more condensed than what are generally designated as the standard. As the different type foundries of the world varied also slightly in the bodies of the type, much inconvenience was caused in printing offices. But within a few years a "Standard Point System" has been adopted by American foundries, each "point" being one-twelfth pica in height, which has proved of great advantage. 11 sizes (or faces) are shown below, in order of gradation; Diamond, or 4½ point; Pearl, or 5 point; Agate, 5½ point; Nonpareil, 6 point; Minion, 7 point; Brevier, 8 point; Bourgeois, 9 point; Long Primer, 10 point; Small Pica, 11 point; Pica, 12 point; English, 14 point; Great Primer, 18 point. These are the sizes most commonly used in book and newspaper printing; but there are larger and even smaller faces, the latter, however, of no practical value.

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POTATO BUGS, To Exterminate. — In using Paris green to exterminate the potato bugs, the poison should be mixed with the cheapest grade of flour, 1 lb. of green to 10 lb. of flour. A good way of applying it to the plants is to take an old 2 qt. tin fruit can, melt off the top, and put in a wooden head in which insert a broom handle. Bore a hole in the head also to pour the powder in, and then punch the bottom full of holes about the size of No. 6 shot. Walk alongside the rows, when the vines are wet with dew or rain, and make one shoot at each hill.

POTATOES, To Preserve. — For preserving potatoes in store, the floor is sprinkled with fine quicklime; this is covered with a layer (4 to 5 in. thick) of potatoes; this by a sprinkling of quicklime again, and so on, using the lime in the proportion of about 1 measure to 40 measures of potatoes. This method checks disease when it is present, and improves the potatoes if they are watery or waxy. Layers of straw and powdered plaster of Paris may be substituted for the lime.

POWDERS, Washing.—1. (*English Washing Crystal.*) An impure, half efflorescent crystallized soda, containing a large proportion of sulphate of soda and common salt.—2. (*Washing Crystals.*) Simply a filtered solution of borax and soda.—3. (*English Patent Cleansing Crystal.*) A half efflorescent soda, containing about 25 per cent. of Glauber's salts.—4. (*Washing and Cleansing Crystals.*) Pure crystallized soda, with 1 to 2 per cent. of borax.—5. (*Wool Washing Composition.*) A mixture of 35 parts of dried soda; 10 parts of soap powder; and 10 parts of sal ammoniac.—6. (*Wool Washer.*) A mixture of 90 parts of efflorescd soda crystals with 10 parts of soap powder.—7. (*Universal Washing Powder.*) A water glass containing soda, with a small percentage of tallow soap and starch powder.—8. (*Soap Extract.*) A mixture of crystallized soda and soda soap, containing water (soap 14.3, anhydrous soda 30, and water 55).—9. A washing powder for the finest white linen is a powdery mixture of 90 parts of efflorescd soda; 10 parts of hyposulphite of soda; 2 parts of borax.—10. (*Finest Brilliant Elastic Starch.*) A mixture of about 7 to 8 parts of stearine, with 150 parts of wheaten starch (melted stearine is mixed with about 15 times its weight of starch, and after cooling powdered and combined with the rest of the starch).—11. (*Berlin Prepared Brilliant Dressing Starch.*) Is good wheaten starch, mixed with 2 to 2½ per cent. of borax.

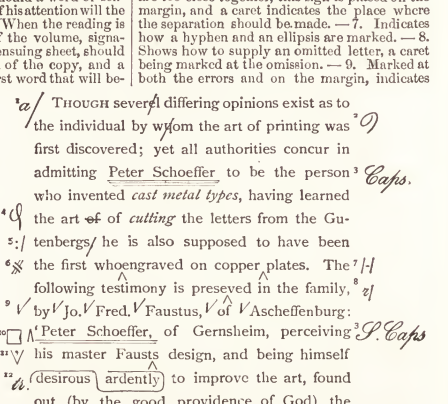
PRINTERS' ROLLER COMPOSITIONS.—1. Take an equal quantity of good glue and concentrated glycerine; soften the former by soaking in cold water, then melt it over the water bath, gradually adding the glycerine. Continue the heat until the excess of water has been driven off, meantime constantly stirring. Cast in brass or bronze moulds well oiled.—2. To 8 lb. transparent glue add enough water to cover it; let it stand with occasional stirring seven or eight hours. After 24 hours, all the water should be absorbed. Heat it in a water bath, as glue is always heated as soon as melted, and when both rise, remove from fire, and add 7 lb. molasses that has been made quite hot. Heat with frequent stirring for half an hour. The moulds should be clean and greased. Pour into moulds after it has cooled a little, and allow to stand 8 or 10 hours in winter; longer in summer. Some use fair more molasses, three to four times above quantity, and less water. In this case, after soaking one to one and a half hours, the glue is left on a board over night, and then melted with addition of no more water, and three or four times its weight of molasses added. Two hours' cooking is recommended in this case.—3. Resin soap and small quantities of oil and earthy matters are occasionally introduced. The heating must be continued until the greater part of the water has been expelled, when the composition is ready for casting in copper moulds, oiled and warmed.—4. Best glue, 10½ lb.; black molasses or honey, 2½ gal.; India rubber, dissolved in oil of turpentine, 1 lb.; Venice turpentine, 2 oz.; glycerine, 12 oz.; vinegar, 4 oz. The above formula is given for the mysterious black composition, so durable and elastic, and known to but very few persons until recently. Purified India rubber only is used. To recast, add 20 per cent. new material. The old home receipt is, 2 lb. best glue, soaked over night, to 1 gal. of New Orleans molasses. Will not recast.

PRICKLY HEAT, Remedy for.—Common salt in the bath will bring instant relief. It is as good as "iodinized sea salt" at 10c per pound, such as is sold in the drug stores. A little common washing soda will be found efficacious for children. If the affliction is severe, almost to the point of eczema, a spoonful of sulphurus acid in a full bucket of water, to be used in a sponge bath, will act like a charm. This is every bit as good as the sulphur vapor bath once so popular.

POLISHING-CLOTHS, For Silver.—Polishing cloths such as jewelers use are warranted to keep silver in brilliant condition. They prevent the scratching which the application of powders to the metal usually produces. To make them, boil soft rags in a mixture of fresh milk and hartshorn-powder, an ounce of the powder being used to a pint of the milk. When they have boiled for five minutes they should be hastily passed through cold water, so that they will be cool enough to wring out and dry before the fire. After the silver is washed and dried each day, it should be polished with a cloth prepared in this manner.

PROOF-READING. — Proofs are now taken by a hand press instead of by planer and mallet. The reader examines the folded sheet to see if the signature, head-lines and paging are correct. The person holding the copy should read clearly and at a moderate pace. It is absolutely essential that the proof-reader should have a desk away from the possibility of detraction by any noises resulting from the conversation or questions of others. No good proof-reading is possible under such circumstances, and the reader should not be held responsible for errors. The eye of the reader should not follow but precede the voice of the one reading; by this mode he will

anticipate the copy; and should a word or sentence be missing in the proof his attention will the more readily be arrested. When the reading is concluded, the number of the volume, signature and first word of the ensuing sheet, should be marked on the margin of the copy, and a bracket made before the first word that will begin the next sheet; the reader will thus be certain that the commencement is right when he gets the succeeding sheet. After the errors have been corrected in the form, a revise is pulled and the reader compares the corrected sheet with the one first read, to ascertain if the corrections have been properly made; and, if the work be a reprint, or the author is not to examine the proof, he proceeds to read it carefully for press. Some proofs are so foul, that it is almost impossible to correct the marks at one time, and it is necessary to have the errors corrected and another sheet pulled before the proof is read finally. In revising a proof, the reader should not only look at the word marked, but glance at every line in which an alteration has been made. Should outs or doubles occur in a proof, such parts ought to be again examined by copy. The illustrations show the manner of correcting a proof, and the same matter after correction: The markings of the corrections are designated by a number for each kind. — 1. A wrong letter or word is corrected by marking a line through it, and putting the right letter or word on the margin of the page, behind a short line. — 2. This signifies that the letter marked is upside down, and should be turned. — 3. When it is desired to change the character of the letters to that of "lower case" (small letters), "caps" (capitals), "small caps" (small capitals), or to italics, it is done by underlining the words as indicated, and writing these abbreviations on the margin. — 4. Take out the marked letters or words. — 5. Put in or change a punctuation point; encircle the correction on margin. — 6. When two letters or words are too close together, this sign is placed on the margin, and a caret indicates the place where the separation should be made. — 7. Indicates how a hyphen and an ellipsis are marked. — 8. Shows how to supply an omitted letter, a caret being marked at the omission. — 9. Marked at both the errors and on the margin, indicates that there is too much space between the letters or words. — 10. Shows that a new paragraph is wanted there, where a caret is marked. — 11. Exhibits the manner of supplying the apostrophe and all other marks, the position of which is on the upper part of a line. — 12. Shows how to mark letters and words that are out of their proper order, that they may be re-arranged. — 13. Indi-



cates how to restore words that have once been marked out, but afterwards are decided to be retained, by underlining with dots and writing the word "stet," in the margin.—14. When a space sticks up between two words, a line under it and this mark on the margin, indicate it is to be pushed down.—15. Shows how to supply omitted words which are too many to be written on the margin. When the omission is too large, it is usual to write on the margin, "Out, see copy," and the copy is returned with the words inclosed in brackets and "out" marked on its margin.—16. Indicates that the letters hang or stand crooked, and should be straightened up.—17. "W.f." is an abbreviation for "wrong font," and signifies that a letter of the same face with the rest of the word must be used.—18. If a line begins wrongly with an indentation as a paragraph, this sign, signifying "no paragraph," is used, with a line connecting the last and first words of the separation.—19. When a word is to be supplied, a caret indicates where, and the word is written on the margin behind a short line.—20. A broken or faulty letter is marked, and a cross placed on the margin.—21. Shows where a word has been accidentally separated by a space.

THOUGH several differing opinions exist as to the individual by whom the art of printing was first discovered; yet all authorities concur in admitting PETER SCHOEFFER to be the person who invented *cast metal types*, having learned the art of *cutting* the letters from the Gutenbergs: he is also supposed to have been the first who engraved on copper plates. The following testimony is preserved in the family, by Jo. Fred. Faustus, of Aschеffenburg;

'PETER SCHOEFFER, of Gernsheim, perceiving his master Faust's design, and being himself ardently desirous to improve the art, found out (by the good providence of God) the method of cutting (*incidendi*) the characters in a matrix, that the letters might easily be singly *cast*, instead of being *cut*. He privately *cut matrices* for the whole alphabet: and when he showed his master the letters cast from these matrices, Faust was so pleased with the contrivance, that he promised Peter to give him his only daughter Christina in marriage, a promise which he soon after performed. But there were as many difficulties at first with these letters as there had been before with wooden ones, the metal being too soft to support the force of the impression: but this defect was soon remedied, by mixing a substance with the metal which sufficiently hardened it.'

POLISH, For Piano Keys. — The frame would not hold the keys sufficiently level or firm. A better way would be to handscrew a few at a time on a board, and scrape them in that position. They should be finished with flour paper, care being taken that they do not get too hot during the process. Unless the keys are very hollow or much discolored, it would perhaps be better to dispense with the scraper altogether, using a coarser glasspaper in its stead. They should be polished singly, on a board covered with several thicknesses of cloth; this should be placed on a bench, and the ivories vigorously rubbed, lengthwise and face downward, until a good polish is obtained. Putty powder is the best polishing material, though pumice might first be used to take out any marks left by the paper. A very brilliant polish may be got by finishing the keys with a similar board covered with wash leather, and sprinkled with rouge. A liberal supply of water is necessary during the process.

POWDERS, Sachet. — The material is either to be ground in a mill or powdered in a mortar, and afterward sifted. — 1. (*Acacia.*) Cassie flower heads, 1 lb; orris powder, 1 lb.—2. (*Scent Powder.*) The following recipe for scent powder to be used for wardrobes, boxes, etc., gives an article far superior to the mixtures sold in the shops: Coriander, 1 oz.; orris root, 1 oz.; rose leaves, 1 oz.; and aromatic calamus, 1 oz.; lavender flowers, 2 oz.; rhodium wood, ½ dr.; musk, 5 gr. These are reduced to a coarse powder. The scent on the clothes is as if all fragsant flowers had been pressed in their folds. — 3. Take of reindeer moss, in coarse powder, any quantity, and very strongly scent it with any of the compound fragrant essences, or with the perfumes of which they are made, or with mixed essential oils, at will.

PRESERVING CUT FLOWERS.—Plants vary in their nature, and different causes lead to decay. Certain flowers, like the flag, the lily, the pansy and others, slough away when put into water. Cut off the end of the stems very frequently. Wild flowers develop and fall more quickly than those from the garden. Flowers plucked in the

bud last longer. Flowers should always be placed in water as soon as possible after being picked; when received by post in a somewhat wilted condition, an immediate plunge into hot water, with a little sal volatile will accomplish wonders. If you are fond of flowers in your hair or corsage, they can be made to last an entire evening if the ends are sealed with a bit of wax.

PRESERVING FRUIT, Table of Time for.—

Fruit.	Time for boiling.	Sugar to qt. of fruit.
Cherries	5 min.	6 oz.
Raspberries	6 min.	4 oz.
Blackberries	6 min.	4 oz.
Strawberries	8 min.	8 oz.
Plums	10 min.	10 oz.
Whortleberries	5 min.	8 oz.
Pie plant	10 min.	8 oz.
Sour pears (whole)	30 min.	4 oz.
Bartlett pears (halves)	20 min.	6 oz.
Peaches (halves)	8 min.	4 oz.
Peaches (whole)	15 min.	4 oz.
Pineapples (sliced)	15 min.	6 oz.
Crab apples	25 min.	8 oz.
Sour apples	10 min.	5 oz.
Ripe currants	6 min.	8 oz.
Gooseberries	8 min.	8 oz.
Wild grapes	10 min.	8 oz.
Quinces (sliced)	15 min.	10 oz.
Tomatoes	20 min.	½ teaspoonful of salt.

RAIN-GUAGE.—A convenient rain-guage sufficient for ordinary agricultural purposes may be made of a common funnel and a large-sized bottle. The upper rim of the funnel should be made so that no water falling into it will splash out. The large opening of the funnel must be circular and exactly 8 in. in diameter, and the water caught by it is collected in the large bottle. The bottle must be graduated; to do this, set it on a level table and pour into it 3½ oz. clean water. On the bottle make a mark at the level at which the water stands. Now add 3½ oz. more, and make another mark; continue this until the scale is finished. Each of these marks means ½ in. of rain fall. This scale may be marked off on paper and pasted in the proper position on the bottle. In using the rain-guage never set it on sloping ground, but on a level surface, at a distance from shrubs, trees, walls, buildings, at least as many feet from their base as they are in height. The guage must be set so that it will withstand a gale of wind. When snow or sleet collects in the guage it should be removed to a warm room for the snow to melt, the quantity of water produced being noted as in the case of rain.

RATS.—1. (*To Catch.*) It is said that rats can not resist sunflower seeds. A trap baited with these seeds is the most effectual method of catching them.—2. (*To Drive Away Alive.*) Somebody who has tried it recommends putting pulverized potash, which soon becomes sticky when exposed to the air, in all the rat-holes about the house. The special detestation of a rat is anything which will stick to his silky coat. Some persons find a mixture of equal parts of cayenne pepper and Scotch snuff sprinkled well into the holes still more efficacious.

RAZOR PASTE.—1. (*Pradier.*) Best putty powder, 1½ oz.; jewelers' rouge, 1½ oz.; scales of iron, ¾ oz.; levigated Turkey ston stone, 4½ oz.; beef suet, 2½ oz.—2. Put equal parts of dried sulphate of iron and salt in a closed vessel and apply a gradually increased heat. Pulverize, elutriate, mix with lard or tallow.

REMEDIAL FOODS.—Celery is invaluable as a food for those suffering from any form of rheumatism, for diseases of the nerves and nervous dyspepsia.—Lettuce is useful to those suffering from insomnia.—Water cress is a remedy for scurvy.—Peanuts for indigestion. They are especially recommended for corpulent diabetes. Peanuts are made into a wholesome and nutritious soup, are brewed and used as coffee, are eaten as a relish simply baked, or are prepared and served as salted almonds.—Onions are almost the best nervine known. No medicine is so useful in cases of nervous prostration, and there is nothing else that will so quickly relieve and tone up a worn out system. Onions are useful in all cases of coughs, colds and influenza; in consumption, insomnia, hydrophobia, scurvy, gravel and kindred liver complaints. Eaten every other day, they soon have a clearing and whitening effect on the complexion.—Spinach is useful to those suffering with gravel. Asparagus is used to induce perspiration.—Carrots for sufferers from asthma.—Turnips for nervous disorders and for scurvy.—Raw beef proves of great benefit to persons of frail constitution, and to those suffering from consumption. It is chopped fine, seasoned with salt and heated by placing it in a dish in hot water. It assimilates rapidly, and affords the best nourishment.—Eggs contain a large amount of nutriment in a compact, quickly available form. Beaten up raw, with sugar, they are used to clear and strengthen the voice. With sugar and lemon juice the beaten white of egg is used to relieve hoarseness.—Honey is wholesome, strengthening, cleansing, healing and nourishing.—Fresh ripe fruits are excellent for purifying the blood and toning up the system. As specific remedies, oranges are aperient. Sour oranges are highly recommended for rheumatism.—Cranberries for erysipelas are used externally as well as internally.—Lemons for feverish thirst in sickness, for biliousness, low fevers, rheumatism, colds, coughs, liver complaint, etc.—Blackberries as a tonic. Useful in all forms of diarrhœa.—Tomatoes are a powerful aperient for the liver, a sovereign remedy for dyspepsia and indigestion. Tomatoes are invaluable in all conditions of the system in which the use of calomel is indicated.—Figs are aperient and wholesome. They are said to be valuable as a food for those suffering from cancer; they are used externally as well as internally.—Apples are useful in nervous dyspepsia; they are nutritious, medicinal and vitalizing; they aid digestion, clear the voice, correct the acidity of the stomach, are valuable in rheumatism, insomnia and liver trouble. An apple contains as much nutriment as a potato in a

pleasanter and more wholesome form.—Grapes dissolve and dislodge gravel and calculi, and bring the stomach and bowels to a healthy condition.—Pie plant is wholesome and aperient; is excellent for rheumatic sufferers and useful for purifying the blood.

RICE, To Boil.—Pick your rice clean and wash it in two cold waters, not draining off the last water until you are ready to put the rice on the fire. Prepare a saucepan with water and a little salt. When it boils, sprinkle in the rice gradually, so as not to stop the boiling. Boil hard for twenty minutes, keeping the pot covered. Then take it from the back of the fire and pour off the water, after which set the pot on the back of the stove to allow the rice to dry and the grains to separate. Remember to boil rapidly from the time you cover the pot until you take it off; this allows each grain to swell to three times its normal size, and the motion prevents the grains from sticking together. Don't stir it, as this will cause it to fall to the bottom and burn. When properly boiled, rice should be snowy-white, perfectly dry, soft, and every grain separate.

RING, Tight, to Remove.—A ring which is so tight on the finger as to preclude removal by the ordinary methods, can be easily removed by thoroughly cleaning the finger and ring from all dirt and grease, and then dipping them in a deep cup of mercury, on the top of which a small quantity of a saturated solution of oxalic acid has been poured. Amalgamation of the ring rapidly occurs, and it can be broken in pieces without difficulty. If it is a gold ring, the acid is not necessary, but if brass or copper it must be dipped in the acid or the mercury will not attack it.

ROSES, White, to Make Blue.—Water the trees throughout the winter with a solution of Prussian blue, and if you want them to be green use sulphate of copper.

ROTATION OF CROPS.—It is well to have some system of rotation adapted to the soil and farm under cultivation, thus bringing every part of the farm into grass again, at intervals of 10 or 15 years. If five acres of sod be broken yearly, and five acres be put down to grass, ten acres will be annually under the plow; which, for one hundred acres, would give meadows of ten years' standing. Under such a system it will be seen, the land could be thoroughly cultivated and enriched, and made to produce larger returns both in grain and grass.—1. The following is a *rotation of four years*, which is greatly approved of by practical men, as it has the merit of substituting alternate and continuous rotation for triennial rotation. It is carried out according to the following plan: First year, potatoes; second, wheat; third, clover; fourth, wheat.—2. First year, beetroot; second, wheat; third, clover; fourth, wheat.—3. (*Rotation of Five Years.*) First year, potatoes; second, wheat; third, clover; fourth, colza; fifth, wheat.—4. First year, potatoes; second, wheat; third, clover; fourth, wheat; fifth, oats.—5. First year, colza; second, beetroot; third, wheat; fourth, clover; fifth, wheat.—6. (*Rotation of Six Years.*) Linseed, beetroot, wheat, colza, wheat, oats, rye, or barley.—7. Flax, beetroot, wheat, colza, wheat, oats, barley, or rye.

ROUND SHOULDERS, To Cure.—Anybody can cure round shoulders by a very simple system of exercise. The round-shouldered man should go into the open air three or four times a day, let his hands drop to his sides and then, while inhaling fresh air, raise himself on his toes as high as he can. The filling of the lungs pushes the shoulders back to their normal condition, and if the practice is steadily followed for a couple of months, the worst pair of stoop shoulders in time will become as straight as a drill sergeant's.

RUBBER, Artificial.—1. Prepared by mixing a thick solution of glue with tungstate of soda and hydrochloric acid. A compound of tungstic acid and glue is precipitated, which at 86° to 104° Fahr. is sufficiently elastic to admit of being drawn out into thin sheets. On cooling this mass becomes solid and brittle, but on being heated is again soft and plastic. This compound can be used for many of the purposes to which rubber is adapted.—2. Heat in an iron kettle, ½ filled, 10 lbs. sulphur and 20 lbs. rapeseed oil, with constant stirring until the sulphur is melted, and the mass begins to swell; then pour it into a mold dusted with some kind of powder, or upon a slab moistened with water, when it will harden at once. Linseed oil may take the place of rapeseed, when less sulphur must be used.

RUBBER, To Dissolve.—1. A mixture of 6 parts absolute alcohol with 100 of sulphate of carbon; the latter is the real solvent; the alcohol has an indirect action. The quantity of solvent required depends on the consistency of solution required; if moderate heat is used and the mixture shaken, the whole dissolves; but a better solution is obtained for adhesive properties by using a large quantity of solvent; not shaking, but drawing off the clear glazy liquid. —2. For a small quantity, place 1 fl. dr. sulphuric acid and the same quantity of water in a vial, and shake together; great heat is evolved; allow to stand till cool; then add 2 fl. oz. spts. turpentine and shake well; great heat will be evolved and the color changed to deep cinnamon. Allow to stand 24 hours, after which a strong, dark sediment will have settled at the bottom of the bottle. Pour off the clear into another bottle, and add 1½ dr. (apothecaries' weight) common India rubber cut into shreds, and then place it uncorked over a gentle heat, and boil slowly 5 hours. At the end of that time the India rubber should be dissolved. It can be concentrated by longer boiling, or thinned by addition of turpentine.—3. The solution of India rubber or gutta percha in chloroform or benzole, frequently called for in photographic work, is usually attended with so many difficulties and drawbacks that in nine cases out of ten, where the solution is required the experimentalist usually purchases it ready made. Yet there need be no difficulty about the matter. First, pure rubber should be obtained. When vulcanized, it is perfectly insoluble. Secondly, pure solvents are necessary. Chloroform containing a large excess of alcohol and water will

fail to act even upon the purest rubber. Again, under the most satisfactory conditions, the action is very slow, and the amount of rubber capable of being taken up is proportionately very small. The plan usually adopted is to place a large amount of shredded rubber in a bottle, which is then filled up with the solvent, and shaken at intervals a few times; and when the shreds do not dissolve like pieces of sugar the whole is thrown aside, and we are written to for an explanation of the failure. If a small quantity of rubber had been placed in the bottle, and the liquid added, it would have been observed gradually to swell out very considerably after the lapse of some time, and a mixture of the whole would be facilitated by stirring with a glass rod or a splinter of wood. The rapidity with which the rubber absorbs the solvent will depend upon its condition; but the action is never very quick, nor is it in any way analogous to the dissolution of a crystal. One cause of the failure of chloroform to act upon the caoutchouc may arise from the presence of alcohol in too great a proportion. Chloroform as sold almost always contains alcohol in small quantity, owing to the fact that when none is present it cannot be prevented from decomposing spontaneously, more especially in the light. It is, however, stated that when entirely protected from light absolute chloroform will not undergo any change. A solution of gutta percha in chloroform has a use which is not generally known. It forms, when carefully made and filtered quite bright, the best possible material for obscuring glass for focusing screens. For fine microscopic work it is said by those whose opinions are of weight to be unequaled. —4. This new solvent consists of a mixture of methylated ether and petroleum spirit—the common benzoline used for burning in sponge lamps. This forms the most rapid and, perhaps, the best solvent; the mixture is as much superior in power to either of its constituents singly as the ether-alcohol is to plain ether in its action on pyroxylin. A very thick solution can be made by dissolving 60 gr. of good India rubber in 2 oz. of benzoline and 1 oz. of sulphuric ether. If the India rubber be cut up fine and the mixture shaken occasionally, the solution will be complete in two or three hours, when it may be diluted to any required strength with benzoline alone. The India rubber should be as light colored as possible, and all the outer oxidized portions must be cut away. Shred the clean India rubber with a pair of scissors, and throw it at once into the solvent.

RUBBER, Elasticity of, to Restore.—Immerse the articles in a mixture of water of ammonia, 1 part; and water, 2 parts; for a time varying from a few mintes to 1 hour, according to circumstances. When the mixture has acted on the rubber it will be found to have recovered its elasticity, smoothness and softness.

RUBBER HOSE, Composition for.—Grind together Java rubber, 20 lbs.; Para rubber, 10 lbs.; white lead, 14 lbs.; red lead, 14 lbs.; yellow sulphur, 1½ lbs. Spread on flax cloth, which weighs 10, 16, and 32 oz. to the sq. yd.

RUBBER HOSE, To Repair.—Cut the hose apart where it is defective; obtain from any gas fitter a piece of iron pipe 2 or 3 in. long; twist the hose over it until the ends meet; wrap with strong twine well waxed, and it will last a long time.

RUBBER, To Preserve.—To keep rubber from cracking, use a mixture of 1 part aqua ammonia with 2 parts water, in which the articles should be immersed until they assume their former elasticity, smoothness and softness, the time required varying from a few minutes to 1 hour.

RUBBER, To Vulcanize.—1. The vulcanizing process consists in incorporating with the rubber 3 to 10 per cent. sulphur, together with various metallic oxides, chiefly lead and zinc, the quantity of the latter articles being regulated by the degree of elasticity required. The goods of large establishments are vulcanized in cylindrical wrought iron steam heaters, over 50 ft. long, and 5 to 6 ft. in diameter. These heaters have doors opening on hinges at one end, and through these the goods are introduced on a sort of railway carriage; then, after the door is shut, steam is let on, and a temperature of 250° to 300° of heat is kept up for several hours, the degree of heat ascertained by thermometers attached to the heaters. The value, solidity and quality of the goods is increased by keeping the articles under the pressure of metallic molds or sheets while undergoing this process. The process requires careful manipulation and great experience to conduct it properly.—2. In vulcanizing rubber in contact with iron, so that the vulcanized rubber and metal will cohere, coat the iron all over with a melted mixture of equal parts of genuine asphaltum and gutta percha. Soft rubber containing 6 per cent. of sulphur, when firmly pressed into contact with this coating and then vulcanized by steam heat, adheres strongly to the metal after cooling.

RUGS, To Make from Old Carpets.—There are three methods of forming old ingrain carpets into rugs pretty and serviceable. They are, in fact, prettier than almost any other style of home-made rugs. In the first method, cut the carpeting, after it has been thoroughly cleaned and dried, into narrow strips across the width. Three-fourths of an inch is the right width. Then draw the strips through the hands a few times to fray the edges somewhat. They are then sewed together by joining the selvedges in a strong over-cast stitch and wound into balls the same as all carpet rags are when prepared for the loom. Made in this way, the rugs when woven do not have as nice a nap as when made by the following methods, but as there is no waste of material the benefit is evident. Of course, all-wool ingrain is the best kind for this purpose. The amount necessary for a rug made in this way is 2½ pounds if 1 yard square, while in the second, 4 pounds are required. In this second method the strips are cut lengthwise of the width, the same size as the other, and then fringed a quarter of an inch on each side. Thus a fine nap is formed when the rug is woven; but when we consider the waste of good material and the tedious work necessary, we conclude that it does not pay. In sewing these strips to-

gether care must be exercised in lapping the ends neatly, so that they will not show when the rug is woven. Then form into balls. Any one who weaves rag carpets well can weave these rugs, but they must be woven good in order to be a success. Loose, careless weaving spoils their appearance. There must be enough warp woven on each end of the rug to serve for the purpose of hemming. Usually the looms are intended to weave only one yard in width, but in some places there are those who make a specialty of rug-weaving and can weave them 12 feet wide. Made in this width, for somewhat less, and woven with a heavy warp, much coarser than that used in rag carpets, they make handsome center squares for parlor or dining room, and will cost for weaving and warp about $5, and are as handsome as those bought at the stores costing five times as much. No matter if the old carpet is old and faded, and worn all to pieces, there are great possibilities in it. Just go to work, wash and dry it, and cut it up; the faded browns and yellows become a lovely mottled brown rug, in tint like the dead leaves of autumn. The carpets, whose colors were chiefly green and red, become an attractive mossy-looking rug.

RUST, To Prevent.—1. (*On Grates or Fire-irons.*) To preserve bright grates or fire-irons from rust, make a strong paste of fresh lime and water, and with a fine brush smear it as thickly as possible all over the polished surface requiring preservation. By this simple means all the grates and fire-irons in an empty house may be kept for months free from harm without further care.—2. (*On Iron and Steel Surfaces.*) Caoutchouc oil is said to have proved efficient in preventing rust, and to have been adopted by the German army. It only requires to be spread with a piece of flannel in a very thin layer over the metallic surface and allowed to dry up. Such a coating will afford security against all atmospheric influences and will not show any cracks under the microscope after a year's standing. To remove it, the article has simply to be treated with caoutchoc oil again, and washed after twelve to twenty-four hours.—3. A solution of India rubber in benzine has been used for years as a coating for steel, iron and lead, and has been found a simple means of keeping them from oxidizing. It can be easily applied with a brush and is as easily rubbed off. It should be made about the consistency of cream.—4. All steel articles can be perfectly preserved from rust by putting a lump of freshly burnt lime in the drawer or case in which they are kept. If the things are to be moved (as a gun in its case, for instance), put the lime in a muslin bag. This is especially valuable for specimens of iron when fractured, for in a moderately dry place the lime will not want renewing for many years, as it is capable of absorbing a large quantity of moisture. Articles in use should be placed in a box nearly filled with thoroughly pulverized slaked lime. Before using them rub well with a woolen cloth.—5. The following mixture forms an excellent brown coating for protecting iron and steel from rust: Dissolve 2 parts crystallized iron chloride, 2 parts antimony chloride and 1 part tannin, in 4 parts water and apply with a sponge or rag and let dry. Then another coat of the paint is applied, and again another, if necessary, until the color becomes as dark as desired. When dry, it is washed with water, allowed to dry again, and the surface polished with boiled linseed oil. The antimony chloride must be as nearly neutral as possible.—6. (*On Iron, Underground.*) Cottonseed or linseed oils, 1 lb.; coal tar, 1 lb.; sulphur, 1 lb.; heat separately; mix thoroughly and heat to 300° F. for about one hour, at the end of which it becomes pasty. Heat the metal to which it is applied.—7. (*Within Show Cases.*) It is well known that the rusting of bright steel goods is due to the precipitation of atmospheric moisture upon the metal. This may be obviated by keeping the air surrounding the goods in a dry condition, and a saucer of powdered quicklime placed in an ordinary show-case will usually suffice to prevent the rusting of the cutlery exhibited therein, as the lime will take up the moisture.

RUST, To Remove.—Articles of iron and steel can be easily and thoroughly cleaned from rust by being plunged into a strong solution of chloride of zinc and allowed to remain for twelve hours, or even longer if the rust be very thick. Upon removal the metal should be washed with plain water and then with ammonia water, and quickly dried. Rubbing with putz-pomade will then give them a brilliant polish.

SALAD DRESSING.—This is excellent both for salad and for sliced tomatoes in summer. Take the yolk of 1 fresh egg and mix it with 2 tablespoonfuls of olive oil very slowly, add 1½ spoonfuls of mustard, 3 spoonfuls of salt, a little pepper, and last of all, 2 spoonfuls of vinegar. Beat the white of the egg to a stiff froth, and lightly stir in.

SALAD, Egg.—Of all the delicate bites the egg salad should surely have the palm. It is easily made, and can be arranged early in the morning, leaving the dressing to be the very last duty before the guests arrive. This salad of egg is really of stuffed eggs; and one cup should be given to each person. Boil 10 eggs 20 minutes. Peel off the shells and cut each egg in half, so as to form two cups. From the end of each cup cut a small slice, so they will stand firm. Remove from each egg the yolk and put all the yolks in a bowl. Mix together in an earthen sauce pan 2 eggs well beaten, 1 teaspoonful of dry mustard, 3 tablespoonfuls of sweet cream, 1 teaspoonful of salt, 1 teaspoonful of pepper, 2 tablespoonfuls of olive oil and 2 tablespoonfuls of vinegar. Boil until thick as custard and mix with the hard boiled yolks. Fill the cups made from the white with the mixture and set on ice until cold. Serve each cup with a leaf of lettuce and pour over egg and lettuce some mayonnaise sauce. On the plate should also be a slice or two of thin bread and butter and a cup of Russian tea in which sugar and cream is added. A teaspoonful of rum is a great improvement.

SALTED PECAN NUTS.—Purchase the ready-shelled pecan nuts from a confectioner's. Have a small wire strainer; place the nuts in it. Put

into a small saucepan into which the strainer will fit nicely equal parts of butter and lard. When boiling stand the strainer of nuts into it, and allow it to remain for an instant; remove, drain on brown paper and sprinkle with salt. Stand instantly in a cold place and they will become crisp.

SANDWICHES, To Make.—1. (*Cabbage.*) Substituting finely chopped cabbage for the celery. (See CELERY.)—2. (*Celery.*) Chop celery very fine, heart and all, and add enough salad dressing to spread it easily.—3. (*Cheese.*) Split small crackers, spread thickly with grated cheese, place together, lay on a pan, sprinkle well with salt, and set in the oven until only slightly browned. These make deliciously crisp sandwiches that are very relishable served with tiny cucumber pickles.—4. (*Cucumber.*) Chop very fine tart cucumber pickles, add one-half the amount of hard-boiled egg yolks rubbed smooth, and enough melted butter, and vinegar from the pickle to form a paste. Mix thoroughly and spread.—5. (*Fruit.*) Dainty fruit sandwiches are a novelty for afternoon tea. Cut the bread very thin and butter it lightly, then spread with raisins, dates or candied cherries that have been chopped fine and moistened with orange juice, sherry or madeira. Roll and tie with baby ribbons. When used for light evening refreshments, lemonade or punch is served with these.—6. (*Lemon.*) Into a teacupful of nicest butter slightly softened beat the raw yolk of an egg and a teaspoonful of French mustard. Rub smooth the yolks of two eggs that have been boiled for three-quarters of an hour; rub into them one-fourth of the butter, a scant half teaspoonful of salt and a teaspoonful of lemon juice. Add another fourth of the butter and a teaspoonful of lemon juice, and so on until all the butter and two tablespoonfuls of lemon juice have been used, rubbing completely until all is smooth and fine, and spread moderately thick. These are as appetizing as anything could well be.—7. (*Mixed.*) Chop very fine any cold meat or bits of fowl; two or three kinds may be used; add one-half the amount of finely chopped cabbage or celery; mix with sufficient salad dressing to thoroughly moisten, and let it stand two or three hours before spreading between the slices of bread.—8. (*Nut.*) Chop hickory-nuts, walnuts or hazel-nuts until fine, and mix with salad dressing; or with the rolling-pin roll to a paste, sprinkle well with salt, and spread very thickly between slices of bread cut as thinly as possible.—9. (*Peach.*) Pare very ripe peaches, slice thinly, sprinkle well with sugar, and let stand for two or three hours. Spread bread thickly with fresh, sweet country butter, add plenty of the sliced peaches, and serve at once. Almost any seedless fruit may be used for sandwiches. If for a picnic, slices of sponge-cake may be used instead of bread, and whipped cream substituted for butter, and served for dessert.—10. (*Peanut.*) Peanuts mixed with mayonnaise dressing make an acceptable filling for bread sandwiches and are the thing to be served for the 5 o'clock tea. Take freshly roasted peanuts, chop them very fine, or, better still, roll them to a fine meal; then mix with the dressing; spread on buttered bread, covered with shredded lettuce.—11. (*Tomato.*) Pare very ripe tomatoes, and press through a sieve to remove the seeds; mix thoroughly with mayonnaise dressing.

SALTED ALMONDS.—Heat 1 tablespoonful best butter, or 1 scant teaspoonful olive oil, smoking hot. Then add ½ lb. Jordan Almonds, blanched. When the almonds begin to brown, sprinkle over them 1 scant tablespoonful salt, and stir and shake until all are a golden brown. Oil gives a higher glaze than butter.

SALTED PEANUTS.—Buy raw; shell; put in oven and bake until the skin cracks. Brush the skins off, and proceed as with almonds.

SAUCEPAN or KETTLE, To Mend.—A hole in a granite saucepan or kettle may be mended by using a copper rivet. These rivets, which come in several sizes, may usually be bought from a harness-maker. The rivet is put in the hole, and over the end of it is put a copper washer, which is a part of it. Flatten the end of the rivet with a tack-hammer, and the kettle is good for service for many days. When the enamel is chipped from a spot in the bottom of the saucepan, the weak spot may be re-enforced in the same way.

SAUCES, To Make.—1. (*Fish.*) Port wine, 1 gal.; mountain, 1 qt.; walnut ketchup, 2 qt.; anchovies and liquor, 2 lb.; 8 lemons; 36 shallots; scraped horseradish, 1½ lb.; flour of mustard, 8 oz.; mace, 1 oz.; cayenne, q. s.; boil up gently, strain and bottle.—2. Twenty-four anchovies; 10 shallots; scraped horseradish, 3 spoonfuls; mace and cloves, of each ½ oz.; 2 sliced lemons; anchovy liquor, 8 oz.; water, 1 pt.; Hock or Rhenish wine, 1 bottle; walnut ketchup, ½ pt.; boil to 2½ lb.; strain and bottle.—3. (*Quin's.*) Walnut pickle and port wine, of each, 1 pt.; mushroom ketchup, 1 qt.; anchovies, and shallots, chopped, of each, 2 doz.; soy, ½ pt.; cayenne, ½ oz.; simmer for 10 minutes, strain and bottle.—4. Walnut pickle, mushroom ketchup and soy, of each, 1 pt.; chopped cloves of garlic and anchovies, of each, 1 doz.; cayenne and bruised cloves, of each 1 dr. As last.—5. (*Sauce Superlative.*) Port wine and mushroom ketchup, of each 1 qt.; walnut pickle, 1 pt.; pounded anchovies, ½ lb.; lemon peel, minced shallots and scraped horseradish, of each 2 oz.; allspice and black pepper, bruised, of each 1 oz.; cayenne pepper and bruised celery seed, of each ½ oz. (or currie powder ¾ oz.); digest 14 days, strain and bottle.—6. (*Tomato.*) Bruised tomatoes, 1 gal.; salt, ½ lb.; in three days press out the juice; to each qt. add shallots, 2 oz.; black pepper, 1 dr.; boil for 30 minutes; strain, add mace, allspice, ginger and nutmeg, of each ½ oz.; coriander seed and cochineal, of each 1 dr.; simmer gently for fifteen minutes, strain, cool and bottle.

SAWS, To Mend.—File to a powder pure brass, 3 parts; pure silver, 2½ parts; pure copper, 1½ parts. Mix thoroughly. Put the saw on an anvil, the broken edges in contact. Put a line of the above mixture along the seam, cover with powdered charcoal. Take a spirit lamp and a blowpipe, hold the coal dust in place, and blow just enough to melt the solder

Set the joint smooth with a hammer. File away the superfluous solder.

SCAB. Apple, to Prevent.—Apple scab, the worst fungus disease of the apple in this country, was very largely controlled in orchards sprayed once before the buds started in the spring with copper sulphate (2 pounds to 50 gallons of water), and four times subsequently with Bordeaux mixture. The Bordeaux mixture was applied in various strengths, from 1 lb. to 6 lbs. of copper sulphate and the same weight of lime to 50 gal. of water. The 3 and 4-pound solutions gave as good results as the 6-pound solution the first season, and the second season, after systematic spraying was begun, the 1 and 2-pound solutions were sufficient to hold the scab almost entirely in check. In unsprayed orchards the scab ripens, its spores germinate upon the fruit and leaves, causing a second crop of the fungus, that appears as clouds or blotches on the apple in autumn. On sprayed trees no trace of this second crop of scab could be found, while on unsprayed apples it was almost universal.

SCARS. To Remove.—The cicatrices, scars or marks left by various diseases, burns or wounds of divers kinds, are often less obstinately permanent than is generally supposed, and from some facts which have lately come under notice, it is thought that their prevention or removal in many cases may be accomplished by some mild but effectual antiseptic. Among the exemplifications of the efficacy of the formula, is the case of a gentleman whose face was so severely burnt by the violent spurting of a quantity of melted lead (owing to a workman having incautiously dropped a wet pipe into it), that his eyes were only saved by pebble spectacles from utter destruction. At first, of course, carron oil was the sole application, and as for weeks afterward particles of the granulated metal had literally to be dug out of the flesh, a deeply scarred countenance was naturally predicted by all, except the patient himself. One mark of an almost imperceptible character alone remained after the expiration of 6 months, owing to the whole face being bathed twice or three times a day, as soon as the oil treatment could be discontinued, with a lotion of the simplest character, as is readily seen by glancing at its constituents. Lint soaked in the same solution and allowed to remain on some little time, will frequently mitigate the visible results of smallpox, and one case ringworm treated in this way left no scar whatever. The following is a convenient formula: Borax, ½ oz.; salicylic acid 12 gr.; glycerine, 3 dr.; rose water, 6 oz. Make a lotion.

SCORCHING CAKES. To Prevent.—When baking cakes, set a dish of water in the oven with them, and they will not be in much danger from scorching.

SEA-SICKNESS. To Prevent and Cure.—1. It is asserted that the reason so little attention has been paid to seasickness, especially by those not subject to it, is that there was a fallacious idea that to be seasick did a person good; that it cleared out the system, and, therefore, nature should be allowed to take its course. There is neither advantage in nor need for the ailment. It must be prevented, and the battle of prevention must be fought on land before sailing. For three days before the voyage doses of bromide of sodium must be taken—in preference to bromide of potassium, and this course must be continued for three or four days after sailing. One pleasant effect of this bromization is the sound and refreshing nature of the sleep it induces. The dose is 30 gr. of bromide of sodium three times a day for three days before the voyage, and for three or four days after starting. This treatment has been invariably found to be an absolute preventive. It is said that no evil effects have been found from the use of the bromide of sodium, taken for the prevention of seasickness.—2. It is said that there is no remedy like Worcestershire sauce, in teaspoonful doses, given without water, for both preventing and curing seasickness. It should be supplemented in some cases by the application of a tightly-applied bandage, and resting on the right side, taking frequently small quantities of fluid food, such as good beef tea with cayenne pepper in it. No stimulants must be taken, and the feet should be kept warm with hot brick or bottle. This treatment is very effective. As a remedy for warding off the evil, apply with a brush collodion in three successive layers on the epigastric region over the stomach and neighboring parts. It acts as a powerful antiemetic. The diet and state of health should be looked after for a week before the trip or a voyage on the ocean. Pastry and all rich foods should be avoided, and a course of cooling medicine taken to cleanse and purify the blood. A strong cup of pure, black, unsweetened coffee, taken an hour before starting and three hours after a substantial but easily digested meal, is also a great preventive.—3. There is no remedy for this which will answer in all cases. Some people will always be sick. A dose of 30, 60 or 90 gr. of bromide of sodium three times a day is recommended. A recumbent position is best suited to the patient if ill. Every effort should be made to keep to the deck and a waterproof blanket will be found of use. Keep the bowels free and try to eat. Crackers, beef tea and olives are best relished.

SEWER GAS, To Detect.—1. A suspected joint in a sewer or drain pipe may be tested by wrapping it with a single layer of white muslin, moistened with a solution of acetate of lead. As the gas escapes through the meshes of the cloth it will be blackened by the sulphur compounds.—2. It is usual to detect gas escapes by applying a lighted taper or candle to the suspected place of leakage. This is dangerous, and many explosions have thus been occasioned. A safer mode is as follows: Mix dark soap and water in the proportion of 2 lb. of the former to 5 or 7 pt. of the latter. The sticky paste or liquid so obtained is ready to be applied by the brush to the gas pipe, when, if an escape is taking place, bubbles will readily be seen on the liquid; thus the positions of the gas escapes are indicated without any danger.—3. Saturate unglazed paper with a solution of 1 oz. of pure lead acetate in ½ pt. of rain water; let it par-

tially dry, then expose in the room suspected of containing sewer gas. The presence of the latter in any considerable quantity soon darkens or blackens the test paper.

SHAVING, Easy.—1. Never fail to well wash your beard with soap and cold water, and to rub it dry, immediately before you apply the lather, of which the more you use, and the thicker it is, the easier you will shave.—2. Never use warm water, which makes a tender face.—3. The moment you leave your bed (or bath) is the best time to shave.—4. Always wipe your razor clean, and strop it before putting it away; and always put your shaving brush away with the lather on it.—5. The razor (being only a very fine saw) should be moved in a sloping or sawing direction, and held nearly flat to your face, care being taken to draw the skin as tight as possible with the left hand, so as present an even surface and throw out the beard.—6. The practice of pressing on the edge of a razor in stropping it soon rounds it; the pressure should be directed to the back, which should never be raised from the strop. If you shave from heel to point of the razor, strop it from point to heel; but if you begin with the point in shaving, then strop it from heel to point.—7. If you only once put away your razor without stropping it, or otherwise cleaning the edge, you must no longer expect to shave well and easy, the soap and damp so soon rust the fine teeth and edge.—8. A piece of soft plate leather should always be kept with razors, to wipe them with.—9. (*Shaving Cream.*) Curd soap, 8 oz.; almond oil, 2 oz.; glycerine, 1 oz.; spermaceti, ½ oz.; carbonate of potassium, ¾ oz.; water, 16 oz.; cut the curd soap into shreds, and dissolve it by the aid of a water bath in 14 oz. of water. Dissolve the spermaceti in the almond oil, and while warm mix it with glycerine, potash, and remainder of the water; transfer to a warm mortar, gradually and steadily incorporate the warm soap solution, and continue to stir until a smooth paste is formed. With this incorporate a suitable perfume.

SHERBETS.—1. (*Lemon.*) Four lemons; 1 pt. sugar; 1 qt. boiling water. Shave off the peel from 2 lemons in thin, wafer-like parings, being careful to take none of the lighter colored rind below the oil cells. Put the parings into a bowl, add the boiling water and let it stand ten minues, closely covered. Cut the lemons in halves, remove the seeds, squeeze out the juice and add it with the sugar to the water. Add more sugar if needed. When cold, strain it through a fine strainer into the can and freeze. *a. With Gelatine.* One tablespoonful of gelatine; 6 lemons; 1 pt. sugar; 3½ cups cold water; ½ cup boiling water. Soak the gelatine in ½ a cup of cold water, 20 minutes. Put the sugar and the remaining cold water into a large lip bowl or pitcher. Pare the lemons, cut in halves, remove all the seeds, and press out the juice with a lemon-squeezer; add it to the syrup. Dissolve the soaked gelatine in the boiling water, add it to the other mixture. If liked sweeter, add more sugar. When the sugar is dissolved strain through a fine wire strainer or cheese-cloth, turn into the freezer can and freeze as directed. Sherbet made in this way has none of the volatile lemon oil, which, to a delicate stomach, often proves indigestible. *b. With White of Egg.* Two qts. boiling water; 8 lemons; 1 egg (white); 1 qt. sugar. Spread part of the sugar on a shallow plate or board, and after wiping the lemons with a clean damp cloth, roll them in the sugar to extract the oil. Then cut in halves, remove the seeds, and squeeze out the juice. Boil all the sugar and water until clear. Remove the scum as it rises. Add the lemon juice to the syrup, strain it, and pour it gradually into the beaten egg. Then freeze as usual.—2. (*Orange.*) One tablespoonful gelatine; 6 oranges or 1 pt. orange juice; 1 scant pt. cold water; 1 cup sugar; ½ cup boiling water. Soak the gelatine in ½ a cup of the cold water ten minutes. Put the sugar and remainder of the cold water in a large pitcher. Cut the oranges in halves, remove the seeds, and squeeze all the juice into the pitcher. Add more sugar, if the oranges are very sour. Dissolve the gelatine in the boiling water, and add it to the mixture. Strain it into the can and freeze. —3. (*Pomegranate.*) One doz. blood oranges; 1 qt. water; 1 pt. sugar. Peel the oranges, cut them in halves across the sections, remove the seeds, and press out the juice with a patent potato sifter. Add the sugar and water, and when the sugar is dissolved, strain into the can and freeze. This will have a fine color and no bitter flavor of the rind.—4. (*Pine-apple.*) One pt. of fresh, or 1 can of grated pine-apple; 1 pt. water; 1 tablespoonful gelatine; 1 pt. sugar; 1 lemon. Pare the pine-apple, remove all the eyes, and pick off the tender part with a fork, rejecting all the hard core. If still too coarse, chop it a little. Add the sugar, water, lemon juice and gelatine, which should be first soaked in cold water and then dissolved in boiling water. Freeze as usual.—5. (*Strawberry or Blackberry.*) One qt. berries, or enough to make 1 pt. of juice; 1 pt. of sugar; 1 lemon. Mash the berries, add the sugar, and after standing till the sugar is dissolved, add the water and lemon juice. Press through fine cheese-cloth, and freeze. Vary the sugar as the fruit requires. All of these fresh fruits are improved by the addition of the lemon.

SHEEPSKINS, To Prepare for Mats.—1. Make a strong lather with hot water and let it stand till cold; wash the skin in it, carefully squeezing out all of the dirt from the wool; wash it in cold water till all the soap is taken out. Dissolve 1 lb. each of salt and alum in 2 gal. of hot water, and put the skin into a tub sufficient to cover it; let it soak for 12 hours, and hang it over a pole to drain. When well drained stretch it carefully on a board to dry, and stretch several times while drying. Before it is quite dry, sprinkle on the flesh side 1 oz. each of finely pulverized alum and saltpeter, rubbing it in well. Try if the wool be firm on the skin; if not, let it remain a day or two, then rub again with alum; fold the flesh sides together and hang in the shade for two or three days, turning them over each day till quite dry. Scrape the flesh side with a blunt knife and rub it with pumice or rotten stone.—2. First remove all the

useless parts and soften the skin by soaking, then remove the fatty matter from the inside and soak it in warm water for an hour. Next mix equal parts of borax, saltpeter, and sulphate of soda in the proportion of about ½ oz. of each for each skin, with sufficient water to make a thin paste; spread this with a brush over the inside of the skin, applying more on the thicker parts than on the thinner; double the skin together, flesh side inward, and place it in a cool place. After standing twenty-four hours wash the skin clean, and apply in the same manner as before a mixture of 1 oz. sal soda, ½ oz. borax, and 2 oz. hard white soap, melted slowly together without being allowed to boil; fold together and put away in a warm place for twenty-four hours. After this, dissolve 4 oz. alum, 8 oz. salt, and 2 oz. saleratus in sufficient hot rain water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for 12 hours; then wring out and hang it up to dry. When dry repeat the soaking and drying two or three times till the skin is sufficiently soft. Lastly, smooth the inside with fine sandpaper and pumice stone.—3. Wash while fresh, in strong soapsuds, first picking from the wool all the dirt that will come out. A little paraffine, a tablespoonful to 3 gal. of water, will aid in removing the impurities. Continue to wash the skin in fresh suds till it is white and clean. Then dissolve ½ lb. each of salt and alum in 3 pt. of boiling water, put into it water enough to cover the skin, which should soak in the solution 12 hours, and then be hung on a line to drain. When nearly dry nail it, wool side in, on a board, or the side of a barn, to dry. Rub into the skin an oz. each of pulverized alum and saltpeter, and if the skin is large double the quantity. Rub for an hour or two. Fold the skin sides together, and hang the skin away for three days, rubbing it every day or till perfectly dry. Then with a blunt knife clear the skin of impurities, rub it with pumice or rotten stone, trim it into shape, and you have a door mat that will last a lifetime. If it is to be dyed, have a shallow vessel as large as the skin in which to prepare the dye, so that the skin can be laid wool side down smoothly into the vessel, that all parts may be equally immersed in the dye. This should not be more than an inch deep, otherwise the skin might be injured by the hot dye. After coloring, again stretch the skin to dry, and then comb with a wool or cotton card.

SHOE DRESSINGS.—1. (*For Patent Leather.*) Add to some pure wax which has been melted in a water bath some olive oil, and then some lard. Mix thoroughly by stirring over a moderate fire. Add some oil of turpentine, then a little oil of lavender. This will form a paste which should be put in boxes. Apply with a linen rag. The paste keeps the leather soft and restores the gloss.—2. (*For Preserving the Gloss of Patent Leather and to Prevent Cracking.*) Melt wax with a little oil of turpentine, olive oil and lard. Mix thoroughly together. When cool it should be a thick paste. Vaseline is excellent. Allow it to remain on one-half hour, then dry with Canton flannel.—3. (*For Russet Leather.*) Mix together 1 part palm oil and 3 parts common soap, and heat up to 100° F.; then add 4 parts oleic acid, and 1⅓ of tanning solution, containing at least 1-16 of tannic acid (all parts by weight) and stir until cold. This is recommended as a valuable grease for russet leather, and as a preventive of gumming.—4. (*For Tan Shoes.*) Beeswax, 1 part; oil of turpentine, 4 parts.—5. (*For Boots and Shoes.*) Boil together 1 pt. linseed oil, ½ lb. of mutton suet, the same quantity of beeswax, and a small piece of resin, and when the mixture becomes milk warm apply it with a hair brush. After two applications the article will become water-proof. Great caution must be exercised in melting the above ingredients.—6. Common tar may be made warm, and brushed over the soles of boots and shoes. They are then placed near the fire, so that the tar may be absorbed. When the absorption has taken place, a second or third application may be given with advantage. This application is not suitable for the upper leathers.—7. (*Elastic and Clean, for Ladies' Shoes.*) Three lbs. of rain water placed in a pot over fire, and when well boiling there are added 4 oz. white pulverized wax, 1 oz. clear, transparent glue, in small pieces, 2 oz. pulverized gum Senegal, 2 oz. white soap scraped fine, 2 oz. brown pulverized sugar; the ingredients are placed in one by one, and every time stirred up; it is well to take the pot from the fire every time a substance is added, to prevent boiling over; when all is added, the pot is removed from the fire; when sufficiently cooled, 3 oz. alcohol are added, and finally 3 oz. fine Frankfort black, well incorporated by continued stirring. This varnish is put on the leather with a brush, and very valuable for boots and shoes, as it can be afterward polished with a large brush, like ordinary shoeblacking; shows a high polish, and does not soil the clothing.—8. (*For the Edges of.*) Alcohol, 8 fl. oz.; shellac, 2 oz.; resin, 1 oz.; turpentine, ½ oz.; lampblack, ¼ or ½ oz.—9. (*Self-Shining Blacking.*) Gum Arabic, 4 oz.; molasses or coarse moist sugar, 1½ oz.; good black ink, ½ pt.; strong vinegar, 2 oz.; rectified spirit of wine and sweet oil, of each 1 oz.; dissolve the gum in the ink, add the oil, and rub them in a mortar or shake them together for some time, until they are thoroughly united, then add the vinegar and lastly the spirit.—10. Dissolve 8 oz. gum Arabic in 8 oz. of best black ink, then add 2 oz. of olive oil. Mix thoroughly and then add 4 oz. strong vinegar, 3 oz. brown sugar, 2 oz. alcohol.—11. (*Waterproof.*) Shoes can easily be made waterproof and snow-resisting by the aid of a little paraffine dissolved in benzine. A very little paraffine is needed, and only enough benzine to dissolve it and make it flow easily. The preparation can be brushed over the uppers and even the soles, and as it dries almost as fast as put on the shoes are ready for wear without any delay. The paraffine presents a firm water-proof surface and does not look amiss, although it will not take a shine like unprepared leather. But it will resist any amount of wet, and is very convenient in snowy weather. The preparation differs from the bulk of waterproofers in that instead of making the leather

stiff and hard, it makes it very soft and pliable. The mixture can be applied to patent leather tips and to uppers composed entirely of that material, but it takes off the brilliancy of these stylish articles too completely to be used very extensively for the purpose, although when the paraffine has worn off the polish appears as brilliant as ever.

SIZES, In Clothes.—A "size" in a coat is an inch; in underwear, it is two inches; in a sock, one inch; in a collar, one-half inch; in a shirt, one-half inch; in shoes, one-sixth of an inch; in pants, one inch; gloves, one-quarter of an inch; and in hats, one-eighth of an inch.

SKIN. Care and Treatment of.—1. Ladies wishing a smooth skin made without harm can obtain it by purchasing 10 cents worth of tincture of benzoin. Dissolve it in a pt. of wine and use on the face at night. The face should first be washed with pure and fine soap, and then rinsed off in clear, cold water. The benzoin can be dissolved in water, but wine is preferable.—2. For a rough or sunburnt skin, use 2 oz. of distilled water, 1 oz. of glycerine, 1 oz. of alcohol, and ½ oz. of tincture of benzoin. Without the water, and with the addition of 2 oz. of prepared chalk, free from bismuth, it makes a fine cosmetic for whitening the face, and is not injurious, like the expensive "balms" or "blooms" so highly advertised.—3. Boil a small piece of green benzoin in spirits of wine until it becomes a rich tincture. 15 drops of this poured into a glass of water will produce a liquid that looks like milk, and emits a most agreeable perfume. This wash, while an excellent remedy for spots, pimples and eruptions, renders the skin clear and brilliant, and the cheeks a beautifully rosy color.—4. Another wash is made of medicated soap, which can be bought of any druggist, melted and made into balls, with finely-ground oatmeal. Oatmeal and buttermilk together possess wonderful beautifying qualities, and oatmeal by itself now occupies a place on many dressing-tables. Steeped in water in small quantities, its balsamic qualities and glutinous oiliness makes the flesh beautifully soft and white. A little lemon-juice may be added advantageously.—5. If a remedy is wanted to produce immediate and wonderful effects in whitening the skin, use tar and olive oil, heated together and cooled. Use upon the face when going to bed, with a mask of thin, old linen or muslin, put on to prevent coming off—further protecting the pillows by an old sheet thrown over them. In the morning a bath of white castile soap and water brings the face out pure and softly tinted as a child's. This is not only the best, but one of the most harmless and cheapest preparations that can be procured.—6. If the skin be coarse-looking, and you desire to improve the texture, bathe it before going to bed in very hot water and good toilet soap, and rub thoroughly with a course Turkish towel.—7. Wrinkles are less apparent under a kind of varnish containing 36 grm. of turpentine and 3 dr. of alcohol, allowed to dry on the face.—8. For pimples on the face use this recipe: 30 gr. of bicarbonate of soda, 1 dr. of glycerine, and 1 oz. of spermaceti ointment. Rub on the face; let it remain for a quarter of an hour, and wipe off all but a slight film, with a soft cloth.—9. To remove moth patches, wash the patches with a solution of common bicarbonate of soda and water several times during the day, for two days, or until the patches are removed, which will usually be in forty-eight hours. After this process, wash with some nice toilet soap and the skin will be left clean and free from patches.—10. Peroxide of hydrogen rubbed on the face two or three times a day, for ten days, will also free the skin of any discoloration. A simple remedy for removing freckles is to put 1 oz. of alum and the same of lemon-juice in a pint of rose water; apply at night.—11. To remove moles, moisten a stick of nitrate of silver and touch the mole; it will turn black and sore, but will soon dry up and fall off. If not successful the first time, try again.—12. Rice-powder for the face, though inexpensive, is warranted perfectly harmless. Refined chalk is the safest thing to use, and costs far less than if put up under some other name and sold in boxes. Cascarilla powder is much used by Cuban ladies, and is considered harmless. Wash the face with thick suds of glycerine soap, and when dry, dust on the powder with a puff or piece of chamois-skin.—13. When the feet are sore, as from long walking, take a teaspoonful of Epsom salts, 5 or 6 drops of tincture of capsicum, and put in a shallow basin of water—just enough to cover the soles of the feet—and soak them twenty minutes. One will be surprised at the relief this will give. It will also cure burning of the feet that so many are troubled with in the summer.—14. If you must bathe in your bedroom, then get a square of white enameled cloth, or heavy Turkish toweling, sew a heavy rope around the edge tightly, and you can get a shower bath without getting the water on the carpet. In bathing, use the wrong side of the oil-cloth, as the right side is apt to chill one. For a weak person bathing, especially in summer, a gill of ammonia in a small tub of water, or some rock salt, is a wonderful invigorator, almost as good as a sea bath. The feet should be kept as clean as the hands, and if the nails are cut as often, and attended to as carefully, it will be a means of warding off corns and bunions. The best time to bathe is just before going to bed. It will assist one's sleep, giving a quiet, restful feeling. Never take a bath just after a meal.

SKIN, Washes for.—1. (*Cucumber Cold Cream.*) Almond oil, 1 lb.; green oil, 1 oz.; juice of cucumbers, 1 lb.; wax and sperm, each, 1 oz.; essence of cucumber, 2 oz.—2. Purchase from a trustworthy druggist 4 ounces of almond oil, add a quarter of an ounce each of white wax and of spermaceti. Put these ingredients in a jar, and set the jar in a saucepan with warm water reaching up to within 2 inches of the rim. Let the water boil. A marmalade jar is just about the right size to use. When the wax and spermaceti are melted into the oil add five tablespoonfuls of the thick juice of a large, nearly ripened cucumber. Obtain the juice by pressing the pulp on a fine hair sieve. Color the cream with a few drops of spinach green. Use

enough to give a very delicate tint of green. Pour it to harden into several small jars. It is an excellent cure for sunburn, and is very healing and soothing for the skin. Wash the skin at night thoroughly with warm water before applying the cream. Dry off all the moisture a soft damask towel will absorb, and rub the cream of cucumbers gently into the skin. In the morning wash it off with warm water, and tone the skin with a bath of cold water to make the tissues firm.—3. (*Bloom of Roses.*) It is used for lips as well as cheeks. The difficulty is to get pure carmine, which is very rare in the market. You can make your own carmine thus: Take 9 oz. of carbonate of soda and dissolve 27 qts. of rain water, to which are added 8½ oz. citric acid; boil; then add 1½ lbs. best cochineal, ground fine, and boil for one hour and a quarter. Strain and cool. Boil again with 9½ oz. alum for ten minutes, draw off and let cool. The sediment is to be filtered, washed in clean, soft cold water and let dry in the air. This is your carmine. A glossier tint is got by replacing 1-9 part of the alum by its weight of saline salt of tin. But the reader is cautioned that salts of metals are apt to be poisonous, especially those of lead. Make the carmine on a clear day; good weather favors a good result for some utterly unknown reason.—4. (*Glycerine Lotion.*) It is much recommended as a beautifier and softener of the skin, is made with 1 gal. orange flower water, 8 oz. of glycerine and 1 oz. of borax.—5. (*To Whiten the Hands.*) Take a wineglassful of eau de cologne and another of lemon juice; then scrape two cakes brown Windsor soap to a powder and mix well in a mould. When hard, it will be excellent for whitening the hands.—6. (*Lait Virginal.*) Rose water, 1 qt.; tincture of tolu, ½ oz.; add the water very slowly to the tincture; adding the tincture to the water spoils the operation.—7. (*Milk of Almonds.*) Bitter almonds, blanched, 10 oz.; rose water, 1 qt.; spirits of wine, 85 per cent. pure, ¾ pt.; otto of almonds, ½ dr.; otto of bergamot, 2 dr.; wax, spermaceti, almond oil, curd soap, each, ½ oz.—8. (*Milk of Cucumber.*) Sweet almonds, 4 oz.; expressed juice of cucumbers, 1 pt.; spirits of wine, 85 per cent. pure, 8 oz.; essence of cucumbers, ½ pt.; green oil, wax, curd soap, ½ oz. each. Boil the cucumber juice for thirty seconds, cool as quickly as possible, strain through fine muslin, and then proceed as usual.—9. (*Milk of Dandelion.*) Sweet almonds, 4 oz.; rose water, 1 pt.; expressed juice of dandelion root (be sure it is quite fresh), 1 oz.; esprit of tube rose, 8 oz.; green oil, wax and curd soap, each, ½ oz. Put the dandelion juice into the mortar as soon as the almonds are broken.—10. (*Milk of Roses.*) Take of Valentia almonds, blanched, ½ lb.; of rose water, 1 qt.; of spirits of wine, 85 per cent. pure, ¼ pt.; of otto of rose, 1 dr.; and of white wax, spermaceti and oil soap, ½ oz. each. Shave up the soap and put it in a vessel that can be placed within another vessel, the space between the two being filled with heavy brine. The object of this is to prevent direct contact of the vessel containing the soap with the fire, and it should be so arranged as to have water space between it and the larger vessel underneath also. Salt water boils at a higher temperature than sweet water, therefore it is used that the full benefit of the fire may be obtained. If sweet water were used in the outer vessel, being nearer the fire, it would use up the heat in boiling away, while the inner pot would be scarcely at simmering temperature. This arrangement is called the water bath, or more properly Bain Marie. Add to the shaved soap 2 or 3 oz. of rose water, and when it is melted add the wax and spermaceti in lumps, not cutting them smaller than is necessary to get the correct weights. This insures their melting slowly and becoming partly saponified by the liquid soap. Be very careful about the almonds. They must be perfect. After blanching them, beat them up in a mortar or some equivalent, being sure it is perfectly clean, meanwhile letting the rose water trickle slowly and steadily upon them. A glass syphon from the rose water bottle to a point above the mortar will save much trouble of pouring; or a tin-can with a stopcock to it will do well. When the almonds are beaten up finely and evenly in the rose water, the emulsion, as the result of such an operation is called, must be filled without pressure—an important point—through clean muslin. Use washed muslin, for the new often contains starch, flour, gum, etc. Now put the soap mixture into the mortar and run the emulsion into it at a steady trickle. When you come to the end of the emulsion run the spirits of wine into the mixture, having first stirred the otto into the spirit. Be very careful to let the scented spirit trickle in very slowly, for its sudden addition might curdle the milk. As it is, the milk will be heated, and all precautions should be taken to keep the mortar cool and its contents stirred. Put the resultant milk of roses in a glass bottle having a tap one-quarter of an inch from the bottom. If prepared carefully according to directions this milk will keep pure almost forever without any deposit or floating film forming in it. It will be found a most refreshing face wash.—11. (*For Pallid Skin.*) This is generally only a local indication of a general condition, and that condition is debility. There may be no apparent physical weakness, but, nevertheless, the system lacks that tone which is essential to the proper performance of those bodily functions the integrity of which constitutes health. Anæmia is often present. The causes may, at their commencement, be: 1, dissipation, study, or any excessive demand on the nervous centers; 2, loss of blood or other vital fluids; 3, insufficient supply of food or oxygen. In any case the nervous centers become affected. As local measures for the treatment of pallid skin, cold bathing may be recommended, followed by friction with a soft towel. The following may be used for the cheeks: Dilute liquid ammonia, 1 oz.; glycerine, 2 oz.; water, 4 oz. This should be applied once daily for about three minutes, being well worked into the skin, afterward a soft towel should be used for three or four minutes. If any irritation follows, the glycerine may be doubled in quantity. —12. (*For Red Skin.*) Red spots, with ray-

like blood-vessels seemingly issuing from their centers, are a species of nævus, and may be treated in the same way. Sometimes great numbers appear on the cheeks; they are then very small, and frequently connected over the whole surface of the skin by red lines, which mark the course of dilated blood vessels. This condition is most frequently seen in patients suffering from heart or lung disease, and is due to impeded circulation and consequent congestion of the blood vessels. Let the face be washed twice daily in warm water, and afterwards well rubbed. Dry friction with a soft towel should be freely practiced. The following will be of service if applied once daily: Chloride of lime, 1 oz.; warm water, 12 oz. Redness may be due to plethora of full bloodedness. The whole skin of the face is then of a reddish tint, and subject to flushing; the eyes are moist. The patient is frequently subject to fits of profuse perspiration and attacks of nose bleeding. *Treatment:* This must be constitutional. Locally, the following cooling washes may be used as often as desired: Carbonate of soda, 1 part; prepared chalk, 1 part; borax, 1 part; glycerine, 3 parts; oatmeal water, 6 parts. —13. (*Rose Cold Cream.*) 1 lb. each of almond oil and of rose water, 1 oz. each of white wax and spermaceti, ½ dr. of otto of rose. To prepare it, take a well glazed, thick porcelain vessel; one that is deep is preferable to a shallow one, and it must be able to hold twice the quantity of cream intended to be made. Put the wax and spermaceti into the jar and the jar into a Bain Marie above described; when the wax and spermaceti are melted, add the oil, and continue boiling till the liquid is even and there are no fragments floating in it; then remove the jar and trickle the rose water into it; A tin can with a tap will hold the rose water and allow the flow to be exactly regulated. Such a can is used for the rose milk explained above. Keep stirring and do not let the cream set on the sides of the jar. In cool weather the rose water should be a little warm, lest the cream set before it has been beaten enough, and then, just before the end, add the otto. Add perfumes last, as a rule, to prevent unnecessary evaporation. This cream will set in the jars it is poured into and keep very well. By varying the otto various perfumes are obtained. The method of manufacture does not vary. Violet cold cream, 1 lb. each of huile violette and of violet water, 1 oz. each of wax and of spermacetti, 5 drops of otto of almonds.—14. (*Rose Lip Salve.*) ½ lb. of almond oil, 2 oz. of spermaceti and of wax and alkanet root and ½ oz. otto of rose. The alkanet root is the ordinary blood-root familiar to children. Place the wax, oil and alkanet root into the water bath, and after the first three are melted let them digest four to six hours on the alkanet root to extract its color. Finally strain through muslin and add the perfume just before the salve sets.—15. (*Rusma.*) Rusma is a mixture that removes undesirable hairs quickly. To make it, take in proportions of 3 lbs. best slaked lime to ½ lb. of orpiment in a powder. Mix in a drum sieve and keep well corked. To use, mix with water to a cream. Apply to the objectionable hair for five minutes or till the skin smarts. Scrape it away with a bone or ivory paper knife, wash the place treated plentifully and apply cold cream.—16. (*Tincture of Tolu.*) Dissolve 1 oz. of tolu of balsam in 1 pt. of spirits of wine, 85 pr. ct. pure, so the small quantity used had best be bought. Also, you may use tincture of benzoin instead of tiucture of tolu, and you may vary the water at pleasure, using elder-flower water, orange-flower water, etc.

SLATE, Artificial Writing.—Fine sand, 41 parts; lampblack, 4 parts; boiled linseed or cotton seed oil, 5 parts. Boil thoroughly together. Reduce the mixture by adding spirits of turpentine, so that it may be easily applied to a thin piece of pasteboard. Give three coats, drying between each coat; finish by rubbing smooth, with a piece of cotton waste, soaked in spirits of turpentine. Makes excellent memorandum books, etc. Use a slate pencil.

SLEEPLESSNESS, Treatment of.—A well-known professor, in lecturing to his class of medical students, gave the following advice concerning sleeplessness, which will be found of value for the hardworker who suspects a tendency toward insomnia: He said that he would advise three remedies for insomnia; each one is simple and easy of access: (1) to abstain from all mental work, no matter what the consequences, and give up any habits that over-excite the nervous system. If duty enforces labor of the intellect, then confine it, if possible, to the hours of from 10 a. m. to 3 p. m., and a free use of hot baths will materially assist. (2) Drink freely of skimmed milk from 1 to 2 qts. a day and eat of the plainest and most digestible food, masticating thoroughly and slowly, and avoid wine of any kind, for it only deceives the drowsy brain by its intoxicating influence, demanding full pay the next day. Just before retiring let the patient take an old-fashioned tumbler of bread and milk. This serves to cause the flow of blood to go to the stomach instead of the head; and if the head be placed rather high in bed, it will effectually aid gravity to lessen its fullness. (3) If his means can afford it, a quiet, long, open-air drive in a comfortable carriage, with perfect silence, will induce sleep.

SLUGS, To Trap.—Slugs may be readily trapped. Cut large potatoes in two, and scrape the cut surface until it is cup-like or deeply concave. Place these, with the hollow surface down, in the various places where the slugs are troublesome, and examine them every morning, destroying the pests that are trapped. These traps will also allure the sow-bugs and millipedes which may be around, and which are often as troublesome as the slugs. Pansies, lobelias, and many other soft-stemmed plants frequently suffer from the ravages of the nocturnal pests above referred to. They eat the tenderest part of the stem near the surface of the ground. It may be that this is the cause of the pansies "damping off" at the roots and dying.

SNAKE BITES, Cure for.—A lotion for the

cure of viper bites, consists of 1 part of chromic acid dissolved in 100 parts of water.

SOLDERING MIXTURE.—Lactic acid and glycerine, mixed with water in the proportion of 1 lb. of each to 8 lbs. of water, make a soldering mixture for tin cans in which fruit, flesh or vegetables are to be contained, which is reported harmless from a health point of view. It has been tried successfully in canning fish, and has none of the poisonous properties of the chloride of zinc in common use.

SPINACH COLORING, For Confectionery.—Pick over 2 qts. of spinach, remove the coarse stems, wash, drain, and chop or bruise it. Lay a piece of cheese-cloth over a patent potato sifter, or over a puree strainer, put in a portion of the bruised leaves and press out the liquid. Repeat until all are pressed; or you may squeeze the juice out through a coarse cheese-cloth. Heat this liquid gently, stirring all the time, and as soon as the green coloring separates from the water, pour it through a fine cloth which is laid over a strainer. The green curd will be left on the cloth. When the water has all drained through, rub the green pulp through the cloth into a plate. Dry it and mix with an equal amount of sugar. Use it for coloring creams, candies or frostings, by mixing a small portion with the sugar or cream until the desired shade.

SPONGES, To Bleach.—Sponges can be bleached by first soaking in hydrochloric acid diluted with 1½ parts water, until no more carbonic acid is given off; then wash in pure water, and afterwards leave in a bath composed of 2 lbs. hydrochloric acid. If the sponge be afterward dipped in glycerine, and pressed to remove excess of liquid, it remains elastic, and can be used for mattresses, cushions, and general upholstery.

SQUEAKING SHOES. Remedy for.—1. Inject powdered French chalk through a perforation in the inner sole. The free use of the same substance between soles when boots are being made will effectually prevent any trouble of this nature.—2. Bore a few holes half through the soles and let out the air that is doing the mischief.

STARCH GLOSS.—1. (*Lustrine Alsacienne.*) Borax, 2½ oz.; gum Arabic, 2½ oz.; spermaceti, 2½ oz.; glycerine, 6¾ oz.; distilled water, 2¼ pt.; a few drops of some sweet scented essence. Add 6 spoonfuls lustrine to 6¾ oz. boiling starch.—2. (*Laundry Starch.*) Rub 1 oz. best potato starch up with a little cold water, so as to reduce all the lumps; add a tablespoonful of best loaf sugar, an equal quantity of dextrin, a little soluble indigo, and a lump of pure paraffin about the size of a nutmeg. Then add a pt. of boiling water, and boil, with occasional stirring, for half an hour (not less). The starch should be strained through a linen cloth before using.—3. (*Liquid.*) One oz. each of gum Arabic and borax are dissolved in 10 oz. of water; 1 oz. each of white wax and spermaceti are melted, and while liquid are rubbed with the solution of borax and 10 drops oil of cloves to make emulsion, mixing them thoroughly. A teaspoonful of this mixture in a pt. of starch gives a fine polish. It may also be applied after starching by rubbing over the starch with a cloth and then polishing with the iron.—4. Borax, saturated solution, 2 parts; tragacanth mucilage, 1 part; mix. 1 tablespoonful to 1 pt. of starch.—5. (*To Improve Starch.*) To each bowl of starch, add 1 teaspoonful of Epsom salts, and dissolve in the usual way by boiling. Articles starched with this will be stiffer, and will be rendered to a certain degree fireproof. Use corn starch, boil to smooth paste, cool and starch the goods; dry quickly. Before ironing, dampen down in thin, raw (unboiled) starch water. A little gum Arabic or pure white wax is often added to the boiled starch to afford fine gloss. Iron in the usual way, with a common sad iron; then dampen slightly with a clean cloth and the starch (raw) water, and polish briskly with a polishing iron.

STEEL AND IRON, Microscopic Determination of.—Thus the crystals of iron are double pyramids, in which the proportion of the axis to the bases varies with the quality of iron; the smallness of the crystals and the height of the pyramids composing each element are in proportion to the quality and density of the metal, which are seen also in the fineness of the surface; and, as the proportion of the carbon diminishes in the steel, the pyramids have so much the less height. In pig-iron and the lower qualities of hard steel the crystals approach more closely the cubic form. Forged iron has its pyramids flattened and reduced to superposed parallel leaves, whose structure constitutes what is called the nerve of steel; and the best quality of steel has all its crystals disposed in parallel lines, each crystal filling in the interstices between the angles of these adjoining, these crystals having their axis in the direction of the percussion they undergo during the working. Practically, good steel has the appearance, microscopically, of large groups of beautiful crystals.

STING, Of the Jelly-Fish.—It is not known whether it is a sting like that of a wasp or a nettle, that is inflicted, or whether a secretion, acrid in kind, is thrown upon the surface, and acts directly as an irritant fluid. On the whole, it is supposed it is a fluid, or organic acid, which is the cause of the irritation. For the resultant erythema local alkaline treatment is particularly effective. In the throat case bicarbonate of soda with *mel boracis* proves very grateful and useful.

STOVE BLACKINGS.—1. Mix 2 parts of black lead, 4 parts of copperas, and 2 parts of bone black, with water, so as to form a creamy paste. This is an excellent polish, as the copperas produces a jet black enamel, causing the black lead to adhere to the iron.—2. Plumbago, 2 lb.; water, 8 oz.; turpentine, 8 oz.; sugar, 2 oz. Knead thoroughly and keep in tin boxes. Apply with a brush.—3. Plumbago, make into a thin paste with sodium silicate or water glass. This makes an excellent stove polish and should be brushed thoroughly.—4. Pulverized black lead, 2 lb.; spirits of turpentine, 2 gal.; water, 2 oz.; sugar, 2 oz. Mix.—5. Mix 5 parts black lead, 5 parts bone black, and 10 parts of iron sulphate. Use water q. s. to form a paste. This

is an excellent preparation and the coating is very permanent.—6. Reduce graphite to an impalpable powder by grinding in a mill with water, dry; use with water first, then dry and polish. This is the base of nearly all commercial stove polishes.—7. Turpentine and black varnish, put with any good stove polish, is the blacking used by hardware dealers for polishing heating stoves. If properly put on, it will last throughout the season.—8. (*Paste.*) Pulverized black lead, 2 lb.; spirits of turpentine, 2 gal.; water, 2 oz.; sugar, 2 oz.; mix.—9. (*Liquid.*) Bone black, 2½ parts; pulverized graphites, 2½ parts; copperas, 5 parts; water, q. s. to form a creamy paste.—10. (*Liquid Black Lead.*) Pulverized black lead, 1½ lb.; turpentine, 1½ gill; water, 1½ gill; sugar, 1½ oz.—11. (*Bone Black.*) Mix 2 parts copperas, 1 part powdered bone black, and 1 part black lead, with enough water to give proper consistency, like thick cream. Two applications are to be recommended.—12. (*Brunswick Black for Grates, etc.*) Asphaltum, 5 lb.; melt and add boiled oil, 2 lb.; spirits of turpentine, 1 gal.; mix.

SUGAR, Maple, Artificial.—Decoctions or extracts of the wood or bark of trees are frequently used for flavoring syrups or sugars. Different extracts differ in taste. The hickory tree, it is said, yields an extract that will impart the flavor of the maple, and Daily's method of producing artificial maple syrup or sugar is as follows: Make an extract of hickory bark or wood by allowing water to percolate through the same. The bark or wood may be ground, or sawdust therefrom used. Hot water may be used, or the material boiled in water. The strength of the extract may be increased by increase of the quantity of the wood or bark. To 1 gal. of hot or boiling sugar syrup add, say, 3 tablespoonfuls of the hickory extract. It is said the effect of the extract is to produce a flavor that renders the syrup indistinguishable from genuine maple sugar. If the syrup is boiled down, a sugar resembling maple sugar in taste is produced.

SWEET CORN, To Pack.—Cook the corn on the cob the same as for table use, then shave off as for drying. Take a gallon crock, scatter a layer of salt over the bottom, then about two inches of corn and one inch of salt alternately until the crock is full. Every layer of corn must be packed down solid with a potato masher or something similar. Over the whole put a saucer or small weight, to keep the corn under the brine. When wanted for use, it is better to take out the corn, rinse with cold water several times to take out the salt, and let soak over night. When sufficiently freshened, cook as fresh corn, adding a little sugar.

SWEET OIL, Uses of.—1. If green blinds are dingy and faded, wash and rub on a little sweet-oil.—2. For the earache, drop one drop of the sweet-oil up in the ear and place a piece of cotton in the outer ear.—3. A few drops of sweet-oil will greatly help the running of the carpet-sweeper, sewing-machine and clothes-wringer.—4. Sweet-oil and putty powder, followed by soap and water, make one of the best medicines for brightening brass or copper.—5. To keep polished steel from rusting after cleaning, or when not in use, take a cloth with a little sweet-oil on it and wipe the steel over so that the surface may have a very light but warm coating of oil.—6. Pure sweet-oil rubbed thoroughly all over the body, rubbing in all that the skin will absorb, will be found of great benefit to infants, delicate children, the aged, and any one who is thin or not strong. It is nutritions and strengthening, and given in this way the system is furnished with fats it needs and could appropriate in no other way, as in case of weakened digestion, etc.

SYRUPS, To Make.—1. (*Apple Syrup.*) Proceed with apples as for pineapple syrups.—2. (*Banana Syrup.*) Oil of banana 2 dr.; tartaric acid, 1 dr.; simple syrup, 6 pt.; proceed with bananas as for pineapple syrups.—3. (*Corn Cob.*) Twelve clean cobs are put in a gallon of water and boiled until soft. Then the juice is strained off and a gallon of dark brown sugar added. This is boiled a little while, with the result of a fine quality of syrup. This makes a new use for the corn cob.—4. (*Pear Syrup.*) Proceed with it same as pineapple syrups.—5. (*Pine Apple Syrup.*) The hard nature of this fruit requires pounding with a heavy billet of wood (not metal) in a tub with a strong bottom; when well mashed it will require great pressure to extract all the juice from this fruit; a cider press will answer the purpose; add 14 lb. of sugar to a gallon of juice and a little pure acetic acid; put it on a slow fire and stir until the sugar dissolves; when cold, bottle and tie down.—6. Take a convenient number of the fruit; pare and mash them in a marble or porcelain mortar, with a small quantity of sugar; express the juice; for each quart of juice take 1½ pt. of water and 6 lb. of sugar; boil the sugar and water and add the juice; remove from the fire; skim and strain.—7. Oil of pineapple, 1 dr.; tartaric acid, 1 dr.; simple syrup, 6 pt.

TAN, SUNBURN, Etc., to Remove.—1. Wash the face in watermelon juice. The result is a great beautifying of countenance. No matter what is wrong with the face, the juice of the watermelon will rectify it and produce a clear skin.—2. There is nothing that equals fresh buttermilk for removing tan, freckles, sunburn or moth spots. It has the great advantage that it does not injure the skin, but renders it soft like a little child's. Take a soft cloth or sponge and bathe the face, neck and arms thoroughly with buttermilk before retiring for the night, then wipe off the drops lightly. In the morning wash it thoroughly and wipe dry with a crash towel. Two or three such baths will take off all the tan and freckles. It will keep the hands soft and smooth.—3. The following is a perfectly harmless preparation for removing freckles of the skin: Take 2 oz. of lemon juice, ½ dr. of powdered borax, and 1 dr. of white sugar. Mix them, and let them stand a few days in a glass-stoppered bottle till the liquor is fit for use; then rub it on the hands and face occasionally.

TAPEWORM, Cure for.—Forbid the patient to take any breakfast the day on which it is intended to remove the worm, and give him a large dose of Rochelle salts the preceding

night. At 10 o'clock in the morning he has the following at one dose: Recipe—bark of pomegranate root, ½ oz; pumpkin seed, ½ dr.; ethereal extract of male fern, 1 dr.; powdered ergot, ½ dr.; powdered gum Arabic, 2 dr; Croton oil, 2 drops. The pomegranate bark and pumpkin seed are thoroughly bruised, and, with the ergot, boiled in 8 oz. of water for fifteen minutes, then strained through a coarse cloth. The Croton oil is first well rubbed up with the acacia and extract of male fern, and then formed into an emulsion with the decoction. The worm is expelled alive and entire within two hours. No unpleasant effects follow.

TATTOOING. To Remove.—1. The operation is performed by applying nitric acid with the stopper of the bottle (a better instrument would be a glass rod pointed, to carry the acid), just sufficient to cover the stain, so as to avoid making a larger scar than needful, the acid to remain about one and a half minutes, until the *cutis vera* is penetrated and a crusted appearance shown, then washed off with clean cold water. In a few days after this treatment a scab forms, which contains the tattoo mark or stain. Remove it, and should inflammation supervene, poultice and bathe with warm water. In this way the skin with the stain is not only removed almost painlessly, but the nitric acid at the same time, to a certain extent, seems to decolorize the stain. Of course large tattoo marks, greatly extending over the surface, must necessitate the operation being performed differently.—2. Tattoo the skin, in the usual way, with a concentrated solution of tannin, following the original design. Then apply a crayon of nitrate of silver until the part tattooed with the tannin blackens. Wipe off excess of moisture and allow matters to take their own course. Slight pain continues for two to four days, and after two months the cicatrix which results will almost disappear.—3. These are best removed by the following plan: Wash the part thoroughly with common dilute acetic acid. Half an hour later use caustic potash, 4 gr.; water, 1 oz.; after the lapse of another half hour, use dilute hydrochloric acid, 1 dr.; water, 1 oz. This should be repeated daily. Stronger solutions may be used, if they can be borne.—4. It is said that milk pricked under the skin in the same way as the ink was originally applied will change the blue color to red and finally cause it to disappear.—5. It is stated that if the tattooing is performed with some carbonaceous matter, the marks can be made to disappear by being first well rubbed with a salve of pure acetic acid and lard, then with a solution of potash, and finally with hydrochloric acid. A dermatologist should be consulted if possible.

TEETH, Care of, and Washes for.—Decay is not the only enemy of the teeth, but the accumulation of tartar upon them has an equally bad effect. This must in any case be removed by an experienced dentist, and after that the teeth must be carefully attended to. Simple measures, regularly attended to, are sufficient for healthy mouths. A tooth-powder for a healthy condition of the mouth and teeth should be purely a mechanical agent, possessing a hardness sufficient for the removal, without liability to injure the enamel, of slight accumulations of food and tartar. The brush should be moderately soft, the bristles should be long and elastic and of uneven lengths, so as to facilitate their introduction between the teeth. Once daily is quite enough to use a powder, if any is used at all, and the best time to use it is just before retiring. After meals it is sufficient to use a little tepid water. As a frictional powder, precipitated chalk is a soft and generally efficient agent.—1. (*Tooth Wash.*) Dissolve 2 oz. of borax in 3 pt. water; before quite cold add thereto 1 teaspoonful of tincture of myrrh and 1 tablespoonful of spirits of camphor; bottle for use. One wineglassful of the solution, added to ½ pt. of tepid water, is sufficient for each application. This solution, applied daily, preserves and beautifies the teeth, extirpates tartarous adhesion, produces a pearl like whiteness, arrests decay, and induces a healthy action to the gums.—2. (*Foaming Tooth Wash.*) Quillaia bark, in coarse powder, 4 oz.; glycerine, 3 oz.; rectified spirit, 5 oz.; water, 30 oz.; macerate for seven days and filter through 2 dr. of magnes. carb. with which have been mixed oil of wintergreen, 20 drops, and oils of neroli and cloves, 4 drops each. Finally add 1 dr. each of benzoic acid and tincture of pellitory; color with cochineal or saffron.—3. (*Camphorated Chalk.*) Camphor, 1 oz.; precipitated chalk, 15 oz. Prepared chalk may be used in lieu of precipitated chalk. Less white and velvety, but cleans the teeth better than the softer article.—4. (*For Toothache.*) 2 grains of permanganate of potash, dissolved in a pint of water, forms a toothache remedy par excellence. A tablespoonful of this mixture held in the mouth from one to three minutes, then ejected, will drive away the most violent case of toothache known. A two-grain solution is strong enough, yet is harmless. It must be kept in a bottle of colored glass or in a dark place.

TEMPERING CHISELS.—When tempering cold chisels or any other steel articles, heat to a very dull red and rub with a piece of hard soap, then finish heating and harden in clear, cool water. The potash of the soap prevents the oxygen of the atmosphere from uniting with the steel and forming rust or black oxide of iron. The article will need no polishing to enable the colors to be seen. This will be appreciated when tempering taps, dies or various complex forms not easy to polish. Never "upset" a cold chisel. It is sure death to the steel.

THROAT, Sore, Remedy for.—A teaspoonful of alum and one tablespoonful of best French brandy, put in a half tumbler of water, or a half-pint of water will modify it better. This gargle should be used several times during the day, and at night if the irritation or pain is troublesome. It will be found invaluable.

TOBACCO PIPES, To Clean.—A very simple and effective plan. Cut ½ in. from the end of an ordinary cork, and fit it tightly into the bowl of the pipe. Then with a knife cut a hole

through the cork wide enough to admit the nozzle of a water tap with a little pressure turn on the water gently until the flow through the stem is sufficiently strong, and let it run until the pipe is clean.

TOMATO JELLY.—It is made from a can of strained tomatoes. Season the juice well, remembering that tomatoes stand generous salting, and add hot to a half box of dissolved gelatine. Serve it, when set, with celery mayonnaise, cold slaw, lettuce salad, or anything that sliced tomatoes would be offered with.

TORTOISE SHELL, Imitation.—1. The appearance of tortoise-shell may be given to horn by brushing it over with a paste of 2 parts lime, 1 part litharge and a little soap-lye, which is allowed to dry. This acts by forming sulphuret of lead with the sulphur contained in the albumen of the horn, producing dark spots, which contrast with the brighter color of the horn.—2. Mix an equal quantity of quicklime and red lead with soap lees; lay it on the horn with a small brush in imitatioo of the mottle of tortoise-shell. When it is dry, repeat it two or three times.—3. Take a piece of lunar caustic the size of a pea; grind with it water on a stone and mix with it sufficient gum Arabic to make it of a proper consistence; apply it with a brush to the horn in imitation of the veins of tortoise-shell. A little red lead mixed with it to give it a body, is of advantage. It will stain the horn quite through without hurting its texture or quality. Be careful when the horn is stained to let it soak some hours in water previous to finishing and polishing it.—4. Paint a ground of salmon color; then when dry and smoothed off, coat it over with rose pink, mixed in varnish and turpentine; then, with a flat piece of glass, press on the surface, and remove the glass quickly, being careful not to push it over the paint so as to disturb the curious figures which the pressure will form thereon. Varnish when dry, and you will have a beautiful imitation of tortoise-shell.

TORTOISE-SHELL, To Weld.—Bring the edges of the pieces of shell to fit each other observing to give the same inclination of grain to each; then secure them in a piece of paper and place them between hot irons or pincers; apply pressure, and let them cool. The heat must not be so great as to burn the shell; therefore try it first on a white piece of paper.

TREES, Fruit, Care of.—1. (*Coating for Amputated Branches and Wounds in.*) Shellac, dissolved in alcohol, forms an excellent coating for amputated branches and for wounds of fruit trees, making a water-proof artificial skin, under which the wood grows until the wound is healed.—2. (*To Prevent Ants from Injuring.*) Make a line of gas tar round the stem of the tree, or if it be trained on a wall, make a horizontal line near the ground on the wall, and one around the stem; this will prevent ants from ascending.—3. (*To Protect from Mice.*) A mixture of tallow, 3 parts; tar, 1 part. Applied to the bark while hot, will protect fruit trees against mice.

TRUNK, To Pack.—The cardinal point is to wrap up every delicate garment separately; of course it should be folded smoothly, and to teach how to fold clothes in print is not easy. Any good dressmaker, however, can give you points on that, and the wrapping is the more important thing; pin towels or sheets of tissue paper about your garment, but remember that newspapers are what you should fold between each layer of pretty things in the trunk. It is useless to try to arrange heavy things at the bottom, light on top; the baggage smashers know no top and no bottom; just concentrate yourself on keeping a smooth, even surface for each successive layer. Bows and sleeves can be stuffed out with newspapers better than anything else. Be sure that your wrappings are pinned firmly, so that there will be no coming undonc; they are your bulwarks. In packing breakable articles it is astonishing how many people will jam them down in corners and sides where they get the full force of every concussion against the unyielding walls. Tie on your corks well with bits of rag and twine, and put your bottles near the middle of a compartment, and you may carry ink and shoe dressing safely around the world. In packing such things as delicate hats, bonnets and fancy waists of such a frou-frou nature that no pressure can be allowed on them, it is still better to fill up the empty space of the boxes allotted them with lightly twisted sheets of tissue paper than to give them a chance to move, and with all due respect to the best packing in the world, it is still well to unpack as soon as you can.

VERDIGRIS, To Prevent on Electrotypes.—When electrotypes are not in use they should be well oiled to prevent verdigris, and stored face down to prevent warping. Wood engravings should be oiled and stored on end, for the same reasons.

VERMIN, To Keep from Trees.—The tying of a piece of wool round a tree stem to keep down the bugs and vermin is a poor idea, because it is based on the supposition that all these nuisances ascend from the ground, whereas in most instances the eggs are laid in the foliage above the supposed guard. The only actual preventive involves a delicate operation, which, however, can be successfully performed by a man with a steady hand. It consists in boring a small hole in the tree near the ground and filling it with sulphur. The sap carries this over the tree and there will be few insects settle or crawl on any part of it. The spring is the best time to do this, but with a strong healthy tree it can be done at any time with perfect safety.

VINEGAR, Raspberry, to Make.—1. Bruised ripe raspberries, 3 pt.; white wine vinegar, 3 pt.; macerate for three days, press, strain, and to each pint add 1 lb. white sugar. Boil, skim, cool, and bottle at once; two oz. of brandy to each pint is sometimes added. Cherry and strawberry vinegar may be made in a similar manner.—2. Bruised ripe raspberries and white wine vinegar of each 3 pt.; macerate for three days, press, strain, and to each pt. add 1 lb. of white sugar. Boil, skim, cool, and bottle at once. Some persons add 2 fl. oz. of brandy to each pt.—3. Fresh raspberries 3 lb.; good vine-

gar 2 lb.; macerate in glass for two weeks, then strain without pressure. In a similar manner strawberry vinegar, cherry vinegar, and the vinegars of like fruits may be made.—4. Add ½ pt. good vinegar to every qt. of raspberries, and let them soak for two or three days; then bruise the berries, express the liquid, and to each pt. add 1 lb. of sugar. Boil it for twenty minutes, skim it, and when thoroughly cool, bottle it.

VINEGAR, To Test.—1 Put a wineglassful of the vinegar into a china teacup, and let the cup float in water in a pt. cup of tin or other metal that will stand heat. Boil the water till half the vinegar has evaporated, then drop into the cup a piece of (cane) loaf sugar about the size of a gr. of wheat. Continue the boiling till the liquid in the cup has evaporated, when, if the vinegar contains free sulphuric acid, the dry residue will be found to be blackened. The charring of the sugar is due to free sulphuric acid.—2. To detect the mineral acids with which vinegar is frequently adulterated, and which are very prejudicial to health, a little sulphide of zinc is added to the vinegar previously heated in a test tube. If any of the mineral acids be present, the sulphide is decomposed, and sulphuretted hydrogen given off; this can be readily detected by lead paper. Acetic acid, the one which should be found in vinegar, does not have this action.

WALKING BACKWARD, Cure for Headache.—An apostle of physical culture says that an excellent and never-failing cure for nervous headache is the simple act of walking backward. Ten minutes is as long as is usually necessary to promenade. It sometimes, however, requires more than ten minutes to walk at all, if one is very nervous. Any kind of walking will do, provided it is backward. It is well to get in a long, narrow room, where the windows are high, and walk very slowly, placing first the ball of the foot on the floor, and then the heel. Besides curing the headache, this exercise promotes a graceful carriage.

WALL PAPER, To Clean.—1. Make 10 lbs. rye bread; take off top crust while hot; mix 3 gr. each powdered salts of tartar and ammonia, and sprinkle over the bread; press the bread together as solidly as possible and let dry for a day; just before using pare all the outside rind off. This composition, when pieces of it are drawn over the surface of soiled wall paper, performs wonders in removing deposits of dust and smoke; but it will be only partially effective if the walls have been dusted beforehand, as the marks of the dusty feathers or other agents employed cannot be erased.—2. Rye or Graham flour, 2 qts.; add 1 teaspoonful of emery dust. Mix with water to stiff dough. Bake till barely done; cut off crust and while hot, press into balls the size required and let dry 24 hours. Then use. Will keep four days.—3. Three lbs. wheat flour; 3 lbs. rye flour; 1 tablespoonful pulverized emery; ½ teaspoonful aniline red—("absorene").—4. To remove all stains or marks where people have rested their heads, from wall papers, mix pipe clay with water to the consistency of cream, lay it on the spot, and allow it to remain till the following day, when it may be easily removed with a penknife or brush.—5. If not very dirty, the paper of any room will be much improved by brushing it over in straight lines with a soft broom, covered with a clean, soft cloth; if, however, the paper be much soiled, very stale bread is the best thing to clean it with. Cut a very stale quatern loaf into slices, and, in the lightest manner possible, wipe the paper with it in a downward direction. Clean about a yard at a time, all one way, and be careful to leave no marks. By this process very dirty paper hangings may be made to look almost like new.

WALL PAPER, Measuring Room for.—1. The following table shows how many rolls of wall paper are required to cover a room of the dimensions indicated by the figures in the left hand column, also the number of yards of border necessary:

Size of Room.	Height of Ceiling.	Number of Doors.	Number of Windows.	Rolls of Paper.	Yards of Border.
7 by 9	8	1	1	6	11
7 by 9	9	1	1	7	11
7 by 9	10	1	1	8	11
7 by 9	12	1	1	10	11
8 by 10	8	1	1	7	12
8 by 10	9	1	1	8	12
8 by 10	10	1	1	9	12
8 by 10	12	1	1	11	12
9 by 11	8	1	1	8	14
9 by 11	9	1	1	10	14
9 by 11	10	1	1	11	14
9 by 11	12	1	1	13	14
10 by 12	8	1	1	9	15
10 by 12	9	1	1	10	15
10 by 12	10	1	1	11	15
10 by 12	12	1	1	13	15
11 by 12	8	2	2	8	16
11 by 12	9	2	2	9	16
11 by 12	10	2	2	10	16
11 by 12	12	2	2	13	16
12 by 13	8	2	2	8	17
12 by 13	9	2	2	10	17
12 by 13	10	2	2	11	17
12 by 13	12	2	2	14	17
12 by 15 or 13 by 14	8	2	2	10	18
12 by 15 or 13 by 14	9	2	2	11	18
12 by 15 or 13 by 14	10	2	2	12	18
12 by 15 or 13 by 14	12	2	2	15	18
13 by 15	8	2	2	10	19
13 by 15	9	2	2	11	19
13 by 15	10	2	2	13	19
13 by 15	12	2	2	16	19
14 by 16	9	2	2	12	20
14 by 16	10	2	2	14	20
14 by 16	12	2	2	17	20
14 by 18	9	2	2	13	22
14 by 18	10	2	2	15	22
14 by 18	12	2	2	19	22
15 by 16	10	2	2	15	21
15 by 17	12	2	2	19	22

Deduct one-half roll of paper for each ordinary door or window extra—size 4 by 7 feet.—

2. The following rules are given for the measurement of rooms to determine the exact amount of paper required to cover its surfaces. As most paper when trimmed is 18 inches wide and 24 feet to a single piece, a piece will contain 36 square feet. Measure the length and height of each wall in feet and multiply. Add together the number of square feet of each wall, getting the total number of square feet. Divide this total by 36, which will give you the number of pieces required for side wall. Allow one-half piece of paper for each door and window. To allow for waste in matching it is safer to divide by 33 instead of 36. To find number of single pieces required for ceiling, multiply length by width in feet and divide by 33.

WALL PAPER, Arsenic, to Detect in.—To detect arsenic in paper, immerse the suspected paper in strong ammonia on a white plate or saucer; if the ammonia becomes blue, the presence of salt of copper is proved; then drop a crystal of nitrate of silver into the blue liquid, and, if arsenic be present, the crystal will become coated with yellow arseniate of silver, which will disappear on stirring.

WALLS, Smoky, to Clean.—Brush well, wash with a strong solution of pearlash, rinse at once with clear water. Then give the walls when dry a thin coat of fresh slaked lime, with considerable alum dissolved in hot water added. After this has dried apply whiting and good size.

WATER, Hot, Medical Virtues of.—The uses of hot water are many. There is nothing that so promptly cuts short congestion of the lungs, sore throat or rheumatism as hot water when applied promptly and thoroughly. Headache almost always yields to the simultaneous application of hot water to the feet and back of the neck. A towel folded several times and dipped in hot water, and quickly wrung out and applied over the painful part in toothache or neuralgia, will generally afford prompt relief. A strip of flannel or napkin folded lengthwise and dipped in hot water and wrung out, and then applied around the neck of a child that has the croup, will sometimes bring relief in ten minutes. Hot water taken freely half an hour before bedtime is helpful in the case of constipation, while it has a most soothing effect upon the stomach and bowels. A goblet of hot water taken just after rising, before breakfast, has cured thousands of indigestion, and no simple remedy is more widely recommended by physicians to dyspeptics. Very hot water will stop dangerous bleeding.

WATER, Muddy, to Clarify.—1. It is stated that the suspended matter in the water is nothing but common chalk, and that when this is precipitated by the aid of chloride of iron the highly poisonous and corrosive chloride of calcium is left in solution. Now, as these remarks are wide of the truth, it should be stated that different matter besides "chalk" is contained in our river water to which its turbidness may be attributed, viz., mud—a composition of the silicates (clay and sand) with organic matter in addition to the calcium carbonate. The "highly poisonous chloride of calcium" (?) is a frequent constituent of mineral waters, and it is given, medicinally, in doses of 10 to 20 gr. As 6 or 7 drops of the solution of chloride of iron (representing 2 or 3 gr. of the salt) is quite sufficient to clarify a gal. of the water, it may be readily seen that no ill results would follow its use. A word as to the statement that calcium chloride is poisonous. So, indeed, is sodium chloride (common salt) when swallowed in excessive quantities. However, if this form of iron would prove objectionable for potable purposes, the ferrous sulphate (copperas) may be used in the proportion of 4 or 5 gr. to the gal. It may be of interest to note the fact that the water supplied to the inhabitants of several European cities is purified by the iron process. The impure water is agitated with small particles of iron, usually in the form of filings, and allowed to settle. The iron having an affinity for the suspended matter collects it on its downward course, leaving the water pure and clear above, ready to be drawn off and fit for use.—2. Take the muddy water and pour in a few drops of ferric-chloride. Allow this to filter through cotton placed at the bottom of a funnel. The result is water clear as crystal, with no taint of iron, and moreover soft. As ferric-chloride can be had for a song, this is the cheapest way that is known of purifying water. There is an old woman's way of using almond shells, but that requires time and fills the water with the shells.—3. The quickest and best way is the use of nascent iron carbonate (ferrous carbonate). This is obtained by the use of any ferrous salt and alkaline carbonate. Ferrous chloride or sulphate and sodium carbonate, or bicarbonate, answers admirably. We prefer the ferrous chloride and sodium carbonate; 4 or 5 gr. of each to the gal. of water is quite sufficient. The ferrous carbonate forms at once in flocculent masses, which, in precipitating, carry down with them all mud and other matter. The taste of the water is not affected in the slightest by the operation, and three or four hours is all that is required for the reaction. If done overnight the water will be crystal clear in the morning.

WATER, Distilled Mineral, etc.—1. (*Aerated or Carbonated Waters.*) These require the aid of the powerful machine employed by soda water manufacturers, to charge the waters strongly with carbonic acid gas. The gas is made from marble dust and diluted sulphuric acid, and is forced by a pump into the watery solution. Sometimes the gas is produced by the mutual action of the ingredients introduced into the bottle of water, which must be instantly closed; but this method is found practically inconvenient, and is only adopted in the absence of proper apparatus. The quantity of gas introduced is directed, in the French and American pharmacopœias, in most cases, to be 5 times the volume of liquid. For chalybeate and sulphureted waters the water should be previously deprived of the air it naturally contains, by boiling, and allowing it to cool in a closed vessel.—2. (*Simple Aerated Water.*) Carbonic acid gas water. Water charged with 5 or more volumes of carbonic acid gas.—3.

(*Alkaline Aerated Waters.*) Aerated soda and potash waters should be made by dissolving a dr. of the carbonated alkali in each pt. of water, and charging it strongly with carbonic acid gas. The soda water of the shops generally contains but little (or no) soda.—4. (*Aerated Magnesia Water.*) This is made of various strengths.—5. (*Mialhe's Aerated Chalybeate Water.*) Water, 1 pt.; citric acid, 1 dr.; citrate of iron, 15 gr.; dissolve, and add 75 gr. of bicarbonate of soda.—6. (*Trosseau's Martial Aerated Water.*) Potassio-tartrate of iron, 10 gr.; artificial seltzer water, 1 pt.—7. (*Bourchardat's Gaseous Purgative.*) Phosphate of soda, 1½ oz.; carbonated water, 1 pt.—8. (*Mialhe's Iodurcted Gaseous Water.*) Iodide of potassium, 15 gr.; bicarbonate of soda, 75 gr.; water, 1 pt.; dissolve and add sulphuric acid diluted with its weight of water, 75 gr. Cork immediately.—9. (*Dupasquier's Gaseous Water of Iodide of Iron.*) Solution of iodide of iron (containing 1-10 of dry iodide), 30 gr.; syrup of gum, 2½ oz.; aerated water, 17½ oz.—10. (*Murray's and Dinneford's Fluid Magnesia.*) To a boiling solution of 16 oz. of sulphate of magnesia in 6 pt. of water add a solution of 19 oz. of crystallized carbonate of soda in the same quantity of water; boil the mixture till the gas ceases to escape, stirring constantly, then set it aside to settle; pour off the liquid, and wash the precipitate on a cotton or linen cloth, with warm water, till the latter passes tasteless. Mix the precipitate, without drying it, with a gal. of water, and force carbonic acid gas into it under strong pressure, till a complete solution is effected. The eau magnesienne of the French codex is about a third of this strength.

WARTS AND TUMORS, Caustics for.—1. A painless caustic for the removal of warts and tumors may be made as follows: Arsenious acid, 1 part; sulphate of morphine, 1 part; calomel, 8 parts; powdered gum Arabic, 48 parts; this is to be sprinkled over the cuticle daily, the surface of which has been previously denuded by knife or blister.—2. Cauquoin's paste for the same purpose is composed of 10 parts of chloride of zinc, 2 parts of alcohol (60°), and 15 parts of wheat flour. The zinc in fine is added to the alcohol, then incorporated with the flour in a mortar, strongly pressing with the pestle. As soon as homogeneous it is spread with a roller, into sheets an eighth of an inch thick, and after a few hours put into a well corked bottle.—3. Latour's nitrochloride of zinc paste is also an excellent preparation, and is made by dissolving 50 parts of the chloride and 100 parts of the nitrate of zinc in 80 parts of water. The solution is made by the aid of heat. When it cools, 75 parts of wheat flour is incorporated with 100 parts of the solution, as with Cauquoin's paste.

WASHING, New Method of.—A new method of washing is being extensively adopted in Germany and Belgium. One of its special advantages is that it counteracts the ill effects of soda, which is much used in Europe, upon linen. Two lbs. of soda are dissolved in 3 gal. of water, and to this is added a teaspoonful of turpentine and 3 of liquid ammonia. When the mixture has been well stirred the linen is steeped in it for two or three hours. During the operation the vessel is closed as tightly as possible, and afterwards the clothes are washed out and rinsed in the usual manner. The soap and water may be used again with the addition of ½ a teaspoonful of turpentine and a tablespoonful of ammonia. The process is said to save time, labor and fuel. As there is no necessity for rubbing, the linen scarcely suffers, and its cleanliness and color are perfect. The ammonia evaporates immediately, and the smell of the turpentine is said to disappear entirely during the drying of the clothes. Paraffin has long been used in this country for a similar purpose.

WATCH COMPASS.—Any watch with an accurate dial plate is a compass. As a matter of fact, every watch is a compass three times a day—at 6 a. m., at noon and at 6 p. m. If the hour hand is pointed to the sun, the figure midway between that hand and the figure XII is south. That is to say, at 6 o'clock, if the hour hand is pointed to the sun, the figure III indicates the south. At odd times in the day the watch compass is a trifle out, but not greatly so, and a man losing his way can tell the points of the compass with practical accuracy at any time by following the simple rule indicated.

WATER, Examination of.—Smell and taste are powerful agents in detecting substances dissolved in water. Pure water is free from taste and smell, and is cooling to the tongue and stomach. *Rain water* has a soft taste, resembling weak lye. In case the taste is not sufficient to decide whether spring water is pure, pour some clear soap water into it; if it becomes turbid, the water is hard, and contains some foreign substance. *Spring water*, well water, and water from the interior of the earth, is adulterated with saline matter. A small quantity of foreign matter imparts to water a cooling and refreshing effect, like the water of springs and wells. *Mineral water.* If the amount of foreign matter is increased, or of a certain kind, it is called mineral water. The taste is not agreeable. Water of crystalline purity and an agreeable taste, contains pure carbonic acid gas. If this cannot be decided by taste, it may be detected by allowing a tumblerful of water to stand in a warm room a few hours, when the inside of the glass will be covered with bubbles; the more gas the greater will be the quantity of the bubbles adhering to the glass. To decide positively whether there is any in water, we must pour into it a little clear vinegar, and stir it; after this pour in a little powdered sugar, when the gas will rise in bubbles; if there is much, it will occasion ebullition. By inhaling the gas through the nostrils, it produces a refreshing sensation. Water possessing the smell and taste of rotten eggs, is sulphurous; if the quantity is not too large, the taste is not repulsive, but the smell is decidedly so. Waters of this description possess medicinal properties. If water has a cool taste, but an earthy after-taste, it contains lime. Magnesia causes water to have a bitter taste. Solutions of iron taste like black ink. Potash and soda do not give distinct tastes to water. These salts in mineral waters

produce the taste of salt. If the sulphates of potash or soda are present, they impart a bitter taste, resembling magnesia, but more repulsive. Some waters contain clay, and have an acid taste. It is necessary to use other means than the tongue to distinguish the acid. Saline waters are more impregnated with foreign matter than mineral waters, are repulsive, and have a strong medicinal effect. Saline waters are chiefly those which contain considerable chloride of sodium, as sea water and brine springs; they also contain sulphates, discovered by their bitter taste. *Turbid water.* If water is turbid, the amount of solid matter held in solution may be ascertained as follows: Fill a vessel with water; let it remain until the suspended matter has settled; then pour off the clear water from the precipitate, which may be dried and tested in the same manner as any other mineral. The sides of the vessel should be perpendicular; in that way the sediment settles sooner. Such sediments, next to those of alumina, vegetable matter, iron, etc., consist of siliceous matter. The sediment appears like mud, and should be put in a white porcelain dish and dried. If it shows a tendency to contract, while drying, separating into flakes, the sediment contains alumina; if the flakes shrink, it contains more alumina. Silica does not shrink, but forms a continuous covering; lime and other matter act similarly. A dark sediment indicates vegetable matter, proved by sprinkling some of it on a red hot iron; if it loses its dark appearance, the coloring is caused by vegetable matter. If the color changes to red the sediment contains iron. If desired to ascertain the amount of solid matter in water, it should be measured or weighed, and the dried sediment will give, when weighed, the portion of solid matter.

WATERMELONS, To Select.—A good watermelon may be known by pressing the thumb on the rind, near the center. If the melon yields a little to the pressure and the indent appears by that pressure and disappears after it is removed, the melon is ripe and healthy. If no indent can be made, the fruit is unripe. If the indent is easily made and remains after the thumb is lifted from the melon, it is overripe and unfit to eat. When the watermelon is thoroughly ripe and of good quality the interior of the rind should be a greenish white and the meat reddish pink in color. The rind of a watermelon generally becomes hard and the pulp becomes brittle. If left on the vine until probably matured, the part in contact with the ground will be changed from a white to a pale yellow, and upon close examination numerous small pimples, like the measles, will be noticed on the surface, particularly on the outer edge. With these signs, if the melon be frequently pressed and it cracks inside, it may be regarded as ripe.

WATERPROOF, To Make Cloth.—There is surely no better method than putting ½ lb. of sugar of lead and ½ lb. of alum in a pail of soft water, stirring it often until it becomes clear, pouring it off into another pail, and putting the cloth or garment into it, to remain there for twenty-four hours. The material should then be hung up to dry without wringing. It is said that garments thus treated will keep the wearer absolutely dry in the heaviest rain storm; the rain simply hangs in globules upon the cloth. Waterproof cloth is more healthy to wear than rubber goods.

WAX, Tree, to Make.—60 parts finely powdered lime, 20 parts of fine charcoal are mixed with q. s. of linseed oil. Apply with a brush.

WEATHER INDICATORS, Nature's.—Nature's barometers are the only ones of which most country folk have any knowledge. These they may consult at all times, and they know them by heart. The farmer has been so beaten about by wind and weather that he himself is scarcely sensible to changing atmospheric conditions; but that does not prevent his observing its influence on the things about him. Before rain his dogs grow sleepy and dull; the cat constantly licks herself; geese gaggle in the pond, fowls and pigeons go early to roost and the farm horses grow restless. Abroad, the ants are all hurry and scurry, rushing hither and thither; spiders crowd on the wall; toads emerge from their holes, and the garden paths are everywhere covered with slugs and snails. When the chaffinch says "Weet, weet," it is an infallible sign of rain. As the rain draws nearer, peacocks cry and frogs croak clamorously from the ditches. These are signs which almost every one has heard who lives in the country, though one of the surest ways of predicting weather changes is by observing the habits of snails. Snails never drink, but imbibe moisture during rain and exude it afterward. They are seldom seen abroad except before rain, when they commence climbing trees and getting upon the leaves. The tree snail is so sensitive to weather that it will commence to climb two days before the rain comes. If the down-pour is to be prolonged the snail seeks the under part of the leaf, but if a short or light rain is coming it stays on the outside. There is another species, which is yellow before rain and bluish after it. Others indicate change by dents and protuberances resembling tubercles. These begin to show themselves ten days before rain, and when it comes the pores of the tubercles open and draw in the moisture. In others, again, deep indentations, beginning at the head, between the horns, and ending with the jointure of the tail, appear a few days before a storm. One of the simplest of nature's barometers is a spider's web. When there is a prospect of wind or rain, the spider shortens the filaments by which its web is sustained and leaves it in this state as long as the weather is variable. If it elongates its threads, it is a sign of fine calm weather, the duration of which may be judged by the length to which the threads are let out. If the spider remains inactive, it is a sign of rain; if it keeps at work during rain, the down-pour will not last long, and will be followed by fine weather. Observation has taught that the spider makes changes in its web every twenty-four hours, and that if such changes are made in the evening, just before sunset, the night will be clear and beautiful. The constant iteration of the green woodpecker's cry before a storm has given it the names of rain-bird, rain-pie and rain-fowl.

Stormcock is a provincial name, shared by this bird and the missel-thrush, the latter often singing through gales of wind and rain. Stormbird is also applied to the field-fare. The abhorrence in which mariners hold the swallow-like storm-petrel is well known; its appearance is believed to denote wild weather. This little bird is the Mother Carey's chicken of sailors, and is also called storm-finch and water-witch. Herons flying up and down in the evening, as if doubtful where to rest, "presage some evil approaching weather"—a legend as old as Virgil, though probably devoid of foundation. Concerning gulls in general, children who live by the sea say, "Sea-gull, sea-gull, sit on the sand; it's never good weather while you're on land;" and fisher-folk know that when the sea-mews fly out early and far to the seaward fair weather may be expected. To Scotch shepherds the drumming of the snipe indicate dry weather and frost at night; and woodcocks have been observed to be remarkably listless against snowy foul weather, while, according to another author, their early arrival and continued abode "foretells a liberal harvest." The saw-like note of the great titmouse is said to foretell rain; that of the blue-tilt cold. In the south of France so much store is set by the wisdom of the magpie that if it builds its nest on the summit of a tree, the country folk expect a season of calm; but if lower down, winds and tempests are sure to follow. In Germany, dwellers in the country lack faith in the skylark's song as announcing fine weather; but when the lark and the cuckoo sing together they know that summer has come. The robin, buzzard, lapwing, starling and a number of other birds are said to foretell weather changes; it has been noticed that in nearly all the species named the various cries and calls are closely connected with the bird's food supply. Sleeping is characteristic of certain plants, and though it was at one time thought that this might have reference to the habits of insects, it is now believed to be more dependent on the weather. The tiny scarlet pimpernel, the "old man's weather-glass," opens at 7 o'clock and closes soon after 2. The daisy unfolds its flower at sunrise and sleeps at sunset. Dandelions close up at about 5 o'clock, at which time the white water lily has been asleep an hour and the mouse-ear hawkweed two hours. Local circumstances influence the flowers in their opening and closing, though they are pretty constant from day to day. Many flowers close their petals during rain—probably to prevent the honey and pollen from being rendered useless or washed away.

WEATHER, As Indicated by Clouds.—There can be no doubt that those who observe the clouds can make pretty shrewd guesses as to the weather for the next twenty-four hours. Anvil-shaped clouds are very likely to be followed by a gale of wind. If the sky becomes darker, without much rain, and divides into two layers of clouds, expect sudden gusts of wind. Brassy-colored clouds in the west at sunset indicate wind. If you see clouds going cross wind, there is a storm in the air. When on clear days isolated clouds drive over the zenith from the rain-wind side, storm and rain follow within twenty-four hours. If the clouds be of different heights, the sky being grayish or dirty blue, with hardly any wind stirring, the wind, however, changing from west to south, expect storm. Black clouds in the north in winter indicate approaching snow. If on a fair day in winter a white bank of clouds arise in the south, expect snow. Small black clouds drifting from the southwest is a sign of rain. If in winter the clouds appear fleecy, with a very blue sky expect cold rain or snow. If a layer of thin clouds drive up from the northwest, and under other clouds moving more to the south, expect fine weather. Clouds in the east, obscuring the sun, indicate fair weather. If clouds at the same height drive up with the wind and gradually become thinner and descend, expect fine weather. Enough blue sky in the northwest to make a Scotchman a jacket, is a sign of approaching clear weather. When clouds hang on the mountain side after a rain, and the sun shines on top of the mountains, the storm is over.

WEEDS, To Destroy.—1. The best way to apply salt to paths, to destroy weeds, is as follows: Boil the salt in water, 1 lb. to 1 gal., and apply the mixture boiling hot with a watering pot that has a spreading rose; this will keep weeds and worms away for two or three years. Put 1 lb. to the square yd. the first year; afterward a weaker solution may be applied when required.—2. The plants should be cut off close to the ground and a few drops of coal oil poured on to the crowns. They immediately commence to decay and are utterly destroyed. Troublesome weeds on the lawn can thus be speedily disposed of, but others will likely take their place.

WELLS, To Test Purity of.—A simple method of determining whether a cesspool communicates with a well of drinking water is suggested. Pour into the cesspool about 1 pt. of fluorescin—8 oz. to 1½ pts. of water. In a very short time, if any communication exists, the well will be colored a deep red.

WHALEBONE, Substitute for. — (*Balenite.*) Caoutchouc, 5 parts; burnt magnesia, 1 part; ruby shellac, 1 part; arsenic trisulphide, 1 part; sulphur, 1 part

WHITEWASH, U. S., to Make.—Here is the United States Government formula for mixing a whitewash, that when properly made and applied gives a white that does not easily wash or rub off: To 10 parts of freshly slaked lime add 1 part of the best hydraulic cement. Mix well with salt watr and apply quite thin. Sylvester's process for excluding moisture from external walls consists in using two washes or solutions for covering the surface of brick walls, one composed of soap and water and one of alum and water. The proportions are ¾ lb. of soap to 1 gal. of water, and ½ lb. of alum to 4 gal. of water. Both substances must be perfectly dissolved in water before using. The walls should be perfectly clean and dry, and the temperature of the air should not be below 50° F. when the compositions are applied. The first, or soap wash, should be laid on when at boiling

heat with a flat brush, taking care not to form a froth on the brick work. This froth should remain twenty-four hours, so as to become dry and hard before the second, or alum wash, is applied, which should be done in the same manner as the first. The temperature of this wash when applied may be 60° or 70°, and it should also remain twenty-four hours before a second coat of the soap-wash is put on, and these coats are to be repeated alternately until the walls are made impervious to water. The alum and soap thus combined form an insoluble compound, filling the pores of the masonry, and entirely preventing the water from penetrating the walls. Four coatings will render bricks impenetrable.

WILLOW, To Color Black.—To give a black color to the willow used for baskets and other woven ware the following process has been recommended: Let the material remain from twelve to twenty-four hours in lukewarm water, and then dip it a sufficient length of time in a dye composed of 5 parts of ground fustic, 3 of sulphate of copper, 5 of sulphate of iron, and 4 of cream of tartar. The dye should be kept at a boiling heat for half an hour to extract the color from the fustic and dissolve the other ingredients, after which it may be allowed to cool. A small quantity of logwood added will sometimes improve the color. The same process may be used for coloring the various fabrics of which summer hats are made, such as straw, palmleaf, grass, etc.

WILLOWS, Swamp, to Kill.—May is the month in which to kill swamp-willows. Take a hatchet or ax and merely cut through the bark three or four feet from the ground, then loosen the bark and strip it down to the ground but don't pull it off entirely; let it lie on the ground. Then loosen the bark above the place girdled and let it hang.

WINDOWS, To Clean.—Choose a dull day, or at least a time when the sun is not shining on the window; when the sun shines on the window it causes it to be dry-streaked, no matter how much it is rubbed. Take a painter's brush and dust them inside and out, washing all the wood-work inside before touching the glass. The latter must be washed simply in warm water diluted with ammonia. Do not use soap. Use a small cloth with a pointed stick to get the dust out of the corners; wipe dry with a soft piece of cloth. Do not use linen, as it makes the glass linty when dry. Polish with tissue paper or old newspapers. This can be done in half the time taken where soap is used, and the result will be brighter windows.

WINDOWS, Frosty, to Prevent.—1. Sponge the window with pure alcohol, and as long as the glass is kept perfectly dry this answers, but as soon as the humidity of the store deposits on the window glass there is another sponging due. A weak solution of glycerine (1 to 8) in pure alcohol is also a good wash, and this will act even better than the pure alcohol, but requires a perfectly dry and clean window to start with. The fixing of an electric fan at the side of the window and the throwing of a continuous current of air against the glass will also have the desired effect, but this lowers the temperature of the store, and so is objected to by some dealers. To those who will spend a dollar or so, and whose window permits of the simple arrangement, the following is undoubtedly the best plan. Run an inch pipe of tin along the lower inside edge of the window, this tube being perforated with small holes at every inch or so, the holes being on the upper side of the tube; carry this tube right across the window, having one end closed, and the other running under the window base, and terminating in an inverted tin funnel. Under this funnel place an ordinary kerosene lamp or a gas jet, and keep it lit all day and night. The hot air will rise through the funnel, travel along the tube, and escape through the perforations to the window, ascending up the face of the glass to the top of the window, displacing the heavier colder air. When other dealers' windows are frosted, the window which is not, where the display can be clearly seen, is doing true yeoman's service for the store.—2. Frost can be prevented from appearing on windows in winter, although scientists say that such a thing is impossible. Rub a pane of glass with an oil-saturated cloth. During the entire winter no frost will appear on that pane.

WINDOWS, Steaming, to Prevent.—1. It is thought that if a window is coated with a preparation consisting of 3 parts methylated spirits and 2 parts glycerine, there will be no condensation. The windows should be air-tight, and kept carefully closed. On a very cold day, if the shop is very warm, open them very occasionally, and shut them again almost directly.—2. A remedy found out some years ago has never been found to fail: 1st. Don't put gas lights into your windows. 2d. Put a ventilator as near the ceiling as you can get it, so as to let out the heat. 3d. Keep your door open and let the heat out and your customers in, and show the public that you do not only want them to look into your clean bright windows, but that you invite them inside of your bright and cheerful shop.

WINES, To Test.—1. The presence of lead or litharge in wine may be detected by sulphuretted hydrogen, or a solution of any alkaline sulphhydrate, which will produce a black precipitate.—2. Potassa or soda, improperly present, is detected by a small portion of the wine being evaporated nearly to dryness, and then agitated with rectified spirit; the filtered tincture, holding in solution acetate of potassa, is then divided into 2 portions, 1 of which is tested for acetic acid, and the other for the alkali.—3. A portion of the wine is evaporated to dryness and ignited; the residuum is then treated with a small quantity of hydrochloric acid; the mixture evaporated to dryness; again treated with dilute hydrochloric acid, and tested with liquor potassa. If a white precipitate forms, soluble in an excess of caustic potassa, and reprecipitated by a solution of sal ammoniac, the sample examined contains alum.—4. A drop or two of suspected wine may be poured upon a piece of paper, then dried before the fire. Pure wine stains the paper, but one containing sulphuric acid causes it to become charred and rotten. The effect is more marked on paper smeared

with starch paste.—5. Pure red wine is perfectly decolored by agitation with recent hydrate of lime.—6. Dissolve a piece of caustic potash in a small quantity of the liquid to be experimented upon. If no deposit is formed, and the wine assumes a greenish shade, there is no artificial coloration. A violet colored deposit indicates elderberries or mulberries; a red one indicates beet root or Brazil wood; red violet, that of logwood; blue violet, privet berries, and pale violet, litmus.

WOOD, To Petrify.—Gem salt, rock alum, white vinegar, chalk and peebles powder, equal parts; mix together. If, after the ebullition is over, you throw into this any wood or porous substance, it will petrify it.

WOOD. To Preserve.—1. (*To Prevent Worms in Marine Building.*) A mixture of lime, sulphur, and colocynth with pitch.—2. Saturate the pores with coal tar, either alone or after a solution of corrosive sublimate has been soaked and dried into the wood.—3. Sheathing with thin copper over tarred felt is esteemed the best protection for the bottoms of ships for all marine animals; the joints should be stopped with tarred oakum.—4. Stud the parts under water with short broad-headed nails.—5. (*To Destroy Ants and Insects in Wood.*) Corrosive sublimate is an effectual poison to them.—6. Oils, especially essential oils, are good preventives.—7. Cajeput oil has been proved effectual for destroying the red ant.—8. Dust the parts with pounded quicklime, and then water them with the ammoniacal liquor of gas works, when the ammonia will be instantly disengaged by the quicklime, and this is destructive to insect life. 9. For the black ant, use powdered borax; or smear the parts frequented by them with petroleum oil; or syringe their nests with fluoric acid or spirits of tar, to be done with a leaden syringe; or pour down the holes boiling water to destroy their nests, and then stop up the holes with cement. Ants dislike arsenic, camphor and creosote.

WOODWORK AND FLOORS, Care of.—1. It is of prime importance to select for exposed floors good lumber, and then to take good care of it. A thick coating of boiled linseed oil, applied while hot, is one of the very best of preservatives. The floor must be thoroughly dry and clean. Heat the oil in a tin pail or can placed in a kettle of boiling water. It may safely remain on the stove until wanted if care is taken not to spill or spatter the oil in any way, as this might cause a most disastrous conflagration. Never heat oil merely by putting the vessel containing it upon the stove, but always with hot water surrounding it. When ready for use, lift the kettle of water with the vessel containing the oil from the stove and carry to the corner of the room farthest from the door. With a wide, flat brush or a mop made of strips of woolen cloth, apply the oil, working rapidly and rubbing lengthwise of the boards. It is surprising how quickly hot oil will sink into the wood, and as this absorption is the secret of success, it may be gone over again as soon as the first coating has disappeared. Finish the job by backing out of the door, then leave the room undisturbed for some hours if possible. When it is necessary to use the room at once, it is well to heat an old smoothing iron quite hot and iron the floor, or rub with a bag filled with hot sand. This will cause the oil to absorb at once, and will leave the boards dry and clean. Then rub thoroughly with a thick cloth, and the room may be used at pleasure. If there is time and strength at command, an admirable floor finish may be made by melting about 4 lbs. of common yellow beeswax with 1 gal. of boiled oil. Rub the floor with hot irons until the boards are as warm as they can be made, apply the preparation when at the boiling point, and iron it with relays of hot irons, repeating the application until the wood will absorb no more. Then go over with clear, hot, boiled oil, leave it for a few hours and polish with a soft flannel. This will give a surface that dampness or use will not injure for a long time. Halls and stairs treated in this way are easily kept clean and always look well. With careful management they will not need renewing for years. Sometimes a dark finish is preferred, but this shows dust more readily and is much more difficult to take care of. If desired, it may be made by adding very finely ground burnt umber to the oil. This process of floor-finishing is very simple and easily managed, and any person of average intelligence will have no trouble in making it a success. The only precaution to be taken is in regard to fire, as if the oil boils over or is spilled upon the hot stove, the house might take fire; and as the oil burns so fiercely the fire would doubtless prove very difficult to subdue.—2. (*Polished Floors.*) No rollers should be used on furniture over polished floors. Each part which touches the wood should be fitted with a piece of thick felt securely glued on. This protects the floor and allows easy movement. These floors require only the sweeping with a hair brush and the wiping with a dust mop or soft cloth. Wax, alone, gives the highest polish; but is always slippery. It should be rubbed on evenly. Any little bits remaining will show as black specks after the polishing. The brush should be used across the grain at first, afterward with the grain. Wax and turpentine furnish a less degree of polish, which is, therefore, less slippery, while the addition of paraffine oil lessens it still more. If it be desired to keep the floor very light, the oil mixture should not be used, for oil always darkens wood. Water is the worst thing that can be applied to any waxed surface. A damp cloth may be used. All spatters or drops of any liquid should be wiped up immediately. When spots come—as come they will—rub them hard with a piece of thick felt under the foot or with a flannel moistened in turpentine. Remember to keep the surface well polished, then dirt cannot stick and substances spilled cannot reach the wood and make spots. With all these precautions the floors which are constantly used will need an entire renovation occasionally. They should then be rubbed all over with steel wool till every spot is scraped out. If the wood has grown dark it

may be whitened by a wash of oxalic acid. Rub perfectly smooth and clean before applying the wax or other encaustic. A good encaustic which will clean and polish at the same time may be made from wax, sal soda and any good soap. The wax and soap should be shaved and dissolved in boiling water. Stir frequently and add the soda. Put the mixture in something which may be closely covered and stir constantly until cool. This may be applied to floors, furniture, marbles, tiles, bricks, etc. It will remove ink from polished surfaces. The French use white wax on white marbles, but this is not absolutely necessary.

WORM, Army, to Destroy.—Going over the field with a heavy roller, drawn by a couple of horses, will crush most of the worms, while Paris green in water, sprinkled over them from a garden hose, will kill every one it touches. But in case there is no roller convenient, or the Paris green is not to be had in time, the worms may all be destroyed with very little trouble and expense in another way. They always march in a straight line, and fire nor flood will turn them from their course. When they appear in a neighborhood the farmers find out the direction in which they are moving, and then, at right angles to their course, plow a straight furrow. The "land side" is then made perfectly perpendicular by dressing it with spades, and at intervals of 50 or 100 feet holes, like post holes, are dug, from 1 to 2 feet deep. The worms come to the trench, try to climb up and fail, but having no idea of going back the way they came, they crawl along the trench and fall into the holes. They would soon die there, but most farmers make a sure job by putting an armful of straw in each hole and setting it on fire. If the army worm knew how to change his line of march he would no doubt give more trouble than he does, but his brain power is limited, and he walks into the post holes with his eyes wide open.

WOUNDS, To Heal.—1. When any one runs a nail or a wire in the flesh hold the wound over burning sugar as soon as possible and it will prevent soreness.—2. Procure from your druggist a small bottle of tincture of benzoin and apply to any flesh wound. It will heal immediately and not get sore.

WRINKLES, To Remove.—Wrinkles caused by facial contractions cannot be removed while their cause continues in operation. Withering and puckering of skin, the result of years, may be remedied by: Alum, 1 dr.; glycerine, 1 oz.; water, 1 pt.; to be used three times daily as a wash; or glycerine, 2 dr.; tannin, 1 dr.; rectified spirit, 1 dr.; water, 4 oz.; to be used as a wash three times daily. These washes are astringent, and they do not harm, whereas, some of the much vaunted lotions sold by the perfumers are most injurious if used for any length of time. The skin should be frequently bathed in cold water, and rubbed vigorously with the towel afterward.

YEAST, To Make.—1. (*Without Ferment.*) Boil ½ peck malt in 3 qt. water; pour off 2 qt., keep in a warm place 30 hours; add 4 qt. of a similar decoction, and stir well; again ferment, repeat the addition of 4 qt. until sufficient yeast is obtained.—2. (*Brewer's.*) Brewer's yeast is prepared as follows: 72 lb. unkilned malt and a handful of hops are gradually stirred in a clean tub containing 7 gal. of water of 170° F.; and to this 5½ gal. water of 200° are added. The tub is then covered tightly and left quiet. After some time it is cooled rapidly. This is accomplished by setting in cans filled with cold water. When the temperature of the mash has reached 70°, the tub is covered again and allowed to stand for some twelve hours longer, when 1½ gal. fresh beer yeast are to be stirred in. After another twelve hours have elapsed, pierce a hole in the layer formed by the husks of the malt and dip 3½ gal. of the liquor beneath, then stir the whole up and dip 1¾ gal. from it (husks and liquor). This is the mother leaven, from which yeast can be generated all the year round by using it in the way described instead of the ordinary beer leaven. To the remainder in the tub add 5 gal. wort of 90°, and make use of it within two hours. The mother yeast also must be used the same day for fermenting another portion.

ZINC, To Prepare for Painting.—Dissolve 1 part of chloride of copper, 1 part of nitrate of copper, and 1 part of sal ammoniac, in 64 parts of water, and add 1 part of commercial hydrochloric acid. Brush the zinc over with this which gives it a deep black; leave to dry 24 hours, when any oil color will firmly adhere to it, and withstand both heat and damp.

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It must be borne in mind that when information is not found under one name it may yet be found under some one of several other similar meaning words, names, or forms of names, and the search be persevered in. Long dashes signify that the first named word is *repeated*. To aid in finding information wanted, also study the "CONTENTS AND ANALYSIS" in front portion of the volume.

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