

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Machine Tools.—We now have in stock, ready for instant delivery, part at our N. Y. warehouses and a portion at our works, Manchester, N. H., the following new machine tools, which we offer at the below-named exceptional prices. All modern, latest patterns, lathes, screw cutting, rod feed, power cross feed, 20 in. and under, with hollow spindle. 14 and 16 ft. x 26 in., with compound rest. viz.: Engine Lathes.—2-16 ft. x 26 in., \$786 each; 3-14 ft. x 26 in., \$750 ea.; 1-16 ft. x 20 in., compound rest. \$522; 2-10 ft. x 20 in., \$449 ea.; 2-8 ft. x 20 in., \$425 ea.; 1-12 ft. x 18 in., compound rest, \$455; 2-12 ft. x 18 in., \$435 ea.; 2-10 ft. x 18 in., \$415 ea.; 3-8 ft. x 18 in., \$395 ea.; 3-6 ft. x 18 in., \$375 ea.; 1-7 ft. x 17 in., \$369; 1-6 ft. x 17 in., \$350. Drill Presses.—2-32 in. back geared and self feed, \$365 ea.; 1-30 in., back geared, \$325; 2-28 in., back geared, \$280 ea.; 2-24 in., \$185 ea.; 3-20 in., \$150 ea.; 2-18 in., \$110 ea. Iron Planers.—7 ft. x 22 in. x 25 in., \$775; 4 1/2 ft. x 2 1/2 ft. sq., \$575; 4 ft. x 24 in. sq., \$500. Heavy combined punch and shear, \$950; 15 in. shaper, \$450; 6 in. shaper, \$135; milling machine, \$225; 48 in. radial drill, \$750; No. 1-7 spindle Durrell nut tapper, \$300; No. 2-7 spindle Durrell nut tapper, \$350. In addition we have an immense assortment of new and second-hand machine tools, engines, boilers, and pumps, woodworking and general machinery; fully described in our catalogues 29, 30, and 31, which we mail free on application. S. C. Forsyth & Co., machinists and general machine dealers, Manchester, N. H., and 209 Center St., New York city.

Hand Saw Manufacturers address John E. Tyler, Roxobel, Bertie Co., N. C.

Water Motor and Electric Light Machinery for sale at a low price. See advertisement on page 284.

I will invest in a good thing, part or whole. Address, with particulars, or no answer, 21 Park Row, Box 387, N. Y.

Excelsior Metallic and Steel Tapes, the best article made. General Depot, Keuffel & Esser, New York.

Sheet and cast brass goods, experimental tools, and fine machinery. Estimates given when models are furnished. H. C. Goodrich, 66 to 72 Ogden Place, Chicago.

American Fruit Drier. Free Pamphlet. See ad., p. 270.

Am. Twist Drill Co., Meredith, N. H., make Pat. Chuck Jaws, Emery Wheels, Grinders, automatic Knife Grinders.

Fire Brick, Tile, and Clay Retorts, all shapes. Bornerg & O'Brien, M'f'rs, 23d St., above Race, Phila., Pa.

Peck's Patent Drop Press. See adv., page 268.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Co., Buffalo, N. Y.

Drop Forgings. Billings & Spencer Co. See adv., p. 270.

Brass & Copper in sheets, wire & blanks. See ad. p. 269.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa. can prove by 20,000 Crank Shafts and 15,000 Gear Wheels now in use, the superiority of their castings over all others. Circular and pricelist free.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Machine Diamonds, J. Dickinson, 64 Nassau St., N. Y.

Eagle Anvils, 10 cents per pound. Fully warranted.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 268.

Garmore's Artificial Ear Drums for relief of partial or entire deafness. Invented by one who has been deaf thirty years. Simple and scientific in construction; not observable in use. Send for circular. John Garmore, S. W. cor. 5th and Race Sts., Cincinnati, O.

Pays well on small investment.—Stereopticons, Magic Lanterns, and Views illustrating every subject for public exhibitions. Lanterns for colleges, Sunday-schools, and home amusement. 116 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., N. Y.

Sewing Machines and Gun Machinery in Variety. The Pratt & Whitney Co., Hartford, Conn.

Catechism of the Locomotive. 625 pages, 250 engravings. Most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for catalogue of railroad books. The Railroad Gazette, 73 B'way, N. Y.

Improved Skinner Portable Engines. Erie, Pa.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 270.

Trevor's Patent Key Seat Cutter. Trevor & Co., Lockport, N. Y. See page 269.

Lubricator. See advt., Detroit Lubricator Co., p. 252.

Engines, 10 to 50 horse power, complete, with governor. \$360 to \$550. Satisfaction guaranteed. Nearly seven hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinville, N. Y.

Pat's Mfg'd on royalty. A. B. McCool, Pottsville, Pa.

The Sweetland Chuck. See illus. adv., p. 254.

Steam Pumps. See adv. Smith, Vaile & Co., p. 252.

Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

Calcium Light Apparatus and Stereopticons at low prices. C. Beseler, 218 Centre Street, New York.

Bostwick's Giant Riding Saw Machine, adv., page 238.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 236.

See New American File Co.'s Advertisement, p. 238.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 238.

25' Lathes of the best design. G. A. Ohl & Co., East Newark, N. J.

Red Jacket Adjustable Force Pump. See adv., p. 220.

Collection of Ornaments.—A book containing over 1,000 different designs, such as Crests, Coats of Arms, Vignettes, Scrolls, Corners, etc., will be mailed free on receipt of \$1. Address Palm & Fechteler, 6 West 14th Street, New York.

Combination Roll and Rubber Co., 68 Warren street, N. Y. Wringer Rolls and Moulded Goods Specialties.

Pure Water furnished Cities, Paper Mills, Laundries, Steam Boilers, etc., by the Multifid System of the Newark Filtering Co., 177 Commerce St., Newark, N. J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 143 Greenwich Street. P. O. Box 3088, New York city.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your free book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. THE SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N. J.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Voccom & Son's Shafting Works. Drinker St., Philadelphia, Pa.

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Notes & Queries

HINTS TO CORRESPONDENTS. No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers. We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

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Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) R. D. asks: Will you please inform me what is used to darken bronze? I have the bronzecastings, and want to finish them like the bronze bell pulls and door trimmings we buy at the hardware stores. It is called dark or Berlin bronze. Also how to make a good lacquer for bronze? A. Cleanse the metal by dipping it first momentarily in nitric acid, then rinsing quickly in running water, and rubbing with sandst. The bronzing dip may be prepared by dissolving in a gallon of hot water 1 1/2 lb. each of perchloride of iron and perchloride of copper. The metal should not be allowed to remain in this dip any longer than is necessary to produce the desired color. Rinse well, dry, and polish in warm sawdust or with a rag buff. To make a bronze lacquer, dissolve 1/2 lb. of shellac and 1/2 lb. sandarac in 3 quarts of alcohol, and add enough extract of dragon's blood and turmeric to produce the desired color.

(2) J. K. asks: Is there a way to prevent wood in the form of a box 4 ft. 6 in. x 20 in. from warping on change of temperature? A. The only remedy we know of is to use thoroughly seasoned wood, and to construct the box so that one part will restrain any tendency of another to warp by "dove-tailing," battenning, or crossing the grain. There is nothing of a chemical nature that will prevent warping in wood.

(3) D. C. asks: 1. How is the bright brass plating applied to the cast iron buckles of suspenders? A. See "Electrometallurgy," in SUPPLEMENT No. 310.

(4) F. C. writes: After inserting a small gas pipe through some Scotch water gauge glasses, and letting them lie over night, I found several broken in the morning. Being told that it was caused by the iron touching the glass, I covered the glass pipe with paper, but with the same result. The breakage was not due to any strain, as the piping fits very loosely in the tubes. Could you give any reason for such results, and what I should do to prevent it? A. Scotch glass water gauge tubes, like other glass tubing, is not annealed, or may be only partially annealed, which leaves the glass with an uneven tension or strain; and from experiments made for testing these conditions, we are led to believe that the inner surface has a strain tending to pull it apart, and the outer surface has a strain of compression. These conditions are due to the unequal cooling of the two surfaces. The outside cooling the fastest, compresses the inner surface while it is plastic from heat, and then sets; the inner surface cooling last or slowest, continues to shrink after the outside is set, and thereby induces a tensional strain upon the inner surface. The facts that sustain this theory are these: you may scratch, file, or rub the outside of these glasses with impunity; but if you scratch the inside or touch it with anything that produces the least scratch, even if you cannot see it, the chances are that the tube will show the crack in a short time. These tubes can be cleaned with a small pine stick and cotton wad with safety; but if you undertake to clean them with a piece of iron pipe or rod covered with a peroxide scale that is almost as hard as emery, you can hardly expect better results than you have experienced. The paper that was put upon the iron tube may itself have had particles of grit or sand upon it, that produced an imperceptible scratch.

(5) H. O. writes: Will you please inform me of a varnish and the process of making it, that I could varnish some ornaments that I have bronzed with gold colored bronze? The method I used to put the bronze on was to paint the article, which is cast iron, with white paint, which is white lead and oil; when hard dry, varnish with copal varnish; when sticky dry, dust the bronze powder over it; and when hard dry, brush off all the superfluous bronze with a camel's hair brush. What I would like to know is how to protect it from the dust and from soiling. Is my process correct? A. Coat the bronzed surface, when dry, with spirit copal varnish. Your process is correct.

(6) C. S. asks: How is glucose manufactured? Do you think I could make it from sweet potatoes? What would it cost to make it on a small scale? A. You will find comprehensive papers on glucose and its production in SUPPLEMENTS, Nos. 96, 259, and 260. It can be prepared from the yam, but more profitably from corn or cassava.

(7) J. S. L. asks: What material (not acted on by caustic soda) can I use to make non-porous the lower portion of porous cell used in the "cheap electric pile," mentioned in SCIENTIFIC AMERICAN, Aug. 5, page 86? A. Try plaster of Paris, filled after "setting" with melted paraffine.

(8) G. A. F. asks: What will make the best oak stain to apply to pine finish, and how should it be applied? A. Tincture of turmeric (curcuma) five ounces;

dragon's blood half an ounce; alcohol three parts. Rub up the dragon's blood to a thin paste, with a very small quantity of boiling water in a hot mortar, then add the alcohol, and finally the yellow tincture, mixing all well together. Let the mixture stand for eight hours in a covered vessel, and strain through a cotton cloth for use. Apply with a brush, adding wine spirit if too dark.

(9) W. A. M. writes: I have a rope, with hook attached, running over a pulley which I use for hoisting light packages of merchandise from the ground to the second and third floors of a building. The rope is exposed to sun and rain. Please tell me how to treat it so that it will not rot out, as I find the action of the weather soon destroys it. A. Digest the rope for several hours (or over night) in warm dead oil (a cheap product of the distillation of tar).

(10) J. B. writes: I am about to lay an iron pipe 10 inches diameter, made of plates about three-sixteenths of an inch thick, across the street underground to my boiler shop, for the purpose of transmitting blast to the forges. Will you kindly inform me through the medium of your paper what would be best to use in the way of paint to prevent injury to the pipe from rust or corrosion? A. Dissolve genuine asphaltum in oil of turpentine; give the pipe two good coats of this, allowing the first to dry before the second is applied. See that the pipes are quite dry before putting on the varnish.

(11) H. L. D. asks: Is there any remedy for falling hair, or any preparation that will cause a new growth of hair? also the cause of and how to remove dandruff? A. See "Hygiene of the Hair," by Prof. Erasmus Wilson, in SUPPLEMENT No. 102, and "Baldness," by Geo. H. Rohe, in SUPPLEMENT No. 161.

(12) A. H. J. asks: Can you suggest some way of making paper transparent? I have tried soaking it in machine oil with results not satisfactory. A. We know of no way of making paper transparent. It may be made translucent by saturating it with castor oil or bleached balsam.

(13) W. G. B. asks: Can you give me directions for putting a high polish on ebony, one that will be durable? A. Give the work two coats of fine copal varnish, and rub this down (when dry) quite smooth with fine pumice stone; put on a third coat of the same, and rub down with rotten stone; clean and put on a flowing coat of best spirit copal varnish, and when this has become quite dry, polish with chamois skin and the palm of the hand. 2. Also for a mixture to dye pine to a dark walnut color. A. Dissolve in a pint of water two ounces of sal soda, heat to boiling, add three ounces of dichromate of potash and eight ounces of Vandyke brown, with enough water to reduce to the proper consistency for use with a flat brush or rubber. Use the stain hot, and not too concentrated. This, when dry, takes varnish or oil very well.

(14) J. L. B. writes: IN SCIENTIFIC AMERICAN of May 20, page 323, answer to J. H. Z., No. 22, you give receipt for starching collars, cuffs, etc. Allow me to ask: 1. Should the goods when starched be treated as when ordinary starch is used? A. Yes. 2. Do you mean a common sadiron when you say "use a polishing iron?" A. No; the polishing iron is usually smaller than the ordinary sadiron, and has all the face edges well rounded, so as to admit of a burnishing action, in which the full pressure is brought to bear on a small area, thus developing a gloss not easily obtainable by other means.

(15) H. C. asks: At what temperature the alloy, note 14, page 139, current volume, melts? A. At about 210° Fahr. The receipt should read: "lead 1 1/2 parts, cadmium 1/2 part," etc.

(16) E. B. S. asks: Will you please tell me the best way to prepare the Irish potato for the purpose of cleaning, particularly for cloth and silk? A. The potatoes are simply washed and reduced to a fine pulp by grinding. See "Potatoes and their Utilization," page 229, vol. xiv.

(17) D. E. S. asks: 1. Can you tell me how much pressure a boiler made of 14 inch lap-welded wrought iron pipe will stand? Do you think it would stand 500 pounds to the square inch? If not, how much will it stand? It is a good quality of pipe. A. We believe they are proved to only 300 pounds per square inch. Pipe can of course be made, and has been made, to stand much more than 500 pounds. 2. Do you think cast steel is as good for boiler heads as wrought iron, that is, to insert two-inch flues in? Will it expand more than wrought iron? I mean such as the Chester steel casting, as cast at Chester, Delaware Co., Pa.? Would it not make good heads for small 14 inch boilers with about twelve 2 inch flues? If not as good, is it not nearly as good? A. Yes, if soft or low steel, difference of expansion and contraction being very slight. 3. How much pressure will 2 or 2 1/2 inch steam pipe stand, outside pressure, that is, used for flues? A. We do not know of actual tests, but it will stand much more than any pressure used ordinarily in steam boilers. Locomotives use pressures up to 150 to 200 pounds. 4. Do you think the heads could be put into 14 inch pipe so as to hold as much as any part? A. Yes, if properly done.

(18) J. E. D. asks: Can I use an upright tubular boiler for heating the room in which it stands, another adjoining on

good receipt for dipping cast brass is: equal parts by measure of sulphuric and nitric acid and water. The work must be cleaned with a strong hot solution of soda in water. Dip but a few seconds, and rinse in clean hot water; dry in sawdust.

(20) W. H. W. writes: I have some wood work painted zinc white. Can I bonize it, and if so, please tell me the process? A. The white paint must first be removed by spirits of turpentine or aqua ammonia, and the wood treated with a hot concentrated solution of alum until it is saturated, when it is brushed over with a logwood decoction thus prepared: one part of fine logwood is boiled with ten of water, and filtered through linen, after which it is evaporated down slowly to one half; to every quart of this add from ten to fifteen drops of a saturated solution of indigo perfectly neutral. After rubbing this into the wood it is treated with a saturated and filtered solution of verdigris in hot concentrated acetic acid. This whole treatment is repeated once or twice until the required intensity is obtained.

(21) C. M. C. writes: We have tried most of the different kinds of wood for building steam boxes, and find that about two years is as long as any of them will last. Being compelled to renew them so frequently places a heavy tax on the business. Iron is being used by some for this purpose with very little better success. Kindly give me your opinion on how brick would answer? Boxes require to be about seven feet each way, and no connection between apartments. A. Steam boxes used here are made of wood. If you should thoroughly paint the wood with coal tar, such as is used for iron work, you would no doubt add one or two years to its life. Brick would not do unless treated with coal tar, as the hot steam disintegrates brick and mortar very rapidly. The best and most durable steam boxes that we know of are staved and hooped like cisterns or tanks.

(22) O. R. R. writes: Is the green scum which collects upon the surface of stagnant water a vegetable growth? I have thought that it might be a species of algae, and that it is a means provided by nature for purifying the water. Am I right; if so what is its name? A. The green scum is composed of conferva, chiefly the microscopic globular algae, called *Clathrocystra aeruginosa*.

(23) H. A. O. asks: I get forty pounds of beef per week, and wish to keep it fresh so that it will not spoil. Could I keep it by sinking a barrel in a spring of water, high enough to come above the water? How can I keep the barrel from becoming damp inside? How can I cover it tightly? A. Your plan is a good one in the absence of a supply of ice. The barrel should be tight and kept well down in the water. The meat may be suspended from hooks in the underside of the cover, the latter being well packed with woolen stuff so as to fit tightly and exclude the air. A little unslaked lime in the bottom of the barrel will absorb moisture. If the meat were immersed for a few minutes in Professor Barth's boroglyceride solution it might insure its keeping.

(24) W. J. P. requests a recipe for coloring brass black, something that will bear handling if possible. I have used a dip of butter of antimony, but the results obtained were not altogether satisfactory. Also mention a book containing such recipes? A. To color brass black try a weak solution of permanganate of potassium in very dilute nitric acid. "Spons' Receipts."

(25) A. S. L. asks: 1. How can the grease be prevented from collecting in the trap underneath the kitchen sink, thereby causing foul smells; and if not preventable, what is the most effective method to cleanse the trap? A. To prevent grease collecting in your sink pipe wash down the pipe every day with boiling hot water, which will melt the grease and carry it down to the sewer. If this does not entirely clear it, put some sal soda in the water and pour it slowly into the pipe boiling hot. 2. How can I take the stain from white marble occasioned by water in which flowers have been kept? A. For removing stains upon marble, wash the marble thoroughly with acid and warm water to remove any grease, and apply oxalic acid by laying a piece of white cotton cloth saturated upon the spots for a short time. If it destroys the polish you may repolish with oxide of tin and water applied with a cloth. If the stains are not deep rub the surface only with the oxalic acid and water upon a small piece of cloth quickly, and wash, to free the marble of acid. Then, to give it a gloss, rub with chalk wet with water.

(26) L. L. J. asks: 1. In extracting the coloring matter from a vegetable substance will the resulting liquid keep better whether the vegetable is boiled, or soaked in cold water and then subjected to pressure? A. The more matter dissolved the greater the tendency of the decoction to sour. 2. Also, please tell me of a good mordant for a black or dark brown vegetable dye, without any disagreeable smell or taste? The dye is to be used on vegetable matter, and the ordinary tannic acid adds a peculiar and unpleasant odor and taste. A. Nothing of this character is known. Copper or iron salts are generally used, but they are very perceptible to the taste.

(27) J. B. says: I have at my residence in the country just put in a water closet on the second floor, which, with my waste from the bath, I drain into a large well about twenty-five feet from the house. The said well is lined with dry stone, 18 inches thick, to within 4 feet of the surface. The 4 feet laid in mortar, and covered with 2 inch pine plank bedded in cement on the wall, joints caulked, beside being firmly spiked to two pieces heavy timber crossing the well and built in the wall, making it quite hermetical. I think. Now, what I desire to know is, would it be proper to make a small hole in the cover to permit any gas or foul air generated therein to escape, and would it (if it did escape), not be offensive being so near the house, or would not such an opening have a tendency to drive the foul air or gas toward the water-closet above it? In short, which do you suggest as the better plan, to keep the well hermetically sealed, or make a hole in the same? A. If your house pipes are properly arranged there will be no driving back of foul air, whether you have an opening in the top of the cesspool or not. But such a receptacle as you describe is a bad thing to have near any dwelling,

because by leakage into the adjacent ground it is all the time breeding a poisonous atmosphere. The opening you propose will not help the matter. If you are obliged to have a cesspool, then it should be made absolutely tight, like a bottle, so that there can never be leakage into the earth; it should be ventilated by a liberal pipe, leading to the top of your house; the contents should be removed by pump whenever required, and carted away. In addition to this your house pipes should be trapped and should be ventilated by pipes leading above the roof.

(28) T. E. H. asks: Please inform me of a good and simple way of cleaning and recoloring the barrels and other metal parts of a double barrel shot gun which are quite rusty? Would it be best to color or nickelplate the small parts? A. Take the barrels from the stock and put them in clean cold water free from gritty matters. Attach the brush to the washing rod, and get out all adhering powder and residues; next take tow and wash until the barrels are quite clean. If the parts have rusted it will be necessary to use a little emery flour. Dry the barrels with clean cotton rags, rubbing until the metal feels warm. Plug the ports and muzzles securely, then cleanse the outside parts with a strong alcoholic solution of caustic potash, aided, if necessary, with a little emery flour and a soft rag. Rinse thoroughly in water, dry thoroughly, warm, and while warm rub over every part with the following preparation: pure (dry) zinc chloride 1 oz.; nitrate of antimony 1/4 oz.; olive oil 2 oz.; well rubbed down into a smooth uniform paste. After half an hour's exposure, rub off excess of this paste and polish with clean soft rags. In warming the metal avoid overheating it so as to injure the temper. Gums look nicely when properly electroplated with nickel, but ordinarily the coating is not very serviceable.

(29) E. G. S. asks: What are the difficulties attending the invention and use of a steam road carriage for common roads? A. The principal difficulty is to so "hang" the engine and boiler that the carriage may run in any direction or over obstacles, without affecting the joint and machinery connections. You would get much information by reading up the English experience with steam carriages.

(30) W. W. C. asks: 1. What the component parts are of the black paint used for school black boards? A. The following composition is recommended for black boards: shellac varnish, 1/2 gallon; lamp black, 5 oz.; powdered iron ore or emery in fine powder, 3 oz. If too thick thin down with alcohol. Give the wood three coats of the composition, allowing each to dry before putting on the next. The first coat may be of shellac and lamp black alone. 2. How can I mix a good glossy and durable green or red paint for wagons? A. Better lay on the color in oil and varnish over it. Vermilion or chrome green are good colors. You can purchase the colors ready ground in oil much more cheaply than you could mix them yourself. To obtain a smooth, glossy, or carriage finish apply several coats of the paint; let each dry thoroughly, then rub them down very smooth with fine pumice stone moistened with water, and finally lay on one or more coats of good copal varnish.

(31) D. C. asks: How can I make nitrate of copper, or where I can procure it? A. Some clean turnings of pure copper are placed in a glass or porcelain vessel, and nitric acid diluted, one part of acid to three of water poured upon it; the mixture is set aside out of doors to avoid the poisonous fumes evolved, and when the copper has entirely dissolved the solution is evaporated down in a porcelain dish until it is dry. The green salt thus obtained is the nitrate of copper. It is very corrosive to the skin and must be carefully handled. You can procure nitrate of copper from any large drug house.

(32) W. E. D. writes: Having read a recipe for making a black ink from nigrosine, I resolved to try it, but find that the ink will smear if accidentally rubbed by the hand, especially if the hand is moist. Would you please inform me how to obviate the difficulty? A. Try the following: a concentrated solution of borax 1 part; shellac 4 parts; boiled together and mixed with sufficient nigrosine to give the requisite color.

(33) E. H. R. asks: How can I test amber beads for their purity? A. A small portion of oleic acid is dropped upon the lump and gently warmed. If the amber is spurious it will dissolve; or if adulterated, will be more or less reduced in size.

(34) J. G. asks how to make a cement that will be as hard as stone when dry, and which will adhere firmly to wood. A. Try the following receipt: Melt 1 oz. resin and 1 oz. of pure yellow wax in an iron pan, and thoroughly stir in 1 oz. of Venetian red, until a perfect mixture is formed, which is used while hot. When cold it is as hard as stone; or if the color and heating are objections, use a solution of soluble glass mixed with some quicklime.

(35) B. R. H. asks: Will you please give us receipts for canning sugar corn and tomatoes? A. To can tomatoes select well-ripened perfect fruit; clean, scald, and remove the skins and pack in the cans. It is preferred by many to remove at least one-third of the fluid portion of the fruit before packing. Put on the covers and immerse the cans in boiling water for from an hour to one and one-half hours. When taken out open a small vent (preferably not larger than a pin hole) in the head of each cover, and as soon as the confined air or gases have escaped seal up again and put the cans aside. In the course of a week examine the cans to see if they are tight. Corn is canned in a similar manner, but requires much longer heating to cure it properly: six hours' exposure is frequently required. If the water bath contains a solution of salt or chloride of calcium instead of pure water, the curing operation is facilitated and the curing more effectual. If not properly cured such goods will not keep, and the cans are apt to burst, by reason of the gases disengaged in the process of fermentation or decay. Care must therefore be taken to avoid accident in storing the cans.

(36) C. F. T. writes: 1. Sponge is porous and absorbs water and is increased in weight thereby,

Does sponge absorb gas, such as oxygen or hydrogen? Would it become heavier or lighter by so doing? A. If the sponge is compressed into small compass and then allowed to expand in a gas, the latter will rush in to fill the interspaces and pores, just as water does under similar circumstances; there is no absorption of gas in any other sense. Sponge inflated with air or gas is slightly heavier than when compressed. Hydrogen is much lighter than atmospheric air, so that a sponge inflated with that gas would weigh less than when filled with air. 2. What weight will a cubic foot of confined air support or prevent from sinking in water? A. Atmospheric air varies slightly in volume with changes of temperature and barometric pressure. At 60° Fahr. and 30 inches barometric pressure, dry air is 813.67 times lighter than pure water. A cubic foot of pure water under like conditions weighs about 62 1/2 pounds, and a cubic foot of air about 1 1/2 ounces. The difference is the weight necessary to sink this volume of confined air in pure water. 3. What amount of confined air would prevent a human body (say one weighing about 150 pounds) from sinking in water? A. The specific gravity of the human body in life is nearly that of water. To support the head out of still water 100 cubic inches of air in a light envelope will suffice. A larger volume would be necessary in rough water.

(37) D. H. asks: Can you tell me the quickest method for tanning thin rawhide regardless of the quantity of the leather after it is tanned? A. Put the washed hide into milk of lime until the hair comes out, then rinse, pull the hair out, and with a blunt knife remove the fatty integuments from the flesh side, and having cleaned the hair side, put the skin into a strong, warm decoction of extract of hemlock or oak bark, which keep in a warm place and strengthen every few days by fresh additions of bark extract, until it is found on cutting a trial strip of the skin that it has been tanned through. The more the skin is handled—taken out, rolled and rubbed, and put in again—the quicker and more uniform the tanning operation proceeds. Anything that tends to force the tannin into the skin hastens the reaction termed tanning.

(38) A. D. P. writes: I have occasion to make casts or moulds of plaster of paris from metal types, but am troubled with air bubbles, or picks as they are sometimes called. What can I do to avoid them? A. In the first place use the finest and purest plaster of Paris obtainable. When filling a mould, learn to beat up the requisite quantity of cream quickly, and with care to avoid making it too thick. In pouring this in, use a good camel's hair brush to displace air bubbles; a mere surface cover of this thin cream is all that is requisite. While doing this have ready the thicker plaster, of the consistence of light sirup, and fill up the mould at once. In about twenty minutes you can open the mould, if your plaster is pure and has been properly mixed. If you do not put too much oil on the type and have used your brush properly, you will find clear, sharp moulds.

(39) E. T. S. asks: 1. Can the gas (hydrogen) generated by immersing scrap zinc in acidulated water be ignited? A. If by "ignited" you mean inflamed, yes; it burns very readily in the air. 2. I have a small electric motor which I wished to convert into a generator of electricity; have made all connections as stated in SUPPLEMENT, No. 161, for making small dynamo, and although the armature revolved at a high rate, could get no current? Can you suggest where my mistake lies? A. There may be some defect in the machine or its connections. We are unable to judge from your brief statements. Attach the terminal wires to a galvanometer to ascertain if any current is developed. If not, put a battery in circuit, including galvanometer and machine. If no current passes, there is a break in the coils or a bad connection. If, on the contrary, the current passes while none is developed on operating the machine with no battery in circuit, it is very probable that the armature coils are short circuited, or cut out by a cross contact, supposing the machine to be properly constructed in all other respects. 3. Will you please state what chemicals are used to make oil and water unite? Usually caustic soda or caustic potash. Consult some elementary work on chemistry.

(40) J. T. E. writes: I wish to know what is best to use to take printer's ink out of silk without damaging the goods? A. Put the stained parts of the fabric into a quantity of benzine, then use a fine, rather stiff brush, with fresh benzine. Dry and rub bright with warm water and curd soap. The benzine will not injure the fabric or eye.

(41) J. Mc D. asks: 1. What is the amount of sulphuric acid per gallon of water generally used in removing scale from cast or wrought iron? A. About 10 per cent. 2. How can I cleanse a cask that has contained vinegar for several years, so that it can be used for other purposes? Can it be done by slaking lime in the cask, and allowing the lime water to remain in it some time? Have been informed that coal oil barrels are sometimes cleansed in that way? A. Old vinegar barrels become impregnated to such an extent with their acetous substances that it is next to impossible to render them fit for the storage of any other liquid. Fill the barrels with milk of lime, and let this remain in them for several months, then rinse out well with plenty of warm water, and steam them inside for half hour.

(42) H. H. C. writes. There is a "remedy for dyspepsia" put upon the market here and extensively sold as a "solution of the double chloride of gold." It is very costly, some \$9.00 per bottle, and chemists East, to whom specimens have been sent, declare that there is no gold in it. Will you please suggest a test for gold in this state (or in any combination) that could be used by a person tolerably well skilled in pharmacy, but who lays no claim to being an analytic chemist, and which would indicate to a certainty the presence or absence of the metal? A. On a clean porcelain plate put a drop each of pure hydrochloric acid and of the solution to be tested; mix them together and drop into the mixture a small crystal of pure stannous chloride. If gold is present, a dark, purplish color will at once be developed. Repeat with a drop of pure gold chloride for confirmation. The test is very delicate and conclusive.

[OFFICIAL.] INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending October 10, 1882, AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.] A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

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