

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.

Nothing is more refreshing than a cup of good Breakfast Cocoa. If you purchase that bearing the stamp of Walter Baker & Co., Dorchester, Mass., you will be sure of a pure article.

Physicians acquainted with Dr. Elmore's Rheumatic Goutaline pronounce it the only real remedy for rheumatic disorders ever discovered, and the best remedy for dyspepsia, kidney and liver disorders. Hundreds of city references. Sent anywhere by express, \$2.25 and \$1.50 per bottle. Elmore, Adams & Co., 105 William St., N. Y.

Covering for Steam Pipes, etc.—The H. W. Johns Manufacturing Company still keep ahead of all competitors in this branch of their immense business, simply for the reason that, knowing what is wanted, they furnish the best materials for the purpose. Among the contracts recently completed with the goods manufactured by this company are the steam pipes, etc., of the Del. Lack and Wes. R. R., at Pier 41, N. R., this city, and their works at Dover, N. J.; St. Francis Xavier's Church; U. S. Illuminating Co.'s Works, in Stanton St.; also the Booth Cotton Mills, at Lowell, Mass.; the Nashua Mfg. Co.'s Works, at Nashua, N. H., and others. The office of the company is at 87 Maiden Lane.

Popular Scientific Works by Tyndall, Huxley, Spencer, Proctor, Helmholtz, Geikie, etc., 15 cents each. Catalogue free. J. Fitzgerald, 30 Lafayette Place, N. Y.

Wanted.—A practical mechanic to superintend factory in this city; one conversant with rope spinning preferred. Address, stating age, references, etc., Superintendent, Box 773, New York.

For Sale.—Vertical Engine, 9 x 9, Greenfield maker; used about one year. Sargeant Mfg. Co., Newark, N. J.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 426.

Trevor's Patent Key Seat Cutter. Trevor & Co., Lockport, N. Y. See page 426.

Lathes, Planers, Drills, with modern improvements. The Pratt & Whitney Co., Hartford, Conn.

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.

Metallic letters and figures to put on foundry patterns; all sizes. H. W. Knight, Seneca Falls, N. Y.

Otis Passenger Engine & Safety Drum, Cylinders 8x10, Double Cut Gears, in good condition. L. S. Graves & Son, Rochester, N. Y.

Diamond Planers. J. Dickinson, 64 Nassau St., N. Y. The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

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 price list free.

Brass & Copper in sheets, wire & blanks. See adv. p. 429.

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

Drop Forgings of Iron or Steel. See adv., page 429.

Am. Twist Drill Co., Meredith, N. H., make Pat. Chuck Jaws, Emery Wheels, Grinders, automatic Knife Grinders American Fruit Drier. Free Pamphlet. See adv., p. 429.

Drop Forgings. Billings & Spencer Co. See adv., p. 413.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling. see Frisbie's adv. p. 414.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co., Box 423, Pottsville, Pa. See p. 412.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 414.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 414.

4 to 40 H P: Steam Engines. See adv. p. 412.

"How to Keep Boilers Clean." Book sent free by James F. Hotchkiss, 84 John St., New York.

Scientific Books. See page 396. Catalogues free. E. & F. N. Spon, 44 Murray Street, N. Y.

Lubricator. See adv., Detroit Lubricator Co., p. 398. See New American File Co.'s Advertisement, p. 398.

Steam Pumps. See adv. Smith, Vaile & Co., p. 398.

Engines, 10 to 50 horse power, complete, with governor, \$250 to \$550. Satisfaction guaranteed. More than seven hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

Brass Finishers' Turret Lathes, 13 1/2 x 4, \$165. Lodge, Barker & Co., 189 Pearl St., Cincinnati, O.

Thomas Camp, of Covington, Georgia, General Agent for the sale of Portable Steam Engines, has a trade of \$250,000 per annum in that State. Manufacturers will find this the best medium in the South through which to sell such goods. None but first-class engines sold. Best of reference given and required.

Wanted.—Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, New Haven, Conn. To stop leaks in Boiler Tubes, use Quinn's Patent Ferrules. Address S. M. Co., So. Newmarket, N. H.

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

Water purified for all purposes, from household supplies to those of largest cities, by the improved filters manufactured by the Newark Filtering Co., 177 Commerce St., Newark, N. J.

Assays and Analyses of ores and all commercial products. Advice given and investigations made in all branches of chemical industry. Send for circular. N. Y. Assay Laboratory, 40 Broadway, 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.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description.

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

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

Improved Skinner Portable Engines. Erie, Pa.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificia, Ice Co. (Limited), 143 Greenwich Street. P. O. Box 3083, New York City.

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

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

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

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

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.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

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.

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) E. C. S. asks: 1. What is most satisfactory for heating a private dwelling—steam or hot water? A. Steam and hot water are both used, according to the taste or prejudice of owners as well as the depth of their purses. Hot water is cheapest, easiest managed, and gives a very even temperature, but somewhat clumsy in its get up. Steam has also its advantages in carrying its heat through smaller pipes, and allowing of more complex distribution than water with its clumsy pipes; requires rather more care and costs more than water. 2. What is the best material for radiators (direct radiation), and what the best form? A. Wrought and cast iron are used, and made into forms to suit the conditions of the place to be heated. Radiators for stores, offices, and rooms in dwellings, pipes running along walls or overhead, in coils, for factories or other places where rough and cheap forms may be desirable for economy. 3. What ratio should there be between the radiating surfaces and the cubical contents of the rooms? A. The ratio of surface is empirical, and requires judgment and experience in dealing with all kinds of exposures in rooms and halls, quantity of glass, ventilation, and kinds of occupation. Upon an average, 1 square foot of steam heated surface to 125 cubic feet of space, with variations of 25 per cent, covers most cases. For water, 50 per cent more. 4. What heating surface should the boiler have for each 100 feet of radiating surface? A. 10 to 12 square feet of heating surface in boiler to 100 square feet radiation surface is the usual practice. 5. What boiler pressure will give best results? A. All pressures under 100 pounds are used—1 to 5 pounds is considered the most economical and safe. 6. Is there any standard or reliable book published on steam or hot water heating? A. Write to booksellers who advertise in our columns. 7. What is the thinnest saw (50 or 54 inch) advisable to put in a light mill to saw white oak lumber green, to be run by light power? A. About three-sixteenths of an inch thick.

(2) D. M. F. writes: I am working in the telegraph office here, and I find that sometimes when the line is wide open, without any doubt, I can hear at times a minute scratching sound on the relay, which I cannot change by adjusting. I hear it sometimes when the line is closed, but cannot adjust for it. At times it is quite plain, at others very faint; our relays are a box relay of 200 ohms, in regular use, and a pocket relay of 310 ohms, both of very fine workmanship, made by the Western Electric Manufacturing Company, of Chicago and New York. The latter I use sometimes for amusement, and with it I can tell very nearly where any one who is sending is, by the way it sounds. My main question is this: Is it (the scratching sound—I can almost read it sometimes) caused by induction from the wires hanging on the same poles which are being worked at the time? Old operators can give me no explanation of it. A. The sounds may proceed from earth currents or they may be produced by induction. By placing a telephone receiver in the circuit, or in a shunt around the relay, you will probably be able to interpret the sounds.

(3) J. W. M. asks: What is it the brass founders use to make the brass flow easily and fill up the mould? I have succeeded easily in melting scrap brass in a large upright office stove in fifteen minutes in a sand crucible. In pouring in mould, it would blubber up very much, had numerous vent holes; and a small

weight one pound, compact form, after cooling I would find the casting all full of holes, and sometimes completely hollow; tried twenty times, always the same result, both with borax and with charcoal, and without anything, flux nature; used stove moulder's sand. A. Heat the brass no hotter than is necessary to make it run clean. Your sand mould must be as dry as possible. Vent the mould so that the air will escape by some other passage than the one you pour through. In melting brass, never boil it. A high temperature vaporizes the metal, and fills it with vesicles that are not easily got rid of. Try again.

(4) O. R. J. asks: Will you be kind enough to inform me how chilled iron globules or iron sand is made, that is used in sawing marble and granite? Could it be used in grinding pistons and valves? A. You can make the iron globules by cautiously pouring molten iron into water and breaking the small globules formed by running through steel rollers. This would be poor stuff for grinding valves, cocks, or pistons. If the material to be ground is iron, grind with fine emery, and finish with powdered glass or fine moulding sand. If of brass or composition, use no emery unless the surfaces are very rough. Ground glass is most in use by machinists. Moulding sand, such as is used in brass foundries, is much used, and makes a fine seat finish for valves.

(5) C. E. S. asks: Which, under the same conditions, will give the greatest speed to a boat—the side wheels, or the screw propeller? A. If with a boat of limited draught of water, the side wheels; if of deep draught, especially sea going steamers, the screw propeller.

(6) W. P. B. asks: Will the exhaust from an engine, if allowed to enter the chimney, increase the draught, and if so to what extent? The chimney is 70 feet high, 12 inches wall, 8 feet at base, and 4 feet at top, no inside flue. At what height would the best results be obtained? A. Yes; the amount depends upon the pressure at the mouth of the jet pipe. It is generally thought best to introduce the exhaust just at or above the flue discharge into the chimney.

(7) P. S. M. asks: 1. Can the vapor of gasoline, or rather air charged with that vapor, such as is produced by the various gas machines, be used instead of coal gas to drive gas engines, and for gas blowpipes? If such gas were used to heat the boiler of a small engine, should it be delivered under much pressure, and should it have a greater proportion of air to gasoline vapor than if used for illuminating? A. Yes; under pressure it would answer for both, and the proportions should be about the same in each case.

(8) G. J. E. asks how to keep ticks off of blooded cattle. I have tried kerosene, but that is not altogether satisfactory. A. Use a strong solution from pure Dalmatian insect powder.

(9) J. P. B. asks: Can water flow through a siphon whose short arm is more than 33 feet long? A. No; you cannot calculate safely on more than about 24 feet. 2. Will the flow of water through a siphon be increased by lengthening the long arm? A. Yes. 3. If the long arm is more than the length of the short arm, will the water begin to flow by filling the long arm only? A. It might, if the short arm was not too long, but it cannot be relied upon.

(10) G. J. asks: 1. Is the gas and carbonic acid from sulphuric acid and bicarbonate of soda carried into a lead chamber and passed through water, pure and harmless? A. Yes, generally. 2. Does bicarbonate of soda solution injure vulcanized India-rubber? A. No. 3. Is lead perfectly proof against a strong solution of bicarbonate of soda and carbonic gas? A. Yes.

(11) W. S. H. asks how chemical bronze is prepared to give brass a black color. I have been informed it was chloride of platinum, but all that I have made as yet deposits a thin film of the metal platinum on the surface of the brass that has a silver white color. I cannot get the black color I desire. A. Use a strong solution of hyposulphite of soda in water.

(12) "Subscriber" asks for the best method of tempering spring leaves in an ordinary shop where there are no special facilities for doing such work. A. Spring leaves for, say, carriage springs cannot be tempered without some special facilities, such as a long, even fire and a trough of water or oil long enough to take the required length of spring sidewise or partially endwise. You can make a long fire, even if you have to build a rude fire place over your tuyere.

(13) T. E. H. asks: 1. How are the brass plates used by bookbinders in embossing covers of books made? They seem to be cast and afterward chiseled deeper. A. The blocks for engraving embossing plates are cast from patterns made specially to suit the design, so as to economize the cutting away of so much metal as represents the blank spaces. They are easily made by gluing upon a piece of board of the proper size and thickness, thin pieces cut to represent the lines, borders, corners, and inside lettering, or vignette in outline. When the casting is faced off, it is ready for the graver. Where metal routing machines are in use, it is about as cheap to rout as to make a pattern. 2. What causes sponginess and blow holes in our stereotype plates? We use old type metal and the papier mache process. Plates are generally good on face but spongy under the surface or on the back. Frequently a line of blow holes follows or occupies the direction of the flow where poured in. A. Perhaps your mould is corroded or dirty on the back, or it may be that you do not take sufficient pains in pouring your metal. If poured too hot it would be likely to generate gases which might create sponginess.

(14) J. W. H.: It is probable that you have a cross or short circuit in your wires.

(15) J. F. F. writes: In almost every issue of the SCIENTIFIC AMERICAN in column Answers to Correspondents are specific directions for making electrical apparatus and the amount of electricity they will develop, or that is required to operate them; also answers to questions of a theoretical as well as practical nature. Please tell me if your knowledge of these subjects is derived from the study of books or is the result of workshop experience, or both? What books would you recommend to the study of and what course of ex-

periments or practice to a person desirous of becoming an electrical engineer? In what books will I find the data and formula for calculating sizes of wire, etc., for making electro magnets for different purposes? A. Begin with "Gano's Physics;" then purchase "Electricity and the Electric Telegraph," by Prescott; Higgs' "Electric Light;" Dredge's "Electric Illumination;" Gordon's "Electricity and Magnetism;" and "Electric Batteries," by Naudet. Supplement your studies by experiment, making your own apparatus. If possible, take a course in one of our technical institutions.

(16) F. N. Y. asks: Can you give me a receipt for glue, such as is used by paper box makers? A. Soften a pound of fair glue by digestion for an hour in hot water, sufficient to cover it. When soft, add sufficient water to form the desired thickness and melt by heating in a glue pot or bath of water, in which the glue vessel is placed.

(17) J. H. E. writes: 1. I have a small engine of 1/2 horse power. Would it be practicable to construct a dynamo machine, for running one or more Edison incandescent lamps, small enough to be run by the engine? A. Yes. 2. How many lamps would it be capable of running? A. Two or three three-candle lamps. 3. Where can I find directions for making such a machine? A. In SUPPLEMENT, No 161.

(18) A. E. I. writes. I have among a lot of photographic chemicals one bottle labeled colloidion. It is of a light yellow color and smells strongly of ether. Could you through the columns of your valuable paper tell me how to prepare it for use? A. Use it as it is, if of pure light color. 2. What is meant in chemistry by the term "excess;" for instance, "add an excess of acid"? A. Sufficient to just overestimate the alkali or acid present, as shown by reddening litmus paper when acid is in excess and bluing red litmus paper when alkaline. 3. I bought some calcium sulphide, which being exposed to the light for some time, does not shine in the dark; what is the reason? A. It was not properly made or kept, and had oxidized to sulphate of lime by exposure to the air. It should be kept in an air tight bottle. 4. Is the gravity battery constant, or must it rest to regain its energy? A. The gravity is very constant.

(19) J. S. asks: What are the products of combustion of the gas generated by gasoline as used in gas machines, and whether they are injurious to health? A. They are variable mixtures of carbonic acid gas and a small amount of carbonic oxide, and consequently are deleterious; the above apparatus may be used in a well ventilated room without danger of contaminating the air.

(20) T. N. M. asks (1) how to etch on steel. A. Cover the surface with a thin coat of asphaltum varnish of fine quality, then cut the design through to the surface of the steel, and etch with a weak solution of nitric acid in water; finally wash with hot water and remove the asphaltum with hot turpentine. 2. Also, how to make impression paper used by etchers on steel. A. See method of manufacture, in SCIENTIFIC AMERICAN, No. 10, vol. xlvi., page 148, March 11, 1882.

(21) C. F. P. asks if there is anything that I can put into glue in a liquid state that will keep it from tainting or spoiling without interfering with its adhesive quality. A. Add a little of a solution of bisulphite of soda to it.

(22) T. S. asks: 1. Is celluloid a good insulator of electricity or not? A. Yes. 2. For connecting it firmly with metallic parts—say by screws or any other means—what will be the safest method to avoid its partial inflammation? A. Coat it with a solution of gnta-percha in bisulphide of carbon.

(23) J. S. asks: Can you give us a receipt for a water-proof leather cement such or similar as is used on leather belting? A. See receipts for cements in SUPPLEMENT, No. 158.

(24) F. R. S. asks: 1. Does back water affect the power of a turbine water wheel, if the head remains the same? A. Yes. 2. Is the outward pressure greater at the bottom of a tub full of water than at the top? A. Yes. 3. What part of a boiler receives the greatest pressure when in use? A. Bottom.

(25) W. E. P. writes: 1. Please give directions through the SCIENTIFIC AMERICAN how to splice a wire cable. I have one that has been used for stacking; several of the wires are broken in one place. Can I mend it without having to cut in two and splicing? A. A wire rope is spliced in the same manner as a hemp rope. Any old sailor should do it. You can mend only by splicing. 2. Is an injector as reliable as a boiler feeder as a hot water pump? A. An injector requires more careful use; any chip or other foreign matter will stop its operation, but its stoppage is at once indicated, and discovered on examination.

(26) P. N. K. writes: I am told that if air leaks into the smoke box of a locomotive it will cause the gases therein to ignite. Is this a case of "chemical combination"? If so, please give equation. A. The access of air to hot carbonic oxide will cause it to ignite and burn to carbonic acid, CO + O = CO₂, if the temperature is high enough, which it generally is in the smoke.

(27) C. F. writes: There is a discussion at our shop about the mode of reducing bronze powder to an impalpable condition, that is, metallic bronze. So, will you please let us know through the SCIENTIFIC AMERICAN? A. Metallic bronze is pulverized by trituration in a mortar, and the coarse is separated from the fine by elutriation. The ordinary bronze powder is bisulphide of tin, made by fusing tin with sulphur.

(28) H. and G. ask: Can you give a good recipe for making artificial cider? We have seen "manufactured" cider that has the exact flavor of real apple cider, and keeps longer, but we don't know how it is made. A. It is a solution of the required strength of tartaric acid in water to which the necessary amount of caramel (sugar coloring) has been added to give the required color. Sometimes it is sweetened with glucose, and a small portion of bisulphite of soda or salicylic acid added as a preservative.