

## 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.

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Our goods rank first for quality, safety, and durability. Please compare them with any other make, and if not found better and cheaper quality considered, we will bear the expenses of the trial, Lehigh Valley Emery Wheel Co., Lehighton, Pa.

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Light and Fine Machinery and Tools to Order. Lathe catalogue for stamp. Edward O. Chase, Newark, N. J.

Malleable and Gray Iron Castings to order, by Capital City Malleable Iron Co., Albany, N. Y.

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Combination Roll and Rubber Co., 27 Barclay St., N. Y. Wringer Rolls and Moulded Goods Specialties.

Send for Pamphlet of Compilation of Tests of Turbine Water Wheels. Barber, Keiser & Co., Allentown, Pa.

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

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

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

"How to Keep Boilers Clean," and other valuable information for steam users and engineers. Book of sixty-four pages, published by Jas. F. Hotchkiss, 84 John St., New York, mailed free to any address.

Peck's Patent Drop Press. See adv., page 94.

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.

Diamond Drills, J. Dickinson, 64 Nassau St., N. Y.

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

Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, Limited, Erie, Pa.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. Corrugated Wrought Iron for Tires on Traction Engines, etc. Sole mfrs., H. Lloyd, Son & Co., Pittsburg, Pa. Supplee Steam Engine. See adv., p. 93.

List 27.—Description of 3,000 new and second-hand Machines, now ready for distribution. Send stamp for same. S. C. Forsaith & Co., Manchester, N. H., and N. Y. city.

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

Improved Skinner Portable Engines. Erie, Pa.

C. B. Rogers & Co., Norwich, Conn. Wood Working Machinery of every kind. See adv., page 77.

The Sweetland Chuck. See illus. adv., p. 78.

Electric Lights.—Thomson Houston System of the Arc type. Estimates given and contracts made. 631 Arch, Phil.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Solomon's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N. J.

Lighting Screw Plates and Labor-saving Tools, p. 93.

For Rubber Packing, Soapstone Packing, Empire Packing, and all kinds, write Greene, Tweed & Co., N. Y.

For the Garden and Farm.—A great variety of Seeds and Implements. Send for catalogue. Address R. H. Allen & Co., P. O. Box 376 New York city.

Cope & Maxwell Mfg. Co.'s Pump adv., page 108.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 110.

See Bentel, Margedant & Co.'s adv., page 110.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Telegraph, Telephone, Elec. Light Supplies. See p. 109.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Eagle Anvils, 10 cents per pound. Fully warranted.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 108.

Peerless Colors for Mortar. French, Richards & Co. 40 Callowhill St., Philadelphia, Pa.

Saw Mill Machinery. Stearns Mfg. Co. See p. 93.

Elevators, Freight and Passenger, Shafting, Pulleys and Hangers. J. S. Graves & Son, Rochester, N. Y.

Gould & Eberhardt's Machinists' Tools. See adv., p. 108.

Gear Wheels for Models (list free); Experimental Work, etc. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Barrel, Key, Hogshead, Stave Mach'y. See adv. p. 110.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 108.

The Medart Pat. Wrought Rim Pulley. See adv., p. 109.

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.

Engines, 10 to 50 H. P., \$250 to \$500. See adv., p. 109.

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.

Safety Boilers. See Harrison Boiler Works adv., p. 109.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 109.

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

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, send for catalogue to Rowley & Hermance, Williamsport, Pa.

Portable Power Drills. See Stow Shaft adv., p. 108.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher-Schumm & Co., Philadelphia, Pa. Send for circular.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 108.

The Porter-Allen High Speed Steam Engine. South-west Foundry & Mach. Co., 430 Washington Ave., Phila., Pa.

Ore Breaker, Crusher, and Pulverizer. Smaller sizes run by horse power. See p. 109. Totten & Co., Pittsburg, Pa.

4 to 40 H. P. Steam Engines. See adv. p. 108.

**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.

Were new 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.

To OUR CORRESPONDENTS.—The destruction of our old offices by fire January 31, 1882, caused the loss of a considerable number of inquiries from correspondents and of our replies thereto, which we had in hand for publication. Those of our friends who find their inquiries neglected will know from the above the reason why; and they will oblige the editor by repeating their inquiries without delay.

(1) E. M. F. asks: Can you give good receipts for making indelible aniline black inks, for use in marking linen with a pen? A. Dissolve 1 oz. of cupric chloride in 3 1/2 oz. of distilled water, and add 1 1/2 oz. of common salt, and 1 1/2 oz. aqua ammonia (C. P.). One volume of this solution is then mixed with four parts of a solution prepared as follows: Aniline hydrochlorate, 3 1/2 oz.; distilled water, 2 1/2 oz.; gum arabic solution (gum 1 oz., water 2 oz.), 2 1/2 oz.; glycerine, 1 1/2 oz. The greenish liquid resulting is an excellent indelible ink for linen, although the characters written with it do not develop a full black color until after exposure to the air for a day or two if not hot pressed.

The following is Puscher's formula for a similar ink: Dissolve 4 parts of aniline black in 16 parts by weight of alcohol, with 60 drops of strong (pure) hydrochloric acid, and dilute the dark blue solution with 90 parts by weight of water in which 6 parts of gum arabic have been previously dissolved.

(2) M. S. asks: 1. Please give a receipt for preparing a good gold colored bronze for use on japanned work? A. Verdigris, 8 oz.; tin oxide (putty powder), 4 oz.; borax and niter, each 2 oz.; corrosive sublimate, 1/4 oz.; make all into a thick paste with oil, and fuse together. 2. Can you tell us of a good way to reproduce faded photographs, faded paper prints? A. The following method is simple and in most cases quite effective: Put the card in warm water until the paper print may be removed from the card backing without injury. Hang up the paper in a warm place until perfectly dry, and then immerse it in a quantity of melted white wax. As soon as it has become thoroughly impregnated with the wax it is pressed under a hot iron to remove excess of the latter, and rubbed with a tuft of cotton. This operation deepens the contrasts of the picture and brings out many minor details previously invisible, the yellowish whites being rendered more transparent, while the half tones and shadows retain their brown opaque character. The picture thus prepared may then be used in preparing a negative which may be employed for printing in the usual way.

(3) E. W. F. asks: Can you give receipts for the dyes used in imparting light fancy or varicolored tints (or bronzes) on iron, zinc, copper, and brass? A. Dissolve 4 oz. hyposulphite of soda in 1 1/2 pints water, and add a solution of 1 oz. lead acetate in 1 1/2 pints of water. The metals to be colored are placed in this liquid, which is then gradually heated to the boiling point. This treatment produces on clean iron a light steel blue color, zinc becomes bronze, and copper or brass become successively red, scarlet, deep blue, light blue, bluish white, and finally white with a tinge of red.

This dip has little effect on lead or tin. By replacing the acetate of lead in the solution by sulphate of copper, brass becomes first of a rosy tint, then green, and finally an iridescent brown color. Zinc does not color in this liquid; it reduces and precipitates the copper as a dark brown sponge, but if boiled in a dip containing both the lead and copper salts, it becomes covered with a black adherent crust, which may be improved by coating with a thin wax lacquer. Sometimes these liquids are thickened with gum tragacanth and applied to the plates with a brush to form designs, etc., and the plates are then heated to 212° Fah., and rinsed or plunged into one of the hot baths, by which a variety of effects are produced.

(4) I. M. McP. asks for a receipt for coating wood to make blackboards for school purposes, etc. A. To make one gallon of the paint take 10 oz. of pulverized and sifted pumice stone, 6 oz. powdered rotten stone (or infusorial silica), 3/4 lb. of good lampblack, and alcohol enough to form with these a thick paste, which must be well rubbed and ground together. Then dissolve 14 oz. of shellac in the remainder of the gallon of alcohol, by digestion and agitation, and finally mix this varnish and the paste together. It is applied to the board with a brush, care being taken to keep the paint well stirred so that the pumice stone will not settle. Two coats are usually necessary. The first should be allowed to dry thoroughly before the second is put on. The second coat should be applied so as not to disturb or rub off any portion of the first. One gallon of this paint will ordinarily furnish two coats for sixty square yards of blackboard. When the paint is to be put on plastered walls the wall should be previously coated with glue size—glue, 1 lb.; water, 1 gallon; lamp-black q. s. to color; put on hot.

(5) B. W. S. writes: I wish to draw water from a sixteen foot head, through hydrant, the connection between the two being 1 1/2 inches—lead pipe of the kind known as "extra light." Will this pipe stand the pressure without fear of bursting? A. Your pipe would stand the pressure of 16 feet head, but probably would not stand in connection with a hydrant, when the current will be started and stopped many times a day, and subjecting the pipe to shocks or "water hammer." If the pipe is to be thus used we would advise a stronger one.

(6) J. T. asks: 1. Does a glass water gauge sustain full boiler pressure? If so, why does it not burst? A. Yes. It does not burst because the tube is small and thick. 2. Is there any difference in efficiency between one gallon of water raised to 100 pounds steam and 100 gallons raised to same pressure? A. Under the same conditions the work should be nearly in proportion to the water evaporated.

(7) H. M. asks: 1. How high will 50 pounds pressure to the inch in a force pump throw water from a quarter inch nozzle? A. A quarter inch nozzle, about 44 feet. 2. Or what size stream from nozzle under 50 pounds pressure reaches the highest? A. The larger the stream the higher the jet, if the pressure be maintained. If the nozzle were three-quarters inch the height would be about double that from a quarter inch nozzle.

(8) E. P. T. would like to know if it is necessary for a steam pump to have a vacuum chamber to lift water at any distance? If not, will you please explain? A. It is not necessary. The air chamber is put on to prevent shocks or "water hammer" in the suction pipe.

(9) M. S. asks: 1. Would it be safe to run our 18x36 inch engine 80 revolutions per minute—fly wheel 14 feet diameter, 6 tons weight; engine is now running 70 revolutions? How much more power would we get; steam 90 pounds, 5 inch steam pipe, 6 inch exhaust? A. Yes; if well proportioned and balanced. With same pressure of steam the increase of power is in proportion to revolutions.

(10) D. D. D. asks: 1. What is the proper proportion and area of steam and exhaust ports for a 2 inch by 4 inch steam cylinder, 80 pounds steam, boiler pressure 200 revolutions per minute? A. Steam ports one-tenth area of piston, exhaust one-sixth to one-seventh area of piston. 2. What area steam pipes and exhaust pipes should have to area of cylinder? A. Refer to rule in SUPPLEMENT No. 253.

(11) D. F. H. asks: What kind of barometers are used by the Signal Corps, U. S. A.? A. Both mercurial and aneroid.

(12) J. K. & S. write: The length of my drain is 165 feet, total fall is 8 3/2 feet; the question we wish answered is this: our creek is often full from bank to bank, and we want to know if the water escaping from, say, a half inch pipe, with a pressure of 100 pounds to the inch, will flow away through a 4 inch sewer pipe with fall of 8 3/2 feet when creek is full? The fall to top of bank, or when our creek is high, is 4-25 feet; will the high water retard the flow enough so that the 4 inch pipe will not take it away fast enough? We are compelled to put in our water motor on first floor, and we do not want to put in motor unless we can get the waste water as it flows from a Turner's water motor fast enough so as not to inconvenience us or overflow. A. Yes; your 4 inch drain will carry off the water with 4-25 feet fall in 165 feet.

(13) H. S. N. asks: What cause or causes might produce a collapse of a flue in a steam boiler? A. The flue not being a true cylinder, or different thicknesses of iron used in the different parts of the flue might cause it. Flues as usually made are not perfectly true cylinders, therefore extreme pressure will produce collapse.

(14) W. F. L. writes: 1. I have charge of a locomotive engine, cylinder 8x16. The boiler is too small to generate sufficient steam to pull the load at the speed desired. The cylinders have two inches clearance at each end. Can I fill a portion of this space by attaching pieces to cylinder heads, say 1 inch or 1 1/2 inches thick, and thus save steam? A. Yes. 2. One of the steam chests has a hole in it where the stuffing box joins the chest, three-sixteenths by half an inch in size on outside, but larger on the inside. Can I fill it with the material of which rust joints are made (salammo-

niac and iron borings), and make a durable job? A. No. Can you not drill out the hole and put in a top screw or bolt?

(15) H. E. writes: I would like to ask you if common wrought iron will do for the magnets in an electric bell, and what size wire is used? A. Common iron will do if well annealed. Use No. 22 wire.

(16) W. A. P. asks: 1. Can you give me a scheme for making volumetric estimations of silica or silicates in lead and iron ores? None of the works at hand give any information on this subject. A. We know of no good practical way of determining silica by the volumetric method. Silica is usually estimated gravimetrically. Consult Thorp's "Quantitative Chemical Analysis." 2. I am using charcoal fuel and a common water jacket furnace. What are the reactions, and why is limestone used in the following charges: Ore—lead sulphide, 2 per cent; arsenic, 1 per cent; zinc lead, 74 per cent; silica, 5 per cent; charge—ore 100 lb.; limestone, 24 lb.; iron ore (peroxide, 62 per cent iron, 3 per cent silica), 68 lb.; charcoal, 40 lb.? A. Lime (or limestone which becomes lime in the furnace) is an alkaline flux combining with and rendering fluid the silicates and silicious earths contained in the ore and fuel, thus releasing the metallic burden and aiding the reduction by the iron and carbonic oxide. According to the analysis given the lime charge in this case seems to be considerably in excess of the requirements.

(17) W. S. asks: Can you tell me the way to make scagliola, an imitation of marble? A. See answer to M. N., next page.

(18) P. D. asks: 1. What does gas tar owe its preserving qualities to? A. Chiefly to the presence in it of small quantities of carbolic acid or phenol, creosote, and similar substances. 2. What late elementary works on chemistry do you recommend? A. Consult Fownes' "Elements of Chemistry," Barker's "Text Book of Chemistry," Youman's "Class Book of Chemistry," Cooke's "New Chemistry." Address the book dealers who advertise in this paper.

(19) J. H. & Son ask: How can we remove from ordinary rubber tubing its objectionable smell? A. Boil the tubing for a few minutes in water containing about 5 per cent of caustic potash, rinse well in hot water, and then immerse for about half an hour in cold water containing 3 per cent of hydrochloric acid. Finally rinse thoroughly in running water.

(20) G. H. asks: What can be used in mortar to prevent it freezing in cold weather? Salt does not appear to "fill the bill." Will the substance called chymogene (about which I know nothing) do this? A. We know of no practical substitute for salt in this connection. Glycerine would prevent the freezing if used in sufficient quantity, but it would be apt to greatly retard the setting. Chymogene is a very light distillate of petroleum, and could not be used in mortar as proposed.

(21) E. J. E. writes: 1. I wish to silver the outside of a lot of lamp globes, so as to make mirrors of them. Can you tell me how silvering on such glass surfaces is done? A. You will find explicit directions for silvering glass in SUPPLEMENT, No. 252. 2. Cannot the electric light be produced from a galvanic battery? If so, why are dynamo machines used? A. A battery can be used for purposes of electric lighting, but it is vastly more expensive to maintain than the dynamo, and does not afford as constant a current.

(22) H. P. asks: Can you tell me how sulphur can be decolorized? A. The characteristic odor of sulphur developed by heat cannot be removed.

(23) H. L. K. asks: Can you give me a receipt for the preparation of a cement or paste to unite leather and paper to iron? A. See receipts for marine glue, and other cements, page 2510, SUPPLEMENT No. 158.

(24) E. H. R. asks: 1. Can you tell me of an expeditious and efficient way to clean the inside of the barrels of a breech-loading shot gun? A. If the piece is quite dirty use a small cylindrical brass wire scratch brush (obtainable in the market), then apply a little oil and fine emery with a rag and steel or wooden rod, wiping out occasionally with a clean slightly oiled rag. Finally remove as much of the oil as possible with a clean dry rag. 2. What is the best way to remove rust and prevent its formation on such a piece? A. To remove the rust (if the metal has not been badly eaten into) rub the parts well with emery flour and good sperm oil on a cloth or chamois leather. The use of acids cannot be recommended. To prevent rusting clean the piece thoroughly, warm it, rub over every part pure refined sperm oil, then wipe as clean as possible with a dry cloth, and keep dry. 3. Will coal oil injuriously affect the barrels of such a gun? A. Not if the piece is well wiped afterward.

(25) E. N. H. asks: 1. What is a good waterproof varnish for brass models, something that will dry quickly? A. Try the following: Shellac, 3 oz.; alcohol, 1 pint; dissolve by digestion and agitation in a covered vessel, and dilute with alcohol if not thin enough for use. Warm the metal and apply the varnish quickly. 2. What would you recommend to clean fine mathematical instruments? A. The unlacquered parts may be brightened by rubbing them with a piece of chamois leather and jeweler's rouge; the lacquered parts (sometimes) by using the skiu with a very little warm alcohol. When lacquered brass or iron work has become badly discolored it is usually necessary to remove all the remaining lacquer by hot potash water or alcohol; clean the surface of the metal, and relacquered it.

(26) R. E. R. writes: The beams under the floor of my room (second story) are 3 inches by 8 inches, and are 16 inches apart and about 18 feet long. I desire to place a lathe in the middle of the floor (standing lengthwise with the beams), which, with appurtenances, will weigh about 700 pounds. Will the floor sustain such weight easily? How much will it sustain? Will the vibration caused by the treadle motion make any difference as to the safety? A. Yes; the floor will carry it if there is not much other load, but will be likely to vibrate or shake very much under the action of the treadle. Your girders should be not less than 12 or 14 inches deep.