

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.

Lubricene.—A Lubricating Material in the form of a Grease. One pound equal to two gallons of sperm oil. R. J. Chard, New York.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J. Foundry and Machine Shop, in live Western town, for sale cheap. Address Box 275, Winona, Minn.

Fan Blowers Cheap. Unadilla (N. Y.) Machine Works.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

Howard Patent Safety Elevators. Howard Iron Works, Buffalo, N. Y.

A Lee Moulding Machine, second-hand, but as good as new, cost \$800, will be sold for \$500, including a lot of cutters that cost over \$150. I. N. Keyes, Worcester, Mass.

Catalogue of Scientific Books. Mailed free on application. E. & F. N. Spon, 46 Broome St., New York.

Wanted.—A good second-hand or new Bolt Heading Machine, with latest improvements. Address Frick & Co., Waynesboro, Franklin Co., Pa.

Wanted.—A Combined Power Punch and Shears for light work. 209 West 33d St., New York.

For the most durable and economical Paint for cars, roofs, bridges, iron, brick and wooden buildings, address Pittsburg Iron Paint Company, Pittsburg, Pa.

Improved Steel Castings; stiff and durable; as soft and easily worked as wrought iron; tensile strength not less than 65,000 lbs. to sq. in. Circulars free. Pittsburg Steel Casting Company, Pittsburg, Pa.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, \$350. Forsaith & Co., Manchester, N. H.

Boilers ready for shipment, new and 2d hand. For a good boiler, send to Hilles & Jones, Wilmington, Del.

Best Steam Pipe & Boiler Covering. P. Carey, Dayton, O.

Foot Lathes, Fret Saws, 6c., 90 pp. E. Brown, Lowell, Ms.

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

Power & Foot Presses, Ferracute Co., Bridgeton, N. J.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

Alcott's Turbine received the Centennial Medal.

All kinds of Saws will cut Smooth and True by filing them with our New Machine, price \$2.50. Illustrated Circular free. E. Roth & Bro., New Oxford, Pa.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J.

Cheap but Good. The "Roberts Engine," see cut in this paper, June 1st, 1878. Also horizontal and vertical engines and boilers. E. E. Roberts, 107 Liberty St., N. Y.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See ad. back page.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

Band Saws, \$100; Scroll Saws, \$75; Planers, \$150; Universal Wood Workers and Hand Planers, \$150, and upwards. Bentel, Margedant & Co., Hamilton, Ohio.

Patent Wood-working Machinery, Band Saws, Scroll Saws, Friezers, etc. Cordeman, Egan & Co., Cincinnati, O.

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

Improved Wood-working Machinery made by Walker Bros., 7 and 75 Laurel St., Philadelphia, Pa.

Dead Pulleys, that stop the running of Loose Pulleys and Belts, taking the strain from Line Shaft when Machine is not in use. Taper Sleeve Pulley Works, Erie, Pa.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

Boilers & Engines cheap. Lovegrove & Co., Phila., Pa.

Bound Volumes of the Scientific American.—I will sell bound volumes 4, 10, 11, 12, 13, 16, 23, and 32, New Series, for \$1 each, to be sent by express. Address John Edwards, P. O. Box 773, New York.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Pulverizing Mills for all hard substance and grinding purposes. Walker Bros. & Co., 23d and Wood St., Phila.

Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J.

NEW BOOKS AND PUBLICATIONS.

THE SALE AND INTRODUCTION OF PATENTS, AND PATENTEES' DIRECTORY. By JAS. H. EDWARDS. Published by the Keystone Publishing Co., 326 Penn avenue, Pittsburg, Pa.

This volume contains practical advice designed to assist inventors in disposing of their patents by instructing them how to place the same before the public. The author seems to have had considerable experience in the business, and details what he thinks ought to be done with great minuteness. He undertakes a difficult task, however, when he assumes to lay down rules which are presumably applicable to all inventions. Few new devices, we imagine, are sold by personal canvassing in an unknown field, on the part of the inventor, book agent fashion, and we disagree with the writer in the apparent assumption that people who have no immediate need for new inventions can be talked into a conviction to the contrary. We have always advised inventors to attend to their own business and make their own disposals; and we know that the cheapest and best mode of introducing inventions is through the columns of this journal. Beyond this the subject is a matter for judgment and business tact, depending greatly upon special circumstances, under many of which the advice in this volume, in common with the lists of business houses given, may prove of utility.

Notes & Queries

(1) W. & B. ask how to turn and polish glass in a lathe, such as lens for microscopes, etc. A. Turn two pieces of brass, one concave and the other convex. Grind one into the other until they become spherical. Cement a small disk of glass to the end of a stick and shape it roughly on a common grindstone, then as the concave brass piece is revolved grind the glass in it, applying emery and water. The glass must be moved around to prevent scratching, and as it takes the proper form finer emery must be applied. When at last the surface is semi-polished and free from scratches, the concave brass surface may be covered with rosin and pitch equal parts. This must be shaped while warm, and as the lathe revolves, by means of the convex brass, which is wet to prevent adhesion. The lens may now be finished in the pitch form by applying a thin paste of rouge and water.

(2) P.—You do not send sufficient data. Consult Trautwine's "Engineer's Pocket Book," or Boller's treatise on "Highway Bridges."

(3) A. S. asks what amount of bluestone it takes for one cell of gravity battery. A. Two lbs.

(4) A. L. asks which of the three kingdoms, namely, animal, vegetable, or mineral, can water most properly be said to belong. If not belonging to any, to which kingdom does it most approximate? A. It may be classified with the last named.

(5) M. E. R. asks for a good, durable and cheap brown wash for outside woodwork, as fences and the like. A. 1. Coal tar dissolved in benzine affords a brown wash much used in some sections. 2. Slake half a bushel of lime in boiling water, strain it through a fine sieve, and add a peck of salt previously dissolved in hot water, 3 lbs. of rice boiled to a paste, and 1 lb. of glue softened, and dissolved in a little hot water. Then stir in a sufficient quantity of ochre to produce the desired color, and let the mixture stand for several days in a covered vessel. This wash is preferably applied hot.

(6) J. A. R. asks: What is the best formula for making baking powder? A. Powder and thoroughly dry separately by gentle heat 1/2 lb. tartaric acid, 3/4 lb. of pure bicarbonate of soda, and 3/4 lb. of potato farina. Mix dry, pass through a sieve, and preserve as much as possible from air and moisture.

Please give me full directions for making a simple battery for silver plating. A. See pp. 396 (44), 92 (39) and 268 (45), vol. 37, and 155 (17) and 123 (1), vol. 38, SCIENTIFIC AMERICAN.

How is soluble coffee prepared, such as is called "soluble coffee, made in one minute without boiling"? A. The soluble extract is made by concentrating or evaporating the strong aqueous infusion at a moderate heat in vacuo.

Let me know the process for manufacturing rubber stamps, and what kind of rubber is used. A. See p. 1326, SCIENTIFIC AMERICAN SUPPLEMENT, and p. 48, current volume SCIENTIFIC AMERICAN. The strips sold by the rubber companies for this purpose consist of caoutchouc with about 6 per cent of sulphur.

(7) E. E. P. asks: Is it possible for me to become a thorough pharmacologist by self instruction? A. We think you should spend a year or so in a pharmacy.

(8) G. A. H. asks: 1. What is the lifting power of 100 cubic feet hydrogen gas? A. 100 cubic feet of pure hydrogen is about 7 lbs. lighter than an equal volume of atmospheric air under the same conditions of pressure and temperature. 2. Also, the lifting power of 100 cubic feet of common illuminating gas? A. Coal gas is about twice as heavy as hydrogen. 3. Is the single gas generator mentioned July 20 in SCIENTIFIC AMERICAN suitable and most convenient for inflating a balloon of 150 lbs. lifting power? A. No. 4. What is the proportion of water to add to the acid? A. About 1 of acid to 5 of water.

(9) T. L. G. asks how hydrogen and oxygen gases are separated. A. If the gases are simply mixed, pass the mixture slowly through a strong aqueous solution of sodium pyrogallate made slightly alkaline by excess of the bases; the solution will absorb the oxygen. When in combination (OH₂=water) they may be isolated by means of a strong current of electricity passed through the liquid between platinum electrodes; oxygen then escapes at the anode and hydrogen at the cathode, so that the gases may be collected separately by inverting immediately over the respective poles bottles filled with water to displace the air.

(10) J. P. E. asks how to remove rust spots from a sword blade. A. Apply a little fine emery and oil, and finish with crocus and rouge.

(11) S. D. M. asks: 1. Can steam be condensed fast enough to be used over and over as the agent of power in the steam engine, the injector being used to force the water into boiler? And if so, would it not be economizing fuel to use alcohol which boils at 173° Fah. instead of water with a boiling point of 212° Fah.? A. Steam is used in this way frequently in the case of engines with surface condensers. There is not generally any economy in the use of a liquid having a lower boiling point than water. 2. Is it necessary that the supply water be cold for the Giffard injector to work satisfactorily? A. The injector, as made at present, will take hot water. 3. Do methylated spirits produce a hotter flame than alcohol? A. No. 4. Of the two which is the most expensive? A. Alcohol.

(12) L. P. C. writes: A friend and myself had a dispute in regard to the circumference of the drive wheels of a locomotive. He claims that a locomotive having wheels large in circumference (everything else being equal) will pull the heaviest load. I believe a locomotive having small wheels (everything else being equal) will pull the heaviest load. A. The rule for determining the tractive force of a locomotive in pounds is: (Diameter of piston in inches)² × length of stroke in inches × mean pressure in cylinder in lbs.

per square inch + Diameter of driving wheel in inches. From this you will see that, other things being equal, the tractive force increases as the diameter of the driving wheel diminishes.

(13) C. & B. ask for a recipe for making the metal used in fusible plugs in common use in the crown sheet of tubular boilers. A. There are a number of fusible alloys, a good selection of which may be found in the article "Alloy," in "Knight's Dictionary." One of the lists is as follows:

Tin.	Lead.	Bismuth.	Mercury.	Melting point, Fahrenheit scale.
1	25			558°
1	10			541°
1	5			511°
1	3			482°
1	2			441°
1	1			370°
1 1/2	1			334°
2	1			340°
3	1			356°
4	1			365°
5	1			378°
6	1			381°
7	1			390°
8	1			310°
2	2	1		292°
1	1	1		254°
1	2	2		236°
5	3	3		202°
5	3	3	3	122°

(14) Old Reader asks: 1. What should be the fall per 100 feet to gravitate coal cars (contents one ton), length of track one half mile, empty cars to be hauled back to shaft by wire rope, with stationary engine at shaft? A. One foot or less will answer. 2. And would 3/4 wire rope be strong enough to handle trains of from 20 to 30 cars? A. It would be better to use 1 inch rope.

(15) S. asks: Has an engine ever been invented that would run or was propelled by the expansive force of water (in the hydrostatic press, for instance, great power may be exerted)? Has this power ever been utilized in propelling an engine? If not, what are the difficulties in the way? And if it has, why has such a machine not come into general use? A. We understand you to refer to water pressure engines, which are used to a considerable extent in localities where there is a sufficient head and supply of water, but which are not so cheap or simple as many varieties of water wheels.

(16) F. A. C. writes: I am making some fine plaster of Paris castings, and find upon pouring that the metal splutters, boils up, and blows out without settling down into the mould. Will you be kind enough to inform me of the cause as well as the remedy for the same? A. Mix sand or pulverized pumice stone with your plaster to render it porous, and provide air vents. Thoroughly dry the plaster mould. You will find full directions for making moulds of this kind in SCIENTIFIC AMERICAN SUPPLEMENT No. 17.

(17) J. W. P. asks: At what degree of heat would water be blowing off steam at 150°? A. The temperature of the water would be about 366° Fah.

(18) L. H. B. asks: What is the fastest time ever made by a Mississippi steambot? What is the fastest time made by Hudson river steambot? Give length of largest steamer on each of above rivers. A. As these are all questions about which there is considerable discussion, we must ask some of our readers to send replies.

(19) F. J. G. writes: I have a small induction coil which gives about a 3/8" spark. I have taken it apart and find the wire of the secondary coil to be uninsulated; each layer of wire being separated from the rest by 3 thicknesses of paper. 1. Can I by better insulation produce better results? A. Yes. 2. What is the easiest and best way to do it? The wire is about No. 32, and a little over a mile long. A. It may easily be covered with shellac varnish before winding. Silk covering, however, is the best.

(20) W. S. writes: I am building an engine of the inverted cylinder type, 2 inch bore by 3 1/2 inch stroke, steam ports 3/8 x 3/8, exhaust 3/8 x 3/8. I wish to run it from 250 to 300 revolutions per minute, with 50 lbs. pressure. Will 1/2 inch copper boiler 14 inches diameter x 2 feet 9 inches high, with flue tapering from 14 inch at bottom to 3 inch at top, do? If not, what size and thickness of wrought iron? What size should pump be? A. We think these dimensions will answer. The pump plunger can be 3/8 inch diameter.

(21) C. E. B. C. writes: I am running a saw mill, cylinder 12 in., 4 foot stroke, driving wheel 20 feet, drum on saw mandrel 2 feet. I wish to know if the working capacity of the mill would be increased or decreased by lessening the size of the main wheel? A. This would decrease the capacity if the speed of the engine remained the same as before the change.

(22) O. P. asks: 1. What quantity of iron filings, and what proportion of sulphuric acid to water, are needed to produce in 2 hours 25 cubic feet of hydrogen? A. 25 cubic feet of hydrogen = 2.14 × 17.28 × 25, or about 925 grains (at 60° Fah. and 30 inches barometric pressure). Fe + SO₄ = Fe SO₄ + 2H. Then 2 : 56 = 925 : x = 3 lbs. (nearly) of iron; and 2 : 96 : 925 : y = about 6 1/2 lbs. of sulphuric acid (specific gravity 1.8). The acid must be diluted with 5 or 6 volumes of water for use. 2. Will this hydrogen be adapted for feeding a retort gas stove? A. Not very well.

(23) "Inquisitive" writes: 1. Having tried to make a battery as described in the July 29, 1876, number of the SCIENTIFIC AMERICAN, I failed. I did as was described. Will you give me a little information as to it? Is there a wire inside the cylinder, and is it coiled? What kind of zinc should I use? A. The cylinder is solid cast zinc. 2. The first one I made I left it over night, and in the morning the cylinder was all ate up. Can you give me the reason? A. Your paper diaphragm must have been defective.

(24) L. S. asks what size of hot rolled iron to use for a countershaft making 425 revolutions per minute, driving a circular saw 24" diameter sawing live oak; saw making 1,200 revolutions per minute. Shaft bearings placed at intervals of 8'. A. 2 1/2 inch shaft will answer.

(25) J. D. Q. asks if there is anything better than red lead to make up steam pipe joints. A. We believe this is as good as anything else.

(26) J. A. H. writes: If we take a pair of scales (even balanced) and place the beam in an inclined position, why will it not remain so? There is not only friction to prevent, but most scale beams are so made that by far the greater part of the weight lies above the fulcrum, in which case its natural tendency when once out of its horizontal position would be to depart still farther from it. Where then is the power sufficient to overcome these obstacles and to bring the beam to its horizontal position? A. The center of gravity of the beam of a balance is always placed a little below the fulcrum to insure stable equilibrium. If the center of gravity of the beam and the fulcrum coincide, then the beam when balanced will remain in any position in which it is placed.

(27) W. N. asks: What is the effect of sal soda on iron in steam boilers, also on the incrustation? A. The use of soda, with frequent blowing, sometimes prevents the formation of scale to a considerable extent, and does not ordinarily injure the iron.

(28) J. W. asks for directions for waterproofing any kind of closely woven goods, leaving it flexible and coloring it brown. A. Dissolve by aid of heat in a gallon of water 2 ozs. soap and 4 ozs. of glue. Saturate the fabric with this, and, after drying, treat it in a similar manner with a saturated aqueous solution of equal parts of alum, aluminum sulphate or acetate, and salt; dry at a temperature of about 80° Fah. A brown color may be given to the cloth in the operation by introducing the proper quantity of Bismarck brown into the second bath, or by adding a little ferrocyanide of potassium to the first, and a suitable quantity of copper sulphate to the last bath.

(29) Engineer writes: Will you please work out an example from the following formula for finding the points for an "adiabatic" curve on an indicator diagram: $x = b \times \left(\frac{a}{a'}\right)^{\frac{1}{n}}$. Where "a" represents the piston stroke to point of release (clearance added), and a', a'' aⁿ, any other such points; "b" represents the absolute pressure at release, and "x" the pressure at a', a'', aⁿ. Data: Cylinder 22' x 44'. Clearance 0.0175 piston displacement. a = 43.175. b = 12.125. A. Suppose a' = 21.5875. Then $\frac{a}{a'} = 2$. To raise this to the 1/2 power: Log. 2 = 0.3010300 Multiply by 17 = 5.1176100 Log. of 17th power of 2 = 5.1176100 Divide by 16 = 5.1176100 Log. of 1/2 power of 2 = 0.3198506 Add log. — 12.125 = 0.0836817 Logarithm of pressure = 0.0836832 at a' Corresponding number, pressure at a' = 25.324.

(30) H. R. B. writes: I have made a strong extract of walnut bark (from the nut), and it seems to contain a kind of mucilage which prevents its ready absorption by the article I wish to stain with it. Can it be removed? A. Heat the solution gradually to about 130° Fah., and, after cooling somewhat, add a small amount of aqueous solution of basic lead acetate (sub-acetate of lead—Goulard's water), cool, settle, and filter. Excess of lead salts remaining in the solution may be removed by saturating it with hydrogen sulphide, again filtering and heating until the liquid ceases to smell of the sulphide. This removes both the gummy and albuminous matters.

(31) W. J. C. asks for a process for filtering water in large quantity, say 40 barrels per day, the water being perfectly clear after filtered, if muddy before. A. See pp. 229, 299 (10), 331 (10), SCIENTIFIC AMERICAN, and 1748, 472, 455, 1363, and 1384, SCIENTIFIC AMERICAN SUPPLEMENT.

(32) C. H. H. writes: At a temperature of 80° some bands of pure rubber which I use have a tendency to adhere to a fabric. Is there a cheap method of treating the rubber so as to avoid this? A. See p. 48, SCIENTIFIC AMERICAN, current volume.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

E. B.—The curious vertebra-like specimens are probably silicified fragmental remains of certain crinoids, abundant in some of the formations of the Niagara period. Crinoids grew on stems and had somewhat the form of a lily, hence have received the name of "stone lilies." Their cup-shaped body sent out five arms, often branching into as many thousands, each composed of a hundred little bones jointed together. The stalk was also jointed somewhat like the vertebrae of the spine. Additional specimens would be quite desirable in settling the question.—A. C. P.—It is a variety of black limestone or *lucullite*—the color is principally due to carbonaceous matters and iron oxide. It contains much alumina and silicic acid, and would probably take a fine polish. It does not contain notable quantities of phosphoric acid.—L. T.—The specimen is a tooth of the fossil shark *Lamna texana*, described by Roemer as occurring in the cretaceous fauna of Texas.—J. F. McF.—The residue contains *Pinnularia grandis*, *Tabellaria floccosa*, *Navicula cuspidata* and closterium. The large objects bog moss.

HINTS TO CORRESPONDENTS.

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.

E. R. W., H., P. D., H. B., and others; who desire replies to inquiries, should give full name and address.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

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.