

Business and Personal

The Charge for Insertion under this head is \$1 a Line.

Hoadley Portable Engines. R. H. Allen & Co., New York, Sole Agents of this best of all patterns.

Hotchkiss Air Spring Forge Hammer, best in the market. Prices low. D. Frisbie & Co., New Haven, Ct.

Amateurs and Artizans, see advertisement, page 221. Fleetwood Scroll Saw, Trump Bro's, Manufacturers, Wilmington, Del.

For Sale, cheap—One 60 H.P. Boiler, 40 Engines and Boilers. Address Junius Harris, Titusville, Pa.

Circulars Addressed—Very complete lists of all trades. H. Welsh, 6 Gold St., New York, up stairs.

Wanted—To engage the services of a Practical Man to travel and sell Engines, Boilers, Saw Mills, Machinery, and Machinist's Supplies. Address, with references, Beall Engine and Boiler Works, Cumberland, Md.

Steam Engines—25 per cent. extra power, or an equal saving in fuel guaranteed, by applying the R. S. Condenser. T. Sault, Constl'g Engr', Gen. Agt., N. Haven, Ct.

We call the attention of those interested to the advertisement of Hyatt & Co.'s Varnishes, elsewhere in this issue. The goods are standard, and will never disappoint those who use them.

The N. Y. Plow Co., 55 Beekman st.—Works, Newark, N. J. Agricultural Implements and Iron Castings.

Says the Muscatine (Iowa) Courier: "We have done and are still doing business with quite a number of Advertising Agencies throughout the country, and have no fault to find with them, but Messrs. Geo. P. Rowell & Co. give us more business than any other. Furnishing a large amount of advertising, and paying promptly, has put this house at the very head of Agencies, and has made them a name for honesty, reliability and promptness, which of itself is worth a fortune."

New York Agency wanted for Machinery & Supplies. Best of References. J. J. Bockee, Jr., P. O. Box 5007.

The merits of Morton's Brass and Copper Sash Chain with patented attachments are worthy of notice. See advertisement, page 221.

An experienced traveling Salesman, who has few equals, is open for something worth \$2,000 a year. Address Box 14, Clear Lake, Iowa.

Wanted—One 2 spindle Edging Machine. Address, with description and price, P. O. Box 2253, New Haven, Conn.

Bargains in Cotton and Woolen Machinery, New or Second Hand. J. J. Bockee, Jr., 20 Cortlandt St., N. Y.

Scientific Books—Send stamp for Complete Catalogue. E. & F. N. Spon, 446 Broome Street, New York.

Enterprise M'fg Co., Philadelphia, Pa., Patented Hardware Manufacturers and Iron Founders. Small gray iron castings, warranted soft and smooth, made to order, and patented articles of merit manufactured on royalty.

A New and Novel Article of Merit—Agents Wanted. Also, Partner to operate Canadian Patent. I. C. Cowles, opposite Post Office, Syracuse, N. Y.

Sure cure for Slipping Belts—Sutton's patent Pulley Cover is warranted to double the work before the belt will slip. See Sci. Am. June 21st, 1873, p. 339. Circulars free. J. W. Sutton, 95 Liberty St., New York.

Something New—Door and Bell Plates—Letters Engraved on Glass. For Beauty and Durability it cannot be excelled. Send for Price List. P. O. Box 443, W. J. Pettis, Providence, R. I.

The Baxter Engine—A 48 Page Pamphlet, containing detail drawings of all parts and full particulars, now ready, and will be mailed gratis. W. D. Russell, 18 Park Place, New York.

Double-Entry Book-Keeping Simplified. The most successful Book on the subject ever published. Cloth, \$1. Boards, 75 cts. Sent post paid. Catalogue free. D. B. Waggener & Co., 424 Walnut St., Philadelphia, Pa.

A Self-Acting Trap, to rid out all Rat and Animal Creation. Agents wanted. No trouble to sell. For Traps, &c., address John Dilaine, Limestoneville, Monroeville, Pa.

Brass Gear Wheels, for Models, &c., on hand and made to order, by D. Gilbert & Son, 212 Chester St., Philadelphia, Pa. (List free.) Light manufacturing solicited.

Hotchkiss & Ball, West Meriden, Conn., Foundrymen and Workers of Sheet Metal. Will manufacture on royalty Patented articles of merit in their line. Small Gray Iron Castings made to order.

Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., U. S. A.

Drop Press, 3,000 to 4,000 lbs. Send description and lowest price to Kittredge Cornice and Ornament Company, Salem, Ohio.

Electric Burglar Alarms and Private House Annunciators; Call, Servants' & Stable Bells; Cheap Teleg. Insts.; Batteries of all kinds. G. W. Stockly, Cleveland, O.

Steam and Water Gauge and Gauge Cocks Combined, requiring only two holes in the Boiler, used by all boiler makers who have seen it, \$15. Hillard & Holland, 62 Gold St., New York.

Scroll Sawyers—If you want the best Jig Saw Blades, get them made by A. Coats, 108 Hester St., N. Y.

Water, Gas, and Steam Goods—New Catalogue packed with first order of goods, or mailed on receipt of eight stamps. Bailey, Farrell & Co., Pittsburgh, Pa.

Price only \$3.50.—The Tom Thumb Electric Telegraph. A compact working Telegraph Apparatus, for sending messages, making magnets the electric light, giving alarms, and various other purposes. Can be put in operation by any lad. Includes battery, key, and wires. Neatly packed and sent to all parts of the world on receipt of price. F. C. Beach & Co., 246 Canal St., New York.

For Sale—Large lot second hand Machinists' Tools, cheap. Send for list. L. H. Shearman, 45 Cortlandt Street, New York.

For Tri-nitro-glycerin, Mica Blasting Powder, Frictional Electric Batteries, Electric Fuses, Explosives, Gutta Percha Insulated Leading Wires, etc., etc., result of seven years' experience at Hoosac Tunnel. address Geo. M. Mowbray, North Adams, Mass.

For best Bolt Cutter, at greatly reduced prices, address H. B. Brown & Co., New Haven Conn.

"Lehigh"—For information about Emery Wheels &c., address L. V. Emery Wheel Co., Weissport, Pa.

American Metaline Co., 61 Warren St., N. Y. City.

Small Tools and Gear Wheels for Models. List free. Goodnow & Wightman, 23 Cornhill, Boston, Mass.

Peck's Patent Drop Press. Still the best in use. Address Milo Peck, New Haven Conn.

For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular.

Genuine Concord Axes—Brown, Fisherville, N.H. All Fruit-can Tools, Ferracute Wk's, Bridgton, N.J.

Faught's Patent Round Braided Belting—The best thing out—Manufactured only by C. W. Army, 148 North 3d St., Philadelphia, Pa. Send for Circular.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E Lyon 470 Grand Street New York.

Barry Capping Machine for Canning Establishments. T. R. Bailey & Vail, Lockport, N. Y.

The "Scientific American" Office, New York, is fitted with the Miniature Electric Telegraph. By touching little buttons on the desks of the managers signals are sent to persons in the various departments of the establishment. Cheap and effective. Splendid for shops, offices, dwellings. Works for any distance. Price \$6. with good Battery. F. C. Beach & Co., 246 Canal St., New York. Wakers. Send for free illustrated Catalogue.

Temples and Oilcans. Draper, Hopedale, Mass.

For 13, 15, 16 and 18 inch Swing Engine Lathes, address Star Tool Co., Providence, R. I.

Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass.

For best Presses, Dies, and Fruit Can Tools, Bliss & Williams cor. of Plymouth and Jay, Brooklyn, N. Y.

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

Notes & Queries

G. J. E. will find directions for making rubber handstamps on p. 156, vol. 21.—H. F. G. (size of boiler), H. P. T. (cut-off of engine), and S. M. R. (horse power of a waterwheel) do not send sufficient data.—I. H. can cement meerscham by the process described on p. 202, vol. 47.—W. L. S. will find that his queries as to magnetic variation are answered on p. 164, vol. 33.—T. J. W. will find a description of the polyspherical ship on p. 100, vol. 31.—W. F. R. will find a recipe for paste that will not sour on p. 219, vol. 30.—B. J. B. will find an answer to the cannon and ear question on p. 273 vol. 32.—F. H. will find a recipe for bronzing on iron castings on p. 283, vol. 30.—M. A. will find a recipe for black paint for iron fencing on p. 379, vol. 31.—C. will find a recipe for paste on p. 315, vol. 30, and on p. 11, vol. 31.—B. W. D. will find directions for constructing a windmill on p. 241, vol. 32.—M. H. K. is referred to p. 319, vol. 32, for a means of getting rid of ants. Constructing a sundial is described on p. 409, vol. 29.—W. P. K. will find directions for freeing sulphuric acid from water on p. 111, vol. 29.—E. T. can bleach beeswax by the method described on p. 294, vol. 31.—S. A. R. will find directions for making a filter on p. 251, vol. 31.—G. V. can temper springs by the process described on p. 363, vol. 32.—S. L. will find directions for waterproofing cloth on p. 347, vol. 31. For a book on the lathe, try "The Lathe and its Uses."—A. D., D. McG., A. C. D., and R. F. H. will find a full explanation of the mystery of an ice boat traveling faster than the wind on p. 176, vol. 23.—H. S. S. will find a method of ascertaining the amount of water carried over in steam on p. 257, vol. 31.—A. K. will find a recipe for a cement for filling burr stones on p. 251, vol. 31.—J. A. will find directions for making malleable iron castings on p. 133, vol. 29.—D. I. S. can drive away cockroaches by the method described on p. 315, vol. 32.—W. M. H. will find a recipe for yellow lacquer on tin on p. 139, vol. 32.—T. C. P. will find directions for preserving eggs on p. 219, vol. 31.—H. L. S. will find directions for manufacturing aluminum on pp. 99, 116, vol. 32.—H. G. S. will find an answer to his query as to the growth of the beard on p. 362, vol. 32.—A. K. will find the desired information as to the phylloxera on p. 48, vol. 33.—S. A. T. will find directions for extracting glycerin on p. 202, vol. 31. Consult a physician as to the feet troubles.—T. B. will find directions for making bleaching salts (chloride of lime) on p. 91, vol. 32.—V. L. Jr. and A. J. P. will find directions for silvering without a battery on p. 299, vol. 31.—F. M. E. will find an answer to all his queries as to lightning rods on p. 145, vol. 31.—A. E. G. will find a recipe for paraffin varnish on p. 91, vol. 31. Ants may be destroyed by the method described on p. 319, vol. 32.—J. B. M. can prevent rust on iron by the method given on p. 253, vol. 31.

(1) J. N. Jr. asks: In regard to the fire-proof qualities of a safe, do the walls require to be any thicker for a large sized safe, or does 5 inch filling offer the same protection in a large as well as in a small size? A. The same thickness for both sizes will do.

(2) I. L. asks: What is the name of the fastest steamboat in the world, and what is her best time? A. We think about 25 miles an hour has been made on the North river, and this is the fastest time. Perhaps some of our readers may have notes that will be of interest.

(3) T. H. W. says: Please give me through your valuable paper a rule by which I can exactly calculate the departure of a curve from a tangent, the radius and tangent being given, at right angles to each other. A. You want the equation of the curve, which you can obtain from a treatise on analytical geometry, for any of the common curves. In case you do not know the nature of the curve, it must be determined by experiment. The equation of the circle, referred to its center, R being the radius, and x, y, the co-ordinates, is x<sup>2</sup>+y<sup>2</sup>=R<sup>2</sup>

(4) G. L. B. asks: Have I a right to make any patented article for myself? A. No.

1. Does a rifle ball leave the gun before one feels the recoil? A. No. 2. Will the recoil make any difference with the shooting? A. Yes.

(5) D. C. asks: Why does iron not always shrink alike? A. Because it is not homogeneous, being harder and closer in fiber in some places than in others.

(6) C. P. A. says: 1. I have in mind to build a small boat, 40 feet long and 13 feet wide. What size of engine would it take to run it? A. Use an engine of 12 or 15 horse power. 2. Does boiler iron have to be stamped on every plate with the breaking strain and the maker's name? A. The law in regard to stamping boiler plates is as follows: "And be it further enacted: That every such plate of boiler iron or steel, made for use in the construction of steamboat boilers, shall be distinctly and permanently stamped by the manufacturer thereof, and, if practicable, in such places that the marks shall be left visible when such plate shall be worked into boilers, with the name of the manufacturer, the place where manufactured, and the number of pounds tensile strain it will bear to the square inch." This refers to plate subject to a tensile strain.

How are rubber stamps made? A. See p. 156, vol. 31.

(7) R. B. asks: Can water be pumped from an airtight tank, having no vent? A. No.

(8) H. D. M. asks: Can you give us a first class recipe for making Babbitt metal for lining journal boxes? A. It would be better to buy the metal from a reliable manufacturer. We can recommend the use of cast iron boxes, from personal experience and observation.

What is the best style of clutch now known for connecting two lines of shafting, to throw them in and out of gear? A. You will probably find a friction clutch the most satisfactory.

(9) J. O. asks: Can I own and run a steam yacht for my own pleasure upon the Connecticut river and on Long Island Sound, without getting a license? I do not wish to carry passengers for hire. A. You must obtain a license. Apply to the inspector in your district. The fees are: Vessel, \$25; captain, \$10; engineer, \$5.

(10) H. H. says: 1. Following the subjoined directions, I attempted some electro-plating: "Take a \$2.50 piece of gold and put in a mixture of 1 oz. nitric and 4 ozs. muriatic acid (in glass vessel only); when it is all out, dissolve 1/2 oz. sulphate of potash in 1 pint pure rain water, and mix with the gold solution, stirring well; then let it stand, and the gold will be thrown down; then pour off the acid fluid, and wash the gold with two or three waters, or until no acid is tasted on touching the tongue to the gold. Now dissolve 1 oz. cyanuret of potassium in 1 pint pure rain water, to which add the gold, and it is ready for use. Clean the article to be plated from all grease and dirt with whiting and a brush; if there are cracks, it may be necessary to put the article in a solution of caustic potash; suspend it in the cyanuret of gold solution with a small strip of zinc about the width of a common knitting needle." With the exception of using some fully 18 carat gold for the \$2.50 gold piece, I followed directions, but the result was not satisfactory. The deposit was about the color of and very similar in appearance and feel to German silver. What was the cause? How can I, in some simple manner, touch up by electro-plating with gold such things as parts of watch movements, etc.? A. A defective colored gilding may be improved by the help of the following mixture: 3 parts nitrate of potash, 1 1/2 alum, 1 1/2 sulphate of zinc, 1 1/2 common salt. These ingredients are put into a small quantity of water, to form a sort of paste, which is put on the articles to be colored; they are then placed upon an iron plate over a clear fire, so that they will attain nearly a black heat, when they are suddenly plunged into cold water; this gives them a beautiful high color.

(11) W. B. H. asks: How can I find the relative conductivity of different substances? A. You can find them tabulated in De la Rive's work on electricity, and in several others. The process of working them out is somewhat complicated, and requires a great deal of experience to do it accurately.

(12) L. J. W. says: I have tried to electroplate with a battery of 2 zincs and a carbon in dilute sulphuric acid, but I cannot get a good deposit either on metal or a wax mold, the wax mold being well rubbed with pure graphite. The zincs are 3 inches x 6 x 1/2, and the carbon is of the same size. The deposit on the metal is in spots, and brittle, altogether unlike the nature of copper. Please tell me what is the matter. A. Your trouble might arise from several causes. Perhaps your solution is too strong. The best solution is made of 3 parts saturated solution of sulphate of copper and 1 part of sulphuric acid with 10 of water. Perhaps your anode is too large. Try a smaller one. Perhaps your cathode and anode are too near together; try them farther apart; that is, separate your metals farther from the copper plate.

(13) L. S. Y. asks: What chemicals and metals are used in the Hill battery? A. Sulphate of copper and sulphate of zinc are the chemicals, and zinc and copper the metals.

(14) A. B. C. asks: 1. How will I proceed to finish up ash doors and frames in oil polish, after filling with two coats of filling? What material is used, and how many coats are necessary to produce a good job? A. The fineness of the polish depends in a great measure upon the care with which the filling may be rubbed down; the rubbing is indispensable, in fact, to a good finish. For the best work, put on three coats of shellac; after the first coat is hard, rub it down with No. 1 sandpaper; after the second coat is hard, rub down with No. 1/2 sandpaper, and after the third coat, the same. Then put on one or two coats of beeswax dissolved in spirits of turpentine and oil, in some cases three coats. For polished panels, put on three coats of hard flowing varnish, each of the first two coats to stand two or three days until hard, and then be rubbed with rottenstone, the third coat to be rubbed with cotton batting and flour. 2. I have a brick foundation, penciled, and it is ruined from mold. How can I prevent the mold from affecting the paint? A. The mold is caused

from dampness, and this arises either from a close confined position of the wall, or from water rising in the body of the wall from the ground. The only remedy is to remove the cause of the dampness.

(15) M. H. T. & Co. say: In our business we have orders for hooks, etc., that are to withstand the draft of an ordinary locomotive. Will you please give us your idea of the amount an engine with four drive wheels can lift, dead weight, with single purchase? A. About 8,000 lbs. on an average, taking the adhesion at 1/2 of the weight on the driving wheels.

(16) C. F. asks: 1. What is the percentage of phosphorus in phosphorus oil? A. Twelve grains phosphorus are put into 1 oz. almond oil. About 4 grains phosphorus are taken up by the oil. 2. What medical action has it? A. Solutions of phosphorus have been used in small quantities to allay excessive oxidation of the animal tissues. Vitreous phosphorus, taken internally, acts as a powerful irritant poison.

Can corrosive sublimate be made by precipitation of mercurial nitrate by muriate of soda? A. No; the precipitate consists of the subchloride of mercury (calomel).

(17) G. says: 1. I have a boiler carrying 70 lbs. to the square inch with a 3/4 safety valve attached. What would be the pressure on said valve? Will I have any greater pressure on a 3 inch safety valve with the same pressure of steam? A. Pressure on 3/4 valve=70x(3/4)<sup>2</sup>x0.7854; pressure on 3 inch=70x(3)<sup>2</sup>x0.7854, hence the pressure in the second valve is 16 times as great as that on the first. 2. Please give me a rule for finding horse powers of boilers. A. We do not know of any standard for the horse power of a boiler.

(18) P. asks: 1. Can gold leaf be applied to glass without the use of oils? A. Gold size is used for this purpose. 2. How can I transfer a wood cut or steel engraving to glass, so that I can apply colors to the back, and let them strike through? A. See p. 123, vol. 30.

(19) G. F. K. asks: 1. I have built an engine 1 1/4 bore x 3 inches stroke, with a fly wheel weighing 12 lbs. Would a copper boiler 20 inches high x 15 inches diameter, with 4 flues two inches in diameter, heated with 4 lamps, making 60 lbs. steam, run said engine at the rate of 600 revolutions per minute? A. If the lamps are very powerful, we think it may answer. It will have to be forced, however. 2. Please state the thickness the boiler shell should be. A. Make it 1/4 of an inch thick.

(20) C. H. says: I have a 1 inch iron pipe, 480 feet long, to bring water from a spring. The fall is 8 or 10 feet, and the water runs out 3 feet above the ground. I cannot get the pipe to run full of water; it will not run more than half full, though there is water enough to fill it. What is the remedy? A. Probably the pipe has high points, where air collects.

(21) H. N. B. says: I am running a circular saw, with an idle pulley in a horizontal frame, hinged, and working a few inches from the saw pulley. The belt is quite slack, increasing the lap six inches. I apply just sufficient weight on the frame to keep the belt from slipping; it works smoothly and well and almost noiselessly. One lacing has lasted three months on heavy work. The proprietor contends that I am wearing the belt on the outer surface and otherwise injuring it by applying the weight. Is he right? A. The plan you have adopted is a very good manner of applying a tightener. It would probably be somewhat more efficient if you stretched the belt a little tighter; but from your account of the manner in which it operates, there seems to be little reason for making any change.

(22) L. M. says: I say that, if a train of cars runs on a circular track or a curve, the road must be inclined outward if the locomotive draws, and inward if it pushes from behind. My friend says in both cases the road must incline inward. Who is right? A. Your friend.

(23) I. D. C. asks: 1. Will a balloon made in the form of a sphere or a spheroid carry as much weight and ascend with as much ease as if made pear-shaped, the gas and all other things being equal? A. Yes. 2. Is gas of a high illuminating power the best for balloons? A. The lightest gas is the best, hence that having the best illuminating qualities is by no means the best for a balloon. 3. How can I determine the weight which a balloon of a given size will ascend with when filled with coal gas? A. See p. 64, vol. 32.

(24) L. B. S. asks: How can I make an all battery for plating and other purposes? A. Put a copper plate in a glass vessel 8 inches deep, and cover it with crystals of sulphate of copper. Suspend a piece of zinc near the top. Connect insulated copper wire to copper plate and another to zinc. Fill the vessel with water.

(25) I. O. T. asks: 1. Please give me a rule for finding how much and what size of wire I must use on relays, in putting up a short or long telegraphic line. A. Use the purest copper obtainable, and make the sum of the resistances of all the relays equal to the resistance of the rest of the circuit, including that of the battery; this gives the best result when the line is well insulated. There is no simple formula for fixing upon the size of wire that would serve for any and every case whatever; but for local and short circuits, Nos. 18 to 23 are convenient sizes, and Nos. 23 to 32 are generally used for main lines. A current of 0.02 of a weber is a very fair working strength for main line circuits. All the necessary data for ascertaining the resistance of the various sizes of copper and iron wire will be found in J. T. Sprague's work on "Electricity, its Theory, Sources, and Applications," under "Conductivity and Resistance." 2. I have been making an induction coil, 7x3 inches, center bundle of wires is 1 inch in diameter; primary coil is of No. 14 wire, about 90 feet long; see-