

## Business and Personal.

*The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.*

**Agricultural Implements and Industrial Machinery for Export and Domestic Use.** R. H. Allen & Co., N. Y. \$1,000 for any Churn equal to the "Prize." A. B. Cohu, 197 Water St., New York.

**Baxter Wrenches** fit peculiar Corners where no other wrench answers. Greene, Tweed & Co., 18 Park Place, New York.

**To Manufacturers seeking foreign trade.** Agentleman of extended So. American travel, speaking Spanish and French, seeks employment during the Centennial, or to travel. C. E., 619 Walnut St., Room 27, Phila.

**Mfrs of Shafting, Pulleys and Hangers,** address, with lowest price list, the Queber Watch Case Manufacturing Co., Cincinnati, O.

**Swimming Shoes.** Pat'd Nov. 2, 1875. Will sell Patent, or have them made on royalty. O. G. Ahlstrom, 104 Center St., New York.

**Wanted.** A good 2d hand Steam Engine, Cylinder 18 in. x 36 in.; Band Wheel, 12 or 13 ft. x 36 in. face. Address, with full particulars, N. W. Robinson, P. O. Box 775, Burlington, Vt.

**Linen Hose for Factories.** 1, 1½, 2 & 2½ in. At lowest rates. Greene, Tweed & Co., 18 Park Place.

**Meter and Yard Comparing Rods, Meter Sticks,** and Meter Scales of every description, at Keuffel & Esser's, 111 Fulton St., New York.

**Wanted.** 2d hand 20 to 24 in. Swing Lathe, Bed 12 ft.; Screw-Cutting; good order. Address S. J. Benedict, East Randolph, N. Y.

**Wanted.** Position to build intricate experimental machinery, or charge in general machine shop, by a driving man. Address C. F. B., 280 Henry St., Brooklyn.

**Parties about to build,** write Pugsley, 6 Gold St., N. Y., for price Wheelbarrows, Picks, Shovels, Sand screens.

**American Agency in London** will push sales of any really good article; first class references. Address Europe, Box 5,315, Post Office, New York.

**Who Sells an Automatic Table Fly Brush?** J. W. T., Savannah, Ga.

**Wanted.** A thoroughly competent Machinist as Foreman in a shop employing 20 to 30 hands in the manufacture of Specialties. Address, giving references, Athol Machine Co., Athol, Mass.

**Burglar Alarm, Door and Window Fastening.** Sent by mail on receipt of 75 cents. C. H. Fowler, Rosindale, Mass.

**Propeller Engine, 7x8, and Steam Boiler for Sale** by E. A. Pope, Box 2739, Boston, Mass.

**For Sale.** 36 in. x 16½ ft. Lathe, \$400; 25 in. x 12 ft. Lathe & Chuck, \$300; 18 in. x 12 ft. Lathe, \$250; 15 in. x 8 ft. Lathe & Chuck, \$175; Fox Lathe, \$200; 8½ ft. Planer, \$425. Shearman, 45 Cortlandt Street, New York.

**300 new and second hand machines of every description** for sale at low prices. Send stamp for our List No. 5, just printed, fully describing each machine, stating just what you want. Don't buy until you look over our list. S. C. Forsaith & Co., Manchester, N. H.

**"Abbe" Bolt Forging Machines and "Palmer" Power Hammers** a specialty. Send for descriptive lists with reduced prices. S. C. Forsaith & Co., Manchester, N. H.

**Engineers, Read about Allen Governor,** on our last page. Send to Mr. Allen for circular.

**Gas and Water Pipe, Wrought Iron.** Send for prices to Bailey, Farrell & Co., Pittsburgh, Pa.

**File-cutting Machines.** C. Vogel, Fort Lee, N. J.

**Yacht and Stationary Engines, Sizes 2, 4, 6 & 8 H.P.** Best for Price. N. W. Twiss, New Haven, Conn.

**Inlaying and Fret Sawing in Wood, Shell, Metal, &c.** See Fleetwood Scroll Saw, page 189.

**Shingles and Heading Sawing Machine.** See advertisement of Trevor & Co., Lockport, N. Y.

**Painters, Grainers, &c., send for Circulars** and Sample of first class & quick Graining, done with my perforated Metallic Graining tools. J. J. Callow, Cleveland, O.

**Seeds & Implements—200 Illustrations—just out.** Mailed on receipt 23c. stamps. A. B. Cohu, 197 Water St., New York.

**"Wrinkles and Recipes" is the best practical Handbook for Mechanics and Engineers.** Hundreds of valuable trade suggestions, prepared expressly by celebrated experts and by correspondents of the "Scientific American." 250 pages. Elegantly bound and illustrated. A splendid Christmas gift for workmen and apprentices. Mailed, post paid, for \$1.50. Address E. N. Munn, Publisher, P. O. Box 472, New York City.

**Wanted.** Every Machine Shop to send for one of Gardner's pat. centering and squaring attachments for Lathes. On five days' trial, to be returned at our expense if not satisfactory. 700 one inch shafts centered and squared upper day. Price \$35. R. E. State & Co., Springfield, Ohio.

**Family Dish Drainer.** Shop right deed and patterns \$10 per year. J. R. Abbe, Lawrence, Mass.

**Solid Emery Vulcanite Wheels.** The Original Solid Emery Wheel—other kinds imitations and inferior. Caution—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, New York.

**Steel Castings,** from one lb. to five thousand lbs. Invaluable where great strength and durability are required. Send for Circular. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

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

**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.

**Hotchkiss & Ball, Meriden, Conn., Foundrymen** and workers of sheet metal. Fine Gray Iron Castings to order. Job work solicited.

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

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

**Spinning Rings of a Superior Quality.** Whittinsville Spinning Ring Co., Whittinsville, Mass.

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

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

**Temples and Oilcans.** Draper, Hopedale, Mass.

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

**All Fruit-can Tools, Ferracuta Wks, Bridgeton, N.J.**

## Notes & Queries.

C. M. will find a recipe for filling for wood on p. 315, vol. 30.—J. E. M. will find a recipe for chicken cholera medicine on p. 395, vol. 30.—A. G. will find a good recipe for mullage on p. 196, vol. 34.—H. C. S. can bronze castings by the method described on p. 11, vol. 34.—A. B. R.'s discovery of an electric phenomenon is similar to A. S. G.'s, explained on p. 186, vol. 34.—W. L. D. will find directions for repairing the silvering of his mirror on p. 267, vol. 31.—R. S. can coat cellular substances with silver by the process described on p. 203, vol. 34.—P. & L. cannot use the electricity from a belt economically. See p. 10, vol. 34.—J. C. C. will find on p. 203, vol. 34, particulars as to molding wax for electrotypers' use.—T. E. L. will find directions for staining wood in imitation of mahogany on p. 170, vol. 34.—C. W. K. will find a full description of Dr. Crookes' torsion balance on p. 149, vol. 34.—E. B. and others will find full directions for making an æolian harp on p. 315, vol. 33.—A. A. H. will find directions for making a battery for medical purposes on p. 196, vol. 27.—T. H. H. can utilize mica scraps by the method described on p. 42, vol. 25.—W. F. S. will find a description of an incubator in a forthcoming number.—J. L. R. Jr., will find on p. 42, vol. 26, directions for fastening leather covers to iron pulleys.—W. W. N. will find on p. 203, vol. 30, directions for painting tin roofs.—R. J. O'C. can fasten rubber covers to wooden spindles with good glue.—O. B. F. will find directions for amalgamating zincs for batteries on p. 27, vol. 30.—J. M. will find that timber will bend more easily if kept for some time in boiling water.—J. T. S. will find a description of malleable cast iron on p. 138, vol. 29.—H. E. will find directions for making artificial stone on p. 113, vol. 24.—J. P. will find directions for making citrate of magnesia on p. 203, vol. 34.—E. C. B. will find a practical recipe for tinning iron castings on p. 362, vol. 31.—R. C. M. will find directions for soldering gold on p. 251, vol. 28.—T. P. F. will find formulas for calculating the strength of boilers on p. 186, vol. 32.—W. T. D. will find directions for bluing steel on p. 123, vol. 31.—J. E. M. will find directions for preserving natural flowers on p. 204, vol. 28.—J. J. will find directions for putting a white enameled surface on iron vessels on p. 362, vol. 32.—C. H. R. will find directions for melting rubber on p. 119, vol. 28.—J. W. B. will find directions for browning gun barrels on p. 11, vol. 32.—H. C. S. will find directions for electro-silvering on p. 362, vol. 31.—E. D. will find a description of the sand blast process, which is patented, on p. 195, vol. 27.—L. F. will find a description of the gyroscope, on which the toy which he describes is founded, on p. 91, vol. 31.—C. R. will find directions for utilizing leather shavings on p. 105, vol. 25.—A. P. will find directions for varnishing violins on p. 231, vol. 26.—A. L. S. can run solder into thin bars by the method described on p. 232, vol. 31.—W. C. W. will find a description of testing lubricating oils on p. 360, vol. 33.—J. W. V. will find directions for lighting gas by electricity on p. 4, vol. 29.—J. A. will find a good recipe for stove polish on p. 169, vol. 33.—F. G. P. will find an explanation of the theory of color on p. 180, vol. 33.—A. B. can blacken the inside of brass telescope tubes by the method described on p. 362, vol. 25.—J. O. will find on p. 27, vol. 34, directions for making mullage for postage stamps.—J. P. J. will find directions for making battery carbons on p. 187, vol. 32.—T. H. R. can ascertain the amount of moisture in the air by using a hygrometer. See p. 409, vol. 32.—W. S. can season his wooden hubs by the process described on p. 58, vol. 32.—G. W. S. will find a recipe for cement for rubber on p. 119, vol. 28.—H. E. J. must use Indian and Chinese ink for Patent Office drawings.—W. W. will find, on reference, that the absolute zero of temperature, and the shrinkage of gases when cooled, are discussed on p. 170, vol. 32.—J. W. J. will find a recipe for stencil ink on p. 273, vol. 28.—C. H. C. will find directions for calculating the speed of pulleys, etc., on pp. 26, 73, vol. 25.—G. B. F., C. E. C., K. Q. X., and J. A. have sent correct answers to W. C. S.'s problem published on p. 107, vol. 34. The replies sent by S. R., M. A. C., and C. F. E. are erroneous.

(1) G. D. T. asks: 1. What is the actual horse power of a steam engine 10 x 14 inches, running at 215 revolutions per minute, with a boiler pressure of 60 lbs., cutting off at ¼? A. A test would be necessary before this question could be answered. 2. Can the exhaust steam pipe on an engine be turned into the smoke stack without injury to either? A. Introduce the exhaust pipe so that it discharges upward, in the middle of the smoke stack.

(2) F. E. H. says: Please give me a recipe for making Pharaoh's serpents. A. The genuine ones are simply sulpho-cyanide of mercury made up by means of gum water into the form of cones, pills, or cylinders. They are still made and sold, on a small scale, in this city. We are not aware of any law specifically referring to them. Several substitutes for the dangerous mercury preparation have been proposed, but the snakes they produce are not so life-like nor so big. The following is said to be the best imitation: Take white sugar 3 parts, bichromate of potash 2 parts, saltpeter 1 part. Pulverize separately and mix intimately; finally press the mixture into small paper cones.

(3) E. L. S. asks: What diameter and pitch of propeller would you advise for a boat 58 feet long, 7½ feet beam, with ¾ feet draft of water, engines having 6 x 8 inches cylinders? A. Diameter 3½ feet, pitch 4½ to 5 feet.

(4) R. S. B. asks: I have some liquid which is neither good old hard cider, for it has a vinous taste, nor yet is it good vinegar. How can I convert it into good marketable vinegar? A. Prepare a large barrel, with a false bottom having a number of holes bored through it. Place this in

the barrel about six inches above the real bottom, and fill in above the false bottom to the top of the barrel with good, well burnt charcoal, in coarse powder. Moisten the charcoal thoroughly with some of the cider, cover the barrel with a piece of felt or woolen goods, and allow to remain until there is a perceptible rise in the temperature; then add the cider in such a manner as to keep up a constant percolation of the fluid through the charcoal until the process is complete. The vinegar may be drawn off from a spigot at the bottom.

(5) R. J. C. asks: How much power is there in an overshot wheel propelled by a spout of water 12 inches wide by 3 inches deep? A. A good overshot wheel may give ¾ of the whole effect of the water.

(6) F. O. says: P. is testing a boiler with water from a pipe showing a pressure of 60 lbs. The boiler being filled, the gage shows 5 lbs. The gage is half way from top of boiler: now, if the pressure be added from the pipe, should the gage on the boiler show 60 or 65 lbs.? I claim the cause of the 5 lbs. pressure is due to the weight of water above the gage, and must be added to the 60 lbs., and make the gage say 65. P. says the 6 lbs. has nothing to do with it; the pressure must be 60 lbs. Who is right? A. If the pipe enters the boiler at the lowest point, according to the data furnished, the pressure at the highest point of the boiler would be 60 lbs., and the gage would show a pressure of 65 lbs.

(7) C. G. N. asks: How large a boat will a 3 horse power engine propel, with side wheels? A. Make her from 20 to 25 feet long. Good friction gearing is preferable to ordinary toothed wheels. Side wheels give very satisfactory results in smooth water.

(8) R. B. H. L. asks: 1. What kind of cannon is used for chain shot? A. Chain shot have ordinarily been fired from a smooth-bored gun; but we believe that occasionally a peculiar form of gun has been employed, consisting of two barrels, slightly diverging at the muzzles and having a common vent. 2. How many kinds of cannon have ever been used? A. Cannons are generally classed as muzzle and breechloaders, with smooth bore or rifled barrels. 3. If a cannon 1 inch bore, 70 feet from a target, be loaded with 100 No. 1 shot, to what width would the shot spread? A. It is impossible to give a definite answer to this question, since, as you must be aware, the difference in the performance of different guns, in this respect, is very marked.

(9) T. D. and others.—There is no work on taking the buckle out of saws. It is an art known only to saw makers, and attainable only by long practice and a thorough knowledge of the principle upon which saw plates are worked in order to impart that strain upon different parts so as to overcome the expansion by centrifugal force caused by the velocity of the saws in use.—J. E. E., of Pa.

(10) D. W. W. asks: 1. Is it possible for boiler tubes to get heated to the point of producing a spheroidal state when the proper supply of water is kept up in the boiler? A. Experiments seem to show that, in order that water may assume the spheroidal state, a small quantity must be dropped upon a plate which is heated to a higher temperature than the boiling point of the water. 2. What is the lowest temperature at which the spheroidal state can exist in the case of iron and water, and how is it affected by pressure? A. Under atmospheric pressure, the temperature required is about 290° Fah. In a boiler properly designed, the temperature necessary for the spheroidal state could not be produced, if the ordinary water level was maintained. We have, however, occasionally seen boilers in which the circulation was so poor that tubes were burned out when apparently covered with water.

(11) W. C. B. asks: 1. Is it practicable to pump water through a pipe 150 feet long, it being level from the pump to the well, which is 18 feet deep? Yes. 2. Is it better to have the pipe higher at the well than the pump? A. Lay the pipe as straight as possible, with the highest point at the pump. 3. Should there be a check valve at the well? Yes. Put it at the bottom. 4. What sized pipe should we use? A. A 2 inch pipe.

(12) S. H. S. asks: What is the matter with our stove? When the damper was closed, the draft went around under the bottom of the stove; when the draft is all closed, the smoke or something else will condense into liquid and run through the chimney, through the upper floors, and into the room below. A. This may be owing to some peculiar kind of fuel you are burning, which you do not specify. When the draft is closed the flue soon becomes cold, and the air carrying the smoke precipitates its latent moisture upon the sides of the flue; the moisture naturally carries the particles of unburnt fuel with it. If this is the cause, a more free draft would abate the difficulty.

(13) M. B. says: I have a boat 50 feet long and 10 feet wide. The engine is 8 x 9 inches. What size and pitch of wheel should I use? A. You can use a wheel 3½ feet in diameter, with 5 feet pitch. In general, a wheel that is properly proportioned for speed is likewise suitable for towing.

(14) J. J. says: It is claimed that the outside horse, in plowing a circle, commencing in the center, gains only so much as he gains in the first round and no more, as the inside horse follows all the time after. Others assert that the outside horse gains each round plowed, and will gain in each round so long as they continue plowing in a circle, and that each and every day the outside horse has traveled the farthest. Which is right? A. This is a very pretty question, of little or no practical importance; and we therefore forego the satisfaction of answering it, and throw it open to the competition of those who may be interested in finding a solution.

(15) M. J. asks: What is the method of testing hydraulic cement for water? A. It consists in gaging a small quantity of the dry powder with water, and immediately immersing it in water. If the sharper edges crack or break away after a short time, the cement is too hot or fresh, or is inferior in quality.

(16) J. H. D. asks: What weight can an average horse raise, if hitched to a rope, the rope to pass over a pulley, and the weight attached below? A. The following table, given by Mr. Trautwine, furnishes a fair statement of average results, the speed of horse being miles per hour, and the traction in lbs.:

Speed.	Traction.	Speed.	Traction.
¾.....	333	2¼.....	111
1.....	250	2½.....	100
1¼.....	300	2¾.....	91
1½.....	167	3.....	83
1¾.....	143	3½.....	71
2.....	125	4.....	63

(17) J. A. K. asks: What causes an explosion when water is pumped into a hot boiler? Is it the sudden generation of steam, or does the boiler crack? A. When an explosion takes place under such circumstances, steam is formed rapidly; and the iron, weakened by overheating, cannot resist the pressure.

(18) J. W. A. McC. asks: By what rule can I find out what quantity of water will be supplied by a wooden pipe, with a 3 inch bore, having a head of water of 250 feet, the length of said pipe being about 10 miles? A. If we knew all the particulars of the case, we could only give you approximate rules; and it would be useless to attempt to furnish information from the meagre data you have sent. We hope to treat of matters of this kind, in special articles, before long.

(19) R. E. B. says: If I take out a water wheel 10 feet in diameter, and replace it with one 2 feet in diameter, using the same quantity of water, do I gain any power? A. Not from the fact of its being larger. If the new wheel is a better one than the other, *per se*, there will, of course, be a gain.

(20) T. A. B. asks: Should the balance wheel of a gig saw or vertical re-sawing machine and the gate and connecting rod of the same form a perfect balance, to prevent thump or jar? A. Vertical resawing or other rapidly operating machinery should be balanced so as not only to counteract the weight of the gate or frame and connecting rod, but also the momentous force, and this latter depends upon the velocity at which it is run. I know of no established rule for accomplishing this. About the only way that I know of to get a perfect counteraction is to construct the balance wheel with more counteracting weight than is really required. Then remove the surplus little by little until the machine moves properly.—J. E. E., of Pa.

(21) W. M. K. asks: To what extent, if any, will air in an open inverted vessel, mingle and pass off with a current of water when deeply immersed and under a pressure of 500 lbs. to the square foot? Would hydrogen or some other gas remain longer unchanged in bulk than atmospheric air? A. Either the air or hydrogen will be absorbed much more readily by the water, under these circumstances, than under ordinary pressure.

(22) G. H. says: I have in my cellar a horizontal single flue boiler for the generation of steam for heating purposes. Trouble seems to be caused by a sluggish combustion. It does not smoke nor emit gas; but no matter how much coal is put in at one time, the fire burns dull, and it is difficult to raise 3 lbs. of steam and hold it. The flue fills with soot quickly, which hangs in festoons, indicating that there is no draft. A. Your description will not enable us to help you very intelligently; but we would recommend that you see whether the chimney, *per se*, is in good working order.

(23) H. F. J.—We cannot estimate the performance of your engine and boiler accurately from the data sent. If you will put a check valve on the end of your pipe, we think you will have no more trouble.

(24) O. K. and others ask: 1. How is the focallength of a microscope lens calculated? A. Focal length is reckoned from the center of the combination. 2. How can I test lenses for chromatic faults? A. The only test for achromatism is the color; if there is no color, the lens is achromatic. The best lenses are made of two kinds of glass cemented together and burnished in the cell, there being no necessity for removing them. 3. How can I ascertain and compare the powers of microscopes? A. In comparing the magnifying power of microscopes, opticians generally have agreed to consider 10 inches as the distance of distinct vision; then by comparing the real size of the object with the apparent size of the image at a distance of 10 inches, the magnifying power is easily determined. See p. 25, vol. 33.

(25) G. W. S. asks: What should I put on a wooden plug joint to harden the wood (poplar, bass, or lime) and at the same time to keep the joint from moving when fastened in by a screw at right angles to the plug? A. Powdered resin might answer your purpose.

(26) G. W. J. says: I am running a pair of high pressure engines, 15 x 28 inches, with 100 lbs. steam, at 150 revolutions per minute. These engines are both connected to the same shaft, with a fly wheel only 3 feet in diameter but very heavy. On the crankshaft is a cog wheel 2 feet in diameter, geared in another wheel on a countershaft, 5 feet in diameter, or 2½ to one. Connected to this countershaft is a screw 10 inches in diameter, with square thread of 1¼ inch pitch, or 9½ threads to the foot, running through a cast iron nut. How much thrusting pressure do we apply to that nut?