

Business and Personal.

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

Agricultural Implements, Farm Machinery, Seeds, Fertilizers. R. H. Allen & Co., 139 & 191 Water St., N. Y.

Wanted to Manufacture, on Royalty, a useful Patent, of Iron. Address Benjamin Tabers, South Camden, N. J.

Manufacturers of small Steam Pumps with Boiler, send circular and price to A. L. Henderer, Wilmington, Del.

For Power Hammers or Bolt Headers, the best, S. C. Forsaith & Co., Manchester, N. H.

Foot Lathes. Wm. E. Lewis, Cleveland, Ohio.

Address W. H. Rishel, Danville, Pa., Agent for the Sale of Patents.

Foot Lathe, new, Baldwin's make. Will be sold cheap. Address D. H. Stephens, Riverton, Conn.

Wanted the address of makers of the shingle machine which cuts with a thin knife, weighted to prevent bending. F. L. Johns, Calcutta, Clay Co., Ind.

Second hand Horizontal Engine, 23 in. x 60, for Sale. Apply to Watts, Campbell & Co., Newark, N. J.

Every metal worker should have a Universal Hand Planer. For Catalogue, J. E. Sutterlin, Manufacturer, 60 Duane Street, New York.

John W. Hill, Mechanical Engineer, Dayton, Ohio. Drawings, opinions, and advice.

Price only three dollars—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., 263 Broadway, New York.

Cast Iron Sinks, Wash Stands, Drain Pipe, and Sewer traps. Send for Price List. Bailey, Farrell & Co., Pittsburgh, Pa.

Pratt's Liquid Paint Dryer and White Japan surpasses the English Patent Dryers and Brown Japan in color, quality, and price. Send for descriptive circular to A. W. Pratt & Co., 53 Fulton Street, New York.

Rue's "Little Giant" Injectors, Cheapest and Best Boiler Feeder in the market. W. L. Chase & Co., 33, 95, 97 Liberty Street, New York.

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

Many New England Manufactories have Gas Works, which light them at one fourth the cost of coal gas. For particulars, address Providence Steam and Gas Pipe Co., Providence, R. I.

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

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

Scale in Steam Boilers.—I will remove and prevent Scale in any Steam Boiler, and make no charge until the work is found satisfactory. George W. Lord, Philadelphia, Pa.

For the best Cotton Cans and Galvanized Fire Pails, address James Hill, Providence, R. I.

For small size Screw Cutting Engine Lathes and Drill Lathes, address Star Tool Co., Providence, R. I.

Mechanical Expert in Patent Cases. T. D. Stetson, 23 Murray St., New York.

For the best Portable Engine in the world, address Baxter Steam Engine Co., 18 Park Place, New York.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement. Andrews' Patent, inside page.

All Fruit-can Tools, Ferracute, Bridgeton, N. J.

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

Iron Frame Band Saws, cheapest and best, \$150. Address S. C. Forsaith & Co., Manchester, N. H.

Brown's Coal-yard Quarry and Contractor's Apparatus for hoisting and conveying materials by iron cable. W. D. Andrews & Bro., 414 Water St., New York.

Deane's Patent Steam Pump—for all purposes—Strictly first class and reliable. Send for circular. W. L. Chase & Co., 95 & 97 Liberty St., New York.

Temples and Oilcans. Draper, Hopedale, Mass.

For Surface Planers, small size, and for Box Corner Grooving Machines, send to A. Davis, Lowell, Mass.

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., 263 Broadway, New York, Makers. Send for free illustrated Catalogue.

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

Eames Patent Molding Machines, for Metal Castings. Saves fully one third in cost of labor of molding, and secures better work than the ordinary method. For Circulars, address P. & F. Corbin, New Britain, Conn.

The Improved Hoadley Cut-off Engine—The Cheapest, Best, and Most Economical steam-power in the United States. Send for circular. W. L. Chase & Co., 95 and 97 Liberty St., New York.

Peck's Patent Drop Press. For circulars, address Milo, Peck & Co., New Haven, Conn.

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

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. T. Holland & Co., 62 & 64 Gold St., New York. Send for catalogue.

Millstone Dressing Diamond Machines—Simple, effective, economical and durable, giving universal satisfaction. J. Dickinson, 64 Nassau St., New York.

Hoadley Portable Engines, 2d hand, perfect order, complete, 30 h. p., \$1,400; 18 h. p., \$1,000. Address S. C. Forsaith & Co., Manchester, N. H.

Portable Engines, new and rebuilt 2d hand, a specialty. Engines, Boilers, Pumps, and Machinist's Tools. L. H. Shearman, 45 Cortlandt St., New York.

Best Philadelphia Oak Belting & Monitor stitched. C. W. Army, Manufacturer, 301 & 303 Cherry St., Philadelphia, Pa. Send for circular.

For First Class Steam Boilers, address Lambertville Iron Works, Lambertville, N. J.

Engines and Boilers a Specialty—1st class; new patterns; late patents; reduced prices. Plain and Cut-off Horizontal and Vertical Engines; Hoisting Engines; the celebrated Ames' Portable Engines; Boilers of all kinds; Cistern Turbines; and the best Saw Mill in the market. Large stock always on hand. Hampson, Whitehill & Co., 39 Cortlandt St., New York. Works at Newburgh, N. Y.

Buy Boulton's Paneling, Moulding, and Dove-tailing Machine. Send for circular and sample of work. B. C. Mach'y Co., Battle Creek, Mich., Box 227.

Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass. Send for sample and price list.



H. K. will find a recipe for cement for grindstones on p. 251, vol. 31.—J. H. B. will find a recipe for hard cement on p. 9, vol. 37, and a description of porcelain on p. 3, vol. 30.—F. W. D. will find an explanation of the shirt polish mystery on p. 203, vol. 31.—F. H. M. will find a recipe for a silver plating solution on p. 299, vol. 31.—J. F. will find that a process of tempering mill picks is detailed on p. 202, vol. 31.—G. R. L. C. will find directions for mounting chromos on p. 91, vol. 31.—C. H. F. will find directions for preserving iron from rust on p. 239, vol. 31; for painting brick walls on p. 346, vol. 31.—W. H. M. can clean chamois skins by the process detailed on p. 91, vol. 31.—W. H. K. will find a description of the cultivation of the castor bean on p. 335, vol. 31.

(1) J. S. S. says: I contend that if two casks are put on an equal level, and a one inch pipe is fastened airtight in the head of one end, and a 12 inch pipe similarly in the other, each pipe being 50 feet high and filled with water, the pressure will be as much in one disk as the other. Is this so? A. The pressure on equal and similar areas in the two casks will be the same.

(2) J. C. asks: Can you tell what to put on a lumenized paper to remove the gloss, so that water colors can remain on the surface? A. Try gentle steaming.

(3) G. V. says: I intend to pump water for irrigation. I have to carry the water 600 feet in an open tank or trough, the amount of water to be pumped being 1,000 gallons per minute. I can afford to give it a fall of 3 inches in the whole. What should be the dimensions of the trunk? A. Give the trunk from 1 1/4 to 2 times the cross section of the discharge pipe of the pump. 2. Would pine lumber 1 inch thick be heavy enough? A. Yes.

(4) D. J. T. asks: 1. What percentage of boiler pressure is the mean effective pressure on piston in an ordinary slide valve engine with throttle valve wide open? A. From 75 to 80 per cent. 2. I have been running for eighteen months an engine with 10x16 inches cylinder, and I notice that some of the bolts that hold the face plate to steam chest, also to cylinder head and piston head cap, are being cut away as if by acid; some of them are reduced to about one half their original size. The part affected is that which passes through the steam chest plate, the piston head cap, and the cylinder head. It is not rust, for the parts have been kept perfectly well lubricated. Can you tell me the cause and a remedy? A. Probably caused by water carried over with the steam, in which case the use of dry steam will be a preventive.

How can I make a first class Babbitt metal? A. You will have to experiment to get the metal right. See p. 364, vol. 29.

(5) E. P. asks: What process is used in casting steel or iron into ingots, so as to prevent blow holes on the outer surface? The process I have used is casting through a sprue into bottom of mold, causing metal to flow upward. This process is not satisfactory, and I wish to know how it can be remedied. A. Make your mold with a long neck, into which the air may rise and leave the blowholes in the top part of the casting, which is to be cut off.

(6) J. A. T. asks: I desire to construct a reflector telescope. 1. Can ground specula be procured in this country, 4 1/2 or 6 1/2 inches in diameter? A. Yes. 2. What would be the probable cost of a 4 1/2 or 6 1/2 inch speculum? A. For silvered glass mirrors, parabolized, \$40 for each square decimeter (4 inches) of surface. The focus is six times the diameter, and the highest power equals twice the aperture expressed in millimeters (fifty per inch). 3. Could you give me a full explanation of the construction of small sized reflectors? A. The English have devoted much talent and money to the construction of reflectors without adequate results. The diagonal plane of the Newtonian obstructs the best part of the mirror, and its supports add diffraction wings to the image of a star. All the silvered mirror costs but one fifth, and its power is nearly five sixths, of that of the achromatic of like aperture.

(7) C. asks: Does a fence over a hill contain exactly as many pickets as a fence on level ground, between the same points, the pickets being the same distance apart? A. Yes.

(8) M. asks: What do opticians mean by immersion lenses? A. An immersion lens is a microscopic objective which has its front and back combinations so adjusted that a film of water, joining the front surface and the thin glass cover of the object, completes the correction for spherical aberration, which correction depends in a dry objective upon the thickness of the front lens. Objectives of 1-10 inch and shorter focus are made to work either dry or with immersion by a screw collar adjustment.

(9) Z. T. K. asks: What is the horse power of an undershot or current water wheel 30 feet in diameter, of 15 feet face and 3 feet deep, running in a current which moves 3 miles an hour? A. Multiply 0.384 times the square of the velocity of the water in feet per second, and divide by 35,420. As to your other query, see article on friction of water in pipes, p. 48, vol. 29.

(10) T. C. W. says: I melted 1 lb. resin and 1 lb. pitch together, in an iron vessel; then, while hot, I poured the contents of the vessel into a wooden mold, in the shape of a brick. But I found

after the mixture got cold and hard, that I could not get it out of the mold; it adhered to the wood. Please to tell me how to construct a mold so that the substance will readily come out when cold and not adhere to the mold. A. Try coating the mold with paraffin.

(11) M. H. P. says: We use in our kerosene lamps a powder which prevents breaking of chimneys. It is said to destroy the naphtha. Can you inform me of any ingredients that will answer the above purpose? A. You do not state the mode of applying the powder in question. If you will send us a sample of the powder and a description of the mode of application, we will endeavor to answer your question.

Is there a cement for mending cracks in iron pots? A. Try glycerin and litharge.

(12) E. C. H. asks: What ingredient in soap is it that, when coming in contact with the eyes or an abrasion of the skin, causes it to smart? A. The alkali it contains. 2. Can there be manufactured an effective article of soap that will not cause such pain? A. No.

Which would be the most serviceable application for ordinary New Jersey yellow pine weather boarding, lime, whitewash, or coal tar, and which would be the coolest in hot weather? A. The whitewash.

(13) S. H. T. asks: What is the mode of etching engravings, etc., on glass? A. See our answer to P. M., No. 4, p. 298, vol. 31. The printing ink protects the glass with which it is in contact from the corroding action of the acid. Mr. Napier, the patentee, prefers to have the glass ground enameled or veneered beforehand, when the objects stand out in relief. If the veneer or enamel is colored, of course the picture remains colored, while the body of the glass is white. This also answers J. G. G.

(14) J. H. asks: How much more power, if any, will be required to turn a wheel one foot in diameter four times around than to turn a wheel 4 feet in diameter once round in the same time? A. Multiply the resistance by the distance through which it is overcome in each case, which will give you measures of the power exerted in turning the two wheels.

(15) J. C. D. says: I wish to run my sewing machine by water power, and propose the following plan: A water wheel 15 inches in diameter, inclosed in a watertight case, to be adjusted under the table of the machine, with a tank, resting 20 feet above the floor and 30 feet on a horizontal line. The tank to hold about 200 gallons, with a pipe leading to the wheel 1 1/2 inches in diameter. The jet from this pipe to be 1/2 inch in diameter, and strike the water wheel at about 45° below the line of the shaft; a discharge pipe to be adjusted at the bottom of the wheel case. Will this run the machine for ordinary domestic sewing? A. This plan will doubtless answer well.

(16) W. H. G. asks: If a loaded ship, afloat, were elevated one half the number of feet which it draws, would it capsize? A. Generally it would; but the load might be so disposed that the ship would remain upright.

(17) A. M. asks: By what process are raisins manufactured? Can the grapes grown in this part of the world be used for this purpose? B. The grapes are dried, either in the sun or in ovens. We do not think it likely that raisins made from the grapes of this country would compare very favorably with those that are imported. We cannot refer you to any work especially devoted to this subject.

(18) J. N. & S. say: We want to drive a shaft at a right angle to our line shaft, and wish to know if we can do it with friction pulleys. The speed of line shaft is 300 per minute. Of what material and how should the pulleys be constructed? A. You can do it with friction pulleys, made of cast iron, if you have sufficient surface.

(19) M. F. D. asks: 1. How shall I make a dry rose madder suitable for painting on wax for flowers? A. Inclose 2 ozs. troy of the finest Dutch madder in a bag of fine and strong calico, large enough to hold three or four times as much. Put it into a marble or porcelain mortar, and pour onto it a pint of clear soft cold water. Press the bag in every direction, and pound and rub it about with the pestle, as much as can be done without tearing it, and when the water is loaded with color pour it off. Repeat the process until the water comes off but slightly tinged, for which about 5 pints will be sufficient. Heat all the liquor in an earthen vessel till it is near boiling, and then pour it into a large basin, into which place 1 oz. of pulverized alum; stir the mixture for a short time, and while stirring pour in gently about 1 1/2 ozs. of a saturated solution of subcarbonate of potash; let it stand till cold, to settle; pour off the clear yellow liquor, add to the precipitate a quart of boiling water, stirring it well; and when cold separate by filtration the lake, which should weigh 1/2 an oz. Fresh madder root is superior to the dry. 2. How shall I make cadmium yellow for the same purpose? A. Cadmium yellow (sulphide of cadmium) is a compound of sulphur and cadmium. It is obtained by precipitation from a salt of cadmium by a current of sulphuretted hydrogen gas, or by an alkaline carbonate.

(20) J. N. P. says: The copper mines in the mountains of East Tennessee are second to very few in the country. I recently observed a precipitating process which interested me very much. Two shafts have been sunk to a depth of fifty or sixty feet, and a stream of so-called "copper water" has been struck. Pumps are inserted, and this water is pumped into a very long trough, running nearly level. Into this trough is put a lot of old scrap iron. Every twenty or thirty feet along the trough are pits, about two feet deep, into which the precipitated copper is swept. It is then shoveled out and is ready for the refinery. 1. Of what does this water consist? What is the proper name of it? A. A solution of sulphate of copper in water, and probably proceeds from the oxidation of copper

pyrites (sulphide of copper). This solution is commonly called blue vitriol. 2. If the residue is the copper precipitated from the water, what becomes of the iron? A. The iron takes the place of the copper in solution. 3. What is the proper name of the water after the copper is taken out? A. The solution of sulphate of iron is called green vitriol.

In certain parts of the country adjacent to the mines, there prevails among the cattle a disease which the natives call milk sickness; they say the cattle never have it unless they have been feeding in dark caves or places in the mountains where the sun seldom shines. To what is it attributable? A. Probably to some poisonous substance contained in the water, which could be determined by an analysis.

(21) W. S. B. asks: 1. Has science ever given a decided answer as to the cause of the Gulf Stream? A. It is due to the flow of the heated waters of the torrid zone towards the poles, the direction of the flow being influenced by the earth's rotation and the forms of the continents. 2. How swiftly does it flow, and how wide is its current? A. The maximum velocity of the Gulf Stream is five miles an hour, and the average less than one and a half.

(22) J. W. asks: 1. Does lead contain sulphuric vapors and oxygen vapors? A. No. 2. When lead melts, does it expand and force the vapors off? A. No. 3. When the lead is cooling, does it re-absorb these vapors from the air? A. No.

1. Is there such a thing as malleable glass? A. No. 2. Fluorhydric acid corrodes glass. Is the glass converted into a vapor or into silicic acid? A. It attacks the silicic acid in the glass, combining with it to form hydrofluosilicic acid. 3. Can the glass be obtained by evaporating the fluorhydric acid? A. No.

Do potassium and magnesium combine together? A. No.

If four grains of arsenic and two grains of potassium were combined together, would the combination be green? A. No.

(23) P. E. V., of Paris, France, asks: 1. Will you please give more precise details for preparing the waterproof paper described on p. 146, vol. 31? I have tried the process, but failed. A. A concentrated solution of borax in warm water should be made, to which is added the shellac in a fine powder. The paper, after saturation in the solution, may be pressed between rubber rollers and dried. 2. What is aqueous solution of shellac in borax? A. Shellac is the purified resin which exudes from the branches of several trees in tropical climates, and in particular from the *ficus indica*, *ficus religiosa*, and *rhamnus jugubia*. It is soluble in an aqueous solution of borax, by which it may be distinguished from most common resins.

(24) C. B. F. asks: What is the thickness of the earth's outer crust? A. Nothing is definitely known as to this. Some philosophers fix 60 miles as the thickness of the earth's crust, and others imagine it to be 125.

Should cream be allowed to sour before churning? A. No.

1. Is silver better than brass or German silver for a cornet? A. There is some difference of opinion on this subject, but the general belief is that there is no particular advantage in employing silver. 2. What is German silver composed of? A. Copper, zinc, and nickel.

Is gold the heaviest metal? A. No. Is the centennial tower progressing? A. You should apply to the projectors for information. We have heard nothing of it, late.

(25) C. E. W. asks: What is the rule for finding the mean of the thermometer when part of the observation are above and a part below zero? A. Add all the negative readings together, and subtract the sum from the sum of the positive readings. Divide the difference by the whole number of readings.

(26) S. K. H. asks: What is oxygenized oil, used for testing olive oil? A. Several oils have the property of absorbing oxygen under certain conditions, among which is boiled linseed oil. This latter may be possibly the oil in question; but no mention can be found, in scientific works, of any oil specifically named oxygenized.

(27) E. S. asks: What is the gas or smell proceeding from newly baked bread? My dwelling is connected with a bake house, and the smell from a large quantity is penetrating, and very disagreeable. Is it unhealthy? A. The smell is due to the escape of the gases and volatile compounds generated from the breadstuff during the process of fermentation, and expelled by the heat. We know of no case where it has proved unwholesome to a marked degree.

How can I determine whether water is poisoned by passing through lead pipe? A. Render the water acid with dilute oil of vitriol, and add sulphuretted hydrogen to it. A black coloration indicates the presence of lead.

When plaster of Paris has been used to fasten the parts of a lamp together, what will soften it so that the parts can be separated? A. Dilute muriatic acid.

(28) N. E. L. says, in reply to Y. M., who has trouble in sucking water with his pump at 200 revolutions: I am using a small engine, and I was told I could not suck water from a well about 20 feet deep with 3/4 inch pipe. I put in the pipe; and near the pump in the suction pipe, I put a T joint with about 1 foot of 3/4 pipe, with the end soldered up. This serves as a water or air chamber. I have no trouble in running 200 revolutions per minute. J. M. should put in an air chamber about five times the capacity of his pump. A T joint and a piece of pipe may do, but an air chamber, with the water drawn from the bottom and the supply pipe coming in a few inches above, so that, while it is pumping, it will not prevent a steady flow of water into the chamber, will be better. The pump now has to start the water in the whole length of the supply pipe; and in fact, the pump will form a vacuum before the momentum of the water is overcome. With an air chamber, it has only the water from the pump to the air chamber to start,