

Business and Personal.

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Situation Wanted by a Machinist and Engineer, experienced as foreman. Address Draughtsman, 547 Lafayette Ave., Brooklyn, N. Y.

Self-feeding Upright Drilling Machine of superior construction; drills holes from 1/8 to 1/2 inch diameter. Pratt & Whitney Co., Manfrs., Hartford, Conn.

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Special Planers for Jointing and Surfacing, Band and Scroll Saws, Universal Wood-workers, etc., manufactured by Bentel, Margedant & Co. Hamilton, Ohio.

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We make steel castings from 1/4 to 10,000 lbs. weight 3 times as strong as cast iron. 12,000 Crank Shafts of this steel now running and proved superior to wrought iron. Circulars and price list free. Address Chester Steel Castings Co., Evelina St., Philadelphia, Pa.

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

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

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

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

Friction Clutches for heavy work. Can be run at high speeds, and start gradual. Safety Elevators and Hoisting Machinery a specialty. D. Frisbie & Co., New Haven, Ct.

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To Steam Users, Engineers, Boiler Makers and Inspectors. Send for book with valuable information. The use of coal with economy; horse power of engines and boilers; safe pressure; grate and heating surface; coal and water required per horse power. Price 25 cents. Lovegrove & Co., Philadelphia, Pa.

The Turbine Wheel made by Risdon & Co., Mt. Holly, N. J., gave the best results at Centennial tests.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St. Wm. Sellers & Co.

Wm. Sellers & Co., Phila., have introduced a new injector, worked by a single motion of a lever.

Kreider, Campbell & Co., 1030 Germantown Ave., Phila., Pa., contractors for mills for all kinds of grinding.

The only Engine in the market attached to boiler having cold bearings. F. F. & A. B. Landis, Lancaster, Pa.

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

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

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

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

"The Best Mill in the World," for White Lead, Dry, Paste, or Mixed Paint, Printing Ink, Chocolate, Paris White, Shoe Blacking, etc., Flour, Meal, Feed, Drugs, Cork, etc. Charles Ross, Jr., Williamsburgh, N. Y.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

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

For Heavy Punches, Shears, Boiler Shop Rolls, Radial Drills, etc., send to Hilles & Jones, Wilmington, Del.

2d hand Planers, 7' x 30', \$300; 6' x 24', \$225; 5' x 24', \$200; sc. cutt. b'k g'd Lathe, 3' x 28', \$200; A. C. Stebbins, Worcester, Mass.

Blake's Belt Studs. The best fastening for Leather and Rubber Belting. Greene, Tweed & Co.

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

Solid Emery Vulcanite Wheels—The Solid Original 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, N. Y.

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

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

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.

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. Pittsburgh Steel Casting Company, Pittsburgh, Pa.

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

Notes & Queries

(1) L. S. S. asks for a recipe for a good sympathetic ink. A. See reply to W. P., No. 25 of last volume of SCIENTIFIC AMERICAN.

(2) W. S. A. asks: 1. Whether the coil for a telephone or an electro-magnet must be wound evenly in parallel layers, or would it do as well if wound haphazard, or in any way approximating to layers? A. The coil should be wound evenly. 2. How to magnetize two steel bars, each 4 1/4 inches long x 1/2 inch diameter? A. See reply to H. R., No. 2 of current volume. 3. What battery power is needed in the form of a gravity battery? A. 8 or 10. 4. Must the batteries be connected for intensity or quantity? A. Quantity. 5. Must the two magnets of a pair of telephones be of equal strength? A. The results are better when the two magnets are of equal strength.

(3) P. L. C. writes: I wish to know what is the best preparation of paint or solution to put on tin, galvanized iron, or common sheet iron, where it is kept constantly in water, sometimes hot water? A. Several coats of genuine asphaltum varnish, each permitted to thoroughly harden before applying the next, ordinarily suffice. Will India rubber dissolve and mix in with boiled linseed oil? A. Yes; gently heat the oil, and stir until the caoutchouc is softened and diffused through it.

(4) N. C. L. writes: Twice I have seen a scrap of paper thrown on the ground, after a few moments, catch fire, somewhat mysteriously to me, although I think the parties who threw it must have put it to some chemical treatment. A. Saturate the paper with a solution of phosphorus in ethylic ether or carbon disulphide. The solvent on evaporation leaves the phosphorus in a finely divided condition and spontaneously inflammable.

(5) C. B. asks (1) for the best material for a gas balloon about 4 feet diameter. Would cotton upon which rubber is deposited answer? A. Silk is most suitable, but light fine muslin is often used. 2. How can I cover cotton with a thin coating of India rubber? A. Digest caoutchouc in 30 parts of benzole in a warm place and in a well closed vessel. Apply with a brush.

(6) C. W. H. asks: What are the best ingredients for preventing ink and mucilage from souring and moulding? A. A few drops of carbolic acid and clove oil to each pint bottle are usually all that is requisite.

(7) C. M. K. asks for a composition to cover a pipe with that will make it fireproof at about 3000°. A. If we understand you, we know of nothing. At what degree of heat will lava melt, such as used for tips in gas burners? A. It has not been determined, we think.

(8) F. C. C. asks: How can I test coal oil? A. Place a small sample of the oil to be tested in a cup partially immersed in a vessel of water, and having placed the bulb of a good thermometer in the oil, heat the water gradually, and as the temperature of the oil rises apply the flame of a burning taper to its surface, and note on the thermometer the degree at which it inflames. This should not occur below 120° Fah. Many of the standard oils inflame only at temperatures of 150° or higher.

(9) N. P. S. writes: 1. I have an emery wheel that has accidentally become saturated with sweet oil. It is as smooth as glass, it does not cut at all. How can it be cleaned? A. If the emery wheel is made of materials that are insoluble in benzine, you might soak it for a few hours in benzine. 2. In using compressed air as motive power for a small wheel or fan of high speed (say 1,500 revolutions per minute) is there anything gained by inclosing it and employing the air on the same principle as water for a turbine wheel? A. No. 3. If not, at what angle is the best to let the air strike the fan? A. 70°.

(10) J. W. asks: What is the process for silvering the inside of glass globes or the inside of bottles? A. SCIENTIFIC AMERICAN SUPPLEMENT No. 105 describes several processes.

(11) S. G. P. asks if it would lessen the danger of kerosene explosions by filling the lamp partly with water. A. No.

(12) J. C. asks: 1. Is there any simple test by which a layman may ascertain if his well water is injuriously affected by the lead pipe pump connection? A. Evaporate by gentle heat a small sample of the water nearly to dryness in a clean porcelain cup, moisten the residue with acetic acid, and add to a portion of it a few drops of strong hydrosulphuric acid—pure water saturated with the gas evolved by the action of dilute sulphuric acid on iron mono-sulphide; a black precipitate indicates lead. Add to another portion of the dilute acetic acid solution a little pure hydrochloric acid: a white precipitate, which redissolves on diluting with boiling water, indicates lead. To the remainder of the solution add a few drops of dilute sulphuric acid and let it stand for a time: a white heavy precipitate indicates lead. 2. It would be difficult to examine the pipe. The well is covered up and cemented airtight. Is that any objection? A. If there is a possibility of an accumulation of noxious gases in the well it should be ventilated.

(13) A. McN. asks: Are tomatoes injurious when eaten freely? A. No.

(14) F. P. B. asks for a mixture capable of producing a spark when struck by steel. A. A minute quantity of the fulminate of mercury will answer. It is prepared as follows: 1 drachm of mercury is dissolved by aid of gentle heat in 1/2 oz. (measured) of nitric acid, of specific gravity 1.4, and the solution then poured into 3/4 oz. of alcohol (specific gravity = 0.83); action soon ensues with the evolution of copious white fumes, and the fulminate is deposited at the bottom. This is carefully washed with cold water and dried at a

very gentle heat. It explodes by friction or percussion, or when heated above 380° Fah. Sealed in small grains between slips of paper with a little waterproof cement it may be kept for any length of time. This is an exceedingly dangerous substance to handle.

(15) H. J. S. asks for a fine blacking recipe. A. See reply to query No. 10, in No. 1 of current volume.

(16) J. G. R. writes: 1. I wish to make the battery described in "Science Record" for 1876, p. 221, called the Coke manganese galvanic cell. Please tell me what size box will I need and what shape for the Coke manganese cylinder described? A. 4 inches square and 6 inches deep. 2. Will common brown straw wrapping paper do to make cylinders in? A. Yes. 3. Are the paper wrappers to be left on when I set up the battery? A. Yes. 4. Can I use common tinman's zinc (that is, thin rolled zinc) for the negative pole? A. Yes. 5. Will it give as much power as thicker zinc as long as it lasts? A. Yes. 6. With three such cells will I get more power than from the same size and number of sulphate of copper gravity battery? A. Yes.

(17) J. L. inquires as to the best method of hardening iron links for locomotives. We cannot use the recipe in "Wrinkles and Recipes" of hardening in iron box with bones, owing to not having proper furnace accommodation. Can you advise any other good method? A. Heat the link to redness, and spread upon it pulverized prussiate of potash until the latter fuses, then reheat the link to a blood red, and immerse it in cold water until cooled.

(18) G. M. L. asks: Why is it necessary to use carbon points in electric lights? A. It is the only substance yet discovered which will produce the effect. Your second question cannot be answered in these columns.

(19) A. N. C. writes: 1. In connecting telephones with the wrong pole of the battery it spoils the magnets. Will you please tell me how to determine which pole to put them on? A. If the helix is applied to the north pole of the magnet the wire should be wound in a left hand direction, and the current should traverse the helix (from + to -) in a direction that would be left handed when we look at the north pole of the magnet. If the helix is placed on the south pole of the magnet the helix should be oppositely arranged. 2. Is it infringing on the Bell patent to use a plate made of paper? A. Yes. 3. Can a telephone made with a skin and a piece of twine be used to transmit sound from the Bell telephone? A. It is said to have been done.

(20) H. W. G. writes: Will you please inform us what is the utmost horse power of a locomotive, with cylinders 16" x 24", drivers 5 feet, running 30 miles per hour, boiler pressure 130 lbs., boiler 40", 144 flues 2", 11' long, firebox 2' 10" x 5' 6"?? A. Horse power = (2 x area of one piston in square inches x speed of piston in feet per minute x mean pressure of steam throughout stroke in lbs. per square inch) ÷ 33,000. You can readily substitute the proper quantities in this formula, and solve.

(21) A. H. G. asks: 1. Which boiler will steam the best, flue or tubular? A. There is not a great deal of difference between well proportioned boilers of the two classes. 2. Where the boiler is quite short, would you advise many tubes and large diameter of shell to make up for lack of length, or several flues of moderate size with large diameter of shell? A. The former, in general.

(22) S. writes: Mr. Bourne, in his work on the steam engine and cognate subjects, says that the resistance overcome in well shaped vessels going through the water is composed mainly of the friction of the bottom of the vessel against the water, and very little by the moving aside of the water by the vessel's bow. I ask why should not the friction of the vessel's sides count for something as well as that of the bottom? A. We do not understand that Mr. Bourne attributes all the resistance to skin friction, but that he desires to call attention to its great preponderance, and his remark about best form probably refers to a form in which the requisite displacement is obtained with a minimum of immersed surface.

(23) J. M. K. writes: Will some printer tell me how many lbs. of pica type will print four pages 10 x 15 inches? A. The amount of pica type required for four pages 10 x 15 would be about 200 lbs., as it requires over 46 lbs. for a page, and the cases can never be set entirely clear.

(24) D. L. G. asks: 1. What is the difference in process of manufacturing malleable cast iron, from that of manufacturing common cast iron? A. Malleable cast iron is cast iron rendered partly malleable by annealing. The casting is first made of the desired form, and then annealed by being heated in an air tight box, and allowed to cool slowly. 2. Where can I get malleable casting done? A. Consult our advertising columns.

(25) S. L. G. asks: 1. Can we conduct water 1/2 of a mile through a 1/4 inch pipe, where a part of the pipe will be higher than the source of supply? A. Yes, but the pipe must be laid with great care, and supplied with air valves. 2. Can two siphons be united where the source of one is higher than the other? A. Yes. 3. Should the junction be made at the highest or lowest point? A. We do not think it is a matter of great importance which point is used. 4. How much power could we get from a stream of water 2 inches square at the source, with a fall of 15 feet in 1/2 of a mile? Would it be one man power? A. The horse power of the water would be lbs. of water discharged per minute x height of fall ÷ 33,000.

(26) D. S. F. asks: Which has the greatest propelling power, a wheel of 3 feet in diameter with a journal through the center and let run on two rails (one on each side) down an inclined plane, or one of 6 feet in diameter of the same weight, and with the same sized journal through the center, and let run down the same inclined plane, both run the same distance, and will there be any difference in the speed and force attained

in running a certain distance? A. The difference will ordinarily be in favor of the large wheels.

(27) J. E. P. asks if three cells about 2 1/2 gallons each of a gravity battery are sufficient to nickel plate small articles with. A. Yes.

(28) G. S. H. writes: I want to take up an elm tree about 8 inches diameter at the butt, and transplant it (I will have to carry it about 1 mile). I want to save all the top. Can I move it any season of the year, and how? How shall I prepare the ground to receive it? A. It is doubtful if an elm tree of that size can be transplanted without "cutting back" the top somewhat. Unless the top is cut back the tree will never have the vigor it possessed before removal. It is preferable to move early in the spring. The earth to receive it should be a soft rich material, and kept moist until the dry season is over.

How can I get rid of ants and roaches? I mean keep them away. A. See reply to J. H. K., in No. 2 of current volume.

(29) W. W. C. writes: Powder being ignited in an airtight vessel which it is not strong enough to burst, how long would it retain its power? A. If combustion occurred, the products would probably retain their pressure until released.

What is the relative height and depth of the waves and trough of the sea, or is the height of the waves measured from the bottom of the trough of the sea? A. It is measured in the last named manner.

Does a short armed man have any advantage over a man with a long arm? A. Other things being equal he probably does.

(30) J. S. writes: There is a contention over a cut gear, between myself and the rest of the boys, and we have come to the conclusion to refer the matter to you for settlement. I claim that a gear 3 3/4" in diameter, containing 26 teeth on its circumference, is known as 8 teeth to the inch through its diameter, the rest of them claiming that the correct way to determine the pitch is to measure on the pitch line from center to center of tooth, thus a tooth measures 3/8" and 1/8", and they say it is 2 1/2 pitch, which I claim is not correct. A. This question is fully explained in the SCIENTIFIC AMERICAN of January 19, 1878.

(31) J. M. C. writes: 1. I have an engine, 15 inch cylinder, 48 inches stroke, that has near the back port a frost crack about 3 1/2 inches long, that when running with a heavy pressure of steam leaks very badly, and I am afraid will burst the cylinder. Can you tell me of any cement that will close the crack so that it will be steam tight? A. You can secure a patch with tap bolts, and either calk it or drive a rust joint. 2. I have also a Knowles No. 3 pump for supplying boilers. The pump is 230 feet from the pond. I have a clack valve about 6 inches from the strainer, and 8 feet above that I have an upright check valve that hammers very bad when the pump is run any faster than 28 strokes per minute. Is it the length of pipe that makes it hammer so, or does the pump draw too hard? The pipe is 2 1/2 inches. A. It is probably due to length of pipe, and if so, may be remedied by using a larger air vessel or an additional one.

(32) E. B. H. asks: Is there any way of preparing canvas for painting without the use of pumice stone to rub down, and can it be made smooth? A. Apply thick paint to sized canvas with a palette knife or spatula.

(33) G. W. M.—Iron may be very easily deposited from its sulphate; dissolve a little crystalline sulphate of iron in water and add a few drops of sulphuric acid; one pair of Smee's battery may be used to deposit the iron upon copper or brass. The metal in this pure state has a very bright and beautiful silver color.

(34) W. B. H. asks for the different threads used for different sizes of gas pipes, also the different diameters of pipe, both outside and inside. A.

Bore of pipe	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. of threads per inch.	18	18	14	14	14	11 1/2	11 1/2	11 1/2	8	8	8	8	8

The bore is the size by which the pipe is designated; the outside diameter varies.

(35) M. A. W. writes: In making a phonograph, what diameter should the diaphragm which records the vibrations be? How fast should the cylinder which carries the tin foil revolve? What material should the diaphragm be made of? A. In No. 133 of the SCIENTIFIC AMERICAN SUPPLEMENT there are full directions for making a phonograph.

(36) G. D. writes: 1. I have had some type nickel faced, and the nickel on some of it scales or peels off. How can this be guarded against? A. Use a perfectly uniform electrical current, make the zinc surface in the battery and the surface to be coated as nearly equal as possible. The surface of the nickel anode should never be less than the surface to be coated. If the type change their form under pressure, peeling cannot be avoided. 2. Is the recent French invention of toughened glass type a hoax? A. We do not know that they are in use.

(37) J. B. writes: I have a Smee battery with one cell. Can I nickelplate with it? and if so, please inform me how. A. Use a solution of chloride of nickel and ammonia made by dissolving 4 ozs. of the salt in 1 gallon of water.

The figures in parentheses in the SCIENTIFIC AMERICAN index refer to "Notes and Queries."

(38) W. writes: 1. I wish to transmit the power from a 25 horse power turbine to upright shaft 12 feet distant from water wheel shaft. How can it best be done? A. As the distance is quite short we would