

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion.

Best Machinists' Tools, Pratt & Whitney, Hartford, Ct. Small Fine Gray Iron Castings a specialty. Soft and true to patterns. A. Winterburn, 16 De Witt street, Albany, N. Y.

To Clean Boiler Tubes—Use National Steel Tube Cleaner; tempered and strong. Chalmers Spence Co., N. Y. The Advertiser would purchase, or invest capital, in an approved invention; one quite free from detail and of general use preferred. Address P. O. Box 1256, Providence, R. I.

For Sale.—Boults Carver and Moulder, \$195; Bentel Universal Wood-worker, \$295; No. 1 Fay Tenoner, \$125; No. 3 Fay Mortiser and Borer, \$145; No. 1 Fay Band Saw, \$145; Band Saw, \$50; Fay Jig Saw, \$75; Fay Band Saw Setting Machine, \$25; Fay Sticker, \$100; Fay No. 2 Surface Planer, \$125; Fay No. 2 Edge Moulder and Shaper, \$175; 27 in. Richardson Daniel's Planer, \$145; 24 in. Fay End Bed Planer, \$245; Double Shaping Machine, \$175; Sando., \$75; Bentel Rip Borer, \$95; Bentel Horizontal do., \$40; Iron Swing Cut-off Saw, \$40; all above nearly new. Saw tables with cross and rip saws, fans, belting, etc. J. D. Shearman, Indianapolis, Ind.

Tin Foil.—J. J. Crooke, 163 Mulberry St., N. Y. Applicable as are the Varnishes and Japans of Hyatt & Company, and successful as they are with the Artisan and Manufacture of Coach, Car, Carriage Furniture, Sewing Machine, Organ, and general machinery in Wood, Iron, and Tin, their use is recommended. Their motto is purity with color and durability. Send for circular and price list. Office, 246 Grand St., New York.

For the best Steam Packing use the "Selden's Improved." R. Brandt, 127 Avenue D, N. Y.

Baldwin the Clothier is a patented trade mark, and it is the property of O. S. Baldwin, whose residence is in Brooklyn, N. Y.

Saws are filed with great ease by everybody. New machine; \$2.50. Send for illustrated circulars, etc., to E. Roth & Bro., New Oxford, Pa. We want agents.

For the best Gate Valves of all kinds, apply to D. Kennedy & Co., 88 John St., N. Y.

Plumbers—Address Bailey, Farrell & Co., Pittsburgh, Pa., for the best and cheapest iron case street hydrants.

Magic Lanterns and Stereopticons of all prices. Views illustrating every subject for public exhibitions. Profitable business for a man with a small capital. Also lanterns for college and home amusement. 74 page catalogue free. McAllister Mf. Optician, 49 Nassau St., N. Y.

"Little All Right," the smallest and most perfect Revolver in the world. Radically new both in principle and operation. Send for circular. All Right Firearm's Co., Lawrence, Mass., U. S. A.

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

Shaw's Noise-Quitting Nozzles for Escape Pipes of Locomotives, Steamboats, etc. Quiets all the noise of high pressure escaping steam without any detriment whatever. T. Shaw, 915 Ridge Ave., Philadelphia, Pa.

John T. Noye & Son, Buffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all kinds, and dealers in Dufour & Co.'s Bolting Cloth. Send for large illustrated catalogue.

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

For Best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay Sts., Brooklyn, 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.

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.

Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

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

Split-Pulleys and Split-Collars of same price, strength and appearance as Whole-Pulleys and Whole-Collars. Yocum & Son, Drinker st., below 147 North Second st. Philadelphia, Pa.

Skinner Portable Engine Improved, 2 1/2 to 10 H. P. Skinner & Wood, Erie, Pa.

Have you seen the Briggs Lathe? Mounted on iron stand with walnut top and 21 inch driving wheel, with 3 speeds. Price \$25 complete, or \$13 without stand. Frasse & Co., 62 Chatham St., N. Y.

More than twelve thousand crank shafts made by Chester Steel Castings Co. now running; 8 years constant use prove them stronger and more durable than wrought iron. See advertisement, page 270.

Emery Grinders, Emery Wheels, Best and Cheapest. Hardened surfaces planed or turned to order. Awarded Medal and Diploma by Centennial Commission. Address American Twist Drill Co., Woonsocket, R. I.

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

Notes & Queries

(1) C. P. asks: What can be put on plow mould boards to preserve the polish and keep them from rusting, and will be easily rubbed off? A. Use a mixture of tallow and white lead.

(2) J. M. S. asks: What is wash blue? A. It is commonly a fine grade of Prussian blue mixed with enough oxalic acid or ferrocyanide of potassium to render it soluble in water.

(3) F. H. asks how to make the varnish used for transferring? A. Take mastic in tears, 6 1/2 ozs.; resin, 12 1/2 ozs.; pale Venice turpentine and sandarac, each 25 ozs.; alcohol 5 pints. Dissolve in a clean bottle or can in a warm place, frequently shaking it. When the gum is dissolved, strain it through a lawn sieve and it is fit for use.

How can I make an ink that cannot be erased even

with acids? A. To good gall ink add a strong solution of fine soluble Prussian blue in distilled water. This addition makes the ink, which was previously proof against alkalis, equally proof against acids, and forms a writing fluid which cannot be erased without destruction of the paper. The ink writes greenish blue, but afterward turns black.

(4) H. F. asks: 1. Can you tell me how I can check rosin from setting almost immediately when cooling? A. No. 2. Is there a way to odorize the same? A. Use balsam of tolu, sandalwood, oilbanum, storax, powdered vanilla, etc. 3. Is the fume arising when melting by heat injurious to health? A. In a concentrated form, yes.

(5) P. B. asks for a process of transferring writing to type metal? A. Sprinkle the ink lines, while moist, with gum arabic in finest powder. When perfectly dry dust off excess, stretch the paper on a smooth level backing, and pour on the fusible metal.

(6) G. S. says: 1. I have a relay wound to 54 ohms resistance. It is wound with 5 ozs. of No. 30 wire. How many feet of wire, same size, shall I add to make it 160 ohms resistance, and if I wish to increase the resistance still more, shall I add wire at the same ratio? A. With a given battery power, the resistance of wires of the same diameter are to each other as their length; thus, a wire twice as long as another has twice the resistance. We believe you have rated the resistance higher than it should be in the case you mention; the proper way is, as you are winding your coil, to compare its resistance from time to time with a standard, as we will explain in a future issue. 2. Is not common sheet zinc melted and cast into the desired shape just as good as the zincs made on purpose for battery use? A. No. It often contains lead. 3. I wish to galvanize a mile or two of wire; can I do it by drawing the wire through a tank of sulphuric acid into a tank of muriate of zinc, then through the melted zinc? A. Yes. Use sulphuric acid, with twenty or thirty times its weight of water. Let the wire remain in the acid water until the scale, if there be any on it, be entirely removed.

(7) A. K. says: I propose to make an induction coil on the following plan: Using No. 28 wire for the secondary coil, I intend to wind cotton yarn between the convolutions of wire, so that they cannot touch, winding it of course simultaneously and on varnished paper. Having completed one layer, I give it a coat or two of quickly drying copal varnish, and cover the whole layer with strong, varnished paper, varnished on both sides; when the paper is dry, I wind the next layer in the same manner, and treat it the same as the first, and so each proceeding layer till the section is finished. To avoid having layers of great and different tension of electricity too near together, I intend to compose the coil of three sections, each one completely finished, in the above described manner, by itself, and connected by a binding screw. Do you think the insulation will be sufficient? A. Your wire should be finer, say No. 32 instead of 28. The insulation you mention will not give a good result, because it takes too much room. Silk or cotton is the best, although, if you are careful, you can accomplish the result by passing your wire through any quick drying varnish or paint; then over a hot stove, and through cold air to the coil, laying a strip of thin paraffined paper between each layer.

(8) H. H. C. says: Would it be better to have the schoolroom of a second story on the north end and playroom on south, or vice versa? How can we deaden the sound on the floor, so as not to have one school disturb the other? A. The schoolroom should be placed at the north end of the building. To deafen the floors at little expense, lay two thicknesses of building paper upon the floor joists under the planking.

(9) C. A. W. B. asks for a cheap filter to cleanse water from a roof before it enters a cistern? A. Let the water run through a cask or keg of charcoal.

(10) C. A. M. asks: 1. What is the best method of preparing an object of wax or other non-conductable substance for electro-deposit, so as not to fill up deep cut fine lines? A. Covering with plumbago or black lead. The ordinary article sold for household use is not good; purchase from some dealer in scientific apparatus. 2. When graphite is used, how is it made fine enough, and how is it applied, so as to adhere to the object? A. It is carefully ground in water, apply with a camel's hair brush, work in lightly and occasionally breathe on the surface if the powder does not adhere readily, and when this will not suffice, hold the spot for an instant over the mouth of a bottle containing spirits of wine.

(11) W. J. C. asks how to make a telephone? A. The cut we give on first page, No. 14, present volume, is to scale, and once, twice, or three times the size will work well. The spools are of copper wire No. 40. Silk insulation, and the armature is a circular disk of thin ferrotype plate, such as is used by photographers.

(12) T. N. says: 1. I have an induction coil containing 600 feet of secondary, which gives as much as a man thoroughly "pickled" in electricity can bear, with only half a square inch of zinc surface (bichromate battery). Is not this a very good result? A. Very good, if the man has not become sensitive by being "pickled." 2. Can a method of winding naked wire on helices be patented? A. Yes, though the principle cannot be. 3. Can a combination of leading and secondary wires be patented? A. Yes. 4. Can tin be copper plated without using an alkaline solution of copper? A. Yes, but it is troublesome and expensive. 5. What is the easiest way of removing the tin? A. By dipping it into strong sulphuric acid, and when the tin is removed washing with clean water. 6. Will you give me a formula for finding the resistance of primary coils? A. The proper way is to compare the resistance by means of a galvanometer and battery, with a standard of resistance, which may be purchased from the electrical instrument makers.

(13) J. P. asks for a method of making the purple precipitate of Cassius from pure gold of 24 karats, the same as is used for staining glass, etc.? A. Dissolve the gold in a warmed mixture of 3 parts hydrochloric acid and 1 of nitric acid, and evaporate the solution nearly to dryness. Dissolve 1 part of this in about 10

parts of water, and add to it protochloride of tin (stannous chloride) 1 part, dissolved in a small quantity of diluted hydrochloric acid, and 12 parts perchloride of tin (stannic chloride). Wash and dry the precipitate. Before adding the tin salts, the solution of gold should be filtered through a corner of fine white filtering paper in order to remove what chloride of silver remains mixed with it.

(14) Z. I. asks for a material for closing the pores of a large stoneware box to render it impervious to acids? A. What acids and of what concentration?

Please give me a cement to resist boiling water, suitable for mending the delicate handle of a china cup? A. Soak isinglass in cold water until it is soft, and then dissolve it in the smallest possible quantity of hot proof spirit. In 2 ozs. of this mixture dissolve 10 grains of ammoniacum, and while still liquid, half a drachm of mastic dissolved in three drachms of rectified spirit. Mix well together and bottle for use. This is the "diamond cement." To use it, stand the bottle for a moment in warm water to render the cement fluid, and apply to the fracture immediately. It resists water and moisture perfectly.

(15) —, from Jersey City, asks: Will it make any difference whether the electro-voltaic chain belt is plated aluminum, silver or nickel? Will not the silver be just as good? A. The only advantage of the aluminum is that it does not readily tarnish; but silver is a better conductor, and will answer as well.

(16) J. E. A. wishes to know: 1. Which will make the strongest electro-magnet, to coil the insulated wire around the core similar to thread on a spool, or to coil the wire from one end of core to the other, then carry straight back parallel with core to place of beginning, and coil as before? A. Same as the thread is on a spool. 2. Is it an intense or a quantitative current that will make the most powerful electro-magnet? A. An intense current will produce the best magnetic effect by means of a magnet wound with fine wire, having resistance; a quantitative current, by a magnet with coarse wire, having less resistance. 3. If a current of electricity is passed around a number of similar electro-magnets, would all of the magnets be of equal power? A. Yes. 4. If opposite poles of electro-magnets are brought together, will the attraction be greater than when an armature of soft iron is used in place of one of the electro-magnets? A. Yes. 5. If similar poles are brought together, will the repelling power be as great as the attracting power is when opposite poles are used? A. No.

(17) W. E. D. says: In making rubber stamps by Park's method, shall I immerse the whole form in bisulphide of carbon and chloride of sulphur, or remove the mould and rubber from the press and immerse it in the solution? How long a time shall I keep it in the solution? In vulcanizing by the dry process, how can I remedy the sticking in the mould? A. Remove them from the form. A few minutes' immersion, depending upon the bulk of the form, will usually suffice. Use powdered magnesia on the mould to prevent sticking.

(18) A. S. asks: By exhausting the air from a flask of water with an air pump, would it produce any considerable degree of coldness in the water without the use of sulphuric acid, as it is used in Carré's ice machine? A. Yes, if properly arranged, and the flask is covered with some non-conductor of heat. A large pump will be requisite.

(19) F. H. T. asks if alcohol is injurious to leather? A. It is not injurious unless applied in excessive quantities, in which case it may detract from the suppleness and durability of the leather by its solvent action on the natural oils and stuffing. In ordinary liquid shoe dressing strong borax water constitutes the solvent for the shellac instead of alcohol, as in the German preparation.

(20) W. H. asks if a shaft 4 1/2 inches in diameter, supporting a weight varying from 1 1/2 to 2 1/2 tons and running at a speed varying from 500 to 700 per minute, can be run on two friction wheels so placed together as to form a bearing instead of the ordinary box bearing? A. The arrangement is perfectly feasible. Make the friction wheels with diameter four or five times that of the shaft.

(21) R. P. S. says: A friend has a country residence on a beach; the lawn is even with the top of the wall against which the water rises. Every spring the wall is washed out. Now if the wall was laid in Portland cement, would it be a sure protection? A. If, in rebuilding the wall, time is afforded for the Portland cement to set before being submerged or washed by the water, it will then remain permanently. It is important, also, that the wall should have a deep foundation. If the wall is wet at all seasons at every rise of the tide, it would then be well to construct large blocks of it on the bank, where it would have an opportunity to become hard and cohere, and then at low tide lower these blocks into their places in the wall. Such a wall would not wash out.

(22) E. P. F. asks what sizing sign painters use for smalting purposes? A. Mix a stiff oil color as near the color of the smalts to be used as possible. Sift these on to the fresh paint with a fine sieve, allowing the work to lie in a horizontal position until sufficiently dry to retain them.

(23) A. I. W. asks how to restore to its former elasticity a quantity of rubber sponge, which, having lain unused for several years, has become quite hard? A. The rubber has probably suffered partial oxidation and cannot be restored to its former softness.

(24) W. W. says: I have built an icehouse above the ground, with hollow walls 11 inches thick filled with sawdust. I am now building one with hollow walls filled with slacked oyster shell lime. Is this any better than the sawdust? How would I ventilate it so I can keep ice during the summer months? A. Ice keeps well in houses built of wood above ground where the hollow space is 10 inches wide and is filled in with sawdust; a level ceiling over the ice 10 inches thick being also so filled in. The floor should be paved with concrete inclining to the center, where a trapped opening

should receive the water and discharge it into a drain beneath. Ventilation should be afforded by a tube or shaft about 6 inches square, extending from the center of the ceiling to a short distance above the ridge of the roof. The ice should be supported upon a tier of beams laid above the concrete bottom. The larger the quantity the better it keeps—a cube of 12 feet will keep well.

(25) C. E. A. says: If a building be sufficiently protected by lightning rods, will the fluid ever strike them with sufficient intensity to be heard, or will they be constantly drawing off so much of the fluid that enough cannot be collected in the vicinity to produce a report? A. They will draw off the electricity silently and harmlessly, if they are thick enough and well connected with the earth; if these requirements are not fulfilled, the house would be safer without them, as the electricity will choose other courses as well, according to the degree of their conductivity to the earth as compared with that of the lightning rods.

(26) F. A. P. & Bro. ask how to grind hard chilled metal castings? A. Use artificial emery wheels. State the kind of metal to manufacturers of such wheels; they will provide one suitable for the work.

(27) W. R. T. asks if it would have been practical to have driven the English channel twin steamer Castalia with one wheel, driven with the engine placed in one hull, or with one wheel driven with two engines, one engine in each hull, the engines attached to the same shaft? A. Yes.

(28) C. W. asks if the annealing process has a tendency to weaken metals. Is the cohesive or tensile strain less in soft than in hard metals? A. No.

(29) F. A. B. asks what kind of rubber to use in making rubber stamps? A. Use common gum rubber, obtainable at any of the larger rubber dealers. The gum rubber sold by druggists is often worthless, owing to long exposure to light and air.

(30) W. J. McG. asks: 1. What are the melting points of iron, lead, copper, tin, silver, and gold? A. Iron melts at 2786° Fah., lead at 612°; copper at 1996°, tin at 442°, silver at 1773° and gold at 2016°. 2. What degree of heat is required to convert these metals into gases? A. It has not been determined accurately—from 2,000 to 10,000°. 3. One pound falling through a distance of 10 feet exerts a force of 10 foot lbs. on the substance on which it falls. What would be the weight of a mass of material which would exert the same force, by pressure, when resting quietly on the substance? A. The weight would strike the surface with a force equal to $\sqrt{2 \times 10 \times 32}$ lbs. pressure at the moment of contact. The mass must therefore weigh $\sqrt{640}$ (= about 23.35 lbs.), since it must exert the same pressure.

(31) J. D. asks: How is phosphor-bronze manufactured? A. True phosphor-bronze is a combination, without intermediates, of copper with phosphorus. It is simply a phosphide of copper in definite proportions. The copper must be commercially pure, being exempt from arsenic, antimony, iron or zinc. The maximum and minimum percentages of phosphorus in the bronze are 2 and 4.

(32) A. M. C. says: I have a pump that has a tight foot valve and the water is always up to the barrel of the pump, but it will not start, after resting a while, without filling the air chamber and letting it remain for 3 or 4 minutes. A. It is quite probable that the piston leaks.

(33) C. J. & Co. ask: 1. What reduction in the grate bars is necessary when "slack" is to be burnt? A. They should be sufficiently close together to prevent material loss from unburnt fuel falling through. 2. Is there any existing patent in the use of a blower to burning of coal screenings or slack? A. No. 3. Would there be any utility in placing air jets back of the bridge wall to burn the smoke? A. No.

(34) B. F. B. asks for a remedy for a deposit that collects on the bottom of steam boilers. A. Use a feed water heater with sediment collector.

(35) W. H. S. says: We finish silk goods on a cylinder heated with red hot irons. Will it have any effect on the goods if the cylinder be heated with steam, so long as we get the same temperature? A. Probably not.

(36) G. B. D. asks: 1. What are the advantages of the oscillating steam engine? A. Fewer working parts. 2. What are the mechanical difficulties that hinder its coming into use? A. Unequal wear of the trunnions and packing of the same. 3. If these difficulties could be surmounted, would not this style of engine be preferable to the reciprocating? A. Probably, by many engineers.

(37) F. R. M. asks: How many square feet are there in the surface of the earth? A. We do not know that this calculation has ever been attempted. Brande gives the surface, on the assumption that the earth is a sphere, as 196,625,000 square miles.

(38) H. McK. asks: 1. What sized circular saw can I run with a steam engine 2 inches bore and 4 inches stroke, running 300 revolutions per minute, with boiler carrying 50 lbs. steam per square inch? A. Diameter 8 to 10 inches. 2. What will be proper speed for the saw? A. 3,500 revolutions per minute.

(39) J. T. asks: How many lbs. will 4 wrought iron round rods sustain, rods 15 feet long and 3/4 inches diameter? Will square rods sustain more pressure than round rods, length and diameter same? A. If you refer to tensile strength, it is from 40,000 to 60,000 lbs. per square inch. In the case of square bars, as their sectional area is greater, they are stronger.

(40) W. C. B. asks: Would it be practical to drive a grist mill with one or two horses, in this way: Build a large wheel 36 feet diameter, place the horses on the periphery, then gear for speed, as is usual in breast or overshot water wheels. Would I gain anything over the common horse powers in use? A. No.

(41) F. B. M. asks how to drill a hole through a watch crystal and not break it? A. Drilling from both sides with a common drill is a very good preventative of breaking. Work lightly and use turpen-