

Business and Personal.

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

Manufacturers of Machinery for all purposes will confer a favor by mailing their Circular to Geo. A. Cobiaugh, Manufacturer's Agent, Middletown, Pa.

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

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

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

Windmill rights and royalties for sale cheap. Mill tested and proved a success. See cut in Scientific American, April 10th. For circular, terms, &c., address E. S. Smith, Good Hope, McDonough Co., Ill.

The advertising house of Geo. P. Rowell & Co. has already gained a world-wide reputation. Its business is being extended every month, and it now has contracts for space in nearly every newspaper published in the United States and Canada. Messrs. Geo. P. Rowell & Co. have evinced a remarkable business tact, and have reduced the advertising system down to a very nice science.—[Journal-Recorder, West Meriden, Conn.]

Clark's Pressure Blowers and Exhaust Fans.—Send for price lists. R. W. Wilde, 20 Cortlandt St., N. Y.

A Valuable Patent for Sale—Gas Engine worked by heat evolved by an oxyhydrogen mixture, when ignited. Address P. Vera, care of T. Duque, 763 Broadway, New York.

For Sale—A Complete set of Patent Office Reports, from 1790 to 1871, inclusive, bound in full sheep and in perfect order. Price \$150 currency. This set cannot be duplicated in this country, and is worth \$250. Address Lock Box 38, Washington, D. C.

Reciprocity! Wanted: Machinery to hull, clean and polish 500 or 400 lb. rice per hour in the best possible style. State full particulars to E. Lindemann, Wallua, Sandwich Islands.

Valuable Patent for Sale Cheap, by State or County Rights—A perfect Odorless Broiler, the only one ever invented over which control is had for inspection while using—without odor or grease, on stove or floor. All fat and juices saved in Broiler Pan. See Scientific American, June 26. Address Joseph Mansfield, Jefferson, Wis.

File Cutting Machines—Parties having such, and wanting a practical man, address P. O. Box 185, Syracuse, N. Y.

Wanted—A 10 ton Steam Crane for Pipe Foundry, new or second hand. Reply by telegraph. Hamilton's Foundry, Toronto, Ont.

Situation Wanted—To take charge of a Boiler Shop. Address J. T. Connelly, Connellsville, Pa., Patentee Gusset Connection Locomotive Boilers.

Patterns, Patent Office and Experimental Models, made by Crook & Herring, 36 Center St., New York.

Barry Capping Machine for Canning Establishments. T. R. Bailey & Vail.

Second Hand Steam Engines, Pumps, and Iron-Working Machinery. Catalogues free. E. E. Roberts, 119 Liberty Street, New York.

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., 216 Canal St., New York, Makers. Send for free illustrated Catalogue.

Scientific Expert, in Patent Cases, C. Gilbert Wheeler, 115 State St., Chicago, Ill.

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

Wrought Iron Pipe—For water, gas, or steam. Prices low. Send for list. Bailey, Farrell & Co., Pittsburgh, Pa.

Small Gray iron castings made to order. Hotchkiss & Ball, Foundrymen, West Meriden, Conn.

Hotchkiss & Ball, West Meriden, Conn., Foundrymen and Workers of Sheet Metal. Will manufacture on royalty any patented articles of merit.

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

See N. F. Burnham's Turbine Water Wheel advertisement, next week, on page 109.

Houston's Turbine Water Wheel, manufactured by Wm. P. Duncan & Co., Bellefonte, Pa.—Send for Circular.

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

"Lehigh"—For information in regard to emery wheels, their uses, &c., address L. V. Emery W. Co., Weissport, Pa.

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

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

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

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

Faught's Patent Round Braided Belting—The Best thing out—Manufactured only by C. W. Army, 301 & 303 Cherry St., Philadelphia, Pa. Send for Circular.

Three Second Hand Norris Locomotives, 18 tons each; 4 ft. 8 1/2 inches gauge, for sale by N. O. & C. R. Co., New Orleans, La.

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

Notes & Queries

A. J. R. will find directions for preparing liquid glass (silicate of soda) on p. 225, vol. 23.—R. K. is informed that making malleable iron castings is described on p. 138, vol. 29.—R. F. will find a recipe for cement for china on p. 343, vol. 24.—F. C. will find directions for enameling iron saucepans, etc., on p. 149, vol. 28.

(1) E. G. T. says: I have a small telegraph apparatus for learners, consisting of a key and sounder, the current being obtained from a simple battery of zinc, copper, and blue and white vitriol. How could I make it work an electric light? What material would be required, and how should I arrange it? A. See p. 35, vol. 33.

(2) W. C. asks: 1. Which will be the stronger of the following? Three cells of Bunsen, zincs 1/2x6x14 inches, carbons 1/2x2x9 inches, porous cups 8 inches high, 3 inches diameter, and 1/8 inch thickness; or a Grenet battery of 8 cells, zinc plate 1/2x2x4 1/2 inches, and carbon plates 1/2x2x4 1/2 inches? A. On short circuit, the Bunsen. On long circuit, the Grenet. 2. Can the electric light be produced with one of the above batteries? A. Yes, with either. Use 50 cells Bunsen or 100 Grenet. 3. Is the middle plate of a Smee cell sometimes made of carbon? If so, is it as good as the silver coated with platinum? A. Yes. 4. Where can I find directions for making induction coils? A. On p. 219, vol. 32.

(3) E. G. S.—There would be no action in a battery of zinc only, arranged as you propose.

(4) A. B. says: I have a telegraph line of 1/4 of a mile in length, with two relays on it made of No. 24 cotton-covered copper wire, 1 lb. of wire in each relay. The battery is of the Lockwood and Callaud pattern, six jars each. The current is strong enough to produce a very disagreeable sensation on the tongue when it is placed between the wires of the main line. The relays will not work with sufficient force to operate the sounder that is attached to the local battery. One jar of the local battery will work the relay on a 2 foot circuit very well; but if I put my tongue between the wires of the local battery, I cannot discover any current passing. What is the matter with the relays, and what shall I do to make them work? A. Do you use a ground for a return wire? If so, try another wire in place of the ground.

(5) A. G. Jr. says: In Science Record for 1873 some one recommends chromium as a negative metal in galvanic couples. I see in the market lead plates, covered with a film of what purports to be chromium, and apparently coated by deposition. If chromium can be so deposited, what salt of the metal is there that can be used? A. The chromium is not deposited upon the lead electrically, but is pulverized mechanically, and then pressed into the lead.

(6) G. H. says: Can a lightning rod lose its properties as a conductor, after standing 7 or 8 years and becoming considerably tarnished from exposure? Is it more dangerous to use such a rod than none at all? I ask these questions because our factory was recently struck by lightning, the electricity leaving the rod after passing down a short distance and entering the building, where it expended its force among a lot of iron castings, which lay upon the floor directly opposite that part of the wall to which the rod is attached. Its action upon these castings is shown by small spots, where the iron seems to be eaten as if by some acid, though the roughened surface is somewhat brighter and looks as if a small quantity of molten tin had been dropped there. I cannot find that the fastenings of the rod are out of order, and therefore wonder why the electricity should leave it, unless its conducting qualities are impaired. Would repolishing the rod restore its efficiency? A. The age of the rod would not affect its usefulness, unless the joints had lost, by rust, their conducting power, or the rod was diminished in size by rust. We would be glad to have you examine the portion which goes into the earth, and let us know whether it is still perfect, how deep it runs into the ground, and what the condition of the earth about it is in regard to moisture; also whether the rod contains any joints, or whether it is one continuous rod. What metal is the rod composed of?

(7) G. B. asks: Of what shape must I construct a magnet in order to gain the most power? A. Of horseshoe shape. 2. What power can be got per square inch? A. This is proportional to the size and number of turns of the wire and the strength of the battery. 3. What ratio does the power diminish as the distance is increased? A. As the square of the distance.

(8) J. M. says: I tried to make ground connection by taking two pieces of sheet tin, 1 1/2 feet square: I soldered copper wire to them and buried in moist earth, about 3 feet in ground, and it would not work with about 100 feet of wire. What is the reason? A. Your plate was too small. 2. I made a battery in the following manner: 1 quart jar with coil of copper in bottom, and a zinc fitting the jar, with hole in center and suspended along the copper, with wire attached. A wooden cup was put in the jar with holes in the bottom for the blue vitriol. I let it stand about 4 hours, and it gave a current. Is such a battery in use, and what do you think of it? A. Your battery is a modification of the Daniell. We cannot see that it has any peculiar merit. 3. How is the electric light made? A. See p. 35, vol. 33.

(9) W. R. D. asks: 1. What is the most practicable method of electrotyping by means of zinc? A. See p. 405, vol. 32. 2. How is silver plated? A. By an electrolyte process.

(10) M. D. asks: 1. What size of objective and eyepiece would suit a tube 4 feet long? A. The size of the object glass depends on its approach to perfection. When achromatic and of the proper curves, it may be 3 or 4 inches in diameter for a tube 4 feet long; but the only way, and that followed by all astronomers, is to try the glass, and, if it is not satisfactory, to reduce the size with diaphragms until a sharp image is obtained. 2. How can the object and eyepieces be neatly and correctly attached? A. Neat and correct mounting can only be done by turning the tube on the lathe, as the glasses have to be perfectly centered, which means that the optical center of the curve must coincide with the axis of the tubes, and this is of primary importance. Of course the focal length of the object glass must be a little less than the length of the tube; while that of the eyepiece may be shorter, in proportion as the object glass is better in quality. An inferior objective can bear only a weak eye glass, that is, one of long focus. 3. What is an approved elementary treatise on astronomy? A. Herschel's "Astronomy," published by Appleton, is one of the best.

(11) H. P. T. asks: Is there anything gained in a Callaud or gravity battery by covering the zinc with unsized paper? Does it reduce the working strength of the battery? In case of accidental disturbance and mixing of the solutions, does it prevent the deposition of copper upon the zinc? I find after long use that the paper is covered here and there with crystals of copper; but upon removing the paper I cannot see any trace of copper upon the zinc. A. If the gravity battery is properly put together, so that the fluids do not mix, there will be no local action. The paper will do no harm and not much good.

(12) A. B. says: I have been trying to invent a process which would assimilate circles to right lines, in other words, to do away with the tedious process of referring numbers to logarithms and back again in ordinary trigonometrical calculations. My idea is to do away with degrees, minutes, and seconds in the circle, and to reduce all parts to decimals. Therefore I propose that the circumference of a circle shall be 1,000 or 10,000 or 10,000,000, and all the parts correspond in decimals. Is this practicable? If not, why? A. This method is practicable, and was used in the beginning of this century in France, when attempts were made for a thorough introduction of the decimal system, making a day 10 hours long, the week to 10 days, etc. At that time tables were calculated and published, in which the quadrant of the circle was divided into 100 degrees, the degree into 100 minutes, the minute into 100 seconds, so that the quadrant was divided into one million parts; but it met with no favor, as the natural division of the circle is into 6, which is no divisor of 10. Your system is worse, as dividing the whole circle into 1,000 parts gives 250 for the quadrant. If you study thoroughly the use of logarithms in trigonometrical calculation, you will see that it would be a retrograde step to do away with them, as they simplify the calculations enormously, and admit of a great saving of time. You will need your tables of sines and tangents just as much without logarithms as with them, and without them no trigonometry is possible. You may calculate them for decimal degrees, but the change does not amount to much, and does not involve any fundamental principle, as they cannot be dispensed with.

(13) A. K. says: 1. In constructing a small electromagnetic motor, in which two electro-magnets cannot be successfully applied, I intend to substitute one of them by a well magnetized iron bar. Will said bar magnet, working on a pivot in such a manner as to bring one of its poles in contact with a pole of the electromagnet, be attracted and repulsed regularly whenever the poles of the electro-magnet are changed, or will it lose its polarity after a while and be attracted by a negative as well as a positive pole? A. Iron will not retain magnetism. 2. Will the repulsion be of the same power as the attraction? A. Yes. 3. Will an oblong-shaped core answer instead of a round one, as commonly used for electro-magnets? A. Yes.

(14) D. R. S. says: Please give me minute details of how to make and mount a telescope, such as is used on rifles for long range firing. A. We would not advise you to try to make such a telescope unless you are an optician. The lenses generally used for this purpose are made and mounted in France, and it is difficult to compete with their makers as to quality, and impossible as to price. A tube about one foot long is required, and attached to it are a French objective at one end, and a sliding eyepiece at the other end.

(15) H. E. asks: 1. Can a field or marine glass be obtained that will enable an observer to recognize the face of a person at a distance of two miles? A. No field glass can have that power; a large astronomical telescope is needed for this purpose. 2. Can a binocular telescope accomplish this? A. A binocular telescope is necessarily of limited size; but if long enough, it will serve the purpose a little better than a single one.

(16) W. C. M. asks: 1. On what principle is the Baumé hydrometer constructed? We tested a sample of oil with five hydrometers, and they all showed differently. A. There are four kinds of hydrometers. The first is that of Baumé, which must indicate zero in pure distilled water in relation to liquids heavier than water, and 10° in relation to liquids lighter than water. In the second kind, the specific gravity of distilled water is assumed at zero in both scales, either for heavy or light liquids. This is adopted in the Pharmacopœia Batava. The third is that of Cartier, which is like that of Baumé except that the degrees are larger, every 20° of Cartier being equivalent to 22° of Baumé. The fourth is the centesimal hydrometer of Gay Lussac, which is made for use in alcohol only. To test any of these hydrometers for accuracy, without having a recognized standard to com-

pare them with, requires a hydrostatic balance. Baumé for heavy liquids must indicate zero in distilled water of 60° temperature; and in a salt solution, of 1.18 specific gravity and at the same temperature, it must indicate 20°. Baumé for light liquids must indicate 10° in distilled water, and 30° in a mixture of water and alcohol, of a specific gravity of 0.88. The hydrometer of the Pharmacopœia Batava for heavy liquids must indicate the same as Baumé, but that for light liquids must show zero in distilled water and 20° in the mixture of water and alcohol of 0.88 specific gravity. In Cartier's hydrometer, the specific gravities mentioned must correspond with those of Baumé minus 2° nearly, that is, the indications of Cartier are nearly 2° less for every 20°. Gay Lussac has based his alcoholometer on the principle of placing zero for water and 100° for absolute alcohol, while 100° corresponds with 44° of Cartier, and 47° of Baumé. Half alcohol and half water, having a specific gravity of 0.917, must correspond with 23° of Baumé, 13° of the Pharmacopœia Batava, 21° of Cartier, and 56° of Gay Lussac. It will be seen that this testing is troublesome, and it is best to procure a reliable standard to compare your hydrometers with.

(17) L. D. T. asks: 1. What is the best way to build a brick cistern, so as to filter the water perfectly? A. See p. 362, vol. 32. 2. How deep does an 8 foot diameter cistern want to be to hold 100 barrels water? A. About 12 feet.

(18) W. L. says: 1. We keep water up stairs to use in case of fire, but it has to be changed often. What can be put in to keep it from smelling bad? A. It will be better to continue to change. 2. The steam pump draws the water now from the well, about 18 feet, with a 2 1/4 inch plunger of 10 inches stroke, running at 62 per minute. Flow of water is about 208 feet per minute, through iron pipe 1 1/4 inches in diameter. The pipe is large enough to keep tank full of water, and sometimes we have to shut off to keep from running over. If we should lay 1 1/4 inch iron pipe to the river, down a gradual descent of about 18 feet, then down to bottom of river 8 feet, making in all about 24 to 25 feet raise, and about 360 feet in length, will it work well? A. Yes, if properly laid.

(19) M. T. W. says: Can you give me a formula for making a cheap concrete of lime, sand, cement, or any other suitable material that will pack in an inch space between planks 2x4 inches, and resist the action of heat, cold, and the atmosphere? A. In France, asphalt is extensively used for this purpose, especially where the plank is laid on the ground, for cellar floors, etc., in which case no sleepers are used.

(20) A. H. asks: I have a kitchen 14 feet wide, with shed roof. The roof has 2 feet fall, and is slanting. Whenever we have a heavy rain, the water stops on it and comes through very badly. Is the roof too flat? A. Your roof is too flat for shingles. You had better raise it so as to give it a steeper pitch. Six inches to the foot is little enough.

(21) J. E. D. asks: Is there anything that will cut shellac except alcohol? A. Shellac is soluble in a hot solution of borax in water.

(22) E. H. asks: What is the best method of obtaining free gold from the ore? It is very soft, mined with pick and shovel only. A. First crush the ore very finely, mixing it water by agitation, and allowing it to run over a short inclined plane composed of sheet copper, the surfaces of which have previously been evenly colored by a film of mercury which adheres strongly to it. Through the strong affinity existing between the two metals (gold and mercury), the particles of the gold are arrested by the quicksilver, while the other substances accompanying it pass by without hindrance. The alloy of gold and mercury formed may be decomposed by placing it in an iron retort, the beak of which, or its connection, dips beneath the surface of some cold water in a suitable vessel. On the application of a strong heat to the retort, the mercury is vaporized, and, distilling over, is condensed beneath the surface of the water, while the gold remains behind in the retort. The above is one of the best methods in use; but if the gold is required in a very pure state, the following process may be employed: After finely crushing the ore, subject it to the action, for some time, of a hot mixture of muriatic and nitric acids, 3 parts of the former to 1 of the latter. To this solution, after decantation from the undissolved residue, add a strong solution of copperas in water, until no further precipitate forms. Allow to subside and decant the supernatant liquid. The precipitate consists of the pure gold in a minutely divided condition, to which, alone, its dark color is due. An excess of acid in the above operation should be particularly avoided, as it will only redissolve, in part, the precipitate formed on addition of the iron salt.

(23) L. C. T. asks: You recently gave me a recipe to form tannate of gelatin inside a keg. Please tell me the quantity of gelatin by weight to use to 3 quarts water, and the quantity of tannin by weight to 1 quart water? A. Use about 1 3/4 lbs. gelatin to 3 quarts water, and a saturated solution of tannin. 2. I presume the gelatin is a fine form of glue, and not that used for pastry purposes. A. You are right.

(24) C. C. & B. ask: What kind of stamping ink will not smear when used on leather glazed with oxalic acid, glue, and white of eggs? A. Try a strong solution of copperas in water.

(25) G. A. B. asks: 1. What kind of acid is used in soldering, and how is it prepared for use? A. Add zinc to a small quantity of muriatic acid, until no further solution takes place. 2. What kind of copper is used for making soldering tools? A. Ordinary copper, carefully tinned. 3. Is there anything better than copper to make soldering toolsof? A. No.