

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

The best results are obtained by the Imp. Eureka Turbine Wheel and Barber's Pat. Pulverizing Mills. Send for descriptive pamphlets to Barber & Son, Allentown, Pa.

Steam Tug Machinery, Engines, Boilers, Sugar Machinery. Atlantic Steam Engine Works, Brooklyn, N.Y.

Park Benjamin's Scientific Expert Office will send an engineer to Europe on Aug. 7. Manufacturers and others desiring reports on foreign machinery or processes, business commissions executed, or information obtained, can have same done on moderate terms. Address 37 Park Row, N. Y.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIENTIFIC AMERICAN of this week.

Electro-Bronzing on Iron. Philadelphia Smelting Company, Philadelphia, Pa.

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

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

Having enlarged our capacity to 96 crucibles 100 lb. each, we are prepared to make castings of 4 tons weight. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Wanted—A new or second hand 150 h. p. vertical, automatic cut-off, condensing engine that will run 160 revolutions per minute. Address, giving description and price, Ypsilanti Paper Co., Ypsilanti, Mich.

Vertical Engines. F. C. & A. E. Rowland, New Haven, Ct.

We want to make some heavy, patented machinery, on royalty or otherwise. Vulcan Works, Toledo, O.

Steam and Gas Fitters' Tools a specialty. Send for circulars. D. Saunders' Sons, Yonkers, N. Y.

Wanted—Good new pressure Hydraulic Motor, guaranteed under 40 to 60 lb. pressure, 3 in. supply, to run trams carrying 25 to 30,000 lb. on incline $2\frac{3}{4}^\circ$, 800 ft. long, 250 ft. high. Builders of inclines and mining engineers address, with plan, etc., latest tramway improvements, C. B. Maclell & James, Exchange Place, Kansas City, Mo.

Manufacturers and other owners or occupants of large buildings will conserve their interests by sending for samples and price lists of H. W. Johns' Asbestos Liquid Paints. H. W. Johns Mfg. Co., 87 Maiden Lane, New York, sole manufacturers of genuine Asbestos materials.

Telephones repaired, and parts of same for sale. Address P. O. Box 305, Jersey City, N. J.

Improved Dynamo-Electric Machines for Electroplaters and Stereotypers. Price \$75 for 150 gallon machine. Equal to the best, at half cost of the cheapest. J. H. Bunnell, Electrician, 112 Liberty St., New York.

Wright's Patent Steam Engine, with automatic cut-off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

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

H. Prentiss & Co., 14 Dey St., New York, Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

For Screw Cutting Engine Lathes of 14, 15, 18, and 22 in. Swing. Address Star Tool Co., Providence, R. I.

The Horton Lathe Chucks; prices reduced 30 per cent. Address The E. Horton & Son Co., Windsor Locks, Conn.

Lincoln's Milling Machines; 17 and 20 in. Screw Lathes. Phoenix Iron Works, Hartford, Conn.

Boilers ready for shipment. For a good Boiler send to Hilles & Jones, Wilmington, Del.

A Cupola works best with forced blast from a Baker Blower. Wilbraham Bros., 2318 Frankford Ave., Phila.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Linen Hose.—Sizes: $1\frac{1}{2}$ in., 20c.; 2 in., 25c.; $2\frac{1}{2}$ in., 29c. per foot, subject to large discount. For price lists of all sizes, also rubber lined linen hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N.J.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are being sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

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

Excelsior Steel Tube Cleaner, Schuylkill Falls, Phila., Pa.

Partner wanted. See adv. on page 30.

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

Bradley's cushioned helve hammers. See illus. ad. p. 29.

Band Saws a specialty. F. H. Clement, Rochester, N.Y.

Sheet Metal Presses, Ferracette Co., Bridgeton, N. J.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Brinker St., Philadelphia, Pa.

Wanted, the address of parties who manufacture steel tubing; also iron tubes. Address L. F. Standish & Co., New Haven, Conn.

Noise-Quelling Nozzles for Locomotives and Steamboats. 50 different varieties, adapted to every class of engine. T. Shaw, 915 Ridge Avenue, Philadelphia, Pa.

Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. ad. p. 30.

Factory Fire Hose.—A large lot good Cotton Hose for sale cheap. W. F. Corne, Agent, 117 High St., Boston.

Stave, Barrel, Keg, and Hoghead Machinery a specialty, by E. & B. Holmes, Buffalo, 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.

The American Watch Tool Company, Waltham, Mass., can cut standard Taps and Screws from 1-100 of inch diameter upward, of any required pitch.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

We have opened a sample depot for American goods, and wish to negotiate with manufacturers seeking Spanish markets. We shall be glad to receive catalogues, price lists, and samples of American products. Address Herrero Hermanos, Cadiz, Spain.

Hand Fire Engines, Lift and Force Pumps, for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., and 93 Liberty St., N. Y. city, U.S.A.

Combined Universal Concentric or Eccentric and Independent Jaw Chucks. Pratt & Whitney Co., Hartford, Ct.

NEW BOOKS AND PUBLICATIONS.

BOLETIN DE LA SOCIEDAD DE GEOGRAFIA Y ESTADISTICA DE LA REPUBLICA MEXICANA. Tomo IV., Nos. 4 and 5. 1879.

We have already had occasion to call attention to the great scientific value of the papers read before the Geographical and Statistical Society of the Mexican Republic, and to the excellent style in which they are issued. The current number (a double one) of the Society's "Bulletin," recently received, maintains the high character of those that have preceded it, and contains, in addition to a record of the "Proceedings" for July, 1878: A Resume of Recent Discoveries in European and Asiatic Archeology, by Senor Brackel-Weldé; Altimetric Data, by Senor Reyes; A Memoir on a Means for Improving the Canalization of Mexico, by Dr. de Belina; A Report on the Cultivation of the Mulberry and the Rearing of the Silkworm in Colima, by Senor Moreno; A Paper on the Origin of Belize, by Senor Carrillo y Ancona; Facts relating to the Discovery of the New Mineral Barcenite, by Senor Ramirez, wherein the author, while claiming for his countryman, Senor Mendoza, the priority of discovery of the new species, grants that the honor of making the first quantitative analysis of it belongs to Professor Mallet, of Philadelphia, and that the name "barcenite" given to it by the latter should be accepted; A Memoir on the Moon and Meteorology, by Senor Reyes; Influence of Altitude on the Life and Health of the Inhabitants of Anahuac, by Dr. de Belina; and The Law of Periodicity of Rains in the Valley of Mexico. In addition to the foregoing memoirs, there are several unsigned papers and translations; and, altogether, the collection is one of considerable scientific interest.

REVISTA GENERAL DE MARINA. Cuaderno, 5. May, 1879: Madrid

This ably edited Review, now in its fourth volume, is a monthly periodical of about 75 pages, most excellently printed and copiously illustrated, and devoted to the interests of the navy exclusively—being in fact the sole organ of that branch of the Spanish service. We cannot give the reader a better idea of the scope of this interesting and valuable publication than by enumerating its contents, which, in the number before us, are as follows: Santa Cruz (Tenerife) and the Fisheries of the African Coast, by Captain Galiano; Reflections on the Formation of the National Navy, by Captain Mangano; Brief Notes on the Recent Progress in Portable Firearms, especially in France, by Lieutenant Toca; Description of a New Hydraulic Dock; The Archer and Clark Standfield System of Raising Sunken Ships, by Lieutenant Pastorin; and "Various Notes," under this heading being included short accounts of the most recent discoveries and improvements in matters appertaining to the navy.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) C. E. A. asks: 1. Can a boat be propelled by letting steam direct from the boiler through a nozzle under the boat pointing toward the stern? A. Yes. 2. If so, at what speed can a flat bottomed skiff, sharp at both ends, 15 feet long, 2 feet wide at bottom and 3 feet wide at top, with an upright boiler with 10 feet heat surface, with 120 lb. of steam, be propelled? A. If with the stream, the speed would be perceptible, but if against it, the stream would have the advantage. 3. Does a bullet thrown from a rifle cut with a gaining twist increase in revolutions after it has left the gun? A. No. 4. Why does a ball thrown from the same rifle make a larger hole in an animal at a long distance than at a short distance? A. Because at the short distance the substance is cut before it has time to yield.

(2) J. N. writes: Having occasion to use compressed air, and storing as large quantity as possible in a vessel containing 5 feet, if I pump air in so as to have a pressure of 15 lb. to the inch, how many feet can I discharge through a gas meter; or, in other words, how many feet of air can I pump into the vessel to make a pressure of 15 lb. to the inch? A. A quantity equal to the capacity of the vessel.

(3) "Young Mechanic" asks: 1. What branches of school study are the most necessary for a person intending to become a first class mechanic to be well versed in? A. Chemistry, physics, and mathematics. 2. What is the best book on mechanics for him to study first? A. The class books used in high schools and universities.

(4) F. W. S. asks: Which of two journals will wear the most, one running in wooden boxes and the other in metal ones, other conditions being equal? A. Those that run in wood; the wood holds dirt and grit, and all the wear falls on the journal.

(5) C. C. W. writes: I am building a small steam launch of the following dimensions: Length, over all, 18 feet, beam amidships, 4 feet 6 inches; draught aft, loaded, 18 inches; Clunker built, sharp lines, 2 plain valve engines, 2x4 inches, set on the quarter. I intend carrying 40 lb. steam and speed 200. What size screw do I need, and what pitch to do the best possible work? Please explain the principle of the injector. A. 22 inches diameter and 2 feet 8 inches pitch, you will get a moderate speed. For an explanation of the action of the injector consult Bourne's Catechism of the Steam Engine.

(6) E. P. asks. 1. Is water compressible? Is the water compressed to an appreciable extent at great depths in the ocean, 4 or 5 miles? A. Practically, no. 2. Would a wreck in sinking in the deepest part of the ocean reach a depth where it would remain stationary, owing to the density of the water, before touching bottom? A. If its specific gravity is greater than that of water it will go to the bottom.

(7) W. V. asks how lime can be removed from water pipes in a dwelling house. They have only been in use two years, and all soft water which passes through them becomes so hard as to be useless. A. The lime salts cannot be removed by chemical means without doing injury to their iron pipes. Carbonic acid water (soda water) would probably dissolve the greater part of the salt with the least injury to the iron.

(8) S. S. S. asks how to separate lead from silver on a small scale. A. To separate the silver from a rich lead expose it in a large cupel (a porous dish made of bone ash, to a strong red heat, in a muffle open at both ends so as to admit of the passage of air over the melted metal. Under these circumstances the lead gradually becomes oxidized to litharge, which is absorbed by the porous dish, leaving a nearly pure button of silver and gold behind. On a larger scale Keith's new electrochemical process gives very good results.

(9) J. J. W. asks how much tannic acid it would require to be used in a seventy-five horse power boiler. We use water slightly impregnated with lime, and forms a slight coating in about a month. What effect would the acid have upon the water distilled from boiler when the acid is used? A. We cannot recommend the use of tannic acid in a boiler under these conditions. Use $\frac{1}{4}$ ounce of soda to the barrel of feed water instead, and use the blow out every day.

(10) H. J. K. asks: Do you know of any substance, flexible, elastic, and at the same time transparent, to be used in place of wire in constructing a small machine? It must be of sufficient strength to sustain the weight of an ounce. A. Make a solution of fine gelatine in an equal weight of hot concentrated glycerine. If properly prepared and cooled slowly the resulting substance is nearly as flexible and elastic as caoutchouc, and semi-transparent.

(11) D. A. B. asks: If a chain suspended by both ends from above, the right passing around a sheave below, to which a weight is attached, say 10 tons—is there more than 5 tons strain, on any section of chain: if so, where is the breaking point? A. No; the breaking point will be in one of the parallel sides.

(12) W. J. R. asks: Would a pair of engines, 8 inches bore and 9 inches stroke, give good results at 200 revolutions, working steam at about 30 lb. mean effective pressure? What would be a better proportion? A. It would not be economical; you had better get same speed of piston by longer stroke and less revolutions, if your work will permit it.

(13) J. J. F. asks what is the heat conducting power of terra cotta, and what is the conducting power of iron? A. Taking the conducting power of gold at 1000, iron is 374, terra cotta 11.

(14) J. J. S. asks for the simplest and best method of making a lightning arrester for acoustic telephones. A. Surround the wire for a distance of three or four inches with a copper tube having a number of internally projecting points, which come very near the wire but do not touch it so as to interfere with its vibrations. The copper tube should be connected with a ground wire having good ground connections. See p. 395 (26), current volume.

(15) J. M. L. asks: What is the matter with a Blake transmitter when it loses its force? Is it the fault of transmitter or of the battery? If in the battery how can it be corrected? A. The trouble probably lies in the Leclanche battery. Put a small handful of sal-ammoniac in the jar and add a little water. If this does not remedy the difficulty you should write to the manufacturers.

(16) J. W. S. asks: 1. How large should the steam supply pipes be to make the pressure on the piston the same as that in the boiler? How large should the steam supply and ports be in proportion to the engine? A. It depends upon the pressure of the steam and velocity of the piston; usually $\frac{1}{4}$ the diameter of the cylinder is sufficient for the steam pipe, but with high speeds it should be larger. 2. How do you change the lead in an engine? A. By shifting the eccentric. 3. How much lead should an engine, 11x20, with a small fly wheel, have? A. If running at usual velocity, from 1 16 to 1 8 inch will answer.

(17) S. B. M. asks: Which requires the most power, to run a piece of machinery with cog gear or belting? A. If a large power is to be transmitted at a slow speed, the belt; if a small power at high speed, gearing.

(18) C. S. writes: I am running a cider mill and press. Would like to know which is the best, canvas or cloth, through which to press the finest ground apples? A. Fine haircloth, with a backing of strong unbleached muslin, is generally preferred, we believe, where a sand filter is not used.

(19) J. B. Z. asks what to use in steam boilers to keep them from rusting, and also what is the

best article to paint the outside with. A. Fill them entirely full of water and close them up tight. Keep the outside coated with a good oil paint—brown oxide ground in pure linseed oil.

(20) J. A. M. asks: Are glass insulators indispensable or not in putting up lightning rods on buildings, for protection against the electric current? Some parties have been putting up rods here without insulators, using only strips of zinc to hold them to walls and roofs. Our people are ignorant on the subject, and would be glad to see a full explanation in your valuable scientific journal. A. Insulators should not be used. The rod should be fastened directly against the building. But the most important precaution is to make sure that the bottom end of the rod has a large conducting surface in contact with the earth. Better have no rod than simply to stick the end a few feet down into dry earth; the proper way is to solder the bottom end of the rod to a metal water pipe or gas pipe in the ground. If there are no pipes, then make a long trench and put in some good conducting material, such as fine charcoal, or hard coal dust, iron ore, or old iron, making a good connection between the bottom end of the rod and this conducting material.

(21) N. W. asks what thickness of iron to use to make the shell of a small steam boiler, about 18 inches high and 10 inches in diameter, steam pressure about 50 lb. to the square inch. A. 1-16 inch, if of good iron and well made, but we would advise not less than 1-12 of an inch.

(22) L. S. asks: What size keel would be suitable for a cat rigged boat, 12 feet long, $4\frac{1}{2}$ feet wide? A. $1\frac{1}{2}$ inch by 3 inches deep would probably answer, but one or two inches deeper would be more weathery.

(23) C. C. asks: 1. Will one cubic foot of iron swim in the water if the water is 20 miles deep? A. It will sink. 2. It is said that the wall of a cistern should be built a little distance from the dirt wall. Is this correct? A. To sustain the wall, keep the earth packed close to it.

(24) C. M. writes: On page 330, present volume, Professor Wilder is made to say: "For acid poisons give acids." 1. Is this a mistake? If not, in what cases would acids be antidotes for acid poisons, and in what cases would they be harmful or dangerous? A. The statement of Professor Wilder about acids—"similia similibus," etc., may well be questioned by the correspondent. Where poisonous doses of acids have been taken, the best antidotes are calcined magnesia, chalk, lime, magnesia carbonate, etc., exhibited with plenty of cold water. Every effort must be speedily made to excite vomiting. Acids are never exhibited as antidotes for acids? See "Horsely on Poisons," and Marbail's Toxicology, p. 34. 2. What is the remedy for arsenious acid? A. We believe there is no specific antidote yet known for this poison. Perhaps the most effective antidote, if administered at an early stage (otherwise remedies in this connection are rarely attended with success), is recently precipitated moist ferric hydrate, or a mixture of this with magnesia. It is most advantageously exhibited in the form of a mixture of solution of ferric chloride (liquor or tincture) with sodium carbonate—two to three ounces of the former to one ounce of the crystals of the latter. Instead of the sodium carbonate, a quarter of an ounce of calcined magnesia may be used. These quantities will render at least 10 grains of the arsenic insoluble. No chemical antidotes should ever supersede active evacuant treatment by emetics and the stomach pump.

(25) E. L. W. asks what to apply to the wooden bottom of an aquarium to render it waterproof. A. Linseed oil, 3 oz.; tar, 4 oz.; resin, 1 lb.; melt together over a gentle fire. If too much oil is used the cement will be too soft. This may be corrected by adding tar and resin, or by allowing it to simmer for a longer time. Apply warm, and do not use the aquarium for several days.

(26) J. D. asks: 1. If height of water be 17 feet, overshoot wheel be 13 $\frac{1}{2}$ feet, gate 4 feet wide and opened $1\frac{1}{2}$ inch, and discharging the water 3 $\frac{1}{2}$ feet below the surface (or at a height of 13 $\frac{1}{2}$ feet); and again, if the height be 16 feet and all the rest be the same, what is the actual horse power in each case? A. If you have stated your case correctly: Under 16 feet fall, the power would be with wheel $4\frac{1}{2}$ feet face, 11.8 horse power; under the conditions given, the power with 17 feet fall would be no more, as the water is to be delivered under the same head, viz., 3 $\frac{1}{2}$ feet; but if this is an error, and with 17 feet fall you intend to deliver the water under $4\frac{1}{2}$ feet head, the power of the wheel would be increased to about 13.4 horse power, provided the wheel and buckets are so proportioned as to receive the increased quantity of water without waste. 2. What is the number of cubic feet of water that will pass through in 1 minute in each varying height (17 feet and 16 feet)? A. 306 feet under 3 $\frac{1}{2}$ feet, and 347 feet under $4\frac{1}{2}$ feet head.

(27) I. J. M. writes: In your answer to T. E. W., No. 35, volume XL., No. 24, you decide against him. Are you not wrong? We are taught that bodies at the center of the earth weigh nothing; if so, they can certainly have no momentum. As they approach the center, gravity decreases, until at the center the attraction is equal on all sides, and having no momentum, come to a state of rest. A. We think not; the accumulated work or momentum must be expended. Gravity cannot vibrate a pendulum when hanging vertically, but draw it aside and let it swing, and the accumulated work carries it past the center line, and it continues to vibrate until friction and the resistance of the atmosphere have destroyed or used up the momentum.

(28) W. E. C. asks: 1. How can I mould a porous cup for a Bunsen battery? A. They are unglazed porcelain, and cannot be made to advantage except by a potter. 2. What solution is used on the outside of the porous cup? A. Use a saturated solution of common salt or water 15 parts, sulphuric acid 1 part. 3. How many $\frac{1}{2}$ gallon jars would be required to work a telegraph line $\frac{1}{2}$ mile in length? A. Without knowing the resistance of your line we cannot tell; try two. The gravity battery is much better adapted to telegraphy than the Bunsen.