

**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 publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.*

For best Belt Lacings, use Blake's Belt Studs. The strongest fastening for all belts. Greene, Tweed & Co., New York.

To Sewing Machine Inventors.—Any party having invented a sewing machine containing new mechanical principles, or improvements upon existing machines, attachments, or shuttles, and wishing to dispose of the invention, will find it advantageous to address Manufacturer, room 97 Boreel Building, New York City.

For best Fixtures to run Sewing Machines where power is used, address Jos. A. Sawyer & Son., Worcester, Mass.

American Novelties wanted for Export.—Loeb & Co., 40 White St., New York. Branch houses in London and Manchester, England, and Hamburg, Germany. Correspondents in all the European cities. Submit samples.

Save your Fuel.—From one-fifth to one-third of the usual amount of coal bills can be saved by the use of fireproof, non-conducting Asbestos Coverings on hot air and steam pipes, boilers, heater pipes in dwellings, etc. The genuine is manufactured only by The H. W. Johns Manufacturing Company, 87 Maiden Lane, New York, sole manufacturers of Asbestos Paints, Roofing, etc.

A Bargain.—Foot Lathe; back geared, etc. 530 Main, Buffalo, N. Y.

Band Saw Machines. P. Prybil, 467 W. 40th St., N. Y.

Forges, for Hand or Power, for all kinds of work. Address Keystone Portable Forge Co., Phila., Pa.

Self-locking Stencils. Write P. O. Box 77, Chicago.

For Machine Knives and Parallel Vises, see advertisement, p. 349. Taylor, Stiles & Co., Riegelsville, N. J.

Wanted.—Circulars about Hot Water and Steam Heating Apparatus. Address R. Campbell, 285 University St., Montreal, Canada.

Manufacturers of Cylinder Lubricators for oil or tallow, please send description to E. Bradley & Co., Three Rivers, Province of Quebec.

Metallic Pattern Letters to put on patterns of castings, at reduced prices. H. W. Knight, Seneca Falls, N. Y.

Linen Hose, Rubber Hose, Steam Hose; all sizes. Greene, Tweed & Co., 18 Park Place, New York.

Wanted.—Parties to Manufacture and Sell a Rotary Shuttle Sewing Machine. J. J. Green, Boonton, N. J.

Wanted.—No. 1 Cupola 2d hand. Stiles & Parker Press Company, Middletown, Conn.

Blake Crushers, all sizes, with all the best improvements, at less than half former prices. E. S. Blake & Co., Pittsburg, Pa.

Comb'd Punch & Shears; Universal Lathe Chucks, Lambertville Iron Works, Lambertville, N. J. See ad. p. 333.

Jig Saw Machines. P. Prybil, 467 W. 40th St., N. Y.

The Friction Clutch Captain will start calendar rolls for rubber, brass, or paper without shock; stop quick, and will save machinery from breaking. D. Frisbie & Co., New Haven, Conn.

You can get your engravings made by the Photo-Engraving Co. (Moss' process), 67 Park Place, N. Y., for about one-half the price charged for wood cuts. Send stamp for illustrated circular.

Presses, and Dies that cut 500,000 fruit can tops with out sharpening. Ayar Machine Works, Salem, N. J.

For Sale.—One Horizontal Steam Engine, 20' x 48'; one 18' x 42'; one 16' x 36'. Atlantic Steam Engine Works, Brooklyn, N. Y.

Empire Gum Core Packing is reliable; beware of imitations called Phoenix. Greene, Tweed & Co., 18 Park Place, N. Y.

Situation Wanted.—Have had ten years' experience as mechanical superintendent of a large sewing machine business. Understand mechanical drawing, tool making, etc. Best of references. Particulars by letters. Address K., Box 254, Guelph, Ontario, Canada.

See Staples & Co.'s advertisement of Non-Congelable Lubricating Oils on inside page.

The Baker Blower ventilates silver mines 2,000 feet deep. Wilbraham Bros., 2318 Frankford Ave., Phila., Pa.

Wheelbarrows.—The "A. B. C. bolted" will outlast five ordinary barrows. \$24 per doz. A. B. Cohn, 197 Water St., N. Y.

Park Benjamin's Expert Office, Box 1009, N. Y. Recipes and information on all industrial processes.

To stop leaks in boiler tubes, use Quinn's Patent Ferrules. Address S. M. Co., So. Newmarket, N. H.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 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, Pittsburg, Pa., for lithograph, etc.

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

Steam Excavators. J. Souther & Co., 12 P.O. Sq. Boston.

Bradley's cushioned helve hammers. See illus. ad. p. 373.

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

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

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

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 349.

Special Wood-Working Machinery of every variety. Levi Houston, Montgomery, Pa. See ad. page 269.

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

Portable Railroad Sugar Mills, Engines and Boilers Atlantic Steam Engine Works, Brooklyn, N. Y. Silent Injector, Blower, and Exhauster. See adv. p. 334.

The Paragon School Desk and Garretton's Extension Table Slide manufactured by Buffalo Hardware Co.

Planing and Matching Machines, Band and Scroll Saws, Universal Wood-workers, Universal Hand Jointers, Shaping, Sand-papering Machines, etc., manuf'd by Bentel, Marredant & Co., Hamilton, Ohio. "Illustrated History of Progress made in Wood-working Machinery," sent free.

Fire Brick, Tile, and Clay Retorts, all shapes. Borgner & O'Brien M'rs, 23d St., above Race, Phila., Pa.

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

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

For Superior Steam Heat. Appar., see adv., page 334.

Special Tools for Railway Repair Shops. L. B. Flanders Machine Works, Philadelphia, Pa.

Brass or Iron Gears; list free. G. B. Grant, Boston, Millstone Dressing Machine. See adv., page 3J1.

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

The E. Horton & Son Co., Windsor Locks, Conn., manufacture the Sweetland Improved Horton Chuck.

For Reliable Emery Wheels and Machines, address The Lehigh Valley Emery Wheel Co., Weissport, Pa.

Pays well on small investments; Magic Lanterns and Stereopticons of all kinds and prices; views illustrating every subject for public exhibition and parlor entertainments. Send stamp for 80 page Illustrated Catalogue. Centennial medal. McAllister, 49 Nassau St., New York.

Patent Steam Boiler Damper Regulator; most reliable and sensitive made. National Iron Works, New Brunswick, N. J.

Deoxidized Bronze. Patent for machine and engine Journals. Philadelphia Smelting Co., Phila., Pa.

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

The New Economizer, the only Agricultural Engine with return flue boiler in use. See adv. of Porter Mfg. Co., page 270.

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.

Power Hammers. P. S. Justice, Philadelphia, Pa.

Drawing Materials. G. S. Woolman, 116 Fulton St., N. Y.

**NEW BOOKS AND PUBLICATIONS.**  
**JOURNAL OF THE CINCINNATI SOCIETY OF NATURAL HISTORY.** January, 1879.

This number of the Society's Journal, in addition to the Proceedings, contains a note by Mr. V. T. Chambers, correcting some typographical errors in a former paper; a "Description of a New Family and Genus of Lower Silurian Crustacea," by Professor A. G. Wetherby; a "Revised List of Cincinnati Birds," by F. W. Langdon; and a "Report of Committee on Geological Nomenclature." The latter committee conclude that the Lower Silurian rocks exposed about Cincinnati, and in some parts of Kentucky and Indiana, are to be referred to the Trenton, Utica, Slate, and Hudson River groups, and the term "Cincinnati Group" should be dropped, not only because it is a synonym, but because its retention can subserve no useful purpose in science, and because it will, in the future, as in the past, lead to erroneous views and fruitless discussion. The present being the last number of the first volume, closes with an index and title page. We are glad to observe that this flourishing organization is confining itself mainly to a study of the natural history of the immediate vicinity in which it is located, a plan which should be, but is not, pursued by every local natural history society. For this reason its contributions to science will prove valuable, which they might not be were the efforts of the members directed towards the working up the geology, fauna, and flora of the entire continent.

**SPONS' ENCYCLOPEDIA.**

Part 7 of Spons' Encyclopedia of the Industrial Arts, Manufactures, and Commercial Products, continues the article on beverages, completing beer, and adding cider, cocoa, coffee, tea, water, and wine; 64 pages. Price 75 cents.

**ELECTRIC TRANSMISSION OF POWER: ITS PRESENT POSITION AND ADVANTAGES.** By Paget Higgs, LL.D. London and New York: E. & F. N. Spon. 12mo, cl., 87 pages.

Briefly describes the better known dynamo-electric machines in use in England, and discusses the practicability of transmitting power by electricity, the comparative efficiency of various machines, and related questions of electrical theory and practice. On the basis of 48 per cent of the power originally expended being realized in outside work, Mr. Higgs holds electric transmission to be much superior in economy and convenience to pneumatic or hydraulic transmission.

**ATWOOD'S REVISED RULES OF PROPORTION.** By D. T. Atwood. New York: Bicknell & Comstock.

A second edition, containing some revisions and seven additional plates illustrating the rules of proportion for town and country houses, as given in Part II.

**FUEL: ITS COMBUSTION AND ECONOMY.** Edited by D. Kinnear Clark. New York: D. Van Nostrand.

The previous edition of this work was noticed in our issue of May 31, 1879. There is no change except in the publishing office.

**NOTES ON RAILROAD ACCIDENTS.** By Charles Francis Adams, Jr. New York: G. P. Putnam's Sons.

In the course of his service as one of the railroad commissioners of Massachusetts, Mr. Adams had occasion to study carefully the more serious and instructive railway disasters which have occurred in this country and in England; and in this unpretending book he has brought together the information he then collected, especially with regard to the conditions making such accidents possible, if not inevitable, and also those which experience has shown to be well calculated to prevent railway accidents. He pays particular tribute to the excellence and importance of the Miller platform and buffer; the Westinghouse brake, and the International and Electric Signal Systems. In the course of these "notes" Mr. Adams has taken occasion also to discuss critically a wide range of matters connected with railway service, with which the public at large is quite as much concerned as are railway owners and officials. The book is well indexed.

**A POPULAR GUIDE TO THE TERMS OF ART AND SCIENCE.** By C. Bankes Brookes. Philadelphia: J. B. Lippincott & Co.

Contains between five and six thousand technical and scientific terms, with definitions, arranged first under headings such as anatomy, architecture, farming, botany, chemistry, mining, law, etc., and afterwards alphabetically in a general index. In this way the unscientific and non-technical reader is enabled to find not only the meaning of those scientific and technical terms most commonly met with in print, but also, in one group, the chief terms which enter into the special vocabulary of any art or science.

**DRAWING TABLETS.**

Messrs. Jones Brothers, of Cincinnati, Ohio, are publishing an excellent series of drawing tablets, for the use of learners in the art of drawing. They consist of paper tablets, each sheet having a series of copies and suggestions, so arranged that when one sheet is finished it may be readily removed, exposing a new lesson and sheet, a little more advanced than the last. The practical excellence and convenience of this method are certified to by a large number of teachers in the best public schools.

**THE THEOSOPHIST.** Conducted by H. P. Blavatsky. Bombay, India. Vol. I. No. 1.

A monthly journal devoted to oriental philosophy, art, literature, and occultism, embracing mesmerism, spiritualism, and other secret sciences. It is published under the auspices of the Theosophical Society, whose organ, so to speak, it will be. Contributions are promised from a large number of distinguished Eastern scholars, representing all the various phases of philosophical and religious belief in India, as well as from eminent scientific and literary men of the West. Translations of important Sanskrit and Pali works, hitherto beyond reach, will form a leading feature of the journal. S. R. Wells & Co., 787 Broadway, N. Y., take subscriptions in this country.

**Notes & Queries**

**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. If not then published, they may conclude that, for good reasons, the Editor declines 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) A. A. A. asks how to arrange tumblers to produce, when struck, the notes of the scale. What is inside the tumblers? A. The tumblers are tuned by filling them more or less with water.

(2) W. M. B. asks: How can I brighten and polish skates, after they have been rusted? A. They should be polished on a fine emery wheel and finished with crocus. If you have not these conveniences at hand, you can use several grades of fine emery paper and oil, finishing with the finest.

(3) J. R. S. asks what horse power there is in an engine of the following dimensions: cylinder 16 inch by 30, double eccentric slide valve, cut off at half stroke, steam pressure 90 lb., revolutions 75; it has a balance wheel, 12 feet, and weighs perhaps one or two tons. Now, when it is doing its best the throttle and stop valve are open wide. Now what power would you call it when running thus? A. 16 inch cylinder=201 inches area, 90 lb. pressure cut-off at 1/2=say 68 lb. average, 75x2x2,4feet=375 feet per minute; then  $\frac{201 \times 68 \times 375}{33,000} = 156$  horse power, less 20 per cent for friction and other losses=156-31=125 horse power.

(4) R. E. O. asks how to obtain and retain a perfect vacuum. I have been unsuccessful in my repeated endeavors to cause a vacuum by means of an air pump. A. The Torricellian vacuum found in every mercurial barometer is as nearly perfect as it is possible to make a vacuum by simple means. The most perfect vacua are obtained by means of the Sprengel air pump and the absorption of the residual gas by chemical means. You will find description of Sprengel's pump in almost any work on physics.

(5) W. M. W. B. asks: Can you tell of any mixture to put in cast iron in the ladle that will harden it? We want a very hard surface for plow points and the common chills don't seem to answer the purpose. A. Try the addition of say 1-10 of one per cent of titaniferous acid or a proportionate quantity of titaniferous iron to the metal.

(6) A. W. asks: 1. If a drill be made with twenty toggle joints on the lazy tongs principle, how much power will be lost by friction? A. The percentage of friction would be difficult to determine; it would depend much on the angle of your sections. 2. How much pressure per square inch is there at the lower end of a water pipe one hundred feet long by six inches in diameter with an incline of one to ten? A. At A a little less than 5 lb. per square inch. 3. Would the pressure be less if made in the form of an Archimedes screw? A. No. 4. Where will I find in detail the rules relative to friction? A. Consult "Thurston on Friction."

(7) S. L., in answer to U. C. on glass gilding, gives the following: Dissolve a piece of isinglass (gelatin), the size of a silver dollar, in 1/2 pint of hot water, and after cooling apply this size, with a two or three inch flat camels' hair brush to the glass, previously freed from all traces of grease by washing with alcohol; apply the gold leaf cut to the size of letters desired with a gilder's brush, rubbing the brush on the hair while the size is wet. In presenting the gold leaf to the sized surface do not touch the glass with brush or gold; bring the leaf within 1/8 inch of the surface, when it will be found that the leaf leaves the brush and attaches itself to the sized surface (owing to the electrical condition of the brush). Spread the leaf evenly, give it a second coating of the size, outline with asphaltum varnish, and fill up the letters with the same. When all is dry rub off the superfluous gold with cotton wool.

(8) S. S. asks: How is petroleum refined? I understand that a diluted acid is used. What is "sludge acid"? What is it used for? A. The oil is violently agitated for some time with from two to three per cent of sulphuric acid, and then allowed to stand, when a dark, offensive, viscous substance (called sludge acid) gradually separates, clarifying and partially deodorizing the oil. After running off the clear oil it is again agitated with water and with a very dilute solution of caustic soda to neutralize traces of the acid, drawn off after standing, from the water, and again fractionally distilled to separate the lighter and heavier oils. The acid used is not diluted. "Sludge acid" is chiefly utilized in the manufacture of certain fertilizers, such as nitrogenized phosphates, etc.

(9) P. H. McG. asks: How is gun cotton made? A. If you refer to trinitrocellulose—the explosive variety—it may be prepared in small quantities as follows: Mix 4 1/2 ounces of pure dry nitrate of potash with 30 fl. drachms of sulphuric acid, specific gravity 1.845, and, after cooling thoroughly, stir into this mixture carefully 120 grains of best carded cotton. As soon as saturation is complete, in about one minute—in about one minute if proper care has been used—throw the cotton into a tubful of clean rain water, and change the water repeatedly until litmus ceases to show the presence of acid, then squeeze, it in a cloth, and after being well pulled out, dry it cautiously at a temperature not exceeding 140° Fah. It is now explosive, and too much caution cannot be observed in handling it.

(10) W. J. C. asks for directions for making Vienna yeast cakes like those sold in little tin foil papers. A. The Vienna pressed yeast is prepared as follows: Previously malted barley, corn, and rye are ground up and mixed, next put into water at a temperature of 150° to 170° Fah.; after a few hours the saccharine liquid is decanted from the dregs and the clear liquid brought into a state of fermentation by the aid of some yeast. As the fermentation increases the yeast globules formed rise to the surface and collect as a thick scum easily removed by a skimmer. It is collected on cloth filters, drained, washed with a little distilled water, covered with well woven canvas, and subjected to hydraulic pressure.

(11) J. S. P. asks: What is the best way to dilute muriatic acid for tinner's use so it will not burn the hands? A. The solution is prepared by digesting the acid with scrap zinc in excess for several hours. The solution of zinc chloride obtained must be used without dilution.

(12) T. A. B. writes: 1. When a locomotive is rounding a curve, does the difference in the length of the rails cause the driving wheels on the inside or shorter rail to slip or slide? A. Yes. 2. If three wheels are pressed on the same axle, one at each end, and one of smaller diameter than the other two in the center, the center wheel being provided with a raised track, so that the weight of the axle will rest on the three wheels equally when the whole is put in motion, would the center wheel slide on the track? A. It would.

(13) A. G. Q. asks how to fill the porous cell of a Leclanche battery. A. Remove the cement from the top of the cell; draw out the carbon and pour out the old filling; wash both the carbon and the cell thoroughly, and allow them to soak for 24 hours in clean water. The better way is to fill the cell with water and allow it to ooze out through the pores. Replace the carbon, and fill the cell with equal parts of pulverized gas-carbon and peroxide of manganese. It need not be compressed. Seal the top of the porous cell after filling, leaving one or two apertures in the sealing.

(14) L. W. B., referring to the depths at which divers have operated, writes: In removing the cargo of the ship Cape Horn, wrecked off the coast of South America, a diver by the name of Hopper made seven descents to a depth of two hundred and one feet, and at one time remained down forty-two minutes.

(15) "Sharpie" writes: The SCIENTIFIC AMERICAN SUPPLEMENT of the week ending May 24 contained drawings for the construction of a Sharpie sail boat. I am getting out the material for the construction of the boat, but am not able to fix, by the drawings, the exact position of the center board. Would like to be informed as to the exact distance from deadwood inside measurement to forward end of center board trunk. A. The center board should be 7 feet long inside the