

(7) E. N. P. asks: Will you give me formula for calculating the horse power when the fall of water is 16 feet, and volume or flow 450 cubic feet per second? I find a rule thus, but I don't exactly understand it: "To the actual head or depth of fall, add the height due to the velocity of the water in the head race. Multiply the sum by the volume of the flow of water per second, and by the gross power in foot pounds (62.4) per second; this divided by 550 gives the gross horse power." Please give me explanation of what constitutes "the height due to the velocity." A. "The height due to the velocity" is the additional power given by the velocity of the current, and is obtained by dividing the square of the velocity of the current in feet per second by twice the distance that a body falls in one second. This quotient multiplied by the constant one and one-tenth (1.1) gives the height due to the velocity of the water in the head race; the velocity being the cubic feet of flow divided by the area of the sluice in square feet. The formula as given is $\frac{V^2}{2g} \times 1.1$, where V = velocity; $2g = 64.333 =$ twice the height a body falls in one second. The rest of your rule is correct.

(8) H. N. asks: 1. What is the proper size of smoke stack for a horizontal boiler 3 feet 6 inches by 9 feet, forty 2 1/2-inch tubes? A. At least 20 inches diameter. Your draught cannot be strong, as it will be cramped in the tubes. 2. The distance the brick wall should be from rear end of boiler? Is there a rule for either or both of the above questions? A. 18 inches; there is no rule. 18 inches is more than necessary for draught, but there should be room for a man to work.

(9) P. R. C. asks: What acid is commonly used for cleaning mortar, etc., from brick work before penciling, and should it be used full strength? A. Use diluted muriatic acid, one part of acid to three of water.

(10) G. A. H. writes: 1. I have some samples of pig iron which I wish to coat with some anti-rust preparation that will not weaken the luster or rub off when the samples are handled. Can you tell me of such a preparation? A. Try a solution of gum arabic or a thin mastic varnish. 2. A friend has a very old and choice piece of Japanese carved landscape in ivory, which has grown yellow. Is there any way to cleanse the same and whiten the ivory without injury to the delicacy of the carving? A. Benzine carefully used will answer.

(11) J. W. asks: How far can the best known fire engine throw water horizontally, when it has to pump the water out of a reservoir? A. 210 to 215 feet; it is claimed that 240 to 250 feet has been accomplished on test trials.

(12) A. C. asks if there is more strain on one part of the main rod of a locomotive than another. If so, what part, and why? A. No; not from the direct action of the steam, but there may be lateral strains more at one point than another.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

F. H.—It is a very impure but finely divided kaolin or china clay, and could be used for making pottery or in the present condition as a soft polishing compound.—S. L. M.—It is carbonate of lime colored with sesquioxide of iron.

COMMUNICATIONS RECEIVED.

On Electric Storms. By J. A. On the Aurora Borealis. By E. E. M.

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.

COLLEGE OF ST FRANCIS XAVIER, 39 TO 49 W. 15TH ST., NEW YORK, NOV. 1, 1882. To H. W. Johns Manufacturing Company.

GENTLEMEN: Your Asbestos Coverings are in use in our church and college, and give us great satisfaction. Yours truly, S. H. FRISBEE, S. J., Rector.

ST. FRANCIS XAVIER COLLEGE, 39 W. 15TH ST., NEW YORK, NOV. 15, 1882. H. W. Johns Mfg Co., 87 Maiden Lane, New York.

GENTLEMEN: Before using your air chamber coverings on our pipes we were losing, actual test by steam gauges, eight (8) pounds pressure between boiler and trap or receiver; now the loss is so slight that we can scarcely distinguish it. Our saving of coal by its use is at least thirty (30) per cent.

BROTHER McCLOSKEY, Engineer.

For a bad cold every good housekeeper has a cure, but for a bad pen the remedy is to get one of Esterbrook's.

Engines, 10 to 50 horse power, complete, with governor, \$250 to \$350. Satisfaction guaranteed. More than seven hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinville, N. Y.

Brass Finishers' Turret Lathes, 13 1/2 x 4, \$165. Lodge, Barker & Co., 189 Pearl St., Cincinnati, O.

Inventors' wants supplied. Models, patterns, experimental work. Morse's Novelty Works, 43 Duane St., N. Y. Parties having New or Second-hand Tripod Rock Drills to sell cheap, address V. Castner, Changelwater, N. J.

Important to Inventors.—The Anglo-American Patent Development Company, Limited, 28 Southampton Buildings, London, England, Authorized Capital \$250,000, is prepared to receive applications from American Inventors to develop (by manufacturing or otherwise) their inventions in Europe. Full particulars addressed as above by Registered Letter to be forwarded, with \$5.00 U. S. Currency, to cover expense of investigation, otherwise applications cannot be considered. Inclose stamp for Prospectus of Company to Messrs. Knauth, Nachod & Kuhne, Bankers, New York.

Manufacturers of hydraulic or steam presses for extracting oil of castor beans, cotton seed, or tallow may find it to their advantage to send illustrated catalogues and price lists, with export discounts to W. C. P. O. Box 3, 184, New York.

Thomas Camp, of Covington, Georgia, General Agent for the sale of Portable Steam Engines, has a trade of \$250,000 per annum in that State. Manufacturers will find this the best medium in the South through which to sell such goods. None but first-class engines sold. Best of reference given and required.

Curtis Regulator, Float, and Expansion Trap. See p. 364. A Portable Electric Lighter for \$5 00 is being extensively sold by the Portable Electric Light Co., of 79 Water Street, Boston. It is an economical and safe apparatus for lighting for home and business purposes. Their illustrated circular is sent free.

Woodworking Mach'y. Bentel, Mergentant & Co., p. 382. Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Machine Diamonds, J. Dickinson, 64 Nassau St., N. Y. 50,000 Emerson's Hand Book of Saws. New Edition. Free. Address Emerson, Smith & Co., Beaver Falls, Pa.

Gould & Eberhardt's Machinists' Tools. See adv., p. 382. Walrus Leather. An extra fine lot of heavy trimmed walrus for polishing metals. Greene, Tweed & Co., N. Y.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 382.

Barrel, Key, Hoghead, Stave Mach'y. See adv. p. 382. Magic Lanterns and Stereopticons of all kinds and prices. Views illustrating every subject for public exhibitions, Sunday schools, colleges, and home entertainment. 116 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., New York.

Renshaw's Ratchet for Square and Taper Shank Drills. The Pratt & Whitney Co., Hartford, Conn. Woodworking Mach'y. Rollstone Mach. Co. Adv., p. 382.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Heman, Williamsport, Pa. The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co., 430 Washington Ave., Phil. Pa. The Sweetland Chuck. See illus. adv., p. 382.

Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J. Permanent Exposition.—Inventors' Institute, Cooper Union, N. Y. City. Every facility for exhibition of machinery, merchandise, and inventions. Send for particulars.

Drop Presses, Bending Machines, the Justice Hammer, tools for plow and agricultural implement makers. Williams, White & Co., Moline, Ill. Cope & Maxwell Mfg Co.'s Pump adv., page 366.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 364. Red Jacket Adjustable Force Pump. See adv., p. 366. Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 366.

Bonhack's Match Splint Setting Machine. Best and quickest in the market. Recipes and advice gratis. Address C. F. Bonhack, patentee, 527 W. 43d St., New York. Wanted.—Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, New Haven, Conn.

To stop leaks in Boiler Tubes use Quinn's Patent Ferrules. Address S. M. Co., So. Newmarket, N. H. Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill. The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 350.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 349. Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 350. C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 350.

4 to 40 H. P. Steam Engines. See adv. p. 350. To make Violins, write James Roblee, Syracuse, N. Y. Water purified for all purposes, from household supplies to those of largest cities, by the improved filters manufactured by the Newark Filtering Co., 117 Commerce St., Newark, N. J.

Drop Forgings. Billings & Spencer Co. See adv., p. 333. Assays and Analyses of ores and all commercial products. Advice given and investigations made in all branches of chemical industry. Send for circular. N. Y. Assay Laboratory, 40 Broadway, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Solid Cotton Belting, all widths, in lengths to suit Greene, Tweed & Co., 118 Chambers St., New York.

Sheet and cast brass goods, experimental tools, and fine machinery. Estimates given when models are furnished. H. C. Goodrich, 66 to 72 Ogden Place, Chicago. Improved Skinner Portable Engines. Erie, Pa.

25' Lathes of the best design. G. A. Oil & Co., East Newark, N. J. Combination Roll and Rubber Co., 68 Warren street, N. Y. Wringer Rolls and Moulded Goods Specialties.

First Class Engine Lathes, 30 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn. Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 142 Greenwich Street. 1. O. Box 3083, New York City.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your free book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.) Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

For Power & Economy, Alcott's Turbine, Mt. Holy, N. J. Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y. Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y. Presses & Dies. Ferracete Mach. Co., Bridgeton, N. J. Cast Nickel Anodes, Nickel Salts, all Polishing Supplies. Greene, Tweed & Co., New York.

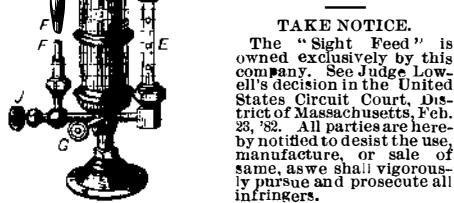
Advertisements.

Inside Page, each insertion --- 75 cents a line. Back Page, each insertion --- \$1.00 a line. (About eight words to a line.)

Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

THE SEIBERT CYLINDER OIL CUP CO.,

Sole Manufacturers of Oil Cups for Locomotives, Marine and Stationary Engine Cylinders, under the Seibert and Gates Patents, with Sight Feed.



THE SEIBERT CYLINDER OIL CUP CO., 53 Oliver Street, Boston, Mass.

Advertisement for 'NEW HOME' sewing machine, highlighting 'SUPERIORITY PROVED' and 'THE SIMPLEST & BEST SEWING MACHINE IS THE LIGHT-RUNNING NEW HOME'.

FOR SALE! Opportunity for a Practical Mechanic. A Machine and Woodworking Shop, located in St. Louis, Mo. Making machinery of rapid sale at good profit.

Advertisement for Pennsylvania Agricultural Works, York, Pa., featuring 'Farguhar's Standard Engines & Saw Mills'.

FOR SALE.—One-third interest in Letters Patent No. 98,794, covering the Automatic Cash Box System now in use. Address WM. L. RAMSEY, Lenoir's, Tenn.

Practical Instruction in Electricity. Day and evening classes. Henry E. Stammers, 1480 Broadway, N. Y.

Advertisement for PAYNE'S AUTOMATIC ENGINES, featuring a 'Spark Arrestor' and 'Established 1840'.

ELECTRICAL GOODS. Learners' Instruments, Electric Bells, and Medical Machines. The Little Giant Grenet Battery, price \$1. Parts of instruments for amateurs constantly on hand.

Advertisement for PECK'S PAT. DROP PRESS, NEW HAVEN, CONN., by Beecher & Peck.

\$3 for complete Rector-Medical Battery. Sent on receipt of price. F. SCHLOSSER, Hoboken, N. J.

LARGE TOOLS WANTED. 30 ft. Pit Lath; also, large Planer, 6 or 7 feet square, to plane at least 24 feet. Send prices and quickest delivery.

Advertisement for The Sugar Refineries at Demerara Use VAN BUZEN'S PATENT STEAM JET PUMP.

RHEA.—PAPER BY J. R. HOYLE, reviewing the progress that has thus far been made in the utilization of the fiber of Rhea, otherwise known as Ramie and China Grass. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 345. Price 10 cents.

Advertisement for PAT. KEY SEAT CUTTER, WILL CUT 100 SEATS 4 1/2 X 3 1/8 INCH PER DAY.

Advertisement for PERFECT NEWSPAPER FILE, The Koch Patent File, for preserving newspapers, magazines, and pamphlets.

Advertisement for Silver Finish, J. A. Fay & Co., Exclusive Agents and Importers for the United States, of the CELEBRATED PERIN BAND SAW BLADES.

Advertisement for NEW BOOKS, GOLD, Gold: Its Occurrence and Extraction, embracing the Geographical and Geological Distribution and the Mineralogical Characters of Gold-bearing Rocks.

Advertisement for SUGAR GROWING AND REFINING, A comprehensive Treatise on the Culture of Sugar-yielding Plants and the Manufacture, Refining, and Analysis of Cane, Beet, Maple, Milk, Palm, Sorghum, and Starch Sugars.

Advertisement for EVERY MANUFACTURER SHOULD HAVE Spous' Encyclopedia of the Industrial Arts and Commercial Products.

Advertisement for THE BEST BAND SAW BLADE, SEND TO LONDON BERRY & ORTON, PHILADELPHIA.

Advertisement for To Electro-Platers, THE VICTOR DYNAMO PLATING MACHINES.

Advertisement for DRAFTING, FIRE AND VERMIN PROOF, Sample and Circular Free by mail.

Advertisement for MALLEABLE AND FINE GRAY IRON ALSO STEEL CASTINGS FROM SPECIAL PATTERNS.

Advertisement for ERICSSON'S New Caloric Pumping Engine FOR DWELLINGS AND COUNTRY SEATS.

Advertisement for DELAMATER IRON WORKS, C. H. DELAMATER & CO., Proprietors, No. 10 Cortlandt Street, New York, N. Y.

Advertisement for FEED WATER PURIFIER, SPRAY FEED WATER PURIFIER FOR STEAM BOILERS.

Advertisement for STEMWINDING Permutation Lock, No. 25, For any Tilt, Desk, Drawer, or Closet.

Advertisement for PATENTS, MESSRS. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine Improvements, and to act as Solicitors of Patents for Inventors.

Advertisement for MUNN & CO., Solicitors of Patents, 261 Broadway, New York, BRANCH OFFICE—Corner of F and 7th Streets, Washington, D. C.