

Advertisements.

Inside Page, each insertion - - 75 cents a line.
Back Page, each insertion - - \$1.00 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 Friday morning to appear in next issue.

To Colleges, Scientific Societies and Individuals.
Anachromatic telescope for sale, of the following dimensions: diameter of object glass, 8 inches; total length, 1 foot; maker, late Henry Fitz, performance, first-class, shows the sixth star in the Trapezium of Orion with clearness. Equatorial stand and 7 astronomical eye-pieces, including a splendid prismatic eyepiece. Address me, or call at office Manhattan Gas Works, corner 14th St. and Avenue C, New York. To a bona fide cash purchaser an inducement will be offered seldom met with. Letters desiring particulars promptly answered, or the glass will be tested on objects which is preferred by me. I. D. J. SWEET.
New York, Dec. 26, 1877.

25 NEW YEAR CARDS, with name, 20c. 25 Extra Mixed, 10c. Geo. I. Reed & Co., Nassau, N. Y.



BARNES' FOOT POWER MACHINERY.

13 Different machines with which Builders, Cabinet Makers, Wagon Makers, and Jobbers in miscellaneous work can compete as to QUALITY AND PRICE with steam power manufacturing; also Amateurs' supplies. MACHINES SENT ON TRIAL. Say where you read this, and send for catalogue and prices.

W. F. & JOHN BARNES, Rockford, Winnebago Co., Ill.

Steel Castings,

From 1/4 to 10,000 lbs. weight, true to pattern. An invaluable substitute for forgings, or for malleable iron castings requiring great strength. Send for circular and price list to CHESTER STEEL CASTING COMPANY, EVELINA STREET, PHILADELPHIA, PA.

PIANOS Retail price \$900 only \$260. Parlor Organs, price \$340 only \$95. Paper free. Daniel F. Beatty, Washington, N. J.

WATSON'S NON-CHANGEABLE GEAR LATHE HAS IN WORK JAMES WATSON GREAT FACILITIES FOR LARGE OR MEDIUM SIZE WORK. MAIN 1008 S. FRONT ST. PHILA. PA.

AIR COMPRESSORS FOR ALL PURPOSES. A SPECIALTY OF HEAVY PRESSURES. THE NORWALK IRON WORKS CO., SOUTH NORWALK, CONN.

AGENTS WANTED. Package of Goods free to every applicant. Star Novelty Co., Charlotte, Mich.

50 Elegant Mixed Cards, with name, 13c. Agent's outfit 10c. Seavy Bros., Northford, Ct.



CAVEATS, COPYRIGHTS, TRADE MARKS, ETC.

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.

In this line of business they have had OVER THIRTY YEARS' EXPERIENCE, and now have unequalled facilities for the preparation of Patent Drawings, Specifications, and the Prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Trade Mark Regulations, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business entrusted to them is done with special care and promptness, on very moderate terms.

We send free of charge, on application, a pamphlet containing further information about Patents and how to procure them; directions concerning Trade Marks, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

Foreign Patents.—We also send, free of charge, a Synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world. American inventors should bear in mind that, as a general rule, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five patents—embracing Canadian, English, German, French, and Belgian—will secure to an inventor the exclusive monopoly to his discovery among about ONE HUNDRED AND FIFTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The expense to apply for an English patent is \$75; German, \$100; French, \$100; Belgian, \$100; Canadian, \$50.

Copies of Patents.—Persons desiring any patent issued from 1836 to November 26, 1867, can be supplied with official copies at reasonable cost, the price depending upon the extent of drawings and length of specifications.

Any patent issued since November 27, 1867, at which time the Patent Office commenced printing the drawings and specifications, may be had by remitting to this office \$1.

A copy of the claims of any patent issued since 1836 will be furnished for \$1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention, and date of patent.

A pamphlet, containing full directions for obtaining United States patents, sent free. A handsomely bound Reference Book, gilt edges, contains 140 pages and many engravings and tables important to every patentee and mechanic, and is a useful and book of reference for everybody. Price 25 cents, mailed free.

Address

MUNN & CO.,

Publishers SCIENTIFIC AMERICAN.

37 Park Row, N. Y.

BRANCH OFFICE—Corner of F and 7th Streets, Washington, D. C.

MARVIN'S
FIRE & BURGLAR
SAFES
COUNTER PLATFORM WAGON & TRACK
SCALES
MARVIN SAFE & SCALE CO.
265 BROADWAY, N. Y.

GUARDIOLA'S COFFEE & SUGAR MACHINERY

Coffee, Malt, Corn, Cocoa, and Grain-Drying Machine. Coffee-Hulling and Polishing Machines. Coffee-Washing Machine. Helix Sugar Evaporator.

Messrs. C. ADOLPHE LOW & CO., 42 Cedar Street, Messrs. MUNOZ & ESPRIELLA, 52 Pine Street, New York, are Mr. Guardiola's Agents, and they will give prompt attention to all orders for any of the above machines.

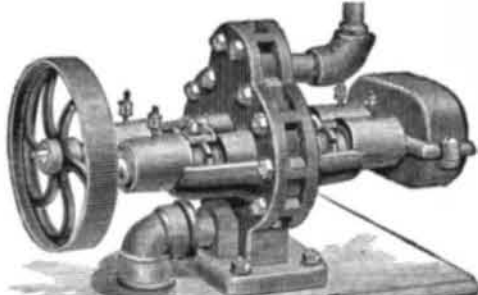
Harrison's System of Grinding!

Illustrated Catalogue Now Ready.

NEW STANDARD FLOURING MILLS. Old Theories, Horizontal Grinders, Slow Runners, Fully Exploded. Fine Flour, High Speed, and Economical Milling Fully Established.

A NEW COPY FOR ALL. Millers and Editors please address EDWARD HARRISON, No. 135 Howard Ave. New Haven, Conn.

ROOTS' ROTARY HYDRAULIC ENGINE.



FOR BLOWING ORGANS AND RUNNING LIGHT MACHINERY OPERATED BY HYDRANT PRESSURE.

GIVES GREATEST USEFUL EFFECT OF WATER. IS A POSITIVE PRESSURE ENGINE.

P. H. & F. M. ROOTS, Manuf'rs, CONNERSVILLE, IND. S. S. TOWNSEND, Gen'l Ag't, 6 Cortlandt St., NEW YORK.

KNOW THYSELF A new Medical Treatise, "THE SCIENCE OF LIFE, OR SELF-PRESERVATION," a book for everybody. Price \$1, sent by mail. Fifty original prescriptions, either one of which is worth ten times the price of the book. Gold Medal awarded the author. The Boston Herald says: "The Science of Life is, beyond all comparison, the most extraordinary work on Physiology ever published." An Illustrated Pamphlet sent FREE. Address DR. W. H. PARKER, No. 4 Bulfinch Street, Boston, Mass.

HEAL THYSELF

IMPORTANT NOTICE.

I wish to negotiate with some responsible manufacturer to make and sell on royalty my lately patented pump valve, an article entirely separate from the pump. Thousands of dozens can be sold every year. Address D. F. DODGE, Lowell, N. Y.



\$3 PRINTING PRESS! Print cards, envelopes, etc., equal to any press. Larger sizes for large work. Do your own printing and advertising and save money. Excellent spare hour amusement for old or young. Or it can be made money-making business anywhere. Send 3c. stamps for large catalogue to KELSEY & CO., Manufacturers, Meriden, Conn.

BOILER COVERINGS

SAVE 10 TO 20 PER CENT. THE CHALMERS SPENCE CO., Foot East 9th St., New York.

"Indispensable to the Library, Clergyman, Lawyer, Physician, Editor, Teacher, Student, and all of any calling in life who desire knowledge."

ENCYCLOPÆDIA BRITANNICA. Ninth Edition.—American Reprint.

This great work is beyond comparison superior in its elaborate and exhaustive character to all similar works. The contributors are the most distinguished and original thinkers and writers of the present and of the past.

This issue is the Ninth revision in a space of over one hundred years since its inception, and this reprint, a copy in every particular of the British Edition now in course of publication, is the best and cheapest work ever offered to the American people.

The articles are written in a most attractive style, and the quantity of matter in each volume is one-third greater per volume than in any other Cyclopædia sold at the same rates.

The work contains thousands of Engravings on Steel and Wood, and is printed from entirely new type made expressly for it.

It will be comprised in twenty-one Imperial octavo volumes, six of which are now ready, and the succeeding volumes will be issued at the rate of three a year.

Price per vol., extra cloth binding, \$5.00. In half Turkey Morocco, extra, \$7.00.

Sold only by subscription.

A neat Pamphlet, giving specimens of pages, cuts, full-page illustrations, list of contributors, etc., will be mailed gratis to applicants.

J. M. STODART & CO., Publishers, 723 Chestnut Street, Philadelphia.

H. H. KEY, Publisher, Room No. 8, 120 Broadway, N. Y.

Cut Brass Gears, list free. Grant, 194 Beverly St., Boston.

HARTFORD STEAM BOILER Inspection & Insurance COMPANY.

W. B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y.

Pyrometers, For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Super-Heated Steam, Oil Stills, &c. HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, N. Y.

ROCK DRILLING MACHINES AND AIR COMPRESSORS. MANUFACTURED BY BURLEIGH ROCK DRILL CO. FITCHBURG MASS. SEND FOR PAMPHLET.

Mill Stones and Corn Mills.

We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gearing, specially adapted to Flour Mills. Send for catalogue.

J. T. NOYE & SON, Buffalo, N. Y.

FOUNDRY AND MACHINE SHOP FOR Sale or Rent. We offer at a bargain, our old works, consisting of three substantial brick buildings, sheds, ample water power and facilities for conducting an iron or wood working business. Coal, iron, hard and soft lumber close at hand. Three railroads. Address SOUTH BEND IRON WORKS, South Bend, Ind.

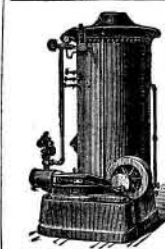
THE TANITE CO., STROUDSBURG, PA. EMERY WHEELS AND GRINDERS. GEO. PLACE, 121 Chambers St., New York Agent.

H. W. JOHNS' PATENT ASBESTOS MATERIALS.

Liquid Paints—all shades, finest in the world. Fire Proof Paint, for Wood work, &c. Roof Paint, for Tin Roofs, Iron Work, &c. Roofing, with white Fire Proof Coating. Roof Coating, for restoring and preserving old roofs. Cements, for Retorts, Furnaces, Leaky Roofs, &c. Steam Pipe and Boiler Coverings. Steam Packing, Asbestos Boards, Fire Proof Coatings, Sheathings and Roofing Felts, &c. These articles are ready for use, and can be easily applied by any one. Send for Samples, Pamphlets, Price Lists, &c.

H. W. JOHNS MANUFACTURING COMPANY, 87 Maiden Lane, New York.

PHILADELPHIA BRANCH, 406 Arch St. DOWNIE, TRAINER & CO., Boston. S. W. HUMPHREY & CO., Columbus, Ohio. S. M. BUCK & CO., St. Louis. C. A. PARKER & CO., New Orleans. THOMPSON & UPSON, San Francisco.



NILES ENGINE

SUITABLE FOR COTTON GINS, CORN MILLS, GRAIN ELEVATORS, PRINTING OFFICES, HOTELS.

And for any purpose requiring an engine from 2 to 12 horse-power.

ADDRESS NILES TOOL WORKS, Hamilton, Ohio.

ESTABLISHED 1844.

JOSEPH C TODD.

(Formerly of Todd & Rafferty), ENGINEER AND MACHINIST. Flax, Hemp, Jute, Rope, Oakum, and Bagging Machinery, Steam Engines, Boilers, etc. Also Agent for the celebrated and improved Rawson & Rittinger Hoisting Engine, I will furnish specifications and estimates for all kinds of machinery. Send for descriptive circular and price Address

J. C. TODD,

10 Barclay St., New York, or Paterson, N. J.

25 per cent. Discount on Price List of Superior Wood-Working Machinery



allowed for the present. Also for Smith's Chilled-Bear Vises; effective, heavy, strong, durable, and economical. For full particulars, address H. B. SMITH, Smithville, Burlington Co., N. J., U. S. A.

Steel Name Stamps.

N. Y. STENCIL WORKS, 87 Nassau St., N. Y.

BIG 84-page Picture Book, free. My plan beats all to make money. Is easy, honest, and pays you \$10 a day. DAVID C. COOK, Chicago, Ill.

FITS, EPILEPSY, FALLING SICKNESS, positively cured by using "Dr. Hebbard's Cure." No humbug. "It has cured thousands." Sample bottle free. Address J. E. DIBBLEE, Chemist, 123 Broadway, N. Y.

MEDAL & PREMIUM AWARDED TO TURBINE WATER WHEELS MANUFACTURED AT MOUNT HOLLY N. J.

THE AMERICAN PHILOSOPHICAL Society hereby offers a premium of five hundred dollars for the best successful process by which anthracite coal dust may be economically utilized, the said premium to be competed for and awarded after due examination and report by a committee appointed for the purpose. Applicants for this premium are requested to file with the Society, within three months, the proofs, 1st, of the originality of their inventions, and 2d, of the successful practical working of these inventions. Application is to be addressed to J. P. LESLEY, Sec., Hall of the American Philosophical Society, 104 South Fifth St., Philadelphia. DECEMBER 7, 1877.

25 EXTRA NEW YEAR CARDS, with 20 cts. Samples 3c. J. B. HUSTED, Nassau, N. Y.

Working Models

And Experimental Machinery, Metal or Wood, made to order by J. F. WERNER, 62 Centre St., N. Y.

DUC'S IMPROVED ELEVATOR BUCKET.

For use in Flour Mills, Grain Elevators, Sugar Refineries, Malt Houses, Breweries, White Lead Works, &c., &c. These buckets are made of Charcoal Iron, and are very strong and durable. No corners to catch, require less power to operate, and cost about the same as the old style bucket. Many thousands already sold. T. F. ROWLAND, Sole Manuf'r, Brooklyn, N. Y.

STEAM ENGINES.

We build the best Portable or Farm Engines in the world. More power with less water and fuel than any others. Low prices. We have the largest line of Engine Patterns in the U. S. Foreign correspondence solicited. TAYLOR MFG CO., Westminster, Md., Successors to Utica Steam Engine Co., formerly Wood & Mann, of Utica, N. Y. Good, responsible Agents wanted in territory not taken.

Mechanics of Ventilation.

By GEO. W. RAFTER, Civil Engineer, being No. 33 Van Nostrand's Science Series. 18mo. Board, 50c.

D. VAN NOSTRAND, Publisher, 23 Murray St. and 27 Warren St., New York.

* * Copies sent free, by mail, on receipt of price.

EUREKA SAFETY POWER!

Practically impossible to explode. Tested to 300 lbs. pressure per square inch. 2-Horse Power, \$150. 3 to 4 H. P., \$250. Also, Stationary Engines and boilers, and Spark Arresting Portable Engines for plantation use. Send for our circular. Discount to the trade.



B. W. PAYNE & SONS, Corning, N. Y.

THE "Scientific American" is printed with CHAS. TENEU JOHNSON & CO.'S INK. Tenth and Lombard Sts., Philadelphia, and 59 Gold St., New York.