

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO. INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS 810 Walnut St., Philadelphia, Pa., U. S. A.

Our New and Revised Catalogue of Practical and Scientific Books, 30 pages, 8vo., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.

CARBORUNDUM HARDEST ABRASIVE KNOWN. EMERY AND DIAMOND POWDER SUBSTITUTE. IN FLOUR-POWDER, CRYSTAL-WHEEL, SLAB & HONE FORM. CARBORUNDUM CO., MONONGAHELA CITY, PA., U.S.A.

ELECTRICITY AND PLANT GROWING.—A paper by Prof. L. H. Bailey, of Cornell University, describing and giving the results of a series of experiments upon the effect of electrical illumination upon the growth of plants. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 990 and 991. Price 10 cents each. To be had at this office and from all new dealers.

VANDUZEN STEAM PUMP THE BEST IN THE WORLD. Pumps Any Kind of Liquid. Always in Order, never Gets out of Order. Every Pump Guaranteed. 10 SIZES. 200 to 12000 Gallons per Hour. Cost \$7 to \$75 each. Address THE E. W. VANDUZEN CO., 102 to 108 E. Second St., Cincinnati, O.

AMERICAN GAS FURNACE CO. of ELIZABETH, N. J., PATENTEES OF A Complete System for the generation of a CHEAP AND PERFECT FUEL GAS. GAS BLAST FURNACES, for all kinds of Mechanical Work. HIGH PRESSURE BLOWERS, ETC. Illustrated Catalogues on application. Address, 80 NASSAU STREET, NEW YORK.

Reece's Patent Hand Bolt Cutter or Screw Plate. Send for new catal. of Edw. J. Reece, Manuf., Greenfield, Mass. Screw Cutting Tools.

TOPOGRAPHICAL DRAWING.—A valuable and instructive paper by A. Laisseau upon the use of photography in making topographical drawings. The method applied to planimetry, leveling and the construction of a plan and drawing of the curves of level. With 8 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 988. Price 10 cents. To be had at this office and from all new dealers.

Telephones Sold outright. Cannot get out of order. Guaranteed free from any kind of trouble. Suitable for exchanges or private plants. Send for Testimonials and Prices. Some good territory left for reliable agents. MASON TELEPHONE CO., RICHMOND, VA.

FREE IT COSTS YOU NOTHING THIS HIGH-GRADE \$60.00 MACHINE ABSOLUTELY FREE. No representation. No Scheme. We mean just what we say. This machine is yours free. No such opportunity has ever before been offered. We shall continue these liberal terms for only a short time. Cut this out and write to-day. Sewing Machine Department, 7-1077 OXFORD BLDG. CO., 342 Wabash Ave., Chicago.

MONEY MADE selling Heveridge's Automatic Cooker. Best cooking device. Food can't burn. No odor. Saves labor and fuel. Fits any kind of stove. Agents wanted, either sex. Good Pay. One agent sold 1730 in one town. Write for terms. W. E. BEVERIDGE, Baltimore, Md.

Engineers and Firemen Send 2c. stamp for 24 page pamphlet containing a list of questions asked by a board of examining engineers. Stromberg Pub. Co., St. Louis, Mo.

The United Autographic Register Co., 148-154 Monroe St. Chicago REGISTERS LEASED at a cost of less than 2 cents per day. OR SOLD at from \$15 to \$50. 50000 in use. Made in 25 styles. Send for Circulars BEWARE OF INFRINGEMENTS.

ELECTRICAL PHENOMENA ILLUSTRATED by Applied Hydraulics.—Mr. G. Claude's method of applying the movements of water to illustrate a few of the first principles of electrical phenomena in such a way as to enable the student to better understand and the tutor to explain them. With 14 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 979. Price 10 cents. To be had at this office and from all new dealers.

AMERICAN DESK 4 ft. Desk \$16 4 1/2 ft. " 18 5 " " 20 Send for catal. 18-20 E. Van Buren St., Chicago, U. S. A.

The Scientific American PUBLICATIONS FOR 1895.

The prices of the different publications in the United States, Canada, and Mexico are as follows:

Table with 2 columns: Publication Name and Price. Includes Scientific American (weekly), Supplement (weekly), Export Edition, Architects and Builders Edition, and combined rates for multiple subscriptions.

Proportionate Rates for Six Months. This includes postage, which we pay. Remit by postal or express money order, or draft to order of MUNN & CO., 361 Broadway, New York.

Waverley Bicycles. ARE THE HIGHEST OF ALL HIGH GRADES. Warranted superior to any Bicycle built in the world, regardless of price. Do not be induced to pay more money for an inferior wheel. Insist on having the Waverley. Can be delivered from factory if agent hasn't it. Catalogue "I" Free by Mail. 22 lb. Scorcher, \$85. INDIANA BICYCLE CO., 23 lb. Ladies', 75. Indianapolis, Ind., U. S. A.

MATCH * MACHINERY. Latest Improved. Complete plants furnished. JOS. C. DONNELLY, 1209 Buttonwood Street, Philadelphia, Pa.

BARNES' New Friction Disk Drill FOR LIGHT WORK. Has these Great Advantages: The speed can be instantly changed from 0 to 1600 without stopping or shifting belts. Power applied can be graduated to drive with equal safety the smallest or largest drills within its range—a wonderful economy in time and great saving in drill breakage. Send for catalogue. W. F. & JNO. BARNES CO., 1990 Ruby St., Rockford, Ill.

NO MORE DULL SHEARS! The DIAMOND SHEARS and SCISSORS SHARPENER. For Barbers, Tailors, Dressmakers, and every woman in the land. Warranted to sharpen any size Shears or Scissors in 10 seconds. Leaves a keen and lasting edge. Beautifully nickeled. Price 25 Cents. DIAMOND CUTLERY CO., 64 Broadway, NEW YORK CITY.

CONCRETE CONSTRUCTION.—A paper by Ernest L. Ransome, treating of the practical application of concrete to false work; with notes on materials, tools labor, etc. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 984. Price 10 cents. To be had at this office and from all new dealers.

MALLEABLE AND FINE GRAY IRON ALSO STEEL CASTINGS FROM SPECIAL PATTERNS. THOMAS DEVLIN & CO., LEHIGH AVE. & AMERICAN ST. PHILA.

ROCK EMERY Made of Large Blocks of Emery Set in Metal. Fastest Grinders known. Can grind anything NO PICKING. Made Sharp. Stay Sharp Will Fit any Mill Frame. Cheap as Best French Buhrs. Sturtevant Mill Co., Boston, Mass. MILLSTONES.

MESSRS. MUNN & Co., Solicitors of Patents, have had nearly fifty years' continuous experience. Any one may quickly ascertain, free, whether an invention probably is patentable by writing to Munn & Co. Communications strictly confidential. A handbook of patents and how to obtain them sent free. PATENTS taken through Munn & Co. receive special notice in the Scientific American. This splendid weekly paper, elegantly illustrated, has the largest circulation of any scientific work. \$3 a year. Specimen copies free. Address MUNN & CO., New York, 361 Broadway.

KEEP THE HEAD COOL. The Braided Wire Spring Pillow is Cool and Cleanly. Comfortable as down or feathers. Practically indestructible. Price, upholstered in fine hair; Adult's, 20 x 28, \$3.50; Couch, 20 x 20, \$3.00; Child's, 14 x 22, \$2.50. Sent, express prepaid, on receipt of price. Address Weston & Wells Mfg. Co., 1117-1119 Noble St., Phila., Pa.

A TELESCOPE having 4 1/2 in. Objective, Eye pieces and Finder is offered cheap. For full particulars address, E. W. BUCKINGHAM, LYNCHBURG, VA.

CRITERION MAGIC LANTERNS And Stereopticons. Oil, Lime or Electric Light. Front of Lanterns easily removable for substitution of scientific attachments. We make lanterns and views for all kinds of uses. Catalogues free. J. B. COLETT & CO., 16 Beckman St., New York. 189 La Salle St., Chicago. 50 Bromfield St., Boston. 151 Post St., San Francisco.

PERFORATORS OF ALL METALS For Cotton, Oil and Rice Mills, Sugar Houses, Distilleries, Phosphate and Fertilizer Works, Mining and Concentrating, Gas and Water Works, Elevators, Thrashers, Separators, Corn Shellers, and all kinds of Grain Cleaning Machinery. Heavy steel and Iron Plates and Cylinders for Screening Ore, Coal, Stone. For Filters, Strainers, Ventilators, Oil, Gas and Vapor Stoves and all special purposes. Special sizes for Coffee Cleaning and Roasting Machinery. Perforated Tin and Brass. The Harrington & King Perforating Co., Chicago, and 24 Pearl St., N.Y.

GATES ROCK BREAKERS GREATER CAPACITY USING LESS POWER THAN ANY OTHER ON EARTH. MODERN MINING MACHINERY OF EVERY DESCRIPTION. GATES IRON WORKS DEPT. T. 50 S. CLINTON ST. CHICAGO.

ICE MACHINES, Corliss Engines, Brewers' and Bottlers' Machinery. THE VILTER MFG. CO., 899 Clinton Street, Milwaukee, Wis.

THE MODERN ICE YACHT.—By Gen. W. Polk. A new and valuable paper, containing full, practical directions and specifications for the construction of the fastest and best kinds of Ice Yachts of the latest, most approved forms. Illustrated with engravings drawn to scale, showing the form, position, and arrangement of all the parts. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 924. Price 10 cents. To be had at this office and of all new dealers.

INCUBATORS Self-Regulating Brooders Most Perfect Machines, Best Material and Workmanship. Our Thermo Regulator is so accurate that thermometer can be dispensed with. 15 breeds high-class poultry. Full stock poultry supplies. Send for large illustrated catalogue. Peerless Incubator & Brooder Co., 515 Ohio Street, QUINCY, ILL.

USE GRINDSTONES? If so, we can supply you. All sizes mentioned and mounted, always kept in stock. Remember, we make a specialty of selecting stones for all special purposes. Ask for catalogue. The CLEVELAND STONE CO., 2d Floor, Wilshire, Cleveland, O.

TURBINE WATER WHEELS. Send for Pamphlet. JAMES LEFFEL & CO., Springfield, Ohio, U. S. A.

ELECTRO MOTOR, SIMPLE HOW TO MAKE. By G. M. Hopkins.—Description of a small electro motor devised and constructed with a view to assisting amateurs to make a motor which might be driven with advantage by a current derived from a battery, and which would have sufficient power to operate a foot lathe or any machine requiring not over one man power. With 11 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641. Price 10 cents. To be had at this office and from all new dealers.

\$5 HAND BONE, SHELL AND CORN MILLS for Poultrymen. Citular and testimonials free. WILSON BROS., Easton, Pa.

Agents, Don't Lose Money by LETTING someone else sell our pants from \$4.00 up. Big profits; no experience in clothing business necessary. Particulars and sample card free. UNION CUSTOM PANTS CO., 250 and 252 E. Jackson Street, Chicago.

CLAY & TORBENSEN, GLOUCESTER CITY, N. J. DESIGNERS & BUILDERS OF YACHTS LAUNCHES AND HOUSE BOATS. SEND 5 CENTS FOR CATALOGUE.

SCIENTIFIC AMERICAN SUPPLEMENT. Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be had at this office for 10 cents. Also to be had of new dealers in all parts of the country.

FOOT POWER MACHINERY Scroll Saws, Tools, Drills, Forges, etc. Send for catalogue. Wilkinson Co., 88 Randolph St., Chicago.

A Valuable Book

THE SCIENTIFIC AMERICAN CYCLOPEDIA OF RECEIPTS, NOTES AND QUERIES. 12,500 Receipts. 708 Pages. Price \$5. Bound in Sheep, \$6. Half-Morocco, \$6.50. This splendid work contains a careful compilation of the most useful Receipts and Replies given in the Notes and Queries of correspondents as published in the Scientific American during the past fifty years; together with many valuable and important additions. Over Twelve Thousand selected Receipts are here collected; nearly every branch of the useful arts being represented. It is by far the most comprehensive volume of the kind ever placed before the public. The work may be regarded as the product of the studies and practical experience of the ablest chemists and workers in all parts of the world; the information given being of the highest value, arranged and condensed in concise form convenient for ready use. Almost every inquiry that can be thought of, relating to formulae used in the various manufacturing industries, will here be found answered. Instructions for working many different processes in the arts are given. Those who are engaged in any branch of industry probably will find in this book much that is of practical value in their respective callings. Those who are in search of independent business or employment, relating to the home manufacture of simple articles, will find in it hundreds of most excellent suggestions. Send for Descriptive Circular. MUNN & CO., Publishers, SCIENTIFIC AMERICAN OFFICE, 361 Broadway, New York.