

(Founded by Mathew Carey, 1785. Centenary January 25, 1885.)

HENRY CAREY BAIRD & CO., INDUSTRIAL PUBLISHERS, BOOKSELLERS and IMPORTERS, 810 WALNUT ST., PHILADELPHIA, PA.

Have Recently Published:

The Complete Practical Machinist. By JOSHUA ROSE. Illustrated by 350 engravings. Thirteenth edition, thoroughly revised and in great part rewritten. (1882) 12mo. \$2.50

Coal-Mining Described and Illustrated. By THOMAS H. WALTON, Mining Engineer. Illustrated by 24 large and elaborate plates, after Actual Workings and Apparatus. 4to. \$5.00

The Manufacture of Leather: Being a description of all the processes of Tanning, Currying, Finishing, and Dyeing of Leather. To which are added complete lists of all American Patents for materials, processes, tools, and machines for Tanning, Currying, etc. By CHARLES T. DAVIS. 302 engravings and 12 samples of dyed leather. 8vo, 824 pages. \$10.00

A Practical Treatise on the Manufacture of Bricks, Tiles, Terra Cotta, Etc.: Comprising every important product of clay employed in Architecture, Engineering, the Blast Furnace, for Retorts, etc., including full detailed descriptions of the most modern machines, tools, kilns, and kiln roofs. By CHARLES T. DAVIS. Illustrated by 228 engravings and 6 plates. 8vo, 472 pages. \$5.00

A Practical Treatise on the raw materials and fabrication of Glass, including Glass Vessels and Bottles, Insulating, Cements, Pastes, Mucilages, etc. From the German of F. Dawidowsky by Wm. T. BRANNT. Illustrated by 35 engravings. 12mo. \$2.50

Galvanoplastic Manipulations. A Practical Guide for the Gold and Silver Electro-Plater and Galvanoplastic Operator. By Wm. H. WAHL, Ph.D., Secretary of the Franklin Institute. Illustrated by 189 engravings. 8vo, 356 pages. \$2.50

The Architect's and Builder's Pocket Companion and Price Book. By FRANK W. VOGDES, Architect. A new revised and enlarged edition, 368 pages, full-bound pocket-book form, gilt edges, \$2.00, cloth. \$1.50

Modern American Locomotive Engines. Their Design, Construction and Management. By EMORY EDWARDS. Illustrated, 12mo. \$2.00

The Practical Steam Engineer's Guide in the design, construction, and management of American Steam Pumps, Boilers, Injectors, Governors, Pistons and Rings, Safety Valves, and Steam Engines. By EMORY EDWARDS. 119 engravings. 12mo. \$2.50

A Catechism of the Marine Steam Engine. For the use of Engineers, Firemen, and Mechanics. By EMORY EDWARDS. 63 illustrations. 4th edition, revised. 12mo. \$2.00

Modern Marine Engines, Boilers and Screw Propellers: their design and construction. Showing the present practice of the most eminent Engineers and Engine Builders in the United States. By EMORY EDWARDS. 30 large and elaborate plates of American Engines, Boilers, and Propellers. 4to. \$5.00

The above or any of our Books sent by mail, free of postage, at the publication prices, to any address in the world.

Our large Catalogue of Practical and Scientific Books, 96 pages, 8 o., 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.

The MARCH 14th and 25th issues of INDUSTRIAL AMERICA

Will be SPECIAL EXPOSITION numbers. The Publisher personally visited New Orleans, and under his direct supervision a most elaborate, terse, ably written, and handsomely illustrated review of the Exposition, and the leading exhibits was prepared.

This is the best, most complete, and most satisfactory account of the Exposition yet published, and should be read both by those who intend visiting New Orleans and those who do not.

Order the two numbers from your newsdealer, and continue the paper if you like it. It only costs 10 cents every other week.

On receipt of 20 cents, both numbers will be mailed direct from publication office; or remit \$2.00, and get the issues from Jan. 1st until the end of the year. Address: INDUSTRIAL AMERICA, 9 Murray Street, New York.

IMPROVED FOOT AND POWER LATHES AND MACHINISTS TOOLS. CATALOGUES FREE. LATHES ON TRIAL. SEBASTIAN, MAY & CO. 187 W. PEARL ST. CINCINNATI, O.

VOLNEY W. MASON & CO., FRICTION PULLEYS CLUTCHES and ELEVATORS, PROVIDENCE, R. I.

DRAWING INSTRUMENTS. Illustrated catalogue sent on application to Wm. T. COMSTOCK, 6 Astor Place, New York.

WORK SHOPS WITHOUT STEAM POWER BY USING OUTFITS OF Barnes' Patent Foot Power machinery can compete with steam power. Sold on trial. Metal and woodworkers send for prices. Illustrated catalogue free.

W. E. & Jno. Barnes Co., Rockford, Ill. Address No. 1999 Main St.

MONEY Easily made handling our goods. Eclipses all others. Used by everybody daily. Sweeping success. No peddling. No opposition. No risk. Easily carried. Easily shown. Easily sold. \$10 a day; \$300 a month; \$7000 a year. Thousands now making a royal income. Agent writes: "My wife and myself made \$14 in less than four hours." SAMPLES FREE. Pamphlet for 2 cent stamp (no postage). Address: SPEAR MFG. CO., 188 W. 5th St., Cincinnati, O.

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.

In this line of business they have had forty 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.

Munn & Co. also attend to the preparation of Caveats, 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 reasonable terms.

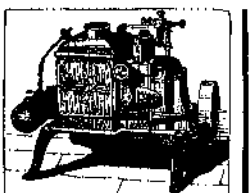
A pamphlet sent free of charge, on application, containing full information about Patents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

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.

MUNN & CO., Solicitors of Patents, 361 Broadway, New York.

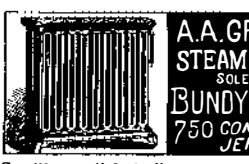
BRANCH OFFICE.—Corner of F and 7th Streets, Washington, D. C.

OTTO GAS ENGINE OVER 10,000 IN USE. WORKS WITHOUT ENGINEER OR BOILER. STEAM COAL OR ASH. STARTS AT ONCE AND IS FREE OF DANGER FIRE OR EXPLOSION. 1 to 25 HORSE POWER. SCHLEICHER SCHUMM & CO. 47 DEY ST. NEW YORK. 214 RANDOLPH ST. CHICAGO. 332 & WALNUT STS. PHILADELPHIA



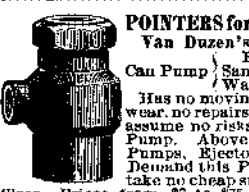
SHIPMAN STEAM ENGINE. A BOAT AND STATIONARY ENGINE. No skilled attendant required! Safe from fire and explosion! No expense when engine stops! —Steam in FIVE minutes.— Runs ten hours on less than 3 Gallons of Kerosene. See illustrated article in this paper, September 13. SHIPMAN ENGINE CO. 55 Franklin St., Boston

PRICES Including crating, and free delivery on cars or to express company's office from any one of our agencies or factories. ENGINE No. 1, 1/2 to 1/4 H.P. \$100 " No. 2, full 1 H.P. 125 " No. 3, full 2 H.P. 175 Illustrated Catalogues on receipt of stamp.



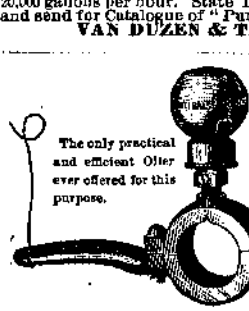
A.A. GRIFFING IRON CO. STEAM HEATING Apparatus SOLE MANUFACTURERS BUNDY STEAM RADIATOR 750 COMMUNIPAW AVE. JERSEY CITY, N.J. See illus. article in SCIENTIFIC AMERICAN Sept. 13, 1884.

READY ROOFING SEND FOR SAMPLE AND CIRCULAR W. H. STEWART 74 COURTLAND ST. NEW-YORK.



POINTERS for Users of Steam Pumps. Van Duzen's Patent Steam Pump Hot or Cold. Is Efficient. Has no moving parts, consequently no wear, no repairs, no trouble. Purchasers assume no risks, as we guarantee every Pump. Above comparison with Jet Pumps, Ejectors, etc., made of Iron. Demand this Pump of your dealer and take no cheap substitute. We make Ten Sizes. Prices from \$1 to \$75. Capacities from 100 to 20,000 gallons per hour. State for what purpose wanted and send for Catalogue of "Patents". VAN DUZEN & TIFT, Cincinnati, O.

GOLD CHLORINATION IN CALIFORNIA.—An interesting paper by F. D. Browning, E.M. describing the mode of chlorinating gold as practiced in Grass Valley, Cal.—The ore and its treatment. Milling, roasting, chlorinating, leaching and precipitating. Extraction of silver. Preparation of reagents. The mill. The chlorination works. Illustrated with 20 engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 445. Price 10 cents. To be had at this office and from all newsdealers.



LUNKENHEIMER'S NEW AUTOMATIC LOOSE PULLEY OILER. The only practical and efficient Oiler ever offered for this purpose. Sample sent for Trial. Cincinnati Brass Works.

CARY & MOEN STEEL WIRE OF EVERY DESCRIPTION 234 W. 29 ST. EVERY & STEEL SPRINGS. NEW YORK CITY

The Cheapest and Best Lubricator. The feed is very plain and positive. It has less parts than any other yet produced. We avoid glass tubes and guarantee the most reliable feed. The new glass is almost everlasting. A child can replace the new shape glass. A specialty is our Small Engine and Pump Lubricator. Holland & Thompson, 217 River Street, Troy, N. Y.

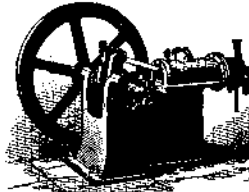
THE HARDEN STAR HAND GRENADE FIRE EXTINGUISHER Puts Out Fire Instantly. See editorial notice in SCIENTIFIC AMERICAN of November 23d, 1884. Send for circulars. Address Harden Hand Grenade Fire Extinguisher Co., 205 Wabash Ave., Chicago, 10 Oliver St., Boston, or 84 West Broadway, New York.

Leffel Water Wheels, With Important Improvements. 11,000 IN SUCCESSFUL OPERATION. FINE NEW PAMPHLET FOR 1883 Sent free to those interested. JAMES LEFFEL & CO., Springfield, Ohio. 110 Liberty St., N. Y. City.

THE PUSEY & JONES CO. BUILDERS OF ALL DESCRIPTION OF MACHINERY USED BY MANUFACTURERS OF PAPER. Wilmington, Delaware.



ROCK BREAKERS AND ORE CRUSHERS. We manufacture and supply at short notice and lowest rates, Stone and Ore Crushers containing the invention described in Letters Patent, issued to Eli W. Blake, June 15th, 1863, together with NEW AND VALUABLE IMPROVEMENTS, for which Letters Patent were granted May 11th and July 20th, 1880 to Mr. S. L. Marsden. All Crushers supplied by us are constructed under the superintendence of Mr. Marsden, who, for the past fifteen years, has been connected with the manufacture of Blake Crushers in this country and England. FARREL FOUNDRY AND MACHINE CO., Manuf'rs., Ansonia, Conn. COPELAND & BACON, Agents, New York.



ECONOMIC MOTOR CO.'S GAS ENGINES. Best in principle, workmanship, and materials. An unequalled small Motor adapted to all uses. Simple, Safe, Economical, Durable. Four sizes: 1 H. P., 1/2 H. P., 1 man power, and a Sewing Machine Motor. Send for Circulars. ECONOMIC MOTOR CO., 12 CORTLANDT STREET, NEW YORK.

WESTON DYNAMO-ELECTRIC MACHINE. The undersigned, sole agents for the above machine for ELECTROPLATING AND ELECTROTYPING, refer to all the principal Stove Manufacturers, Nickel and Silver Platers in the country. Over 1,500 now in use. Are also manufacturers of Pure Nickel Anodes, Nickel Salts, Polishing Compositions of all kinds, and every variety of supplies for Nickel, Silver, and Gold Plating; also, Bronze and Brass Solutions. Complete outfits for plating. Estimates and catalogues furnished upon application.

SMITH'S PATENT BELT FASTENERS. Are positively unequalled for fastening LEATHER, RUBBER, or COTTON BELTING. THE ONLY FASTENER that will run under tighteners, on patent rolls in flour mills, and Electric Light machines. EASIER TO APPLY THAN L. A. CING'S, ANY FAR MORE ECONOMICAL. Pat. Sept. 20, '81; Aug. 15, '82; June 16, '84.

HANSON VANWINKLE & Co. SOLE AGENTS NEWARK, N. J. New York Office, 92 and 94 Liberty St.

PRICE LIST. No. 1. For large drive belts, per box of 100, \$2.00 No. 2. For Cotton " " " 100, 1.75 No. 3. For Rubber " " " 100, 1.50 No. 4. For single Leather belts, per box, 1.25 Combination Funck with guides and nippers, 1.25 Reamers for taking fasteners out, .35 TRY THEM! They will save you loss of TIME, TEMPER, and MONEY. Manufactured by H. D. EDWARDS & CO., No. 16, 18, and 20 Woodward Avenue. Detroit, Mich. Manufacturers of Oak Leather Belting, Agents for J. B. Hoyt & Co., N. Y. Belting and Packing Co., Eureka Fire Hose Co., Cotton Belting Mill Supplies.

HOW TO LAY A DRAIN.—A PAPER by J. M. Allen, treating of the practical and thorough execution of the work of drain lines. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 445. Price 10 cents. To be had at this office and from all newsdealers.

MALLEABLE AND FINE GRAY IRON ALSO STEEL. THOMAS DEVIN & CO. FINE TANNING PATTERNS FINISHING TANNING AND LEHIGH AVE & AMERICAN ST PHILA

THE PAYNE AUTOMATIC ENGINE Gives more power from same amount of fuel and water than any engine made, and 50 per cent more power than rated at. All engines warranted. All sizes and styles, 2 to 25 horse power. Send for prices and catalogue A. 1. B. W. PAYNE & SONS, Elmira, N. Y. P. O. Box 1207. Our General Sales Office, 83 Liberty St. & 149 B'way, N. Y.

THE DINGEE & CONARD CO.'S BEAUTIFUL EVER-BLOOMING ROSES. Our Great Specialty is growing and distributing 100,000—two million strong Pot Plants, suitable for immediate bloom, safely by mail at all Post Offices. 5 Splendid Varieties, your choice, a labeled for \$1; 12 for \$2; 35 for \$5; 100 for \$12. Also OTHER VARIETIES 2, 3, & 10 for \$1 according to value. Send for our New Guide, 76 pp elegantly illus., and choose from over 500 finest sorts Address, THE DINGEE & CONARD CO., Rose Growers, West Grove, Chester Co., Pa.

ROOT'S NEW IRON BLOWER. POSITIVE BLAST. IRON REVOLVERS, PERFECTLY BALANCED, Has Fewer Parts than any other Blower. P. H. & F. M. ROOTS, Manufacturers, CONNERSVILLE, IND. S. S. TOWNSEND, Gen. Agt., 29 Cortland St., 9 Dey St., COOKE & CO. Selling Agts., 22 Cortland Street, JAS. BEGGS & CO., Selling Agts., 9 Dey Street, NEW YORK. SEND FOR PRICED CATALOGUE.

Send stamp for special men copy of Banjo and guitar Journal, the finest thing out; music, news, and information on both instruments. Subscription, 50 cents a year. No postal cards noticed. Address S. S. STEWART, No. 412 North 5th Street, Philadelphia, Pa.

NATIONAL TOOL CO. MANUFACTURERS OF MACHINISTS TOOLS. WILLIAMSPORT PA. PLANERS A SPECIALTY.

DEKOR'S BEARD EXCISE. Remove hair from Mustache, Whiskers, Eyebrows, etc. on the face. No injury. Easy use. Have the willow or 3 Plugs done the work. Will grow it or forfeit \$100.00. Price per package with directions sealed and postage 25 cents. 3 in 1. Sole manufactory by L. A. L. SMITH & CO., Agents, Baltimore, Md.

Weak Nervous Men. Who suffer from Debility, Premature Decay and Exhausted Powers, certainly and permanently cured without STOMACH MEDICINES by the MARSTON BOLDUS; the new plan of treating Nervous Debility, Physical Decay, &c. Endorsed by thousands who have been restored to full and perfect manhood. Sealed treatise sent free. Varicocle cured without Surgery. Address MARSTON REMEDY CO., or DR. H. TRESKOW, 46 West 14th Street, New York.

THE SCIENCE OF LIFE. KNOW THYSELF. A GREAT MEDICAL WORK ON MANHOOD. Exhausted Vitality, Nervous and Physical Debility, Premature Decline in Man, and the untold miseries flesh is heir to. A book for every man, young, middle-aged, and old. It contains 125 prescriptions for all acute and chronic diseases, each one of which is invaluable—so found by the author, whose experience for 23 years is such as probably never before fell to the lot of any physician. Three hundred pages, bound in beautiful French muslin, embossed covers, full gilt, guaranteed to be a finer work in every sense—mechanical, literary, and professional—than any other work sold in this country for \$2.50, or the money will be refunded in every instance. Price only \$1.00 by mail, postpaid. Illustrative sample, 6 cents. Send now. Gold medal awarded the author by the National Medical Association, to the officers of which he refers. Address the Peabody Medical Institute, or Dr. W. H. Parker, No. 4 Beach Street, Boston, Mass., who may be consulted on all diseases requiring skill and experience.

FOREIGN PATENTS. Their Cost Reduced. The expenses attending the procuring of patents in most foreign countries having been considerably reduced the obstacle of cost is no longer in the way of a large proportion of our inventors patenting their inventions abroad. CANADA.—The cost of a patent in Canada is even less than the cost of a United States patent, and the former includes the Provinces of Ontario, Quebec, New Brunswick, Nova Scotia, British Columbia, and Manitoba. The number of our patentees who avail themselves of the cheap and easy method now offered for obtaining patents in Canada is very large, and is steadily increasing. ENGLAND.—The new English law, which went into force on Jan. 1st, enables parties to secure patents in Great Britain on very moderate terms. A British patent includes England, Scotland, Wales, Ireland and the Channel Islands. Great Britain is the acknowledged financial and commercial center of the world, and her goods are sent to every quarter of the globe. A good invention is likely to realize as much for the patentee in England as his United States patent produces for him at home, and the small cost now renders it possible for almost every patentee in this country to secure a patent in Great Britain, where his rights are as well protected as in the United States. OTHER COUNTRIES.—Patents are also obtained on very reasonable terms in France, Belgium, Germany, Austria, Russia, Italy, Spain (the latter includes Cuba and all the other Spanish Colonies), Brazil, British India, Australia, and the other British Colonies. An experience of FORTY years has enabled the publishers of THE SCIENTIFIC AMERICAN to establish competent and trustworthy agencies in all the principal foreign countries, and it has always been their aim to have the business of their clients promptly and properly done and their interests faithfully guarded. A pamphlet containing a synopsis of the patent laws of all countries, including the cost for each, and other information useful to persons contemplating the procuring of patents abroad, may be had on application to this office. MUNN & CO., Editors and Proprietors of THE SCIENTIFIC AMERICAN, cordially invite all persons desiring any information relative to patents, or the registry of trade-marks, in this country or abroad, to call at their offices, 361 Broadway. Examination of inventions, consultation, and advice free. Inquiries by mail promptly answered. Address, MUNN & CO., Publishers and Patent Solicitors, 361 Broadway, New York. Branch Office, cor. F and 7th Streets, opposite Patent Office Washington D. C.