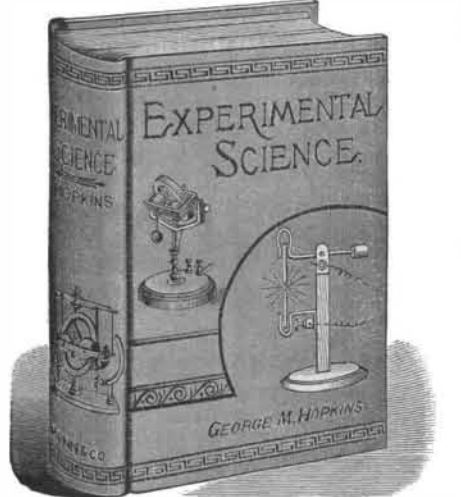


Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO. Industrial Publishers, Booksellers, and Importers, 810 Walnut St., Philadelphia, Pa., U. S. A.

The New Book.

Experimental Science



By GEO. M. HOPKINS.

740 Pages. Over 680 Illustrations. PRICE, by mail, postpaid, \$4.00

SEND FOR FULL ILLUSTRATED CIRCULAR AND TABLE OF CONTENTS.

This is a book full of interest and value for teachers, students, and others who desire to impart or obtain a practical knowledge of physics.

MUNN & CO., Publishers, Office of The Scientific American 361 BROADWAY, NEW YORK.

What the Press says of "Experimental Science." "Mr. Hopkins has rendered a valuable service to experimental physics." "The book is one of very practical character, and no one of a scientific turn of mind could fail to find in its pages a fund of valuable information."

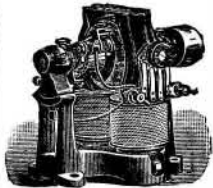
EXCELSIOR STEREOPTICONS FOR SCHOOLS & PUBLIC ENTERTAINMENTS - LANTERN SLIDES COLORED & UNCOLORED SEND FOR CATALOGUE QUEEN & CO. PHILA. PA.

FAMILY ICE MACHINE Ice, etc., in a few minutes. \$10 & up. L. Dermigny, 125 W. 25th St., N. Y. State Rights for sale.

LITTLE HERCULES DRILL CHUCK Has eccentric rotating, self-gripping jaws, which hold strongest when working hardest. The larger the drill, the more powerful the leverage. All working parts of best steel, hardened. The most powerful, accurate, and durable chuck in the market. ONEIDA M. CO. ONEIDA, N. Y., U. S. A.

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.



ELECTRIC MOTORS

For all Special Work. Correspondence invited by the CROCKER-WHEELER MOTOR CO. 430 West 14th Street, New York.

VELOCITY OF ICE BOATS. A COLLECTION of interesting letters to the editor of the SCIENTIFIC AMERICAN on the question of the speed of ice boats, demonstrating how and why it is that these craft sail faster than the wind which propels them.

Barnes' Foot-Power Machinery Complete outfits for Actual Workshop Business. A customer says: "Considering its capacity and the accuracy of your No. 4 Lathe, I do not see how it can be produced at such low cost."

EXCELLENT BLACK COPIES, only equaled by Lithography, of anything written or drawn with any Pen by the Patent SPECIMENS AUTOCOPYIST Ten Eyck & Parker, 66 Pine Street, New York

OIL WELL SUPPLY CO. Ltd. 91 & 92 WATER STREET, Pittsburg, Pa. Manufacturers of everything needed for ARTESIAN WELLS

HOME-MADE INCUBATOR.—PRACTICAL directions for the manufacture of an effective incubator that has been carefully tested and found to perform all that may be reasonably expected.

ARTESIAN Wells, Oil and Gas Wells, drilled by contract to any depth, from 60 to 2000 feet. We also manufacture and furnish everything required to drill and complete same.

THE PHYSIOLOGICAL BASIS OF the Sense of Beauty of Form.—By Albert Goodman. A paper of great interest to architects.

After being on the Market Five Years The "ACME" Still Leads! Sizes One, Two, Three, and Four Horse Power. Arranged for either NATURAL GAS or Kerosene Oil fire, as ordered.

Useful Books! Manufacturers, Agriculturists, Chemists, Engineers, Mechanics, Builders, men of leisure, and professional men, of all classes, need good books in the line of their respective callings.

EVERYBODY SHOULD LEARN How to Use Loose Pulleys. Useful information on this subject is given in our "Catalogue No. 56." Sent free to any address.

STEAM ENGINE. HOW TO MANAGE. By J. C. S.—A very practical paper on the subject. How to fire with wood and coal, how to manage the water supply, how to clean the engine, how to clean the supply pipe, how to range the pump, etc.

AGENTS make 100 per cent. profit on my Corsets, Belts, Brushes, Curlers, and novelties. Samples free. Write now. Dr. Bridgman, 873 B'way, N. Y.

EVERYBODY can BRIGHTEN their eyes. By using the MAGIC VAPOR, a safe and sure cure for weak eyes and headache is guaranteed.

MAGIC LANTERNS WANTED AND FOR SALE OR EXCHANGE. HARBACH & CO. 809 Filbert St. Phila. Pa.

ICE and REFRIGERATING MACHINES The Pictet Artificial Ice Company (Limited), Room 6, Coal & Iron Exchange, New York.

CHANDLER & TAYLOR CO'S SELF-CONTAINED STEAM ENGINES 12 TO 80 H. P. IN STOCK FOR QUICK DELIVERY.

THE STEAM ENGINE: ITS PRINCIPLES, its development, its future and perfection—A paper by E. N. Dickerson, giving an outline of the history of the steam engine, and discussing the principles upon which it operates and which limit its capacity.

GATES ROCK & ORE BREAKER Capacity up to 200 tons per hour. Has produced more ballast, road metal, and broken more ore than all other Breakers combined.

SMOKELESS EXPLOSIVES—A LECTURE by Sir Frederick Abel, F.R.S., treating of the production of explosives for rapid firing guns, and giving an account of the work of inventors in this line of research.

THE EAGLE THE EASIEST RUNNING BICYCLE IN THE WORLD. Speed, Comfort and Safety. AGENTS WANTED.

TYPEWRITERS. Largest like establishment in the world. First-class second-hand instruments at half new prices. Unprejudiced advice given on all makes.

ROPER'S Practical Handy-Books

—FOR— ENGINEERS AND FIREMEN

By STEPHEN ROPER, Engineer.

Table listing various engineering books and their prices, including 'Engineers' Handy Book' at \$3.50 and 'Hand-Book of Land and Marine Engines' at \$3.50.

They are the only books of the kind ever published in this country, and they are so plain that any engineer or fireman that can read can easily understand them.

EDWARD MEEKS, 1012 Walnut Street, Philadelphia, Pa.

PROPOSALS.

Dredging at Ogdensburg Harbor, New York. U. S. ENGINEER OFFICE, Burlington, Vt., December 22, 1890.—Sealed proposals in duplicate, addressed to the undersigned, for 270,000 cubic yards, more or less, of dredging...

Small Electric Motor for Amateurs. Illus. on page 39, this issue. All the material for making this Motor with the difficult parts finished, sent by mail for \$1.25.

SMALL ELECTRIC MOTOR FOR AMATEURS.—By C. D. Parkhurst. Description in detail of a small and easily made motor powerful enough to drive a ten or twelve inch brass fan and to give a good breeze.

JAMES LEFFEL WATER WHEELS ENGINES, and BOILERS. FARLO ST., SPRINGFIELD, OHIO. 110a Liberty Street New York City.

CURRAN'S GROOVED PLASTER SLAB Best foundation for plastering, cement work, or tiling. Superior to and cheaper than metal lath.

\$10.00 to \$50.00 per night. A light and portable business. Magic Lanterns and Views of popular subjects.

BLUE PRINT Photographic Supplies. Send for catalogue. T. H. MCCOLLIN & CO., 103 Arch Street, Philadelphia.

OBESITY.—BY WALTER MENDELSON, M.D. A very interesting paper, exhaustively treating of the causes of obesity and the proper method of combating it.

MONON ROUTE The tourist route between Chicago and Southern Winter resorts via Indianapolis and Cincinnati.

FOR CAPITALISTS. A better investment you don't want. For Sale—My excellent Automatic Cigar Cutter, Patented Dec. 4, 1890.

PATENT RIGHT FOR SALE Parties wishing to handle a nice staple article should buy the Patent Right on my "Carpet Fastener."

The Scientific American PUBLICATIONS FOR 1891.

Table showing subscription rates for The Scientific American and its supplements for 1891, including weekly, monthly, and combined rates.