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, 90 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.

For the Pictorial and Literary Presentation of

Harper's →: : Weekly

TAKES THE LEAD.

In addition to its many other attractions, illustrated records of the achievements in .

►• SCIENCE AND ART •~

form a notable feature. During 1894 there have been capital articles on such topics as: . .

Chicago Drainage Canal. Recent Excavations at Dashur, Egypt. Gold Mines of Colorado. Need of a National Health Board. Electrical Industries. Cleansing the Streets of Paris.

Constant advancement in excellence is the chief guide in the direction of HARPER'S WEEKLY, and, with almost boundless resources, it will continue to treat every scientific event of public interest comprehensively and at the shortest notice.



VANDUZEN STEAM PUMP
THE BEST IN THE WORLD.
Pumps Any Kind of Liquid.
Always in Order, never Clogs nor
freezes. Every Fump Guaranteed.
200 to 12000 Gallons per Hour.
Cost \$7 to \$75 each. Address
THE VANDUZEN & TIFT CO.,
102 to 108 E. Second St., Cincinnati, 0.

ELECTRICAL APPARATUS DESIGNED.
Inventions Developed. F.F. Correspondence Solicited.
F. B. COREY, M.E., 73 Hathaway Building, Boston

GROUND MICA of all grades and for all purposes SHANNOCK MICA CO., SHANNOCK, R. I.

CUTS-Photo-zinc, half tone and wood. What do you need? Indiana Illustrating Co., Indianapois, Ind.



Lasts a Lifetime. Razor, \$2.00. Machine and Strop, \$1.75. ASK YOUR DEALER. E. LOTHAR SCHMITZ, 92 Reade St., New York.

SPECIAL OFFER No. 77.



Tubular Driving Lamp.
IT is the only practicable and perfect driving lamp ever made.
IT will not blow nor jar out.
IT gives a clear, white light.
IT looks like a locomotive head light.
Throws all the light straight ahead from 200 to 300 feet.
Throws all the light straight ahead from 200 to 300 feet.
Throws all the light straight ahead from 200 to 300 feet.

R. E. DIET'N. CO.,
OUT Driving Lamps at the regular

Buy a pair of our Driving Lamps at the regular price, and we will have sentto you free of churge or one year, any one of the neriodicals named below. Write to us. mentioning the SCIENTIFIC AMERICAN and the number of this offer (No. 77), for full particulars.

Cosmopolitan Current Literature, Demorset's, Frank Lestie's Popular Monthly, Godey's, Lippencott's, Munsey's, Suiting, Review of Reviews, Scientific American, Scribner's, St. Nicholas, Youths' Companion.

$oldsymbol{A}$ rchitectural $oldsymbol{B}$ ooks $oldsymbol{B}$

Useful, Beautiful and Cheap.

Any person about to erect a dwelling house or sta-ble, either in the country or city, or any builder wishing to examine the latest and best plans for a church, school house, club house, or any other public building the ARCHITECTS' AND BUILDERS' EDITION of the SCI-ENTIFIC AMERICAN.

The information these volumes contain renders the work almost indispensable to the architect and builder. and persons about to build for themselves will find the work suggestive and most useful. They contain colored plates of the elevation, plan, and detail drawings of almost every class of building, with specification and approximate cost.

Seventeen bound volumes are now ready and may be obtained, by mail, direct from the publishers or from any newsdealer. Price \$2.00 a volume. Stitched in paper covers. Subscription price, per annum, \$250. Address and remit to

MUNN & CO., Publishers,

361 Broadway, New York.

The Phœnix Telephone Company,

PRODUCE EXCHANGE ANNEX, NEW YORK CITY,

Manufactures Magneto Telephones, Telephone Switchboards, Factory Telephone Systems, and Desk Telephones for connecting offices.

WE BUILD TELEPHONE EXCHANGES TO BE RENTED AT POPULAR PRICES.

THE PHŒNIX TELEPHONE

Talks Long or Short Distances. Requires no Battery nor Induction Coil. Does not Infringe. Works on Ground or Metallic Circuit. Is Simple in Construction and Perfect in Operation. Nothing to get Out of Order. Conveys Speech Perfectly. Articulation is Clear and Distinct. Many Experts Pronounce it The Best.

 $\stackrel{-}{
m Special}$ Territory and the Exclusive Use of this Telephone given to Reliable Parties Without Cost.

Write for further particulars, as above.



DIST AS PLAIN is the little book, "Something About Electric Bells." Fully illust'd and cheap-A BU est book on subject. Teaches you a trade. By mail, 20c. J. A. De la Vergne, Jr., Clinton, Mo.





A TYPICAL GOLD MINE.—BY PROF Arthur Lakes. Description of a well-developed typical gold mine as found in the Standley Consolidated Mine at Idaho Springs, Clear Creek County, Colorado, History of the mine, stoping, blasting, methods of timbering, ore sorting, machinery, development. With I'i llustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NOS. 986, 981 and 982. Price 10 cents each. To be had at this office and from all newsdealers.



for Papers, Magazines, etc. Contents instantly removable. Adopted by U. S. Govt. and many libraries. From the Magazines of the Covers to order. H. H. BALLARD, 188, Pittsfield, Mass.

DEAFNESS & HEAD NOISES CURED by INVISIBLE Tabular Coalions. Have helped more to good HEARing than all other devices combined. Whispers HEARing than all other devices eyes. F. Hiscox only, 858-S-B'way, N.Y. Book of proofs FREE



Dust! Dust! Gibbs Patent Dust Protector protects the nose and mouth from inhaling poisonous dust. Invaluable in every industry where dust is troublesome. Nickel plated protector, \$1.00, postpaid, in U. S. or Canada. \$1.40 to foreign points. Circulars free. GIBBS RESPIRATIOR CO., 31 La Salle St., Chicago.



HATCH CHICKENS by STEAM.
MODEL EXCELSIOR Incubator. Simple,
Perfect and Self-Regulating: Thousands in and



Address Simplex Typewriter Co., 26 E. 13th St., New York RECEIVER'S SALE. The entire plant and good will of the Stark Machine

NEUEIVER 3 OALE. will of the Stark Machine and Tool Co., including real estate, tools, machinery, patterns, etc. also thousands of dollars of orders on hand. This plant is located at the corner of Hudson and Seventh Sts. Buffalo, N. Y. and consists of a four story brick building fully equipped for the mamnfacture of tinner's machines and tools, machinery for working sheet metal, pressex, dies, etc. The factory is now in operation, and all information in reference to same cheerfully given. Address MICHAEL NEWELL Receiver, cor. Hudson and Seventh Sts., Burfalo, N. Y. The Most Useful Tool in any Shop is the



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



WOODEN TANKS. For Railroads, Mills and Manufactories. Builders of Steel Towers and Tanks. La. Red Cypress Wood Tanks a specialty. W. E. CALDWELL CO., 217 E. Main Street, Louisville, Ky.

MAXIM'S FLYING MACHINE.-FULL description of the remarkable apparatus which Mr. Maxim recently propelled through the air with marked success. With 12 illustrations. Contained in SUISN-TIPIC AMERICAN SUPPLEMENT, No. 976. Price 10 cents. To be had at this office and from \$16.



Don't Kill Yourself
SMOKING. Use the
HARMLESS SMOKER CURE

It retains all the flavor and enjoyment of smoking a cigar without the injury. Can be used for cigarette smoking and makes it absolutely harmless as it prevents inhaling; also aids to quit the habit when desired. Send for free circular even if you are skeptical. RYERSON D. CATES, B. 1205. 108 La Salle St., Chicago.

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

<u>UP-TO-DATE</u> CLOTHING Sold direct to consumers at LOWEST PRICES



ever before offered. Buy direct from im-porters and manufacturers. We ship WITH PRIVILEGE OF EXAMINATION, We WITH PRIVILING OF EXAMINATION, We save you from 50 to 50 per cent. A taffor fit suit, \$9.50. Fall or winter overconts, \$5.50. Boys' combination. Suits \$2.18. FIR OVERCOATE A SPECIALTY. Send to-day for Ficke mammoth estalog. Address OXFORD MFC.CO., Clothing Dept.T. 25. 344 Wabash Ave., Chicago, ill.

WANTED SPECIAL TIES OF ALL KINDS TO MANUFACTURE FOR INVENTORS LOUISVILLE ELECTRICAL WORKS, LOUISVILLE, KY.



General or local Agents. \$7.52 Laties or grats. Agents. \$7.52 a work. Exclusive territory. The Rapid Blab Washer, Washer all the dishes for a family in one miputa. Washes, rinses and dries them without westing the bands. You pash the button, the machine does the rest. Bright, polished dishes, and cheerful wives. No scalded flugers, nosoled handsor clothing. No broken dishes, no muss. Cheap, durable, warranted. Gircular stree. W. P. HARRISON & CO., Clark No. 12, Columbus, C.

IF you WANT A BARCAIN-OF WISH to sell MAGIC LANTERNS WANTED ON EXCHANGE HARBACH & CO. 809Filbert St. Phila.Pa.

HIGH GRADE ONLY. Warranted. Contractors desiring a trustworthy Jack Screw, address Rumsey & Co., Ltd., Seneca Falls, N.Y.



≒INCUBATORS.

BELTING of Various Styles, ELEVATORS, CONVEYORS, Chain COAL MINING and HANDLING MACHINERY. The JEFFREY MANUFACTURING CO., COLUMBUS, O.



Routes and Rates to Winter Resorts

THE B. & O. R.R. Co. has just issued a little booklet, giving the routes and rates to various winter resorts in Cuba, Florida, North Carolina, Virginia, New Jersey, Pennsylvania and Georgia. The information is very conveniently arranged and indexed. Copies can be had by inclosing a two cent stamp to

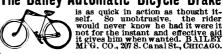
CHAS. O. SCULL, Gen. Pass. Agent,

B. & O. R.R. Baltimore, Md.

A real, practical Electric Motor complete with battery and material for long use, demonstrating electricity as a motive power in the same way it is applied to street ears, etc. Makes 1500 revolutions a minute. Guarante of perfectly made scientifically. Price, \$1, by mail. Also Self-Lighting Match Sale, 10c., postpaid. To Send for Catalogue.

WOOIIS NOVELTY CONCERN,
46 Cortlandt Street,

The Bailey Automatic Bicycle Brake

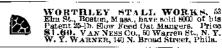


EDGE TOOLS are often nearly ruined by using a grindstone not adapted to the work. Our
quarries produce a large variety of grits
suitable for grinding any tool.

15 May we send you our Catalogue,
which will one you some information?

GRAFTON STONE COMPANY.

No. 80 River Street. GRAFTON, OHIO-





NOW READY!

Fourteenth Edition of

Experimental Science



120 Pages and 110 Superb Cuts added.

Just the thing for a present for any man, woman, student, teacher, or any one interested in science. In the new matter contained in the last edition will be found the Scientific Use of the Phonograph, the curious optical illusion known as the Anorthoscope, together with other new and interesting Optical Illusions, the Optical Projection of Opaque Objects, new experiments in Projection, Iridescent Glass, some points in Photography, including Hand Cameras, Cane Cameras, etc. Systems of Electrical Distribution, Electrical Ore Finder, Electrical Rocker, Electric Chimes, How to Color Lantern Slides, Study of the Stars, and a great deal of other new matter which will prove of interest to scientific readers.

tific readers. 840 pages, 782 fine cuts, substantially and beautifully bound. Price in cloth, by mail. \$4. Half morocco, \$5. Send for illustrated circular.

MUNN & CO., Publishers, Office of the SCIENTIFIC AMERICAN, 361 BROADWAY, NEW YORK.