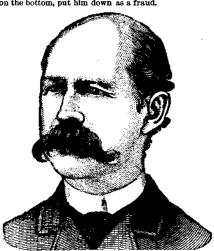
#### Mdvertisements.

Inside Page, each insertion - - - 25 cents a line. Back Page, each insertion - - - \$1.00 a line. The above are charges per agate line—about line.

The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

### CAUTION

Beware of Fraud, as my name and the price are stamped on the bottom of all my advertised shoes before leaving the factory, which protect the wearers against high prices and inferior goods. If a dealer offers W. L. Douglas shoes at a reduced price, or says he has them without my name and price stamped on the bottom, put him down as a fraud.



# .. DOUGLAS \$3 SHOE. GENTLEMEN.

The only calf \$3 SEAMLESS Shoe sm ooth inside. NO TACKS or WAX THREAD to hurt the feet, easy as hand-sewed and WILL NOT RIP.
W. L. DOUGLAS \$4 SHOE, the original and only hand-sewed welt \$4 shoe. Equals custom-made shoes costing from \$6 to \$3.
W. L. DOUGLAS \$3.50 POLICE SHOE. Railroad Men and Letter Carriers all wear them. Smooth inside as a Hand-Sewed Shoe. No Tacks or Wax Thread to hurt the feet.
W. L. DOUGLAS \$2.50 SHOE is unexcelled for heavy wear. Best Calf Shoe for the price.

for heavy wear. Best Calf Shoe for the price.

W. L. DOUGLAS \$2.25 WORKINGMAN'S

SHOE is the best in the world for rough wear; one
pair ought to wear a man a year.

W. L. DOUGLAS \$2 SHOE FOR BOYS is

the best School Shoe in the world.
W. L. DOUGLAS \$1.75 YOUTH'S School
Shoe gives the small Boys a chance to wear the best
shoes in the world.
All made in Congress, Button and Lace. If not sold
by your dealer, write

W. L. DOUGLAS, Brockton, Mass.

ALLEABLE CASTINGS FROM SPECIAL THOMAS DEVLIN & CO. THE TANING JAPAN PATTERNS THOMAS LEHIGH AVE & AMERICAN STORMAR

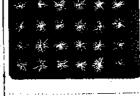
The Franklin Institute of Philadelphia has recently awarded The Scott Legacy Premium Medul to this Company for the adaptability of their system to the Purification of the Water Supply of Cities.

We call attention to the fact that over twenty cities (the two largest plants at present being

are having the benefit of pure water, by the use of our system.

and ATLANTA, GEORGIA)

LONG BRANCH, NEW JERSEY,

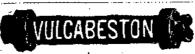


### Patent Riveted Monarch Rubber Belting BEST IN THE WORLD.

Specially adapted for PAPER MILLS, SAW MILLS, and wherever a BELT of UNUSUAL STRENGTH is required.

THE GUTTA PERCHA AND RUBBER MFG. CO. New York, Chicago, San Francisco.

This material is composed of tos, combined with water and and pressed into almost any de-It is superior in many respects nature on account of its resist-and as a non-conductor of elec-



the well-known mineral Asbesacid proof materials, modled sired shape and then vulcanized. to other materials of a similar ance to heat, acid, and alkalies, tricity. For electrical plates, cells, etc., it is unsurpassed.

## W. Johns Manufacturing 87 Maiden Lane, New York,

SOLE MANUFACTURERS OF

H. W. Johns' Asbestos, Millboard, Sheathings, Building Felts, Fire-Proof

Paints, Liquid Paints, Asbestos Roofing, etc. PHILADELPHIA. CHICAGO.

COPPER TUBES.

THE COPYING PAD.—HOW TO MAKE and how to use; with an engraving. Practical directions how to prepare the gelatine pad, and also the antine ink by which the copies are made; hew to apply the written letter to the pad; how to take off copies of the letter. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 43%. Price 10 cents. For sale at this office and by all newsdealers in all parts of the country.

### STEEL BALLS.

For Anti-Friction Bearings, of Best Cast Steel. Hardened, Ground, and Burnished, from 3-16 in. to 2 in. diameter. In quality and density of metal, in uniformity of temper, and in accuracy and nicety of finish warranted unequaled.

Samples and prices on applica-Simond's Rolling-Machine Co., Fitchburg, Mass

PRESERVATION OF MEAT Apply to Dr. Salzer, 613 Park Ave., Baltimore, Md

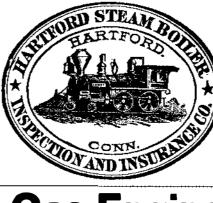
SEVERN AND MERSEY TUNNELS. Full description of these two important engineering works, with two engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 604. Price 10 cents. To be had at this office and from all newsdealers.

# ERIE ENGINE WORKS WALNUT STREETENE PA STATIONARY - PORTABLE A GRICULTURAL - ENGINES STATIONARY - PORTABLE VERTICAL - BOILERS.

THE AGE OF THE STARS.—BY Prof. Janssen. History of the discoveries that have led to the introduction of the doctrine of evolution in the science for estronomy. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NOS. 630 and 631. Price 10 cents each. To be had at this office and from all newsdealers.



THE PHONOGRAPH.—A DETAILED description of the new and improved form of the phonograph just brought out by Edison. With 8 engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 632. Price 10 cents. To be had at this office and from all newsdealers.



# New Cas Engine "The Baldwin"

A four horse-power engine in connection with storage battery, running 84 incandescent electric lights (and without battery, 23 lights), siving a perfect light, with all the steadiness that can be obtained from the high-speed steam engines in common use for electric lighting, and permitting any number of lights to be shut off or turned on without affecting the remaining lights in the slightest degree. A marvel of beauty, perfection, and power, adapted to lighting, pumping, and all purposes where a safe and cheap power is required. Manufactured and guaranteed by

Otis Brothers&Co. Elevators and Hoisting Machinery, 38 PARK ROW, NEW YORK.

RAILS FOR STREET RAILROADS.
A paper by A. W. Wright, C.E., discussing the compative value of iron and steet as materials forstreet rated rails. Contained in SCHENTIFIC AMERICAN STRIEDMENT, NO. 499. Price 10 cents. To be had at the office and from all newsdealers.

system.

The largest Sugar Refineries, Paper Makers, and other Manufactories in all parts of the country have for years used our filters with great satisfaction and benefit. We have suits against the National, Jewell, and other Companies who infringe our patents. HYATT PURE WATER COMPANY,

16, 18 & 20 Cortlandt St., N. Y. City.

The 57th Annual Exhibition

American Institute of the City of New York Will Open OCTOBER 3, 1888.

Intending Exhibitors must make early application to secure proper space and classification. For blanks and information, address General Superintendent, American Institute, New York City.



Automatic of Engines

Horizontal and Vertical.

Specially adapted for Electric Lighting. Yacht and Hoist-ing Engines. Turbine water wheels. Constructors of Special YORK MANUF'G CO., YORK, PA., U.S.A

MESSRS. MUNN & CO., in connection with the publi-tation of the SCIENTIFIC AMERICAN, continue to ex-mine improvements, and to act as Solicitors of Patents

cation of the SCIENTHIC AMERICAN, continue to examine improvements, and to act as Solicitors of Patents
for Inventors.

In this line of business they have had forty-on-years
experience, and now have unequaled factities for the
prosecution of Applications for Patents in the United
states, Canada, and Foreign Countries. Messrs Munn &
Co. also attend to the preparation of Caveats, Copyrights
for Books, Labus, Reissues, Assignments, and Reports
on Infringements of Patents. All business intrusted 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 Patent, Laws, showing the cost and method of securing

b, etc. s also send, freeof charge, a Synopsis of Foreign Pa-Laws, showing the cost and method of securing nts in all the principal countries of the world.

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

ESTABLISHED HALF A CENTURY.

PATENTED NOT FOUND IN OTHER MAKES THAT WILL WELL REPAY AN INVESTIGATION BY THOSE WHO TO SECURE THE BEST SAFE

MARVIN SAFE CO. NEW YORK, PHILADELPHIA, LONDÓN. ENGLAND.

INV ENTORS and others desiring new articles manufactured and introduced, address P. O. Box 86, Cleveland, O.



# THE AMERICAN BELL TELEPHONE CO.

95 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent granted to Alexander Graham Bell, March 7th, 1876, No. 174,465, and January 30th, 1877. No. 186,787.

The transmission of Speech by all known forms of Electric Speaking Telephones infringes the right secured to this Company by the above patents, and renders each individual user of telephones not furnished by itor its licensees responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor



ers, Trenton, N. J., or 117 Liberty Street, New York.
Wheels and Rope for conveying power long distances.
Send for circular.



# The Original Unvolcanized Packing.

CALLED THE STANDARD—As it is the Packing by which all others are compared.

Accept no packing as JENKINS PACKING unless stamped with our "Trade Mark."

JENKINS BROS. (21 John Street, N. Y. 106 Milk Street, Roston. 21 North 5th St., Phila. 54 Dearborn St., Chicago.

# ICE and REFRIGERATING MACHINES

361 Broadway, New York.

BRANCH OFFICES.—No. 622 and 624 F Street, Pacific all CE Company (Limited), Room 6, Coal & Iron Exchange, New York.

The Piotet Artificial Ice Company (Limited), Room 6, Coal & Iron Exchange, New York.

# CHALLENGE, E MERY CRINGING

BRASS WORK Small Brass Work & Models A Specialty.

Also Nickel Plating.
T. L. Mick EEN,
Enston, Penn.

JAMES B. EADS.—AN ACCOUNT OF the life and labors of this eminent engineer. With a portrait. Contained in SCIENTIFIC AMERICAN SUPPLE-MENT, NO. 592. Price 10 cents. To be had at this office and from all newsdealers.

#### AUTOMATIC CUT OFF ENGINES GOVER AND FACTURED UPON SCIENTIFIC AND PRACTICAL PRINCIPL BALL ENGINE CO. ERIE PA

SAWS Wanted 50.000 Sawyers SAWS
send us their full address for a copy of Emerson's LET Book of SAWS. We are first
to introduce NATURAL (AS for heating and
tempering Saws with wonderful effect upmore improving their quality and toughness,
enabling us to reduce prices. Address
SEMERSON, SMITH & CO. (Ltd.),
Beaver Falls, Pa.

Barnes' Patent Foot Power Machinery. ... WORKERS OF WOOD OR METAL,

without steam power, by using outfits of these Machines, can bid lower, and save more money from their jobs, that by any other means for doing their work. Also for Industrial Schools or Home Training. With them boys can acquire practical journeymen's trades before they "go for themselves." Price-List Catalogue Free.

W. F. & JOHN BARNES CO.

No. 1999 ... Ruby St., Bockford, Ill.

# Scientific American

ESTABLISHED 1846.

The Most Papular Scientific Paper in the World.

Only **83.**00 a Year, including Postage. Weekly. 52 Numbers a Year, This widely circulated and splendidly illustrated

paper is published weekly. Every number contains sixeen pages of useful information and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions. Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc. Complete List of Patents each week.

Terms of Subscription.—One copy of the SCIEN-TIFIC AMERICAN will be sent for one year—52 numbers postage prepaid to any subscriber in the United States or Canada, on receipt of three dollars by the publishers; six months, \$1.50; three months, \$1.00.

Clubs.—Special rates for several names, and to Post Masters. Write for particulars.

The safest way to remit is by Postal Order, Draft, or Express Money Order. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO., 361 Broadway, New York.

#### Scientific American Supplement.

This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages full of engravings, many of which are taken from foreign papers, and accompanied with translated descriptions. THE SCHENTIFIC AMERICAN SUPPLEMENT is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geclogy, Mineralogy, Natural History Geography, Archæology Astronomy, Chemistry, Electricity, Light. Heat, Mechanical Engineering. Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Technology, Manufacturing Industries, Sanitary En-gineering, Agriculture, Horticulture, Domestic Econo-my, Biography, Medicine, etc. A vast amount of fresh and varuable information obtainable in no other pub-

The most important Engineering Works, Mechanisms, and Manufactures at home and abroad are illustrated and described in the SUPPLEMENT.

Price for the SUPPLEMENT for the United States and Canada, \$5.00 a year, or one copy of the SCIENTIFIC AM-ERICAN and one copy of the SUPPLEMENT, both mailed for one year for \$7.00. Single copies 10 cents. Address and remit by postalorder, express money order, or check,

MUNN & Co., 361 Broadway, N. Y., Publishers SCIENTIFIC AMERICAN.

#### Builders Edition.

THE SCIENTIFIC AMERICAN ARCHITECTS' AND BUILDERS' EDITION is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors, and with other fine engravings; illustrating the most interesting ex amples of modern Architectural Construction and allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with full Plans, Specifications, Sheets of Details, Estimates, etc.

The elegance and cheapness of this magnificent work have won for it the Largest Circulation of any Architectural publication in the world. Sold by al newsdealers. \$2.50 a year. Remit to

MUNN & CO., Publishers, 361 Broadway, New York.

# PRINTING INKS. THE "Scientific American" is printed with CHAS