

Advertisements.

ORDINARY RATES.

Inside Page, each insertion, - 75 cents a line
Back Page, each insertion, - \$1.00 a line
For some classes of Advertisements, Special and Higher rates are required.

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. Drawings 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 the following week's issue.



VICTOR
OVERMAN WHEEL CO.
BOSTON, WASHINGTON, DENVER, SAN FRANCISCO.
A. G. SPALDING & BROS., Special Agents,
CHICAGO, NEW YORK, PHILADELPHIA.

COLD FORGED PRODUCT.

Fluted Tire Bolt

Patented Nov. 11, 1890; Oct. 20, 1891.



stiffer and stronger than a common bolt. The fluted shank prevents the bolt from turning in the rim and tire.

COLD FORGED MACHINE SCREWS
STOVE BOLTS
LOCK CAP SCREWS
SIDE KNOB SCREWS
THREADED WIRES

AMERICAN SCREW COMPANY,
PROVIDENCE, R. I.

LINK-BELT MACHINERY CO.

Link-Belt and Sprocket Wheels
Elevators and Conveyors
Rope Transmissions
Special Mining Machinery
Special Woodworking Machinery
Gear, Pulley, Sheave and Fly
Wheel Castings. Send for Circular "C."

AGENTS WANTED FOR FINE TOOLS IN EVERY SHOP.
C. H. BESLY & CO.
CHICAGO, ILL. U.S.A.

POP SAFETY VALVES are a necessity, and it is therefore very important to have the best; one that is durable, simple, reliable, and accurate. If you want the best, buy "Lunkenheimer's," it has a large spring, full relieving capacity, and is very sensitive. Every valve thoroughly tested and fully warranted. Provided with a lock key attachment to prevent tampering with. Approved and allowed by the Board of Supervising Inspectors for marine use. For sale by leading dealers everywhere. Send for catalogue of superior specialties of interest to steam users. Mention *Scientific American*. The Lunkenheimer Company, successor to THE LUNKENHEIMER BRASS MFG. CO., Cincinnati, Ohio, U.S.A.

Never
NEVER
NEVER !

The long spring is never made now.

Now
it is the

Quick-winding
Waterbury.

Genuine.
Jeweled.
Accurate.
Handsome.

See it.

All jewelers sell it.
All styles, \$4 to \$15.

PATENTS!

MESSRS. MUNN & CO., in connection with the publication of the *SCIENTIFIC AMERICAN*, continue to examine improvements, and to act as Solicitors of Patents in this line of business they have had forty-five 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. Messrs. 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 OFFICES:—Nos. 622 and 624 F Street, Pacific Building, near 7th Street, Washington, D. C.

LOVELL DIAMOND CYCLES

HIGHEST GRADE. LOWEST PRICES.

FOR LADIES OR GENTLEMEN

Pneumatic Tires, \$115, \$100, \$85.
Cushion Tires, 105, 90, 75.

John P. Lovell Arms Co., Manufacturers
BOSTON, MASS.

Cycle Catalogue Free.

AGENTS WANTED

The Sample Tells the Story

A sample of Dixon's pure flake lubricating Graphite, with an interesting and instructive pamphlet showing the experience of practical and scientific men in using this wonderful lubricant, sent free of charge.

JOS. DIXON CRUCIBLE CO.
JERSEY CITY, N. J.

KODAK FILMS.

Our New Films are giving perfect satisfaction. They are highly sensitive, and repeated tests show that they retain this sensitiveness as well as glass plates. No other films are so free from imperfections; none so uniform; none so reliable. Our film doesn't frill.

Eastman Kodak Co.,
Rochester, N. Y.



The Smith Premier Typewriter

Embodies the most Progressive Mechanical Principles.
All the Essential Features Greatly Perfected.
Perfect and Permanent Alignment.

Easiest Running, and Nearly Silent.
All type cleaned in Ten Seconds without Soiling the Hands.
The Smith Premier Typewriter Co., Syracuse, N. Y., U. S. A.
We have 20 branch offices in the principal cities throughout the United States.

James Smith Woolen Machinery Co.

MANUFACTURERS OF

THE HUB FRICTION CLUTCH.

POWER TRANSMISSION MACHINERY.

411 to 421 Race Street, PHILADELPHIA, PA.
NEW DOUBLE LEVER HUB FRICTION CLUTCH.

The Best Clutch Pulley in existence for Electric Light Plants and all Machinery requiring great speed. The most simple, effective, durable, and economical Clutch on the market. Made in sizes to transmit from two up to one thousand h. p. The Hub Friction Clutch is in use in all parts of the United States. More than 12,000 sold. Write for Cuts, Description, etc.

At 1/4 Price
Gold and Silver Watches, Bicycles, Tricycles, Guns and Pistols, Cars, Buggies, Wagons, Lumbering Saws, Sleighs, Harness, Cart Tops, Sleds, Letter Presses, Jack Screws, Trucks, Anvils, Hay Cutters, Press Stands, Copy Books, Vases, Drills, Road Plows, Lawn Mowers, Coffee Mills, Lathes, Benders, Bumpers, Corn Shellers, Hand Curls, Forges, Scrapers, Wire Feeds, Planing Mills, Wringers, Engines, Saws, Steel Nicks, Grain Pumps, Crow Bars, Rollers, Tools, Bit Brasses, Hay, Stock, Elevator, Railroad, Platform and Counter SCALES. Send for free Catalogue and see how to save money. 151 So. Jefferson St., CHICAGO SCALE CO., Chicago, Ill.

ASTRONOMY
Poole Bros. Celestial Planisphere and Celestial Handbook just published.
For descriptive circular address: **POOLE BROS., CHICAGO, ILL.**

CONTRACTS WANTED FOR LIGHT METAL WORK
SEND IN YOUR **MODELS**
SPECIAL FACILITIES FOR MAKING MODELS

H.W. JOHNS' ASBESTOS STEAM PACKING

Boiler Coverings, Millboard, Roofing, Building Felt, Liquid Paints, Etc.
DESCRIPTIVE PRICE LIST AND SAMPLES SENT FREE
H. W. JOHNS MFG. CO., 87 Maiden Lane, N.Y.



THE EDISON INCANDESCENT LAMP

IS THE ONLY INCANDESCENT LAMP LAWFULLY MADE.

All others infringe the Edison Patents, and are counterfeits.

THE RIGHT OF THE EDISON COMPANY TO AN INJUNCTION AGAINST INFRINGERS HAS BEEN DETERMINED BY THE U. S. CIRCUIT COURT OF APPEALS. COPIES OF DECISIONS SENT ON APPLICATION.

GENERAL ELECTRIC COMPANY.

BRANCH OFFICES:

44 Broad Street New York
175 and 176 Adams Street Chicago, Ill.
284 West Fourth Street Cincinnati, O.
Gould Building Atlanta, Ga.
15 First Street San Francisco, Cal.
620 Atlantic Avenue Boston, Mass.
509 Arch Street Philadelphia, Pa.
407-409 Sibley Street St. Paul, Minn.
133 F Street N. W. Washington, D. C.
Masonic Temple Denver, Colo.

All business outside the United States transacted by Thomson-Houston International Co., 44 Broad St., New York.

1898 NEW MAIL MODEL



Highest Quality and Handsomest Light Roadster of the Year.
Men's and Ladies' pattern, Cushion Tires, \$105
Pneumatic " 125
Boys' High Grade New Mail, " 65
Cushion " 55
Send for catalogue. **W. M. READ & SONS, Mfrs.**
107 Washington Street, Boston, Mass.

The American Bell Telephone Company

125 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent No. 186,787, granted to Alexander Graham Bell, January 30, 1877, the scope of which has been defined by the Supreme Court of the United States in the following terms:

"The patent itself is for the mechanical structure of an electric telephone to be used to produce the electrical action on which the first patent rests. The third claim is for the use in such instruments of a diaphragm, made of a plate of iron or steel, or other material capable of inductive action; the fifth, of a permanent magnet constructed as described, with a coil upon the end or ends nearest the plate; the sixth, of a sounding box as described; the seventh, of a speaking or hearing tube as described for conveying the sounds; and the eighth, of a permanent magnet and plate combined. The claim is not for these several things in and of themselves, but for an electric telephone in the construction of which these things or any of them are used."

This Company also owns Letters Patent No. 463,569, granted to Emile Berliner, November 17, 1891, for a Combined Telegraph and Telephone; and controls Letters Patent No. 474,231, granted to Thomas A. Edison, May 3, 1892, for a Speaking Telegraph, which cover fundamental inventions and embrace all forms of microphone transmitters and of carbon telephones.

THE COMET CRUSHER
THE GREAT BALLAST AND ORE BREAKER
SEND FOR CATALOGUES
6-8-8-00
FRASER & CHALMERS
133 FULTON ST.
W. CHICAGO ILL.
& 2 WALL ST. NEW YORK
Mention the *SCIENTIFIC AMERICAN*.

THE STATE for OREGON

A Great Field for Manufacturers and Factories. Portland is its great industrial center. Her perfect water power unequalled anywhere, has every facility of location for Mills and Factories. Is situated on tide water at the terminal connecting point of Railroad and Sea and River navigation.

Full information furnished free by the Oregon State Board of Immigration, Portland, Oregon.

PATENT JACKET KETTLES

Plain or Porcelain Lined.
Tested to 100 lb. pressure. Send for Lists.
BARROWS-SAVERY CO.,
S. Front & Reed Streets, Philadelphia, Pa.

ELECTRO VAPOR ENGINE.

GAS OR GASOLINE FOR FUEL.
NO BOILER. NO FIRE. NO DANGER.

NO ENGINEER.
Engine operated by spark from small battery.
You turn the Switch.
Engine does the rest.
Kane's Electro Vapor Stationary and Marine Engines, 1/2 h. p. upward, and Kane's Electro Vapor Pumping Engines, 350 to 10,000 gallons capacity.

—MANUFACTURED BY—
THOMAS KANE & CO.,
CHICAGO, ILL.

Send stamp for catalogue "V."

SYLPH CYCLES RUN EAST
Pneumatics not enough; springs necessary for comfort & safety. Sylph spring frame saves muscle & nerves & is perfect. All users delighted. Investigate. We also make 30th rigid Sylph. Catalogue free.
House-House Cycle Co. Mfrs. 10 G St., Peoria, Ill.

PRINTING INKS.

The *SCIENTIFIC AMERICAN* is printed with CHAS. ENED JOHNSON & CO'S INK, Tenth and Lombard Sts., Philadelphia, and 47 Rose St., opp. Duane, New York.