### Advertisements.

Inside Page, each insertion - - 75 cents a line Back Page, each insertion - - - \$1.00 a 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 bead 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.



ARTIFICIAL INCUBATION.—A scription of the French process of raising chickens. With 7 figures. Contained in Scientific American Supplement, No. 278. Price 10 cents. To be had at this office and from all newsdealers.



## TLE WONDERS





and shaped Diamond Carbon Points, Indispensable for Truing Porcelain, Celluloid, Parkener Steel, Chilled Iron, Hard Rub-Ther, Cotton Husk, Paper, Calender and Deep Corper Rolls, for Facing or Turning Hard Rub-Ther, Cotton Husk, Paper, Calender and Deep Corper Rolls, for Facing or Turning Hard Wherein there is much Friction, the Diamond becomes an Important and Innaluable Adjunct, though their Cost may appear at first High. But after considering their Durability, in bedding their edge, Sawing of Time over those of Steel Tools in Grinding, as well as the effectiveness and illimitable Revolutions which they can stand, and truth of work produced, they have proved the Most Economical, Effective and Durable Tool New in Use. Practical Mechanics and Paper Makers using them pronounce these Points a marvel of the age for efficiency and durability, doing that which no steel tool can do. Afterturningthe Rolls, when inspected by a microscope, there is no perceptible wear. They are now extensively used in Rolling, Paper Mils and Bleacheries, both in this country and Europe. The subscriber is "dentified" with the Diamond and "Emery Whee!" trade as the Pioneer maker of Diamond Tools soince introducing the use of his Points and tools for the above purpose. Numerous composite wheels and new industries have been created where their "walue" has proved incalculable. Diamond Points reground and sharpened. Carbon Tools reset and new carbons furnished for the same. Also, glaziers' diamonds manufactured and reset. Send number of tool desired to L. BICKINSON, 64 Nassau Street, New York.

tured and reset. Send number of tool desired to J. DICKINSON, 64 Nassau Street, New York

## PLATINUM.

PLATINUM WIRE, CRUCIBLES, DISHES, etc., and Refiner of Platimum, Gold, and Silver. Hazrierd work a specialty. Old ware remade and scrapbought. MALVERN FLATINUM WORKS, MALVERN, PA., JOHN C. EXTRIBEN, Proprietor.

Minerals & Scientific Books. The largest stock in the world. Complete pieces of the Meteoric Iron from Canon Diablo, described in this paper Aug. 29. 50 cts. and upward. Send for catalogue, specifying in what branch of science you are interested.

A. E. FOOTE, 116 Elm Ave., Philadelphia, Pa.

## PATENT JACKET KETTLES

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



We also make all our Tools same principle, at the BEST NAT!
WORKNASHIP, and always # f time and labor saying in their use.

MESSRS. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN, centinue to examine improvements, and to act as Solicitors of Pa ents for Inventors.

In this line of business they have had ferty-five years' experience, and now have unaquated 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 busness 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 Patents, etc.

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.—No. 622 and 624 F Street, Pa-cific Building, near 7th Street, Washington, D. C.

### PACKING, BELTING, HOSE, MATS, MATTING, ETC. FIGHTALE LEVATORS Established 1855.



The Largest Manufacturers of Mechanical Rubber Goods in the World

THE GUTTA PERCHA AND RUBBER MFG. CO.

Para Building, 35 Warren St., New York.

Send for Catalogue.

San Francisco, Portland, Oregon.



Economy, Rellability, Simplicity, Safety.

THE Motor of 19th Century
Can be used Any Place, to do Any
Work and by Any One. No Boiler! No Fire! No Steam! No
Ashes! No Gauges! No Enrineer! A perfectly safe Motor
for all places and purposes. Cost
of operation about one cent an
hour to each indicated horse gover. For circulars, etc., address
CHADTER CAS FNGINF CO. CHARTER GAS ENGINE CO. P.O. Box 148, Sterling, 111.



### Styles and ALL LOADED WITH **Transparent**

THE EASTMAN COMPANY

NEW KODAKS

" You press the button,

ree do the rest."

Seven New

ROCHESTER, N. Y

Sizes



ATMOSPHERIC DUST.—BY WILLIAM Marcet, F.R.S. An address delivered to the Royal Meteorological Society. Contained in SCIENTIFIC AMBRICAN SUPPLEMENT, NO. 755. Price 10 cents. To be had at this office and from all newsdealers.



# SIEMENS'+CABI

TELEGRAPH, SUBMARINE, UNDERGROUND, TELEPHONE, ELECTRIC LIGHT. INTERIOR,

Manufactured under authority of

SIEMENS & HALSKE by THE EDISON GENERAL ELECTRIC CO. at their SCHENECTADY WORKS.

Cable and Wire Department, Edison General Electric Company EDISON BUILDING, Broad St., NEW YORK.



# \$85 Lovell Diamond Safety \$85

Diamond Frame, Steel Drop Fergings, Steel Tubing, Adjustable Ball Bearings to all Running Parts, including Peals. Suspension Saddle. Finest material money can buy. Finished in enamel and nickel.

Strictly high grade in every particular. No better machine made at any price.

Bicycle Catalogue Free. Send six cents in stamps for our 100-page illustrated catalogue
of Guns, Riftes, Revolvers, Sporting Goods of all kinds, etc. JOHN P. LOVELL ARMS CO., 147 Washington Street, BOSTON, MASS.

JAMES WATT, AND THE APPLICAtion of Science to the Mechanical Arts.—By Archibald
Barr, B.Sc. A very interesting review of the life work
of the celebrated engineer, with the lessons to be drawn
from it by those who are entering upon the study of
science with a view to its application in engineering
work. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 744. Price 10 cents. To be had at this crice
and from all newsdealers.



Perfect Newspaper File
The Koch Patent File, for pre erving Newspapers, Magazines, and Pamphlets, has been recently improved and price reduced. Subscribers to the Scientific American and Scientific American Supplement can be supplied for the low price of \$1.50 by mail, or \$1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN" in gilt. Necessary for every one who wishes to preserve the paper. Address MUNN & CO., Publishers SCIENTIFIC AMERICAN,

BUILDERS OF HUB. SPOKE, WHEEL, WACON Carriage

No. O, HUB TURNING LATHE. Obje, C. S. A.

POROUS EARTHENWARE - BY Chas. C. Gilman. An elaborate discussion of terra cotta lumber and its future uses. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 804. Price 10 cents. To be had at this office and from all newsdealers.



A patent on horse-detaching harness. Can turn a horse loose from a burgy when running in a few seconds by pulling a strap. I have one set of harness will work perfect on any horse or buggy. \$500 for the patent and set of harness. J. H. AKERS, Belvedere Hotel, Washington, D. C. PELTON WATER MOTOR.

# Unequaled for all light running ma-chiners, Warranted to develop a given amount of power with one-half the motor required by anyother. Evidence water required by anyother. Evidence of unquestioned superiority afforded on application. E. Send for Circular. Address. The Pelton Water Wheel Co., 174 Main Strat, San Francisco, Ca., or 295a Central Buraing, Liberty & West Sta, N. Y.

CONSTIPATION, - BY C. L. DODGE,

M.D. A practice paper on the nature and cure of this complaint. Contained in South TOTA A MERICAN SUPPLIES WENT, NO. 278. Price 10 cents. To be had at this office and from all newsdealers.



COMPLETE STOCK OF

Double Brace, Self-Oiling, Adjustable Ball and Socket Hangers, Pillow Blocks, Post Hangers, Etc.

Edison Patent Compression

EDISON GENERAL ELECTRIC CO., SCHENECTADY, N. Y.



### HARRISON CONVEYOR! Handling Grain, Coal, Sand, Clay, Tan B.rk, Cinders, Ores, Seeds, &c.

Send for BORDEN, SELLECK & CO., { Sole of the clirculars. | BORDEN, SELLECK & CO., { Manu'f'ers. } Chicago, III.

# 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 it or its licensees responsible for such unlawful use, and all the consequences Films. thereof, and liable to suit therefor.

# BALL AUTOMATIC MADE ONLY CUT OFF ENGINE THE BALL ENGINE CO.

### GEAR CUTTING

Leland, Faulconer & Norton Co., Detroit, Mich

THE



ESTABLISHED 1846. The Most Popular Scientific Paper in the World

Only \$3.00 a Year, Including Postage. Weekly-52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains six-teen 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, Canada, or Mexico, on receipt of three dollars by the publishers; six months, \$1.00; 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.

### THE Scientific American Supplement

This is a separate and distinct publication from THE CIENTIFIC 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 SCIENTIFIC 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, Geology, 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 Engineering, Agriculture, Hortlculture, Domestic Economy, Biography, Medicine. etc. A vast amount of fresh and valuable information

obtainable in no other publication.

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 AMERICAN and one copy of the SUPPLEMENT, both mailed for one year for \$7.00. Single copies, 10 cents. Address and remit by postal order, express money order, or check,

MUNN & CO., 361 Broadway, New York,

Publishers SCIENTIFIC AMERICAN

## Building 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 spleadid Magazine of Architecture, richly adorned with elegant plates in colors, and with other fine engravings; illustrating the most interesting examples 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 all newsdealers. \$2.50 a year. Remit to

MUNN & CO., Publishers,

361 Broadway, New York.

## Printing inks The SCIENTIFIC AMERICAN is princed with CHAS. ENEU JOHNSON & CO.'S INK, Tenth and Lombard Sts., Philadelphia, and 47 Rose St., opp., Duane, New York

Machinery.

DEFIANCE,