Advertisements.

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 adver-thements at the same rate per agate line, by measure-dent, as the letter press. Advertisements must be received at publication office as early as Thursday morn-ing to appear in next issue.

NO MAN CAN UNDERSTAND the progress has been made in shoe manufacturing until he has worn a pair of the James Means \$4 Shoes, and thus compared them with the shoes heretofore sold for twice the money. Ask your dealer for them.



Shoes from our celebrated factory are sold by the best retailers throughout the United States, and we will place them easily within your reach in any State or Territory if you will send us a postal card, mentioning THE SCIENTIFIC AMERICAN.

JAMES MEANS & CO.,



JENKINS BROS. VALVES. THE ENDERSEMENT OF FIRST-CLASS ENGINEERS AND MECHANICS THROUGHOUT THE COUNTRY has felly de-monstrated these valves to possess the following advantages over all other valves now in use: 1. A perfectly tight valve under any and all pressures of steam, oils, or gases. 2. Sand or grit of any kind will not injure the seat. 3. You do not have to lake them off to repair them. 4. They can be repaired by any mechanic in a few minutes. 5. The clasticity, of the Disc allows it to adapt itself to an imperfect surface. In Valves having ground or metal seats, should sand or grit ket upon the seat, it is impossible to make them tight, except by regrinding, which is expensive if done by hand, and if done by machine soon wears out the valve. and in most cases they have to be disconnected from the pipes, often costing user than a new valve. The laking Discs used in these valves are manufactured under our 1850 patent, and will stand any pressure of steam, oils, or acids, JENKINS BROS., 71 John St., N. Y.: 105 Mik St. Boston; 13 So. Fourth St., Phila.; 54 Dearborn St., Chicago.

100 - 115 115 - 115 1 - 116 OPPER TUBES Mention this paper.

ICE-HOUSE AND COLD ROOM.-BY R G. Hatfield. With directions for construction. F rengravings. Contained in SCIENTIFIC AMERICAN S PLEMENT, 59. Frice 10 cents. To be had at this of and of all newsdeslers. G. Hatfield

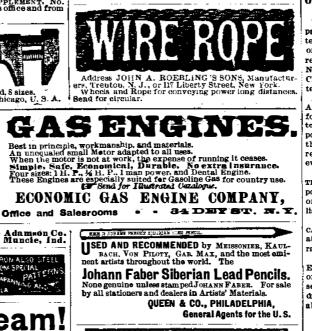
DOSS WEGRAVING (0 35 PEANLY -2R DVA TECHNIK FAE ILLUTIRATED CHANGAVES BY OVR NEW DAY TYPE PROCESS

Send Green Stamp for Most The Specimens

GOLD MINING MACHINERY, - DE scription of some new mining plunds constructed in Ecolard for use in the Transwall Austria and Hungary With 10 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 543. Friendlocats. To be had at this office and from all newsdeekers.



RAILS FOR STREET RAILROADS.— A paper by A. W. Wright. C.E., discussing the compar-ative value of iron and steel as materials forstreet rail-road rails. Contained in SCIENTIFIC AMERICAN SUP-PLEMENT, No. 449, Price to cents. To be had at this office and from all newsdealers.



)hoto ENGRAVING (O' 67 PARK PLACE NEW YORK ENGRAVING FOR ALL ILLUSTRATIVE ANT ADVERTISING PURPDEES

THE CHEAPEST AND BEST

BOOKS. Manufacturers, Agriculturists, Chemists, Engineers, Me chanics, Builders, men of leisure, and professional men, of all classes, need good books in the line of their respective callings. Our post office department permits the transmission of books through the mails at very small cost. A comprehensive catalogue of useful books by different authors, on more than fifty different subjects, has recently been published for free circulation at the office of this paper. Subjects classified with names of author. Persons desiring a copy, have only to ask for it, and it will be mailed

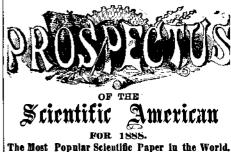
We are prepared to furnish the finest quality of THROUGH PUNCHES and DIEN for MATAL. WURK, for the manufacture of which we have un-equalled facilities. Henry Disston & Sons. Incorporated, Jobbing Department. Front & Laurel Sts., Phila., Pa.

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.

 ${\bf The \, transmission \, of \, Speech \, by \, all \, known}$ 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 thereof, and liable to suit therefor.





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, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity Telegraphy, Photography, Archi-tecture, Agriculture, Horticulture, Natural History, etc. **All Classes of Readers find in the SCIENTIFIC** ABERICAN a popular resume of the best sufferning in formation of the day; and it is the aim of the publishers to precent it is an attractive form. avoiding as much as possible abstruse terms. To every intelligent mind, this journal affords a constant supply of instructive reading. It is promotive of knowledge and progress in every community where it circulates.

every community where it circulates. 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.—One extra copy of the SCIENTIFIC AMERI-CAN will be supplied gratis for every club of five subscribers at \$3.00 each; additional copies at same proportionate

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 SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages. THE SCIENTIFIC AMERICAN SUPPLEMENT is published weeky, 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, Archeology. Astronomy, Chemistry, Electricity, Light. Heat, Mechanical Engineering. Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography. Sechnology, Manufacturing Industries, Saritary Engineering, Agriculture, Horticulture, Donratte Econo-my, Biography, Medicine, etc. A vast amount of fresh and valuable information pertaining to these and allied subjects is given, the whole profusely illustrated with engravings.

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

NEW YORK, PHILADELPHIA, LONDON. ENGLAND. EN' 5.

.MARVIN SAFE CO.

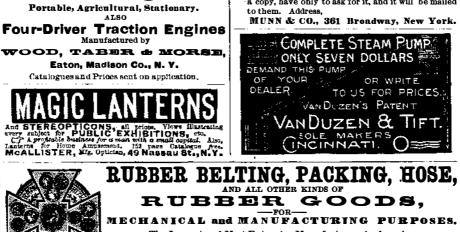
MESSRS. MUNN & CO., in connection with the publi-ation of the SCIENTIFIC AMERICAN, continue to ex-mine improvements, and to act as Solicitors of Patents or Inventors.

for inventors. In this line of business they have had forty the wars experience, and now have unequaled factifies for the preparation of Patent Drawing, Specifications, and the prosection of Applications for Patents in the United States, Canada, and Foreign Countries. Nears Munn & Co also attend to the preparation of Careats, Copyrights for Intring Fables, Results, All business intrusted to them is done with special care and promptness, on very **reasonable** terms

reasonaute terms A pamphlet sent free of charge, on application, con taining full isformation about Patents and how to pre-oure them; directions concerning Labels, Copyrights Designs, Fatents, Appeals, Relissues, Infringements, As signments, Rejected Cases, Hints on the Sale of Pa-tents, etc.

We also send, free of charge, a Synopsis of Foreign Pa-tent Laws, showing the cost and method of securing pstents 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 othe Building, near 7'h Street, Washington, D. C.



Elmira, N.Y.

Steam Engines.

The Largest and Most Extensive Manufacturers in America. THE GUTTA PERCHA AND RUBBER MFG. CO. New York, Chicago, San Francisco, Toronto.

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. Address and remit by postal order. express money order, or check,

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

To Foreign Subscribers.-Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to sub-scribers in Great Britain. India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, and all States of Central and South America. Terms, when sent to foreign countries, Canada and Mexico, excepted \$4, gold, for SCIENTIFIC AMERICAN, one year; \$9, gold for both SCIENTIFIC AMERICAN and SUPPLEMENT for one year. This includes postage, which we pay. Remit hy postal or express money order, or draft to order of MUNN & CO., Str Broadway, New York,

