# Scientific American.

## ESTABLISHED 1845

MUNN & CO.,

EDITORS AND PROPRIETORS

PUBLISHED WEEKLY AT

No. 361 BROADWAY, = = NEW YORK.

#### TERMS FOR THE SCIENTIFIC AMERICAN. (Established 1845.)

#### The Scientific American Supplement (Established 1876)

LESTROHESICAL TYPO

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octave pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for the U.S., Canada or Mexice. \$\$6.00 a year, or £14.8 \$4, to foreign countries belonging to the Postal Union. Single copies 10 cents. Seld by all newsdealers throughout the country. See prospectus, last page.

-Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U.S., Canada or Mexice, on receipt of seven dellars. To foreign countries, eight dollars and fifty cents a year, or £1 ls. 11d., postage prepaid.

#### Building Edition of Scientific American. (Established 1885.)

THE BUILDING EDITION OF THE SCIENTIFIC AMERICAN is a large and splendidly illustrated periodical, issued monthly, containing floor plans and perspective views pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in greatvariety. To architects, builders, and all was contemplate building this work is invaluable.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, \$2.50 a year. To foreign countries, \$3.50 a year, or £0.128. 44. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to me address, \$5.00 a year. To foreign countries, \$6.50 a year, or £1.68. 48. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN, and SUPPLEMENT, \$5.00 a year.

### Export Edition of the Scientific American (Established 1878)

with which is incorporated "LA AMERICA CIENTIFICA E INDUSTRIAL," or Spanish edition of the SCIENTIFIC AMERICAN, published monthly, uniform in size and tyoography with the SCIENTIFIC AMERICAN. Every number contains about 100 pages, prefusely illustrated. It is the fines scientific industrial expert paper published. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. THE SCIENTIFIC AMERICAN EXPORT EDITION has a large guaranteed circulation in all commercial places throughout the world. \$3.00 a year, or \$20 IS. 4d., postpaid to any part of the world. Single copies, 25 cents. MUNN & CO., Publishers, 361 Broadway, New York. The safestway to remit is by postal order, express mency order, draft or bank check. Make all remittances payable to order of MUNN & CO.

The Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

## NEW YORK, SATURDAY, JUNE 5, 1897.

## Contents.

(Illustrated articles are marked with an asterisk.)

•	
A. A. S. Detroit meeting 355 African travels, Miss Kingsley's* 361	Meteorology in Persia
Bicycle frame improvement, Pinover's*	Nile cataracts, utilizing the 354 Notes and queries 364
Bicycle trip, another army 354 Boiler explosion, peculiar* 357	Patent infringement, large award for*
Books, new 364	Patents granted, weekly record
Boys and girls, timidity of 357 Colors to be used judiciously 357	•f
Cowboy, the South American 359	Photography and fog 355
Dumping scew for N. Y. City* 353 Engineers' Society meeting 355	Science notes
Fire engine valve, valuable patent on*	Spider's thread, size of a
Feg and photography 355	Ternade drills, Kansas 355
Gas engines in the U.S	Thames tunnel, the new
Inventions recently patented 364	Truth and the trusts 362
Leipsic exhibition, the	Washington monument, Philadelphia
Mining machinery exhibition, Australia	Wood pulp, increasing demand
214001411411111111111111111111111111111	141

# TABLE OF CONTENTS OF

# Scientific American Supplement

No. 1118.

# For the Week Ending June 5, 1897.

Price 10 cents. For sale by all newsdealers.	
P	AGE
I. ARCHÆOLOGY.—The Casa Grande Ruin, Southern Arizona.—By Cosmos Mindeleff.—2 illustrations	17877
II. CIVIL ENGINEERING—Thirty Ton Steam Traveling Crane.—1 illustration	17866
III. GEOLOGY.—Sixty Years of Geological Research.—An important historical resume of this most important period in the history of geology, with a portrait of Sir Charles Lyell.—2 illustrations	17875
IV. MECHANICAL ENGINEERING.—Launch Engine.—A description of a petroleum vapor engine.—3 illustrations  Electricity Versus Shafting in the Machine Shop.—By CHARLES H. BENJAMIN, Cleveland, O.—A full article giving details of the use of electric current and the economy of the system	
V. MEDICINE.—The Value of Pathological Research.—An important address by Lord Lister, president of the Royal Society	17874
VI. MILITARY ENGINEERING.—Army Signaling and its Use in War	17864
VII. MINING.—Note on Swedish Statistics	17868
VIII. MISCELLANEOUS.—The Greek and Turkish Fleets.—A full account of the fleets of the Greek and Turkish nations, with biographical notices of Osman and Edhem Pasha, generals of the Turkish army.—4 illustrations.  Engineering Notes.  Electrical Notes.  Miscellaneous Notes.  Selected Formulæ.	17864 17865 17865 17865
IX. PHOTOGRAPHY.—The Photo-Stereoscopic Field Glass.—2 illustrations.	17868
X. RAILWAYS.—Estimates of Siberian Railroad Traffic  Serpollet's Automobile Railway Cars.—2 illustrations.  Siberian Railroad Extension in China.	17866 17867 17867
XI. STEAM ENGINEERING.—Apparatus for Sending Water of Condensation Automatically into Boilers.—1 illustration	1786
XII. TECHNOLOGY.—Fluid Air for Industrial Uses	17878
XIII. TELEPHONY.—The Berliner Telephone and Transmitter Patents.—Is illustrations. The Berliner Transmitter Patent.—A continuation of this most important decision which affects vast interests	17870

#### THE GAS ENGINE INDUSTRY IN THE UNITED STATES.

It is a noticeable fact that although the gas engine industry has been advancing with rapid strides in that Brooklyn with the other districts recently in-England and on the Continent, it has made comparatively slow progress in this country. This is said with crease in the total. As to the future there is no reason the knowledge that gas engines as well designed and to suppose that New York will ever lose its present as efficient as any in the world are built in the United position. There is no other city, unless it be Paris, States, and the statement is intended to apply chiefly that can be considered as a rival for second place to the development of the trade. Visitors to the recent gas exposition in New York must have noticed tive youth and vigor of the country that is tributary that although a few excellent types were shown, the gas engine, as such, was conspicuous by its absence. This may have been due, however, to the fact that the exposition was devoted chiefly to lighting and heating and the various methods of gas production.

How comes it that a people which is so quick to aptively little attention to the gas engine, and have left it to other nations to demonstrate its efficiency and indevelopment of electric lighting in this country, and the strongest of all bonds—those of commercial interest

electric motor as against the gas engine. That the wealth to multiply as in the past. Should the dissoluprice of gas must have exerted a powerful influence on tion of the empire ever be brought about, and the the gas engine industry is rendered probable by a world's commerce cease to pulsate from London as its comparison of the prices paid here and in England. The center, we may look for New York to take rank as the city of Manchester, which has about the same popula-chief emporium of the world and ultimately as its most tion as the city of Boston, sold its gas in 1893 at the rate | wealthy and populous city. of 60 cents per 1.000 feet; and the consumption was 3,636,000,000 feet, or more than the total amount furnished by the whole State of Massachusetts, where the gas costs on an average \$1.50 per thousand feet. In Newcastle-on-Tyne the users pay only forty cents a thousand feet, and when we bear in mind that makers are building engines which they will guarantee to use only 20 cubic feet per hour, the popularity of this form of engine in England is largely explained.

It is reasonable to suppose that when this industry, which in respect of its proportions is yet in its infancy, has attained the importance which it has in Europe, it will tend to reduce the price of gas, especially such gas as is used for cooking and power purposes; and the gas companies, themselves, will undoubtedly benefit by the growth of the industry, the increased consumption more than compensating for the reduction in price.

## GOLD MINING MACHINERY EXHIBITION AT COOLGARDIE, WEST AUSTRALIA.

We have been requested by Mr. David T. Day, of the United States Geological Survey, to call attention to a cablegram which he has received from the secretary of the forthcoming mining machinery exhibition at Coolgardie, West Australia. The dispatch requests that American manufacturers may be notified that the exhibition opens on October the first of this year. We gladly comply with the request, as the opportunity is one that should not be lost by any of our prominent manufacturers. The recent discoveries of gold in Western Australia indicate that the field will prove one of unusual richness, and, while it may never equal the which American builders of mining machinery ought

The compactness, handiness and light weight of American mining machinery have never failed to make a most favorable impression in comparison with the more cumbersome European machinery. These qualities are of the first importance in new countries like Western Australia, where roads are poor and transportation is costly, and accessibility, simplicity and ease of repairs are simply invaluable qualities in the too often unskilled hands of the miner. It is necessary that the actual machinery should be exhibited. In such a case as this there is more virtue in a pound of exhibited material than in tons of printed circulars.

# THE SECOND CITY IN THE WORLD.

York, the latter in point of population easily takes s rank as the second greatest city of the world. London, of course, comes first with its great total of 5,600,000 souls. New York, or "Greater New York" as it has been popularly called, contains fully three and a quarter million souls, or three-quarters of a million more than Paris, which has heretofore ranked as the second city to London in point of size. The above estimate is taken from an interesting article on Greater New York in the New York Times. The property valuation is Pharaohs, and whatever political changes may be in  $\frac{97}{57}$  | \$4,559,600,000 and the bonded indebtedness is \$205,559,-317. The city boundaries inclose a total area of 360 square miles, the extreme length being 32 miles and <sub>78</sub> the width 18 miles. It is estimated that within the city limits there are nearly 300 miles of water front, 1,000 miles of railways and 2,800 miles of streets and roads. Spain, Italy, Turkey, and Russia. Erlangen breweries These figures are the more remarkable if we remem- | have 47 cars, Kulmbach 180 and Nuremberg 96.

ber that they represent practically the growth of a single century, for the census of 1800 shows that New York had then only 60,489 inhabitants, and it is certain cluded would at that time have made but a slight inamong the great cities of the world, and the comparato New York render it certain that her rate of growth will be greater than that of the French capital.

As to the possibility of the capital of the western hemisphere becoming the capital of the world it is difficult to conjecture. The London of to-day will soon have passed the six million mark, and there is at present no dispreciate a useful device should have given compara-cernible sign of its growth being arrested. On the other hand, it is adding to its numbers at the rate of 80,000 a year, and the rate of increase is steadily growtroduce it on a large scale into their various industries? ing as the years go by. As long as England is able to The causes are various. They are chiefly to be found maintain her supremacy, naval and commercial upon in the cheapness of steam coal and the high cost of the seas, as long as she can hold together that huge gas in the United States. No doubt the cost of gas conglomeration of peoples and countries known as the illumination has something to do with the wonderful British Empire, binding them to the mother isle with same cause must have operated to develop the -London will continue to grow and its people and

#### EXPERIMENTAL BICYCLE TRIP IN THE UNITED STATES ARMY,

Secretary Alger has given permission for the carrying out of a second military bicycle trip, similar to the famous ride through the Rocky Mountains last year, and the expedition will again be under the charge of Lieutenant Moss. The route has been laid out between Fort Missoula, Montana, and St. Louis, Mo., and the total distance of 3,000 miles will include every variety of country and roads. The party is to consist of a surgeon and a score of privates from the Twentyfifth Infantry at Fort Missoula. A special military bicycle is being built, the design of which is based on the experience gained during last year's trip. The experiment will possess special interest for the bicycling world in general, for it will be one of the objects of Lieutenant Moss to determine which is the best form of punctureless tire for the rough work which will be encountered. For this purpose the company will be furnished with all the best forms of so-called punctureless tires, and it is certain that the tires which can stand reasonably well the wear and tear of this journey will be practically perfect for the first-class roads which are used by the average wheelman.

# UTILIZING THE CATARACTS OF THE NILE.

The cataracts of the Nile, which have always been regarded as the bane of navigation on this noble river, may yet prove to be of inestimable benefit to Egypt if the latest advices from that country are correct. It is stated that a proposal is on foot to utilize the cataracts phenomenal output of the Rand, it is an opening for electric light and power purposes. It is claimed that cotton mills, sugar factories, and the various forms of western industry which have been introduced in this ancient country during the British occupation would be greatly stimulated by the carrying out of such a scheme. On the face of it the proposal is a good one, for fuel is scarce and coal has to be brought in by sea. Electrical power could probably be delivered at considerably less cost than any steam plant could furnish it, and proposed industries which fail to attract capital under existing conditions would probably secure all that was needed if the proposed works were carried out. It is stated that preliminary surveys are now in progress, and there is no reason to suppose that any serious engineering obstacles will be encountered. Compared with our own plant at Niagara Falls, the available head will be insignificant, unless it is proposed to put in a long and costly pipe line. For although the term Now that the city of Brooklyn and other suburban cataracts conveys the idea of a very sudden fall in the districts have been incorporated with the city of New river, as a matter of fact these stretches of the Nile are more of the nature of rapids than cataracts, as may be judged from the fact that river steamers have been hauled against and through them in recent British expeditions up the Nile.

If the proposed work is carried out, it will work another and important step in the recovery of this historic land from the degradation into which it had fallen under Turkish misrule. The civil engineer has done and is doing a splendid work in the ancient land of the store, it is to be hoped that nothing will occur to prevent its present conquest by the transit and level.

MUNICH breweries possess 1,263 freight cars in which their beer is taken to all parts of Europe, including