

Scientific American.

ESTABLISHED 1845

MUNN & CO., EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico. \$3.00
One copy, six months, for the U. S., Canada or Mexico. 1.50
One copy, one year, to any foreign country, postage prepaid, 20 lbs. 5d. 4.00

MUNN & CO., 361 Broadway, corner Franklin Street, New York.
The Scientific American Supplement
(Established 1876)

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year for the U. S., Canada or Mexico, \$6.00 a year, or £1 1s. 3d., to foreign countries belonging to the Postal Union. Single copies 10 cents. Sold 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 Mexico, on receipt of seven dollars. To foreign countries, eight dollars and fifty cents a year, or £1 1s. 11d., postage prepaid.

Building Edition of Scientific American.

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 great variety. To architects, builders, and all who 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, \$3.00 a year, or £0 12s. 4d. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to one address, \$5.00 a year. To foreign countries, \$6.50 a year, or £1 6s. 9d. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN, and SUPPLEMENT, \$9.00 a year. To foreign countries, \$11.00 a year, or £2 5s. 2d., postage prepaid.

Export Edition of the Scientific American

with which is incorporated "LA AMERICA CIENTIFICA E INDUSTRIAL," or Spanish edition of the SCIENTIFIC AMERICAN, published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number contains about 100 pages, profusely illustrated. It is the finest scientific industrial export 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. \$5.00 a year, or £2 12s. 4d., postpaid to any part of the world. Single copies, 25 cents. MUNN & CO., Publishers, 361 Broadway, New York.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO. Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, MARCH 12, 1898.

Contents.

(Illustrated articles are marked with an asterisk.)

Acetylene and acetone (7375)... 173
Acetylene notes... 170
"Apennine" statue, Florence\*... 171
Appraisers' stores, New York... 171
Arctic climate... 172
Book output in England... 171
Books, new... 173
Boys, good advice to... 168
Burners, acetylene (7375)... 173
Burning fields of ice... 162
Celestine... 168
Cheese as a food... 164
Civil service, the Panama Canal... 167
Death rate of soldiers in Cuba... 165
Divers working on "Maine" wreck\*... 161
Dry dock, the Brooklyn... 162
Electric working of Ymuiden locks... 176
Europe, our trade with... 162
Explosions caused by paint... 167
Fighting forces of the world... 164
Gage, safety, Froehlich's\*... 164
Gas, natural, in Kansas... 162
Gun, Hummer's noiseless... 164
Havana, "Maine" wreck at\*... 161
Health resorts, ocean and high altitude... 170
Heat motor, Diesel's\*... 165
Ink spots, to remove... 167
Inventions recently patented... 172
Kissing, the ethnology of... 163
Klondike and California gold finds... 162
Klondike relief expedition, the\*... 163
Lands, public, of the U. S... 163
Lapps, bound for the Klondike\*... 163
Laundrymen's wax (7372)... 173
"Maine," wreck views of the\*... 161
Monuments, Roman circular... 163
Naval cadets, practice ship for... 169
Notes and queries... 173
Painting, priming coat for... 167
Patents granted, weekly record of... 173
Photographs, coloring... 167
Plants, pitchers in... 171
Railroad, London underground... 163
Reindeer, shipping\*... 168
Rust, an old preventive of... 163
Science notes... 166
Shoe polishing device, Burge's well's\*... 166
Signaling through pipe systems... 172
Spanish army, the, in Cuba... 166
Sun spots, some recent\*... 171
Thawing apparatus, Harris'\*... 164
Train robbers' punishment... 167
Wood, heating capacity of... 167
Wood, life of, under water... 167

TABLE OF CONTENTS OF Scientific American Supplement

No. 1158.

For the Week Ending March 12, 1898.

Price 10 cents. For sale by all newsdealers.

I. ARCHÆOLOGY.—A Representation of the Crucifixion.—An illustration of the new graffito which has just been discovered in the Palace of Thebes... 18514
II. CIVIL ENGINEERING.—A Spiral Railway Tower for Niagara Falls... 18506
III. CYCLES AND CYCLING.—The Growth of Invention in Cycles... 18504
IV. ELECTRICITY.—An Electric Curve Tracer for Delineating the Forms and Phases of Periodic Electric Quantities... 18513
V. FINE ARTS.—The Gobelins Manufactory at the Exposition of 1900... 18508
VI. MARINE ARCHITECTURE.—How a Ship is Built... 18501
VII. MECHANICAL ENGINEERING.—Machine Tools... 18504
VIII. MEDICINE AND HYGIENE.—Report on the Bubonic Plague in Bombay... 18513
IX. METEOROLOGY.—Nocturnal Photographs of the Eiffel Tower... 18509
X. MISCELLANEOUS.—Engineering Notes... 18507
XI. NATURAL HISTORY.—An Interesting Monster... 18516
XII. PHOTOGRAPHY.—Black Print Processes... 18506
XIII. STEAM ENGINEERING.—Reversing Steam Turbines... 18505
XIV. TEXTILES.—The Gobelins Manufactory at the Exposition of 1900... 18508

KLONDIKE AND CALIFORNIA COMPARED.

The expected rush to the Klondike is already well under way, and judging from the present indications, it is probable that the army of fortune-hunters which will enter this inhospitable region during the coming season will far exceed in numbers the emigration to California in the days of forty-nine. To those who foresee the disappointment which is, of necessity, in store for the majority of these people, it would be a consolation to be assured that the Klondike exceeds the California gold fields in richness. Unfortunately there is no evidence that it does. The Mining and Scientific Press, of San Francisco, which from the time of the first tidings of the Klondike discoveries has done good work on the Pacific coast in allaying the Klondike fever, has recently published some comparative figures in response to a correspondent's question as to whether the Klondike placers are richer than were those of California. The figures are quoted from J. Ross Browne's "Report to the Government on the Mineral Resources of the Pacific States," made in 1867. This was a sober, authentic report from an official mining expert, who had no motive to give other than an exact statement of the case.

According to this authority, one claim in Calaveras County produced \$250,000 from an area 100 feet long by 40 feet wide, and ninety pounds of gold were taken out in twenty-four hours. One claim in Placer County yielded \$500,000 and another in the same county \$2,000,000, and near Springfield, Tuolumne County, single car loads of "pay dirt" panned out one thousand dollars each. These figures were gathered for government statistical purposes and may therefore be taken as correct. On the other hand the reports which have come from the Klondike are largely hearsay or emanate from the thousand-and-one transportation companies whose interest it is to exaggerate the richness of the new El Dorado. Allowing, however, that the Klondike reports are true, it is evident that the richness of the placers barely equals that of the California placers; certainly it does not exceed it. It is probable that not one in a hundred of the California miners found the fortune or even a hint of the fortune for which he set out. The proportion is likely to be even smaller in Alaska.

THE UNITED STATES CIVIL SERVICE.

There were, in 1897, in the civil service of the United States government, 178,717 positions, of which 87,107 were in the classified list, to be filled by competitive examinations, and 91,610 unclassified, two-thirds of whom were fourth-class postmasters, the others ranging down to mere laborers. Endeavors to establish the government civil service on a basis of competitive examinations, offices then to be held during efficiency, without regard to party changes, were made as far back as 1853 and 1855, and again in 1872 and 1874, but it was not until 1883 that the subject was taken up in such a practical way as to largely affect the appointment and retention of employes of the government. The regulations then established were quite stringent, and they have been made more so by successive administrations, the scope of the law having been also extended and new classes of service brought under the control of the Civil Service Commission.

From a recent revision of the manual of examinations for the classified civil service we note a few of the leading particulars. The examinations are arranged for according to the following divisions of the service:

1, departmental; 2, custom house; 3, post office; 4, government printing; 5, internal revenue. In all, except the first of these divisions, the designation indicates, perhaps, sufficiently the nature of the positions to be filled, but it may be remarked that the departmental service covers the railway mail and Indian attaches, the pension agencies, steamboat inspection and light-houses and life-saving, the mints and assay offices and sub-treasuries, and the engineer and ordnance departments at large, as well as civil, steam and electrical engineers, draughtsmen, etc. For the position of assistant examiner in the Patent Office, it may be noted, a specially rigid examination is called for, covering physics, inorganic and organic chemistry, mathematics, technics, mechanical drawing and French and German. The lists of questions to be answered by applicants for positions are extremely searching, and the tests made at the examinations are such as leave but little room for imposing on the officers of the commission. They are such as are calculated not only to test the special fitness of the employes for each branch of the particular work in which they desire to enter the government service, but, in all the more advanced grades, their general capacity, aptitude and attainments.

The general examinations are held twice a year, in March and April and in September and October, at designated places in all the States, and applications must be received by the commissioners at least ten days prior to the date of examination, such applications being made on special forms prepared therefor. Full details as to all particulars affecting these examinations may be obtained at most of the public libraries, showing also those for which schedule dates are assigned and some which will be taken only when

vacancies occur. John R. Procter, Washington, D. C., is at present the president of the Civil Service Commission.

The civil service law has met with not a little opposition from the politicians of both parties, many of whom have desired to dispose of official positions as the rewards of effective work at the polls, irrespective of the fitness of employes for their places; but it is safe to say that the great majority of the people of all parties are strongly in favor of the law, and would prefer to see it extended in its operations, to include a still larger number of those who work for the public. Permanence of situation for all who work honestly and efficiently in their several lines of duty should be no less the rule in the government service than in all lines of private enterprise, and it is no less true that regularly earned promotion should follow such service.

THE COMPLETION OF THE BROOKLYN NAVAL DRY DOCK.

In our issue of December 25, 1897, we gave an illustrated description of the methods which have been adopted in repairing Dry Dock No. 3, at the Brooklyn Navy Yard. It was expected at the time that repairs would be completed in a very few weeks, and this sorely needed work placed at the disposal of the navy. Unfortunately, just at the time when the closing in of the new apron was being completed, there occurred one of those unforeseen and unpreventable accidents to which engineering works of this character are always liable. Two fresh water springs made their appearance, one within and the other just outside the apron, and under their action a considerable area beneath the apron, the wing-walls and the cofferdam began to subside. At one time matters were extremely critical, for it looked as though the cofferdam and entrance might collapse and the whole dock be wrecked beyond recovery.

The greatest possible force was crowded upon the work, the new lines of sheet piling being driven with all possible speed and the flooring laid on so as to enable the dock entrance to be partially flooded, with a view to reducing the flow of the springs and stopping the disastrous undermining. This has now been done, and two lines of 12 x 12 sheet piling driven as deep as it will go now extend across the entrance, one at the outer edge of the apron and the other at the outer wall of piling which surrounds the dock. New wing-walls have been built, and the entrance is now the first-class engineering job that it would have been if properly designed and built in the first instance.

The value of this dock to the country just now is simply inestimable in view of our critical foreign relations; for it is our only dock on the Atlantic coast which will safely admit our first-class battleships, such as the "Iowa" and the "Massachusetts." In the event of a war we could not send these to the dock at Halifax, as we recently did the "Indiana," because the owners of the dock would be prevented by the neutrality laws from placing it at our disposal.

OUR TRADE WITH EUROPE.

A study of the statistics of our foreign trade for the past year shows that while the United Kingdom is our largest customer it does not take so large a proportion of our exports as formerly. Ten years ago the total value of our exports to the United Kingdom was \$359,734,531, or over 50 per cent of our total exports; whereas in 1897 the proportion had fallen to about 44 per cent. Though it has decreased relatively, it still reaches the great value of \$482,694,024, an increase of over \$120,000,000 in the nine years under consideration. The total increase in our exports to all countries during the same period has been 59 per cent. Our exports to Germany have risen from about 8 per cent of the total to about 12 per cent; our exports to France have remained stationary at about 6 per cent; while those to the Netherlands have risen from 2 to 5.3 per cent.

The large increase in our exports, amounting to \$94,000,000 over the previous year, was, of course, chiefly due to the increased demand for our wheat and corn, the increased export of all cereals amounting in value to some \$70,000,000. The increase in exports of iron and steel was \$14,000,000; in bicycles it was \$3,000,000; in copper, \$3,000,000; and in lumber and manufactured articles in wood, \$5,500,000. We have already in a previous issue referred to the gratifying excess of our exports over our imports. This amounts to \$1,281,741,351 for the past five years; and there is special significance in the figures when we bear in mind that the period has been marked by depression and various influences which have tended to disturb business confidence.

BURNING FIELDS OF ICE.

BY E. B. KNERR.

It seems a somewhat surprising statement to make that on the ice-covered surface of a Kansas lake it is possible to build bonfires by simply breaking through the ice and applying a match to the surface of the water. The flames will shoot up as high as a man and