

Scientific American.

ESTABLISHED 1845

MUNN & CO., EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

TERMS FOR THE SCIENTIFIC AMERICAN.

(Established 1845.)

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, £2 14s. 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 4s. 6d., to foreign countries belonging to the Postal Union. Single copies 10 cents.

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 14s. 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 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

(Established 1878)

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. \$3.00 a year, or £0 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, APRIL 23, 1898.

Contents.

(Illustrated articles are marked with an asterisk.)

Acetylene gas generator for home use* 260
Academy of Sciences, N. Y. 262
Africa, new discoveries in 263
Arctic journey of Dr. Nordenskjöld 263
Balloon, a war at Fort Wadsworth 266
Bicycle lamp, an acetylene gas* 266
Bicycle package carrier, Clapham's* 261
Books, new 263
Brown mummy 265
Bureau of American Republics 258
Clay-spouting well, a 261
Copyrights for artists 259
Cutter head, Boyd's* 261
Decision, trolley, another 262
Diet, a frugal 263
Egypt, census of 261
Electrical news 257
Electrical resistance of metals at low temperatures* 267
Electric mail delivery 259
Food as affected by sewage 263
Foreigners excluded from German school 263
Gasoline yacht "Coyote" 264
Government in the advertising business 258
Ink and colors, preparing 265
Inventions recently patented 265
Lightning rods, conductivity of 267
Lime juice manufacture 263
Liquid air* 267
"Maine," the, how it was destroyed 263
Marble, compression of* 264
Marriage and long life 260
Navy supplement, special 259
Nickel plating wood 266
Notes and queries 263
Olive oil as a dietetic 265
Patent rights, negotiable paper for 258
Patents granted, weekly record of 259
Patents that pay 259
Photographs, faded, restoring 261
Plow, Lambert's* 261
Rangefinder, Fiske's* 257
Rocks, flow of* 264
Sea, command of the 258
Science notes 263
Spar for vessels, Clapham's* 261
Submarine cables 267
Surgery, improved practice in 265
Tattooing, remarkable* 265
Telephones in Europe 267
"Topeka," new cruiser* 257

TABLE OF CONTENTS OF Scientific American Supplement No. 1164.

For the Week Ending April 23, 1898.

Price 10 cents. For sale by all newsdealers.

I. BOTANY.—A Vegetable Curiosity.—1 illustration. 18612
II. ELECTRICITY.—Electric Lighting in Rubber Works. 18604
III. FINE ARTS.—Pulpit of Saint Bavon Church.—1 illustration. 18609
IV. MECHANICAL ENGINEERING.—Powerful Machines for Working Structural Iron and Steel.—2 illustrations. 18609
V. MEDICINE AND HYGIENE.—Home Modification of Milk. 18605
VI. METEOROLOGY.—Table of Wind Pressures Adopted by the English Navy. 18606
VII. MISCELLANEOUS: Engineering Notes. 18607
Miscellaneous Notes. 18607
Selected Formulae. 18607
VIII. NATURAL HISTORY.—Animals Underground. 18610
Mimicry in Insects. 18610
IX. NAVAL ENGINEERING.—Battleship "Maine," 1896-1898.—20 illustrations. 18598
The Navy of Spain.—9 illustrations. 18604
X. PSYCHOLOGY.—The Psychology of Invention.—By Prof. JOSHUA ROYCE. 18602
XI. WARFARE.—Battleship "Maine," 1896-1898.—20 illustrations. 18598
The Navy of Spain.—9 illustrations. 18604

THE COMMAND OF THE SEA.

In his classic work on the influence of sea power in history, Captain Mahan has shown that the command of the sea has been the decisive factor in most of the great wars of the past, and there is no reason to doubt that history will repeat itself in this respect in the event of hostilities between this country and Spain. In the present case, moreover, there will be new factors due to the change from sail to steam power entering into naval warfare which will, we think, render the command of the sea of even greater importance than it was in the days of Nelson. Chief among these is the coaling question—undoubtedly the most vital consideration that confronts the admiral of a modern fleet. In the last century it was possible for a fleet to lay in stores and provisions, extra spars, sails and running gear, sufficient to last for a cruise of many months—to-day we doubt if it would be possible for any navy to gather together a fleet which could keep the sea for twenty-one consecutive days without touching at a coaling station to replenish its bunkers.

The question of coal supply is a serious one at any time, and it can readily be seen that in the event of hostilities between two nations which are separated by three thousand miles of water, like this country and Spain, the question easily becomes first in importance. The navy that elects to place the wide Atlantic between itself and its coaling base will carry on its campaign under an enormous disadvantage. Not only must it maintain a line of coaling ships, but these ships must be convoyed across the water, to which duty a not inconsiderable number of its fighting ships must be assigned. Moreover, to make certain of the transfer of the coal to the fleets, some sort of coaling port must be established, for coaling at sea is both slow and hazardous and only capable of being carried out in fairly smooth water.

As the case now stands, Spain possesses two coaling stations in the West Indies, one at Havana and another at Porto Rico, and as Cuba would presumably be the objective point of both combatants, it is reasonable to expect that Spain would send her fleet to Cuban waters and endeavor to strike a decisive blow in a general fleet engagement. Should she be successful in this, however, she would still be under the necessity of convoying her coal ships across the Atlantic, a task which she could not hope to accomplish successfully in the face of the numerous and powerful auxiliary fleet which we shall soon have at our disposal.

On the other hand, it is quite possible that Spain may choose to place the burden of keeping open a three thousand mile line of communication upon our navy, temporarily surrendering Cuba and Porto Rico, and choosing her battle ground on the eastern side of the Atlantic. If she does this, there is no denying that we should fight at a great disadvantage, and the success of our fleet would be more problematical.

One of our first objects, if we did not rest satisfied with the acquisition of Cuba, would be to secure a base of operations within reach of Spain itself, where coal might be stored and as much refitting as did not involve a visit to the dry-dock carried out. The Canaries would furnish such a base, and it is likely that a collision between the fleets would occur in the vicinity of these islands. If we encountered the full force of the Spanish fleet, it is not to be supposed that our ships, even though victorious, as we think they would be, would come scathless out of the fight. The Spaniards are strong in torpedo boats, and we might even lose a ship or two in the general melee. It is likely, in any case, that the victor in a modern fight will be a ripe subject for the dry-dock and navy yard. If so, this would necessitate part of the victorious fleet limping home for repairs before it could follow up its advantage. This, in itself, would be a perilous trip, for shot-holes at the water line, or a few feet of the outer bottom ripped up by a glancing blow from the ram of a battleship, would not improve the chances of a ship surviving such weather as the San Francisco and the New Orleans encountered on their recent passage.

Of course we should win the struggle; but just how long it would last, or what it would cost us in men and ships, is a question that would be determined by the degree to which a nation driven to bay would prolong the despairing struggle.

RATHER SMALL BUSINESS FOR THE GOVERNMENT.

We are in receipt of a monthly magazine which is carried without charge through the mails of the country, and bears the imprint of the great United States Government Printing Office, at Washington, where it is printed at the public expense. This magazine has about 100 pages of paid advertisements, from soaps, toilet articles and cough medicines to plows and whisky distilleries. Of the magazine itself it is hardly worth while to speak seriously, its sparsely filled reading pages being made up mostly of matter such as is usually furnished in the government consular reports, with an occasional rehash of a subject more capably treated in the public press, all printed in French, Spanish and Portuguese, as well as in English.

As to the origin of this anomalous publication, it may be said that, at a session of a so called International

American Conference, held at Washington, in 1890, an association was formed of which an organization bearing the style of "Bureau of American Republics" has since been the representative, for the ostensible purpose of disseminating special information likely to increase commerce between the several American republics. Such a cause is certainly a legitimate and perfectly laudable one. At first the publications of the bureau were in the nature of free handbooks, but their subsequent development into trade directories and a monthly magazine in which advertisements were published for pay, all expenses of publication being paid by the government, has called out an indignant protest from the trade and technical publications of the country, with whose business the government itself is thus brought into a direct and most unfair competition.

Complaints to the State Department and to high government officials having failed to put a stop to this unworthy business, we are glad to learn that bills, designed to terminate this procedure, have been introduced in Congress. These bills make it "unlawful for any person, firm, corporation or association to print upon or attach to the United States flag any business advertisement, and for any department bureau, officer, or employe of the United States government to print upon or attach to any official publication of the United States government, or any publication permitted to circulate through the United States mail under frank, any business advertisement, or to use such publications in any way as advertising mediums."

The obvious propriety of such legislation is hardly open to question, but we doubt whether it goes far enough, for, among the publications of the bureau is a "Commercial Directory," competing equally with the legitimate field of private publishers, and of which a first large quarto volume has appeared. It is announced that, in this directory, "the advance subscribers [\$5 each] will appear under the proper headings in the United States section," but "subscribers desiring more than one heading will be accommodated at the rate of \$5 for each additional classification."

Of course, it is impossible in any such directory, no matter how voluminous, to include all the names in even the leading departments of business, and, to have the directory of any value, selections of names should be made by competent and unbiased judges; but it would appear, from the announcement of the bureau, that the most insignificant houses or persons may find a place in its pages, and such houses may have their names introduced as many times as they please at the rate of \$5 for each insertion. And this directory is to be put forth in annual editions, under the authority of the United States government!

It is surely inconsistent with the objects, aims and traditions of the government of the United States to engage in commercial enterprises in competition with its own citizens. Such a course would lead to the grossest abuses, and there is no more reason why the government should engage in an advertising business than that it should establish manufactories for the production of flour or sugar, or cotton or woolen goods. It is wrong in practice and wrong in principle, and it is to be hoped that the relief sought for in the bill will be promptly accorded by Congress.

NEGOTIABLE PAPER FOR PATENT RIGHTS.

The substantial re-enactment of the "Negotiable Instruments Law," passed at the last session of the New York Legislature (Chap. 612, Laws of 1897), of the practically obsolete statute of 1877 requiring the insertion of the words "Given for a patent right" in negotiable instruments taken therefor, seems unnecessary at the present day and inharmonious with the progressive spirit of the new law, but it serves as a forcible reminder of the notorious patent right swindles which first called legislation of this character into existence. The evil reached its height, and indeed may be said to have had its life, in the Middle and Western States during the period of prosperity and wild speculation which followed the civil war. The most glaring frauds were committed; large sums were paid for rights under void and worthless patents; patent rights for the same territory were sold over and over again; notes were taken to facilitate the sales, immediately discounted, and, by the time the purchaser discovered the deception, were in the hands of bona-fide holders, enforceable against the maker. The courts were powerless to protect the victims of these and other similar impositions, and the State Legislatures were finally appealed to for relief, with the result that in 1868 Ohio passed an act which required any person, before offering for sale a patent right for any county, to submit the patent to the probate judge of the county and make affidavit before him that the patent was in force and that the applicant had the right to sell, and also requiring that any written obligation taken on the sale of such right should bear on its face the words "Given for a patent right." Failure to comply with the law was made an offense.

That this statute in its entirety was of doubtful propriety seems to have been realized, for within a year