SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845) .....$3.00 a year
Scientific American Supplement (Established 1876) ..... 5.00 "
Scientific American Building Monthly (Established 1885) ..... 2.50 "
Scientific American Export Edition (Established 1878) ..... 3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, JUNE 11, 1904.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

GROWTH OF AMERICAN MERCHANT MARINE.

The growth of our merchant marine is slow, and is in no sense commensurate with our phenomenal advancement in manufactures and commerce. At the same time, it is a fact worthy of note that the documented tonnage of the United States on June 30, 1903, for the first time in our history, exceeded 6,000,000 gross tons register, comprising 24,425 vessels of 6,087,345 gross tons. These figures do not include 1,828 yachts of 74,990 gross tons. The total shipping of the United Kingdom for 1902 was 20,258 vessels of 15,357,052 gross tons (vessels of British colonies number 15,533 of 512,268 net tons). On January 1, 1902, the total shipping of the German Empire was 6,024 vessels of 3,503,551 gross tons. The shipping of the United Kingdom and Germany is largely employed in developing foreign trade. The shipping of the United States is almost wholly a part of our domestic transportation system. On June 30, 1903, 5,141,037 gross tons were engaged in transportation and coastwise trade, 879,264 gross tons were devoted to foreign trade, and 67,044 to fisheries. The distribution of our tonnage on June 30, 1903, was: Atlantic Ocean, 3,157,373 gross tons; Pacific Ocean, 812,179 gross tons; the Great Lakes, 1,902,698 gross tons; Mississippi system, 215,095 gross tons. Our shipping on the Pacific has increased more rapidly than on the Atlantic. In regard to motive power, 3,408,088 gross tons were propelled by steam and 1,965,924 gross tons were sailing vessels, and 713,333 gross tons of canal boats and barges were variously propelled. As regards the materials of construction, 2,440,247 gross tons were of iron and steel construction, and 3,647,098 gross tons were of wood.

During the years 1902 and 1903, nearly 100,000 tons of large ocean-going steamers have been added to our registered fleet.

The subject of the losses of vessels from various causes is a most important one. During the year ending June 30, 1903, 487 vessels of 107,084 gross tons were reported.

The very heavy percentage of loss of steamers by fire discloses unsatisfactory attention to duty in the hold or insufficient fire apparatus, or both. For comparison of the relative losses of the merchant shipping of the United States and foreign nations, the most complete figures are those of the Bureau Veritas. They cover only sea-going steamers of over 100 gross tons and sea-going sail vessels of over 50 net tons. The proportion of foreign vessels on the ocean is so great and of American vessels so small that the figures do not clearly disclose the relative security of navigation under various flags and laws. Figures show that American sea-going vessels from 1896 to 1903 have been less liable to accident but more liable to total loss than foreign steamers, while American sea-going sail vessels have been more liable both to accident and loss than foreign sea-going sail vessels.

The losses of both steamers and sail vessels of all nations are due, of course, more to stranding than to any other cause, as it accounts for 47 per cent of the losses of American sea-going steamers and 53 per cent of the losses of American sea-going sail vessels. The losses of foreign steamers are 44 per cent, and the losses of foreign sail vessels 56 per cent. There is a special reason why American vessels are more liable to stranding than the vessels of other nations which conduct the world's deep-sea trade. American vessels are seldom found in mid-ocean on long voyages. Their course is usually along our own coasts in the domestic trade, or in trade with nearby countries. The excellent lighthouse system of the American coast and care in navigation have thus overcome liability to accident from the nature of our trade along the coasts. Collision differs totally from stranding in that, for its prevention, one must look to the navigating officers. The figures show that superior care and intelligence are possessed by the navigating officers of American steamers.

ELECTRICITY IN KOREA AND JAPAN.

Particular attention is called to the development of the electrical industry in Asia by the present war between Russia and Japan, and especially to that part of it which Americans have established. American engineers and capitalists were the pioneers in Korea and Japan in introducing electrical plants for lighting and power production, and even throughout southern Manchuria—the disputed territory that brought on the present war—more American electrical machinery is found than that of any other nation. The effect of the war upon Korea must inevitably prove momentous, and far Eastern representatives of American electrical concerns are anxiously watching the progress of events.

In the event of Japan proving victorious, Korea will undoubtedly become a fertile field for the exploitation of American electrical machinery. Japan, instead of discouraging American manufactures in Korea, would distinctly favor their introduction. It may not be generally known that the largest single electrical plant in Asia was built by an American firm, and that the consulting engineer was a Japanese graduated from the Massachusetts Institute of Technology. This plant is known as the Seoul Electric Company, a Korean organization which holds the property under mortgage. The plant furnishes arc and incandescent lights for the city of Seoul, and operates over twelve miles of overhead trolley railway. Seoul since the establishment of this plant has assumed quite a metropolitan appearance, and in some respects it is a city more progressive than most of the Asian towns. Altogether, some 1,500 incandescent lamps are used to light it, and half as many more arc lights in the streets. The public buildings and private houses and offices have gradually adopted the electric light, and one sees electricity everywhere in the evening. At first the opposition to railways and electric lights was so pronounced that few natives would patronize them, but conditions have rapidly changed for the better under Japanese influences. Certainly in this respect the Japanese have helped the Americans to open Korea in a most satisfactory way. The machinery and equipments of the railway and lighting apparatus are all of American pattern. There are two double-current generators made by a Pittsburg firm and the boilers are of the water-tube type. High-voltage alternating current is used. A direct current of 550 volts is produced by the generators for operating the railway, and the alternating current is employed for the city lighting. The extension of the plant in the past year has been proposed, and but for the war it would have been nearly doubled in capacity. American and Japanese engineers were drawing plans for extending the railway, and for introducing the electric lighting to the suburbs; but nothing will probably be done now until after the war.

Should Japan defeat Russia and hold Korea, the peninsula empire would become one of the most fertile fields for electrical development in the Far East. At Chemulpo there is a smaller electrical plant for lighting and power purposes, and, as the seaport of the capital of the country, this would prove an important field for introducing American electrical machinery. On the southern coast of Korea, Fusan has one or two American electrical plants, and electric railways running from there to Masampo and Tongi along the coast have been proposed. Masampo is the nearest good port that the Japanese can reach, and every effort will be made to develop it and establish direct connections with the lower end of the proposed steam railroad running from Fusan to Seoul.

Telephones are also largely being used in Korea. In the foreign quarters of Seoul a city telephone system has been inaugurated recently, and the natives are gradually making use of it. The Japanese army of occupation, according to recent reports, are extending the service so as to connect all parts of the army with headquarters. In China telephones have been introduced by the German, French, and English residents, and in Korea the American telephone apparatus is almost exclusively used.

Japan is an excellent market for American electrical machinery and instruments, as shown by consular and other reports. Electrical instruments last year were exported to Japan to the value of $26,781, and electrical machinery sent to the little island empire reached a total valuation of $70,592. These amounts may not seem large, but considering the condition of the country last year, and its gradual opening to the influences of American ideas, the exports of electrical goods showed gratifying encouragement. Boilers and machinery that had more or less direct connection with the electrical trade were exported to Japan from this country to something like $175,000 more than that of exclusive electrical apparatus. Orders for American electrical goods for the current year had been placed in this country, dependent upon the outbreak of hostilities.

Japan is a field that will show increasing demand in the next decade for American machinery and electrical apparatus. The Japanese engineers and electrical experts educated in this country are opening the way for a steady demand for our products. If the present war should prove favorable to Japan, an unexampled trade demand for American electrical machinery will follow. Electrical railways will be projected in a dozen different centers of the island empire, and with their special predilection for American goods the Japanese will undoubtedly place most of their orders in this country. We have even built up a good trade in automobiles in that distant land, and a number of American electrical automobiles were shipped to Japan just prior to the war. Copper wire for electrical construction work has become a considerable item of export to Japan, and the figures furnished by our consuls indicate that nearly every line of electrical equipment will receive a new impetus when the war ends. Meanwhile, agents of the large electrical companies are watching the development of events, ready with accustomed American vigor to open a trade campaign in Korea and Japan that will mark a new era in our exports to the Far East.

THE POLAR REGIONS.

National emulation, more particularly since the great success of Nansen, seems to have played the chief rôle in all the recent researches undertaken in the vicinity of the poles.

No fewer than three expeditions were organized in 1902 for the main purpose of reaching the North Pole. Otto Sverdrup, the Norwegian, with Nansen's old ship, the "Fram," started in through Smith Sound; Lieut. Robert E. Peary, of the United States navy, pursued a like course; while Mr. E. B. Baldwin, also an American, selected Franz Josef Land as his point of departure, although Prince Luigi, of Savoy, had only just vainly attempted it.

The expedition led by Capt. Sverdrup was incontestably the most successful, says Dr. Herman Haack in his Geographen Kalender. As early as 1898 his expedition was already under way. He spent the first winter north of Cape Sabine, where, by means of extended sledge journeys, he explored the fiords of Hayes Sound, in the following spring even advancing as far as the west coast of Ellesmereland. Finding the ice conditions no more favorable in 1899 than in the previous summer, he abandoned forthwith his former plan and fixed upon Jones Sound as the starting point for his investigations, in the hope of finding on the west coast of Ellesmereland a better and freer water course to the north than the narrow neck of Smith Sound can afford, which is so easily obstructed by the pack ice from the Pole. Sverdrup met with difficulties also in Jones Sound, for he could push no farther forward than Inglefeld had reached in 1852, and so he took up his second winter quarters at the point where the coast of Ellesmereland seemed to bend northward, under north latitude 76 deg. 29 min. and west longitude 84 deg. 24 min.

The sledge journeys of the fall of that year established the fact that Ellesmereland extended much farther westward than was supposed, and was separated from North Kent only by the Belcher Channel, a small arm of the sea. In the spring of 1900 Sverdrup continued the exploration of the west coast of Ellesmereland, where he discovered a deep fiord, while his assistant, Isachsen, examined a large body of land lying to the west of it. The "Fram" being free from ice in August, the passage through Jones Sound was continued, but the ship was soon fast again in the Belcher Channel near the westernmost point of Ellesmereland, and Sverdrup established his third winter quarters under latitude 76 deg. 48 min. and longitude 89 deg. The fall of 1900 and the spring of 1901 were devoted to sledge journeys.

Sverdrup himself continued his exploration of Ellesmereland, examining anew and more thoroughly the fiord which he discovered the year before, after which he turned northward and succeeded in reaching the most westerly point occupied by him in the spring of 1899 to which he had then proceeded from Smith Sound.

Isachsen proceeded westward and discovered north of North Cornwall two larger islands, exploring their southern coasts till they turned toward the north. Under latitude 79 deg. 30 min. and longitude 106 deg., he reached his farthest western limit, from which point neither to the west nor to the north was any land visible, and from the character of the floating ice it was not probable that any land existed in either direction. In July of that year the north coast of North Devon was explored in boats.

All attempts to get the "Fram" out of the ice having failed, Sverdrup was compelled to pass a fourth winter in 1901-2 in this region, during which other extended sledge journeys were undertaken. Following the west coast of Ellesmereland, Sverdrup attempted to reach 80 deg. 16 min. N., 85 deg. 33 min. W., the