# 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, JANUARY 23, 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.


## TAMMANY AND THE NEW BRIDGE.

May it not truly be said that the biggest problem affecting the welfare of the citizens of New York that confronts the new Tammany administration is the provision of improved transit facilities? May it not also be said with equal truth that the biggest element in this problem is the construction of the urgently needed Manhattan Bridge, which was designed with a view to the speedy relief of the shockingly congested conditions that prevail on the Brooklyn Bridge? The obvious duty of the new administration is to expedite in every way possible the construction of the new thoroughfare. The new Commissioner of Bridges will find on file in his department the complete specifications and drawings of the bridge, all in good shape for the acceptance of bids and immediate construction of the work. The design was drawn by one of the most distinguished living bridge engineers, and it was passed upon and unanimously approved by a board of experts including some of the best-known engineers in this country, one of whom was the great bridge engineer, George S. Morison, past president of the American Society of Civil Engineers. With a view solely to expediting the construction of the work and avoiding the intolerable delay which seems inseparable from the construction of steel wire cables, the bridge was designed with nickel-steel eye-bar cables. The type lends itself to rapid construction and erection, so much so, indeed, that if the appropriations are made at once, and the bids let, the bridge will be open for public use within three and a half years from the present date. It is a matter of history that the bridge would have been under construction at the present time, had it not been that the necessary appropriations were withheld by the Board of Aldermen on the ground of certain technical objections raised by the engineers who were responsible for the wire cable design, which the late Bridge Commissioner condemned at the time of his taking office.

The first act of the new Bridge Commissioner was to appoint as chief engineer one of the most active opponents of the new design, and the question which is now uppermost in the minds of the citizens of New York, particularly those who live on the Brooklyn side of the river, is whether the new administration has the true interests of the city sufficiently at heart to go right ahead with the present plan, and so avoid the three or four years' delay that would result if this plan were thrown down at the twelfth hour, and the tedious and necessarily lengthy task of getting up a new set of plans undertaken. We speak of three or four years' delay advisedly. To get out the strain sheets and the enormous number of detail working plans necessary for a structure of this magnitude; to draw up specifications; to solicit bids and to close the contracts, would consume the greater part of two years' time. Then the time consumed in the necessarily slow work of stringing the cables, wire by wire, would increase the time of construction of a wire-cable bridge by at least twelve months over the three and a half years required in building the accepted design. This estimate is based, very properly, upon the record of the construction of the Williamsburg Bridge, the delay upon which was notorious.

We have no wish, however, to go at present into the question of wire cables as against eye-bar cables. We do not believe that the average New York citizen cares a snap of the finger about the relative merits of the two systems, but we do know that he is tremendously interested in getting this new bridge and getting it at the earliest possible moment. We do not for one moment believe that the most strenuous opponent of the eye-bar type considers that the present design would fail to do the work demanded of it for a thousand years to come.

The new administration has here an admirable opportunity to rise superior to mere political considerations in its desire to meet a great public necessity; while its chief engineer, by subordinating his personal preferences to the same urgent need of the public, has an opportunity to show that he can live up to the best traditions of his profession.

## THE NAVIES OF RUSSIA AND JAPAN COMPARED.

The strained diplomatic relations between Russia and Japan, and the fact that in the event of a conflict the issue would be determined more than anything else by the command of the sea, render a comparison of the effective naval strength of the two nations a matter of no little interest. In such a comparison the important fact must never be lost sight of, that in the event of war, only a part of the Russian navy can be available in the Far East, whereas the whole of the Japanese navy will be within the sphere of active operations. However, we will first summarize the strength of the two fleets *in toto*, regardless of whether the Russian ships are in European or Asiatic waters; and then we will consider the question of the relative strength of the whole Japanese navy and that part of the Russian navy that is, or may be, concentrated in the Pacific. The total effective fighting force of the Russian navy, excluding obsolete ships or ships of doubtful utility, is made up of fifty vessels (battleships, cruisers, and gunboats) of an aggregate displacement of 358,670 tons; that of Japan consists of thirty-three ships, with a total displacement of 208,240 tons. These two navies are composed of the following classes of ships: Of battleships of the first class, that is, vessels launched within the past decade, Russia has ten, of an average displacement of 12,160 tons; Japan has six, of an average displacement of 14,115 tons. Of second-class battleships, launched between 1886 and 1896, Russia has ten, of an average displacement of 9,545 tons; Japan has no second-class battleships. Of third-class battleships, suitable for coast defense, Russia has three, of 4,126 tons displacement, and Japan one, of 7,220 tons. Of first-class or armored cruisers, Russia has five, of an average displacement of 10,260 tons, and Japan eight, of 9,210 tons. Of second-class cruisers, that is, protected cruisers of larger size, Russia has nine, of 6,425 tons displacement, and Japan eight, of about 4,500 tons average displacement. Of third-class cruisers, Russia has four, of about 3,500 tons displacement, and Japan eight, of an average of 2 870 tons. Lastly, Russia has nine gunboats of 500 tons, and Japan two, of 875 tons. It will thus be seen that in point of numbers Russia has a large preponderance in vessels available for immediate hostilities. Indeed, she may fairly be considered to rank as the third naval power, coming next to France, with Germany a close rival.

On the other hand, a considerable proportion of her fleet consists of coast defense vessels and ships that are too slow or otherwise deficient to be available for duty in the Far East; and since the war must inevitably be fought out in the Pacific, a forecast of the probable fortunes of war should take account only of that portion of the navy that can be concentrated near the seat of war. Applying this test, the Russian fleet is cut down to thirty-one battleships and cruisers, of an aggregate displacement of a little over 200,000 tons, made up of eight battleships, of about 12,000 tons; four armored cruisers, of about 11,400 tons; six second-class protected cruisers, of 6,500 tons; five third-class cruisers, protected and unprotected, of from 1,200 to 3,000 tons, and seven gunboats, of about 1,200 tons average displacement. To these figures may be added about a score of torpedo-boat destroyers on both the Russian and Japanese side, the Japanese boats being of about 300 tons, and the Russian of about 340 tons displacement. It will now be seen that in point of total number of ships and total displacement, the balance is somewhat in favor of Japan. Mere aggregate figures, however, do not tell the true story of relative strength, and this must be determined, in the present case, by an examination of the character of the individual ships themselves.

Other things being equal, the outcome of any naval war will be determined by the relative strength of what might be called the first line of battle, that is, vessels of the battleship and armored cruiser type that carry sufficient protection to enable them to lie in the first line of defense and attack, and endure the give and take of a great fleet action. Now it is just here that Japan is particularly strong. She has a homogeneous fleet of six battleships and eight armored cruisers that are built upon the same plans, have the same speed and maneuvering ability, and in the battleship division have the great advantage of large size of individual units. All of these vessels have been completed within the last five or six years, and they have an average displacement of over 14,000 tons. The latest of these, the "Mikasa," is typical of the whole fleet. She is 15,200 tons displacement, 18 knots speed; is armed with a 9-inch continuous belt, with 6-inch armor protecting the central battery, and she carries four 12-inch, fourteen 6-inch, twenty 3-inch, and a dozen smaller guns, all of the latest Armstrong pattern. Six of the eight armored cruisers are practically identical vessels, of about 9,700 tons displacement, and from 20 to 22½ knots speed. The other two are the fine 7,700-ton vessels illustrated on another page in this issue. They have continuous 7-inch Krupp steel belts, 5 to 6 inches protection on the casemates and turrets, and are armed with four 8-inch, twelve or fourteen 6-inch, and a dozen smaller guns. They carry four submerged torpedo tubes, with one above-water tube. It should be mentioned that the battleships also carry each four submerged torpedo boats. Now, these fourteen fast, well-protected and powerfully armed ships, with an aggregate displacement of 158,000 tons, will be matched against twelve battleships and cruisers in the Russian fleet, of an aggregate displacement of 142,000 tons. The eight Russian battleships have an average displacement of 10,750 tons, and the four cruisers have an average displacement of 11,400 tons. The battleships although smaller than the Japanese vessels, are equally modern; their speed, however, is not as a rule so good. The best of them is the "Cesarevitch," of 13,000 tons displacement and 18 knots speed. She has a 10-inch belt, and the battery of four 12.4 inch and twelve 6-inch guns is carried entirely in turrets, the 12-inch in two turrets, one forward and one aft, and the 6-inch in six turrets, arranged three on each broadside. A most interesting feature in the event of a conflict is the fact that the Japanese and Russian battleships will represent two different schools of design, the Japanese the English, and the Russian the French. The chief difference is in the method of carrying the guns of the secondary battery, which in the Russian ships of the later type is carried in pairs in turrets, while the English guns fire from casemates or open central batteries. The Russian armored cruisers include the "Rossia," "Ruric," and "Gromoboi," big vessels of 11,000 to 12,000 tons displacement and 20 knots speed, and the "Bayan," a 7,800-ton vessel of 21 knots speed. Should the war take place, it is evident that the very latest types of battleship construction will receive an ample test. In the class of protected cruisers, Russia is particularly strong in the possession of six fine vessels of 6,500 tons displacement, and speeds which run up, in the case of one of them, the "Variag," built in this country, to 24 knots, the others having easily made the contract speed of 22 knots. She also has available two third-class vessels of 3,000 tons, which have made the remarkable speed of 25 knots an hour. Against these Japan has four second-class cruisers, of about 4,500 tons and 22 to 23 knots speed, and the three curious vessels of the "Hashidate" class, of 4,300 tons, which did good work in the Chinese war. They are of 17 knots speed, and carry, strange to relate, one great 12½-inch Canet gun, in addition to a numerous battery of 4.7-inch guns. In third-class cruisers Japan has a considerable superiority.

On the point of personnel, discipline, and general efficiency of the officers and crews, all that can be said is that the Japanese proved in the Chinese war that they possess all the requisites of bravery, dash, daring, and intelligence; of the Russian personnel, nothing more is known than can be gathered from the comments of qualified observers; but the discipline is said to be excellent, and the officers are known to be a highly-educated and intelligent class of men, who are believed to have a thorough mastery of their profession. Japan will, of course, have the great advantage of fighting in home waters and within comparatively easy reach of her dockyards.

## DISCOVERY OF DR. DANYSZ, OF PASTEUR INSTITUTE, FOR EXTERMINATING RATS.

The great precautions which were taken not long ago at Marseilles in order to prevent cases of pest being introduced into that port has brought up the question of contagion by rats, seeing that the rats which are carried on the vessels from the eastern countries are the principal agents in the propagation of the pest. The French government is looking for a good method of exterminating the rats so as to decrease the danger of such epidemics. Dr. Danysz, of the Pasteur Institute, has lately been studying the question of the destruction of parasites and claims to have discovered a novel method for destroying rats which will be quite successful. Different methods have been tried before this, among others the Clayton apparatus invented in England, which destroys the rats by asphyxiating them with carbonic acid gas. But Dr. Danysz has found a means of getting rid of the rats without the risk of killing any other animals, and thus the method may be applied especially in the country, on farms and in different establishments where the other animals are to be free from harm. In the course of his researches, Dr. Danysz found that the rats can contract a special disease to which other animals are not exposed. He succeeded in obtaining the bacillus of the disease and at present it becomes quite easy to destroy these animals. It is necessary only to soak bread or grain in a bouillon of the microbe culture and allow the rats to eat it, when they contract the

© 1904 SCIENTIFIC AMERICAN, INC.