

SCIENTIFIC AMERICAN

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A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LVIII.—No. 26.
[NEW SERIES.]

NEW YORK, JUNE 30, 1888.

[\$3.00 per Year.]

THE ARTHUR KILL BRIDGE.

We illustrate in the present issue the great draw-bridge spanning the Arthur Kill and connecting the States of New Jersey and New York. The inlet or strait which it crosses runs between Staten Island, which constitutes Richmond County, N. Y., and the opposite shores of New Jersey. The stream is about 600 feet in available width at the point where the bridge is erected. Were the shores of New York harbor to be inspected with a view to finding the best frontage for public stores and wharves, no better locality could be selected, as regards the water front, than the shores of Staten Island. But hitherto this region has not been available for these purposes for lack of railroad communication. The new bridge, which is designed to afford a way for the great trunk railroads to reach the shore in question, will, therefore, play a most important part in the development of the port of New York. Five to ten miles of additional water front, it is calculated, will be opened up by it. The Baltimore and Ohio, the New Jersey Central, the New York, West Shore, and Buffalo, with other roads, are among the probable users of the bridge.

The structure was erected by the Staten Island

Rapid Transit Company. It was authorized by act of Congress of June 16, 1886, and two years were allotted for its completion. On June 13, 1888, a party of engineers and promoters of the scheme visited the place, and the great draw was swung around from open to closed position, and the kill was crossed by a bridge for the first time only three days before the limit assigned by the charter.

The bridge, being owned by an independent corporation, will be open to traffic under similar conditions to those offered by the Poughkeepsie bridge. Any railroad wishing to use it can do so on payment of the regular tolls. This arrangement removes from it any aspect of monopoly, and tends to make it a public benefit in every sense.

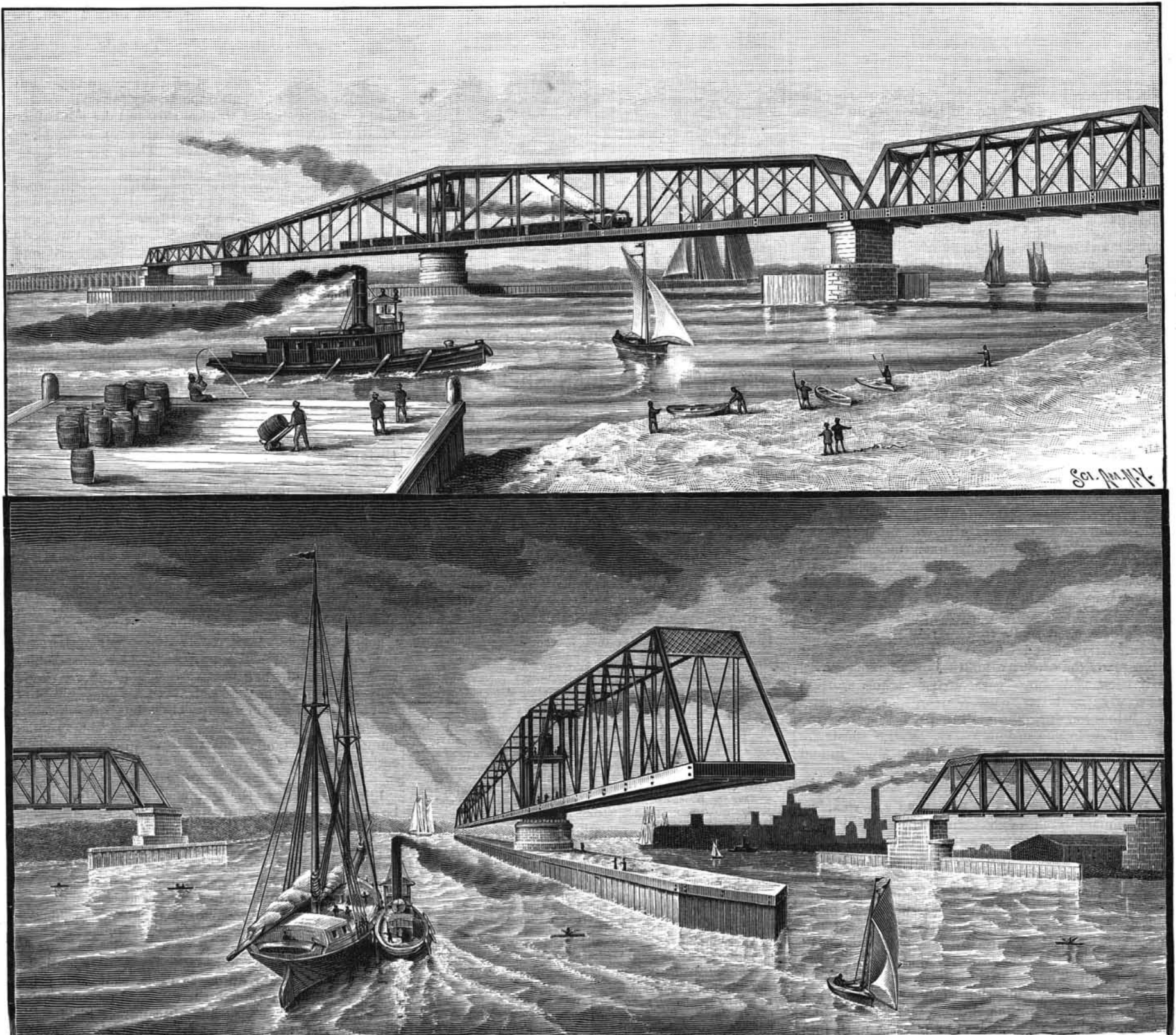
Some very interesting litigation was evolved by the erection. The bridge, it will be noticed, is an interstate bridge, and was erected under Federal authorization. The plans and location were subject to the approval of the Secretary of War of the United States. He held them under consideration for nine months, and eventually approved them without modification. The work was at once commenced, only to be delayed an additional six months by an injunction. This was pro-

duced by the State of New Jersey, represented by Gov. Green, the proceedings being in charge of Attorney-General Stockton. On argument this impediment was disposed of in the United States Circuit Court by Justice Bradley. He decided against the injunction, holding that Congress had the constitutional right to regulate commerce, even though the States directly concerned might be opposed to its action. The decision has attracted much attention, and may yet be of much importance.

The two years allowed for the completion of the work were very seriously abridged by these causes, and the completion of the structure within the specified time, without any extension being asked for, is a matter for congratulation to all directly concerned in the work.

The trusses and drawbridge are carried upon five piers of masonry. These are built of the best material, Lake Champlain granite of the first quality being adopted. Much trouble was experienced in laying them, as a solid foundation was only reached with great difficulty.

The entire length of the bridge proper, exclusive of approaches, is eight hundred feet. It comprises two shore spans, covered by fixed trusses, and two draw



NEW BRIDGE OVER KILL VON KULL—THE LARGEST DRAW IN THE WORLD.

spans, closed by the great drawbridge. Each shore span is one hundred and fifty feet long. The drawbridge is the largest now in existence. Its total length is five hundred feet. On each side of its central pier it affords, when open, clear waterways of two hundred and eight feet width. It will require about two minutes to open or close it. The lower chords of the trusses are thirty feet above the water line. The cost of the structure was \$450,000.

In the eight hundred feet of bridge thus composed, the link is far from complete. On the New Jersey shore numerous lines of railroad and fillings for the various companies who are to use the bridge have to be included in the system. On the Staten Island shore a most extensive work is in progress, designed to afford an approach to the bridge. This will commence about one-half mile from Erastina, and will be five thousand seven hundred feet long. This alone will cost \$70,000.

The iron work was pushed with great rapidity, and under considerable apprehensions at times of delay from strikes. Fortunately these apprehensions proved needless. In four weeks the draw span was put together. Two weeks more were required for the installation of the machinery. The draw contains six hundred and fifty-six tons, and each of the approaches contains eighty-five tons of metal.

The whole will be finished as regards approaches, track, etc., it is hoped, by the end of August, and early in September trains will probably be running across the bridge.

The contractors for the masonry are Messrs. Boller & McGaw, of this city, who have erected much important work, and who are now engaged in the building of the bridge over the Thames at New London, Conn. The superintending engineer is Mr. Charles Ackenheil. The Keystone Bridge Company has supplied the iron work.

It is gratifying to note that not a single life was lost in the erection. In too many cases the march of progress is marred by deaths from accidents incidental to such works as the present, but the Arthur Kill bridge is completed without any such stain.

Rheumatism.

The surroundings of a patient suffering from rheumatism are a matter of no little importance. The Boston Journal of Health says: Free ventilation should be secured, but without draughts, and the temperature kept between 68° and 70° Fah. The patient should be clothed in flannel and lie between woolen blankets. His covering should be light. An excess of bedclothing will add to the pain in the inflamed joints, and unnecessarily increase the sweating. It should be a studied effort to spare him any painful movements possible, and every ministrations should be gentleness itself. Milk, with seltzer water or lime water, pre-eminently meets the requirements as the principal article of diet, during the active period of the disease. If this proves insufficient, or is not well borne, then other light and concentrated food can be administered. Some authorities insist that animal food and alcohol are contra-indicated during the height of the fever. The latter should certainly be prohibited, as a rule, but the patient's diet need not be so much restricted as in other highly febrile disorders. Those who are habituated to the use of stimulants should not be entirely deprived of them.

Hektograph Sheets.

Soak 4 parts of best white glue in a mixture of 5 parts of water and 3 parts of solution of ammonia, until the glue is soft. Warm the mixture until the glue is dissolved, and add 3 parts of granulated sugar and 8 parts of glycerin, stirring well, and letting come to the boiling point. While hot, paint it upon white blotting paper with a broad copying brush, until the paper is thoroughly soaked, and a thin coating remains on the surface. Allow it to dry for two or three days, and it is then ready for use. An aniline ink should be used for writing, and before transferring to the blotting paper, wet the latter with a damp sponge, and allow it to stand one or two minutes. Then proceed to make copies in the ordinary way. If the sheets are laid aside for two days, the old writing sinks in and does not require to be washed off.—Chem. and Drug.

Destruction Wrought by Insects in America.

The annual loss to productive industries in the United States caused by insects is estimated at \$150,000,000. Here is a fair battle between man and another sort of earth occupiers. They are smaller, but if they can whip us, have undoubtedly as good a right to the world as we have. As civilization advances, new insects make their appearance, marching sometimes eastward, but generally westward. There are few, if any, forms of vegetation that have no parasites that devour either foliage or fruit. The loss to the cotton crop is estimated at \$15,000,000 a year, while that to the apple crops is not much less, and that to the potato crop at least one-half as much. But the estimate is not a fair one until into the loss is counted the time spent in fighting to secure the proportion that is saved.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S. or Canada.....\$3 00
One copy, six months, for the U. S. or Canada..... 1 50
One copy, one year, to any foreign country belonging to Postal Union, 4 00
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The Scientific American Supplement

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Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, JUNE 30, 1888.

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NAVAL NOTES.

A great fleet, made up of vessels of many nationalities, was recently assembled in the port of Barcelona, Spain, in honor of the birthday of the Queen Regent. Here is a list of them taken from L'Avenir Militaire: Austria-Hungary.—Admiral the Baron de Montfort commanding.

Table listing ships from Austria-Hungary, Germany, and England with their respective tonnage, guns, and men.

Germany.—Kaiser, armored, 7,626 tons, 15 guns, 630 men.

England.—Admiral the Duke of Edinburgh commanding. Armored ships Alexandra, Colossus, Agamemnon, Thunderer, the cruiser Phaeton and dispatch boat Fearless, corvettes Calypso, Rover, Volage, and Active.

United States.—Corvette Quinnebaug, 1,900 tons, 10 guns, 230 men.

Spain.—Numancia, 7,500 tons, armored, 15 guns, 560 men, and the cruisers Castilla, Navarre, Gerona, Reina-Regente, each carrying from 8 to 29 guns and from 300 to 540 men; the frigate Blanca, 16 guns, 350 men.

France.—Admiral Amet commanding. The armored ships Colbert, Devastation, Amiral Duperré, Indomptable, Courbet, Redoutable, the dispatch boats Faucon, Condor, Milan, and Couleuvrine, and five torpedo boats.

Holland.—The cruiser Jean Guillaume, 3,000 tons, 14 guns, 313 men.

Italy.

Table listing Italian ships: Italla, Lepanto, Dandolo, Duilio, Castelfidardo with their tonnage, guns, and men.

The cruisers Bausen and Vesuvio, and six torpedo boats.

Portugal.—Vasco de Gama, 2,479 tons, 7 guns, 192 men.

Russia.—The cruisers Westrick and Zabiaka.

This gathering of ships of all the modern types but one afforded an excellent opportunity for comparison, and the naval student was not slow to take advantage of it, the foreign journals printing many columns of their observations and criticisms. The one type missing was that of which the Japanese cruiser Nan-iwa-kan is the exponent—a type, be it said, which eminent naval authorities have declared to be the most effective and reliable of any yet devised—swift, easily handled, and strong of battery, compared with the weight. Curiously enough, it was such small powers as Japan, Brazil, and Chili that were the first to truly estimate the value of this type, while the great powers, notably England and Italy, were yet building their slow-going leviathans.

Many of the big ships did not dare come in to their anchorages till the ebb tide served, fearful of running foul of their neighbors or the shore while turning to head the tide and drop their anchors, standing on and off outside till the sub-current of the ebb began to run out strong—for they are of deep draught—then coming in slowly, waiting to gather sternway and letting go their great bows.

In swinging, too, when the tide changed, many are said to have shown the unwieldiness of their designs, in some cases overrunning their anchors before the chains could be overhauled and the anchors reset for the new tide; and such continual working of steam windlasses and such a rattling of chains coming up through the hawse pipes and going out again, the Spaniards never heard before.

Our own Quinnebaug, being of ancient design, did not cut much of a figure when it came to steaming, though flying the handsomest ensign of all, for she is only good for 11 knots an hour with a gale behind her and a fair current running its best; but if the slovenliness of the big ships was not exaggerated, the Quinnebaug could certainly beat them all in handiness and certainty of movement.

Like all our ships, the Quinnebaug has what might be called a congress of nations aboard—Germans, Swedes, Danes, Norwegians, Austrians, Italians, English, Irish, Scotch, Russians, and Negroes; and when a portion of one of the watches was given an hour or so ashore, if they had any such liberty, they must have attracted some attention, speaking all languages as the men do, and the natives, no doubt, got some curious notions of Yankee men-o-war's men.

Since the war the Yankee sailor has gradually disappeared, there being no more excitement and prize money in the life; though there is good reason for the belief that the fact he could, because of his intelligence, earn more money ashore had much to do with his quitting the sea. At the present time the Yankee man-o-war's man is almost as extinct as the dodo.