

SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO. - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

CHARLES ALLEN MUNN, *President*
361 Broadway, New YorkFREDERICK CONVERSE BEACH, *Sec'y and Treas.*
361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States or Mexico..... \$3.00
 One copy, one year, for Canada..... 3.75
 One copy, one year, to any foreign country, postage prepaid. 20 lbs. 4.50

THE SCIENTIFIC AMERICAN PUBLICATIONS

Scientific American (Established 1845)..... \$3.00 a year
 Scientific American Supplement (Established 1876)..... 5.00 "
 American Homes and Gardens..... 3.00 "
 Scientific American Export Edition (Established 1878)..... 3.00 "
 The combined subscription rates and rates to foreign countries, including Canada, 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, OCTOBER 19, 1907.

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.

OLD FRENCH MACHINERY AT PANAMA DOES GOOD WORK.

We have been so accustomed to consider the French machinery at Panama as a worthless asset, that it comes as a very gratifying surprise to learn that one of the old dredges, which had been lying in the Rio Grande River for more than twenty years, has been rebuilt at a moderate cost, and is now capable of excavating 120,000 cubic yards of material per month; or as much as can be removed by four of the most modern 95-ton five-yard steam shovels. When the dredge has been put in service at the La Boca entrance to the canal, it will be capable of doing more work than a modern dipper dredge costing \$102,500. The story of the reconstruction of this derelict reads almost like a romance; for the various parts which have been used in rebuilding were all of French construction, and were found in the jungle or among other abandoned material scattered along the line of the canal, all of which had lain neglected and exposed to the action of the elements for fully two decades. Thus, the three boilers, which were found in the jungle near San Pablo, were in excellent condition, being quite free from corrosion. In good shape, also, were the two cylinders; and it seems that the engine, which was in place in the hull, was, in the words of the Canal Record, "in excellent condition, and could not be surpassed by modern machinery, either as to adjustment or economy of operation." Moreover, "the copper piping on all the machinery is of very heavy design, and shows more careful workmanship than is found in modern machinery." The excellent state of preservation is due, in the first place, to the high quality of the material, and, secondly, to the fact that it was all abundantly covered with white lead and grease when the work was shut down. This dredge is similar in type to an old Scotch dredge, which was reconstructed by the Panama Railroad Co. five years ago, and which has been steadily at work in the interim on the channel from La Boca to Maos Island, with a record of less than forty days out of commission for repairs during that time. It is expected that these two dredges will prove to be of about equal capacity; and that when both of them are in active operation, there will be a marked increase in the total yardage removed from the canal prism. The material removed is taken out and dumped in deep water by eight self-propelled old French hopper barges. It is also stated that another old French dredge of a similar type is now being repaired in the Cristobal drydock, and will be placed in commission about the last of this month.

THE FOUR-DAY BOAT.

The success of the "Lusitania" in steadily breaking all transatlantic records stands for something more than the achievement of an individual steamship company, commendable though that is, and for something more than the success of one of the two great maritime nations who are contending for supremacy on the high seas. For a technical journal the significance of the fine performance of this ship lies in the fact that it marks the successful accomplishment of a supreme effort in the development of the latest type of motive power, the steam turbine. For all his reputation for caution and conservatism, your typical Briton, when he does break away from traditions, is apt to go just a little further than his competitor, whether it be in the building of a 1,710-foot Forth Bridge cantilever, or the construction of a 45,000-ton turbine steamship. When the dimensions of the two new Cunarders were first announced, and it was learned that each was to carry about 70,000 horse-power in motors of what was

then considered to be of a comparatively experimental and untried type, the marine world stood aghast that \$13,000,000 should be risked on such a doubtful venture; and when the supposedly 25-knot "Lusitania" completed her first voyage with an average speed to her credit of 23 knots an hour only, or half a knot less than that achieved by the German boats with the reciprocating engine, there was much wagging of wise heads, and reiteration of "I told you so's"; and this in spite of the assertion of the owners that the ship had been jugged along on between two-thirds and three-quarters of her full power, and had come into port with 1,500 tons of coal in her bunkers.

The second trip of the "Lusitania," which commenced at 10:25 A. M. on Sunday, October 6, and ended at New York at 1:17 A. M. Friday morning, has served to set at rest all doubts as to the success of this boat. The whole voyage from Daunts Rock to Sandy Hook was completed in four days, nineteen hours and fifty-two minutes, at an average speed of just 24 knots an hour, the passage being made in five hours and four minutes less time than was taken on the vessel's maiden trip. Added significance is given to this performance by the official announcement that the vessel was not driven to her full capacity, the intention being to let her extend herself a little more on each succeeding voyage, until she has demonstrated her maximum transatlantic speed. It should be remembered that her contract with the government, on which hinges the payment of a \$750,000 annual subsidy, makes it necessary for the "Lusitania" to make a complete voyage from Queenstown to New York and back at an average speed half a knot faster than was made on this trip, or 24½ knots an hour. Seeing that the "Lusitania" averaged on her trials nearly 25½ knots for 1,200 miles, there can be little question of her ability to make sure of the subsidy. When everything is thoroughly shaken down, and the officers and the crew are familiar with the ship, it will not be surprising if, under favorable conditions of a smooth sea and fair weather, she should make the run at 25 knots an hour, or in four and a half days. This would bring the ship to her dock in New York Thursday evening, and would enable not only New York, but cities far in the interior, to receive their mail one day earlier than they do at present—a convenience which, in itself, would go far to justify the great expense of the construction of these two fine ships. The arrival of these boats on Thursday evenings could be made a certainty by setting the hour of departure of the last mails from London three or four hours earlier in the day than at present.

In addition to securing the land-to-land record, the "Lusitania" on two days broke the record for all-day steaming, doing 608 knots on one day and 617 knots on another, as against the highest previous record of 601 knots, credited to the "Deutschland." Her average speed of 24 knots an hour is about half a knot faster than the highest average of the "Kaiser Wilhelm II." and the "Deutschland." In looking back over the record for the past fifty years of transatlantic travel, it is interesting to note how steady has been the increase in speed and the reduction in time. In 1856 the "Persia" crossed over the same course in 9 days, 1 hour, and 45 minutes. The first eight-day boat was the "Scotia," which in 1866 cut the record to 8 days, 2 hours, and 48 minutes. To the "City of Brussels" is due the credit of being the first seven-day boat, her time being 7 days, 22 hours and 3 minutes, made in the year 1869. It took eleven years to bring the record below seven days, the honor of this performance falling to the "Alaska," which, in 1882, made the trip in 6 days, 18 hours, 37 minutes. Seven years later, in 1889, the "City of Paris," the first of the twin-screw liners, reduced the time to 5 days, 19 hours and 18 minutes. To develop the four-day boat has required eighteen additional years of development; and apparently the feat became possible only with the advent of the Parsons steam turbine.

PROSPECTS OF RELIEF OF BROOKLYN BRIDGE CRUSH.

The Public Service Commission is to be congratulated upon the lucid analysis which it made in a recent report on the causes of the Brooklyn Bridge crowding and the probabilities of its early relief. The congestion was rendered inevitable by the fact that the Brooklyn Bridge is practically the only avenue between the two most important boroughs of the city, and that no less than eight elevated lines in Brooklyn are focused onto the single elevated bridge track, and sixteen Brooklyn surface lines converge onto the one trolley track. Evidently, the most rational method of relieving the congestion would be to divert as many of these tracks as possible to other river crossings, whether by tunnel or bridge. This, however, will take time, and can only be done by degrees as the various alternative routes are completed and put in operation.

Meanwhile, it is possible to quite materially reduce the congestion by putting in operation various devices and plans designed to give temporary relief. One of the most important of those which have been

adopted by the Commission, is to do away with the change of cars at the Brooklyn terminal during the rush hours, and introduce a service of through trains. This through service, and the better distribution and handling of the passengers at the Manhattan terminal, will be greatly facilitated by the construction of the large station which is to be erected on the site of the Staats Zeitung building, where the necessary clearing and excavation is now being pushed with great activity. The steps for immediate relief ordered by the Commission include the construction of new types of surface cars with double-size platforms to facilitate quick loading; increased policing to prevent disorder; increased traffic regulations to prevent obstruction on the roadways; the lengthening of the elevated terminal at the Manhattan end of the bridge to accommodate six-car trains; and the rearrangement of the Brooklyn terminals to enable additional empty trains to start in Brooklyn.

Although the above-mentioned changes will have an immediate and beneficial effect in loosening up the congestion, the fundamental remedies are to be found, as we have said above, in the opening of other routes across the East River. The first relief of this kind will occur within the next few months, when the completion of the Battery tunnel will deflect a considerable portion of the travel from the bridge. Another important agent will be found in the connection of the Brooklyn Broadway elevated road with the Williamsburg Bridge, so that through trains may be run to the new station which is being constructed below Delancey Street. The completion of this work will cause a considerable portion of the Williamsburg and Ridgewood travel to come to Manhattan by the Williamsburg in preference to the Brooklyn Bridge. The greatest relief to the Brooklyn Bridge of any single improvement under way will be afforded in about two and a half years' time, when the Center Street Subway from the Williamsburg Bridge to the City Hall, Manhattan, which is now under active construction, is completed; for the new route will afford the most direct line to Manhattan for the populous district lying between Williamsburg and Jamaica.

The Commission, judging from the present state of the work, believes that soon after the completion of the Center Street Subway, the new Manhattan Bridge, which is being built about a quarter mile to the east of the Brooklyn Bridge, will be completed and ready for traffic. As this structure will provide four sets of tracks for trains instead of one set, as on the Brooklyn Bridge, it is reasonable to expect that upon its being thrown open for service, the Brooklyn Bridge congestion will become a thing of the past. Moreover, immediately upon the completion of the Manhattan Bridge, the older structure will be taken in hand by the Bridge Department for a thorough reconstruction and strengthening and an enlargement of its present capacity.

BATTERY TUNNEL READY IN TWO MONTHS.

Apropos of the prospects of early bridge relief, we note that, if the forecast of the recent special report by Chief Engineer Rice on the Battery tunnel to Brooklyn proves to be correct, this most important section of the Rapid Transit system will be open for service in about two months' time. The present condition of the contract is that the first section in Manhattan is in operation; the third section in Brooklyn is well advanced; and the second section, the completion of which has been delayed by various more or less serious mishaps, is "in a fair way of being put in operation in about two months' time." In this section the tubes are practically complete and ready for track laying and the installation of the signal system, except for the section from the middle of the river to the Brooklyn shore. In this particular stretch of the tunnel a variety of work is being done to finish the tubes. The reconstruction work proper is entirely finished; the piles are all down, and the lining has been made watertight. The principal work remaining to be done before laying tracks consists in lining the roof and sides of the tunnel where the bottom is in fine sand, and in finishing the ventilating shaft. The report states that on account of the methods pursued by the sub-contractor, the extent of the variation provided for in alinement and grade when the tunnel was designed, was exceeded; but that those portions of the tube in sand where the trouble occurred have been now so reconstructed, that a clearance of four inches as a minimum can always be maintained throughout the work. This minimum conforms to the clearance which exists throughout the Rapid Transit Subway in Manhattan, of which this work has been made a part.

In view of the fact that the stability of a portion of the Battery tubes has been seriously called in question by more than one expert who has reported upon them, we have asked the Chief Engineer for a statement as to the exact condition of this work. He assures us that the whole of the tunnel in both tubes, from shore to shore, is a perfectly safe and reliable work; that considering the nature of the material through which it passes, it is remarkably dry; and