

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. \$0.168. 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 Edition (Established 1885) 2.50
 Scientific American Export Edition (Established 1876) 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, corner Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 9, 1899.

GENEROUS CRITICISM—AND THE REVERSE.

Our readers will remember that an American firm not long ago received the contract for building and erecting the spans of the military railway bridge across the Atbara River in the Soudan, the contract being awarded to them entirely on the merits of their bid as compared with those of various English firms which were asked to compete. Not only was the American bid very much lower, but the firm undertook to do the work in a fraction of the time required by English builders.

The bridge was recently completed, and Lord Kitchener, the famous engineer-soldier of the Soudan, in speaking at the opening, complimented the builders on their work, which he said "may fairly well be considered a record achievement." He considered that they had shown "real grit" in their rapid erection of the bridge in the interior of Africa, "so far from home in the hottest months of the year and in dependence upon the labor of foreigners." Such commendation coming from a man who is not only a distinguished soldier but an experienced engineer, is significant.

In a recent issue of *Engineering* the editor reviews the history of the construction of the bridge, more particularly as it concerns the letting of the contract to an American firm, and concludes as follows: "The whole story of the Atbara bridge, relating to the foundations as well as to the superstructure, is full of interest and contains a moral which lies on the surface. The manufacturers of this country must either adopt new methods to cheapen production and increase the rapidity of the output, or they must be content to see orders given wholesale to foreign contractors with whom they cannot hope to compete. The feeble cry of favoritism, inferior material, inferior workmanship, etc., has been heard too long. Let us recognize frankly the danger that besets us and acknowledge the fact that in certain branches of industry we are commercially behind our most active competitors."

In marked contrast with these frank and manly acknowledgments of the skill and enterprise of American bridge builders is the tone adopted by one or two London journals, one of which says, "It now remains to be seen whether this bridge, built in America, on lines condemned by English engineers, will be able to stand the Atbara's rushing floods." As a matter of fact, "Atbara's rushing floods" will have no opportunity to test the stability of American workmanship, for the piers on which the American spans have just been swung are not of American construction, but were built by an Italian firm. The work of sinking the piers was done by this firm, for the reason that there was no English company in Egypt possessing the required plant for that class of work. If the piers should fail to hold up the superstructure, it will be no reflection upon the firm which built and put the latter in place.

The time was when English engineers believed themselves to be unsurpassable in their various lines of work, and it was the fashionable thing to speak lightly of American construction. For the great majority of Englishmen that day has passed, and the criticisms of such men as Lord Kitchener and the editor of *Engineering* may be taken as representative of the opinions of the English people as a whole.

ECONOMY OF THE ELECTRIC UNDERGROUND TROLLEY.

The annual report of the Metropolitan Street Railway Company, of New York city, which has just been filed at Albany, contains some figures on the cost of operation which afford further proof of the remarkable economy of the underground trolley as compared with the use of horse power. In spite of the fact that the company did not begin to feel the benefit of the change from horse power to electricity on the Sixth and Eighth Avenues and Twenty-third Street lines until last March, the report shows that the cost of operating the system was reduced last year to from 52.3 per cent to 48.75 per cent; and it is probable that the next annual report will show a still more marked reduction. These figures should be compared with those of the

Manhattan Railway and of the Third Avenue cable system, the cable system costing 55.8 per cent of its receipts for operation, and the steam power lines of the Manhattan Railway costing 59 per cent.

It may be mentioned in this connection that the compressed air cars of the Metropolitan Company are now running on the cross-town lines, and, in view of the large amount of attention that has been drawn to the compressed air system during the past year, the comparison of the cost of operating these cars with the cost of the underground trolley cars would be of special interest. The compressed air system of car traction, as carried out by the Metropolitan Company, will form the subject of an illustrated article in an early issue of this journal.

IN SEARCH OF AN EFFECTIVE TROLLEY CAR BRAKE.

The fact that the New York State Railway Commission is now carrying out a series of tests to determine the best form of safety brake for use on trolley and cable cars in city streets cannot fail to give genuine satisfaction. We do not know of any subject coming within the sphere of their jurisdiction which could be of greater importance to the interest of street pedestrians in our traffic-crowded cities.

Of late years there has been an enormous increase in the weight and speed of street cars, due chiefly to the introduction of cable and electrical systems. While nominal speeds of six or eight miles an hour may be imposed, it is patent to everyone that the actual running speed is frequently twice as great, and where the cars weigh from eight to ten or twelve tons, as they sometimes will, it is a physical impossibility for a brakeman to make an emergency stop with the hand brake, as ordinarily fitted.

The present tests are being carried out upon a section of the Lenox Avenue underground trolley line in this city. All of the manufacturers of safety brakes have been invited to compete, and, according to one of the commissioners, twenty-two different styles of brakes are to be tested. These will be of three kinds, according as they are operated by electricity, by compressed air, or by hand; and after the trials are over the commission will approve of one or possibly two of the brakes of each kind. On the first day's trials the test was made of an electric brake designed by the General Electric Company, the electric car used weighing about 11 tons. Over a dozen tests were made at speeds of from eight to eighteen miles an hour, and an automatic speed recorder was employed to determine the speed at the time the brake was applied and the time and distance required to stop the car. A full account of these trials will be given in a subsequent issue.

It was merely a question of time before this matter was taken up in serious earnestness. The loss of life and the injuries due to pedestrians being run down by trolley cars is simply shocking, and the more shocking because a greater part of it is absolutely preventable. While, of course, many of the accidents are chargeable to carelessness on the part of the motormen, the majority of them are doubtless due to the fact that the brakes are too feeble to bring the car to a sudden stop. We direct the attention of our readers to this subject as one in which there is a good field for further investigation.

FALL OF THE CHICAGO COLISEUM.

One of those accidents to framed steel buildings which are of all too frequent occurrence has recently taken place in Chicago, where the Coliseum, a structure 304 feet in length by 172 feet wide and 85 feet high, collapsed during erection. It seems that the work had proceeded as far as the erection of the large steel arches which carry the roof. Each arch was a three-hinged steel truss with a clear span of 150 feet, the highest point of the arch proper being 66½ feet from the ground. The arches footed on foundations of concrete which were themselves carried upon piling.

This accident, which involved the instant death of ten workmen and the injury of a large number of others, calls to mind a similar accident to the Coliseum which was being erected in Chicago in the year 1895, when the whole of the steel work collapsed. Another notable instance of this kind was the fall of the steel framework of the shed on the Wilson line pier of New York city. We discussed both these accidents at the time and pointed out, particularly in the case of the Wilson pier disaster, that the collapse was due to the lack of proper temporary bracing between the trusses during erection. It is claimed that more bracing would have been in place at the Coliseum on this occasion if the work had not been delayed by the prevalent scarcity of material; but in any case such huge arches as these at Chicago should never have been erected unless there was ample bracing at hand to give them a reasonable margin of stability. We again commend this most important question to the attention of firms who are engaged in the erection of framed steel structures, and suggest that it would be possible by a judicious use of temporary struts and ties to make absolute provision against collapse, without adding appreciably to the cost of erection.

THE PROLONGED DISTRESS IN PORTO RICO.

A recent dispatch from General Davis regarding the extent of the Porto Rico disaster proves that the worst fears have been more than realized and that for many months it will be necessary to send a steady supply of food to the sorely stricken island. The General repeats his request that supplies be sent at the rate of a thousand tons a week until further notice. He states the most pressing need is not for lumber for building, but for food, and he thinks that the aggregate cost of the supplies which will be necessary to carry the inhabitants over the intervening period until a new crop of fruits and vegetables has been grown will, perhaps, reach a total of \$1,500,000. It seems that it is impossible to ship lumber from the coast to the interior, because of the complete wrecking of the inland roads; and the immediate efforts of the United States should, therefore, be directed to the mere question of keeping life in the bodies of the homeless people, who are already reconstructing the rough shelters which constitute the houses of the peasants in the interior. Another report states that the coffee and fruit crops as well as the small crops are entirely lost. The oranges and bananas were all thrown down, and a request is sent for the distribution of vegetable seeds of such kinds as may be easily and quickly raised.

It is gratifying to note that the response to the appeals which have been made have been instant and generous, and we are satisfied that the actual extent of the calamity has only to be made known to provoke the sending of all the needed supplies.

THE PRELIMINARY SPEED TRIAL OF THE "ALABAMA."

The Cramp Shipbuilding Company has made such good progress with the battleship "Alabama" that she has already been enabled to go out for her preliminary builders' trial, and the results are so satisfactory that it is reasonable to expect that this fine ship will exceed her contract speed of 16 knots by from a knot to a knot and a half when she comes to be officially tested for acceptance by the government.

Four runs were made over a measured distance of 11½ knots, and on the last attempt an average speed of 17.2 knots an hour was obtained for the whole course. The run immediately preceding this was made at the rate of 15.43 knots an hour, thus making an average speed for the two runs, under a forced draught, of 16.32 knots. The vessel was not down to her load line, but, on the other hand, her hull was foul as the result of more than twelve months spent in the waters of the Delaware River. A strong wind was blowing over the course, and this would account for the difference in the speeds of the last two runs, the first being made against, and the last with the wind. In the run out against the wind the average speed of revolution was 112, and in the run back 115. The builder, who was on board, expressed himself as greatly satisfied with the trial, and confident of exceeding the contract speed by a liberal margin.

VELOCITY OF THE WIND.

The great hurricane which wrought such destruction to Porto Rico has furnished remarkable records of velocity. Recent advices from the Weather Bureau station at Hatteras contain some very startling figures, and prove that if we are to register the highest possible velocities of the wind, our automatic apparatus will have to be strengthened accordingly. The greatest velocity occurred shortly after noon, the 17th of August, when records were made which prove this hurricane to have been the most severe within the past seventy-five years.

It seems on the morning of August 16, easterly gales were experienced at Hatteras in which the velocity of the wind ranged from thirty-six to fifty miles an hour. At four o'clock of the morning of the 17th the wind was blowing seventy miles an hour, and at one o'clock P. M. it was ninety-three miles an hour, with extreme velocities of from 120 to 140 miles an hour. At this time the anemometer cups were blown away; but the report states that the wind probably reached an even greater force from three P. M. to seven P. M. of that day. The highest velocity previously reported at the station was eighty miles an hour; this was in April, 1889. The air pressure reached 28.62 inches at eight P. M., and this is the lowest ever recorded on the middle Atlantic coast.

THE NEW PARCELS-POST TO GERMANY.

There was signed on August 26, by Postmaster-General Smith, for the United States, and Baron Mumm von Schwartzstein, on behalf of Germany, the first parcels-post convention between this country and any of the European nations. We have had parcels-post conventions in existence for some little time between this land and several of the Latin-American republics and West Indian islands, but this is the first convention made on our behalf with any of the first-class powers. England, France, and some others of the powers have sought to effect such an agreement with us, or we have sought them; but thus far nothing definite has come of any of the overtures, save