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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.

RAILROAD CONNECTIONS WITH MANHATTAN ISLAND.

There are two great engineering schemes, both vitally affecting the interests of Manhattan Island, which, thanks to one of the greatest railroad companies in this country, appear to be within measurable distance of construction. The greater of these is the proposed railroad bridge across the North River from Hoboken to Twenty-third Street. The other scheme is the proposed Long Island Railroad tunnel, which is to extend beneath the East River from the Thirty-fourth Street terminal of the Long Island Railroad Company to a terminal which will be located conveniently to the proposed terminus of the bridge. The construction of a 3,000-foot span, eight-track railroad bridge across the North River, with its costly approaches and terminals, is such a heavy financial undertaking that no private company would be capable of raising the necessary $60,000,000 or more for its construction. It has also been realized, especially during the last few years, that unless the North River Bridge is indorsed by one or more of the great railroad companies which have their terminals in New Jersey, the chances of its being built are slight. It has recently transpired, however, that at least one of the leading officials of the Pennsylvania Railroad is a director of the North River Bridge Company, and there are evidences that this powerful corporation has now taken hold of the scheme with the intention of putting it through.

The proposed tunnel beneath the East River will give the trains of the Long Island Railroad system a terminal station on Manhattan Island; and as the Long Island system has lately passed under the control of the Pennsylvania Railroad Company, it will be seen that the completion of the bridge and the tunnel will place the company in a very advantageous position as regards terminal facilities on Manhattan Island itself. In this connection also, it should be borne in mind that the company has purchased the franchise of the New York Connecting Railroad Company, which has the right to construct a railroad from a point on the main line of the Long Island road across Ward's Island and Randall's Island to a terminus within the Borough of the Bronx. Almost simultaneously comes the announcement that actual construction has commenced on a line of railroad which will connect Staten Island with Brooklyn, the line passing beneath the Narrows by means of a double tunnel. Although the Pennsylvania Railroad Company is not quoted as being directly interested in this scheme, a glance at the map will show that a connection between the main line of this road and Staten Island by a bridge across the Kill von Kull would provide an all-rail route from Philadelphia to Boston by way of Long Island and avoid the present ferriage from Jersey City, by way of the East River, to the station of the New Haven Road upon the Harlem.

There seems to be a consensus of opinion among those who are practically interested in the distribution of freight at the port of New York, that there would be no advantage in bringing freight trains across the river for distribution by rail on the Manhattan water front. It is claimed that by the present system of car floats the distribution is accomplished more speedily and with less interruption in the general traffic of the city than it could be if freight trains were brought over the Hudson by bridge and handled in the manner proposed by the New York and New Jersey Company. The new Twenty-third Street bridge will be used almost exclusively for passenger traffic. So large is the number of passengers now carried both on suburban and long-distance trains, and so rapid is the increase, that the capacity of the proposed bridge, enormous as it will be, may prove to be none too large by the time the great structure is opened.

AMERICAN LOCOMOTIVES IN ENGLAND.

Amid the considerable amount of discussion which has been aroused by the recent report upon the American locomotives on the Midland Railroad, the best statement has come from the pen of Mr. Charles Rous-Marten, than whom there is no better qualified critic upon the comparative efficiencies of various types of locomotives. Mr. Rous-Marten is well known in every part of the world where locomotives are to be found. He makes it his specialty to ride upon the foot-plate or in the cab of almost every new locomotive that has qualities of novelty or efficiency that render it worthy of special comparison with the standard locomotives already in use. This gentleman recently communicated to The Engineer an article which we reproduce in the current issue of the SUPPLEMENT. As the paper contains the observations of a man who is perfectly familiar with the work of both English and American locomotives, and who is noted as an unbiased observer, its conclusions have particular value in the present discussion.

In the first place, we gather that the test was most carefully carried out by Mr. Johnson, the Locomotive Superintendent of the Midland Railroad; that it extended over a period of six months; and that it was instituted specifically to learn what the respective merits of the two types, American and English, would prove to be under the same conditions. A superior economy was shown on the part of the English engine of twenty per cent to twenty-five per cent in fuel; fifty per cent in oil; and sixty per cent in repairs as the result of the six months' trial. At the same time the Superintendent reports that the "foreign engines worked their trains satisfactorily." Mr. Rous-Marten emphatically condemns the attitude of the non-technical press of England in taking the results of the Midland trial as proving that American locomotives, as such, are broadly inferior to those of British make. In reply to the question, "Is it not a fair comparison to have both engines made as nearly as possible of practically identical power and then to try them together on identical work?" Mr. Rous-Marten, who, by the way, is an Englishman himself, replies: "No, it is not; unless it be clear that each class of engines is the one that would be used ordinarily for the same work in the land of its origin." The Midland freight engine is the outcome of Mr. Johnson's many years of experience in judgment as to what is the best type of engine to haul a 560-ton coal-train over the Midland line; and it does the work at a low cost for fuel, oil and repairs. Now, although the American locomotives were ordered to be built of the same power as the Midland standard freight engines, "it must be noted," says Mr. Rous-Marten, "that the order to the American firms was not that the locomotives were to be of the class and power that would be employed in America to do the work required;" and just here comes in the disadvantage under which the American locomotives were laboring. If the maximum load to be hauled had been stated in the contract, and the American locomotive builders been allowed a free hand as to the size and power of locomotives which they would offer to do this particular work, they would have turned out, according to Mr. Rous-Marten, very different machines than those which were actually sent over. Thus, instead of locomotives with 18 x 24-inch cylinders and 1,200 to 1,300 square feet of heating surface, and 160 pounds of steam pressure, the American builders would probably have sent over an engine with from 1,750 to 2,500 square feet of heating surface and 180 to 200 pounds steam pressure. In other words, according to the author of the paper, American locomotive practice is based upon the principle of allowing a liberal margin of power, whereas the English locomotives, in this case at least, were designed to do just the exact amount of work specified in the contract. The argument is summed up in the statement: "Therefore the recent Midland trial only proves that identical dimensions for identical work will not suit engines of totally different designs and modes of construction."

The fact of the matter is that the question stands where it was before this trial. It is fully admitted by American builders that as a piece of high-class workmanship, the English engine cannot be improved upon for the work it has to do on English roads. But while it is granted that the English engine is longer lived, it is a question whether there is any ultimate advantage in prolonging the life of a locomotive beyond its actual period of usefulness. Here in America we have learned that the conditions of transportation change so rapidly that the ideal locomotive of one decade may have outlived its usefulness in the next. The English always aimed at a high theoretical performance in their locomotives, and unquestionably they have secured it; but they have secured it at the expense of certain elements which go to make up successful railroad operation. If there were less expensive finish on the engines, and less successful effort to prolong their life beyond the period at which, in this country, they would be sent to the scrap heap, it is quite possible that the shareholders of the English railroad companies and the traveling public themselves would be gainers.

HEIGHT OF OCEAN WAVES.

There has been a good deal written lately about the height of ocean waves. An article in our contemporary Knowledge has been largely quoted, in which the writer gives some very interesting figures regarding observations made in the South Indian Ocean, between the Cape of Good Hope, and the Isles of St. Paul and New Amsterdam, this being a region where westerly winds prevail almost without a change the year around. It was in this locality that the highest waves on record, according to the writer, were observed, the measurement of thirty waves at various times during the day showing an average height of 29.63 feet, the largest of observed waves being 37.53 feet in height. Lieut. Paris, who made the observation, had to climb to the twenty-second rung of the shrouds before he obtained the level of the crest.

In these days of colossal steamers, with towering superstructures, it is not necessary to do any climbing of the shrouds to observe the height of the waves. Going from deck to deck, the passenger, with a little experience, can find a position in which sitting or standing the crest of the highest waves will just coincide with the line drawn from his eye to the horizon. He can probably ascertain from one of the officers of the ship what is the height of the deck on which he is standing; adding to this the distance from the deck to his eye, he can obtain a fairly approximate estimate of the height of the waves. In making an estimate of this kind, however, care should be taken to make the observations when the vessel is in the trough between two big seas, and on a fairly even keel, the observer standing amidships and as near as possible to the center line of the vessel. The upper deck of the biggest of the Atlantic steamships is from 30 to 32 feet above the normal waterline, and it is very rarely, even in the heaviest Atlantic storms, that the crest of a wave will reach the height of the observer's eye. When it does, it is probable that the ship herself is moving over one of the cross seas which frequently intersect the regular line of Atlantic rollers.

Perhaps the most accurate gaging of the height of ocean waves ever carried out was that which was recently discussed in a paper before the Institution of Civil Engineers of Great Britain by William Shield, who gave the results of observations made during a storm at Peterhead, North Britain, when the wind varied in velocity from 50 to 90 miles an hour. The method of observation was as follows: Sights were taken along the breakwater with a view to ascertaining the height of the waves as they ran into the bay between the breakwater and the opposite shore. The water along the line of the sights was from 60 to 63 feet in depth. The sights, which were 6½ feet in height, were placed at intervals of 120 feet along the coping of the breakwater, the level of which is 22 feet above low water. As the tide-gage registered 9 feet at the time the observations were taken, the line of sight must have been 19½ feet above still-water level. According to Mr. Shield, wave after wave passed by carrying an unbroken crest at least 3 feet above the line of sight and, therefore, 22½ feet above the still-water level. The wave-period varied from 13 to 17 seconds, and the length of the waves between 500 and 700 feet. Assuming that the troughs of the waves were as far below the still-water level as their crests were above it, the height of the waves would appear to have been 45 feet; but it is recorded that the flatness of the trough curve as compared with the curve of the crest seemed to indicate that the height of the crest above and the depth of the trough below the still-water level were not identical. It was considered by the author of the paper that the crests of the waves were to some extent raised by the friction of the sea-bed. Hence, it was estimated that, on the ground that the volume of water above the still-water level must correspond with that of the trough below it, the height of the waves from trough to crest closely approximated to 40 feet. These figures, it will be observed, are greater than those recorded as having been observed in the South Indian Ocean and elsewhere, due allowance being made for the tendency of the waves to become steeper and loftier as the friction of the sea-bed tells upon them.

SELENIDES OF COBALT.

M. Fonzes-Diacon has been carrying on a series of experiments relative to the combinations of selenium and cobalt, and has succeeded in forming a number of new compounds, the selenides of cobalt, which are analogous to the series of selenides of nickel recently described before the Academie des Sciences. The only previous preparation of the selenide of cobalt is that of Little, who formed a melted protoselenide by the action of selenium upon cobalt heated to redness. The protoselenide was the first body obtained by M. Fonzes-