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THE MONO-RAIL FOR HIGH-SPEED TRAVEL.

The mono-rail railway has achieved a sufficient measure of success to entitle it to rank as a standard system of construction, at least for certain classes of work. At present the system is restricted almost exclusively to railways designed for the hauling of freight by draught animals or by manual power on plantations, or to light railways which act as feeders to the main lines of traffic. It has found its most extensive field of operation in India and some parts of South America. Only of late years has it attracted more than occasional attention as a possible means of passenger traffic, although the mono-rail line between Listowell and Ballybunion, Ireland, nine and one-half miles in length, has been for some years in successful operation. In our issue of May 5, 1900, we gave illustrations of the Langen mono-rail railroad between Barmen and Elberfeld, Germany, which must be considered as the most important development yet made in this direction. This is a double-track, elevated line, carried upon steel posts and A-frames. The trains are made up of full sized cars, each with a seating capacity of fifty people, the average running speed of the trains being twenty miles an hour.

In both the Irish and the German lines above referred to, there is no attempt to obtain exceptional speeds, the operation of both systems conforming to the common practice of suburban and light railways. Rightly or wrongly, however, the advocates of the mono-rail construction claim to see in the system special qualifications for the running of abnormally fast express trains, and, as was to be expected, some highly absurd claims have been made and impossible methods of construction and operation suggested. The proposal which is just now attracting the most attention is the construction of an express railroad between the cities of Manchester and Liverpool upon what is known as the Behr system, in which the weight of the train is borne by a central elevated rail, and the cars are guarded against excessive oscillation by means of steadying rails placed below the level of the single rail, one on each side of the structure. The first application of the company for the necessary parliamentary powers met with refusal; but it seems that another effort is to be made to obtain the necessary powers, and as the project is backed by the powerful influence of Sir William Preece, so long identified with the British Post Office, it is considered probable that it will be carried through. The "trains," which are to be electrically operated, will consist each of a single coach weighing 45 tons and seating 64 passengers. These cars are to be started at ten minute intervals, and traveling at the rate of 110 miles an hour, they will cover the distance of 34½ miles in twenty minutes. There will be no intermediate stations, switches, or crossings. In a paper published recently upon the subject, Sir William Preece seems to be perfectly satisfied that this high speed can be maintained, and that, although the fares will be slightly lower than those charged upon the standard form of railway, the enterprise will prove to be profitable.

In the interests of high-speed transit it is to be hoped that parliamentary obstruction will be removed and that the possibilities of extremely fast travel may receive the thorough testing which would result from the completion of the proposed road. No one who considers the wonderfully rapid development of electrical traction since its inception can affirm that a proposal to raise the speed of inter-urban traffic to 100 miles an hour is chimerical either from the standpoint of the engineer or the capitalist. With a properly constructed track, transmission lines and motors, a mean speed of over 100 miles an hour could certainly be achieved; and if the company, as they state, can carry passengers between Manchester and Liverpool at about the same fare as is charged on the present railroads, and in half the time, it is certain that they will secure a sufficient volume of travel to render the undertaking profitable. We do not, however, for a moment believe that the mono-rail is indispensable to the realization of extremely high speeds, for it would be possible to run a train at equal speeds over a surface road, provided the proper superelevation of the outer rail were given. The advantages of the system seem to lie chiefly in the fact that by carrying the trains well above the surface, the risks that are incidental to all surface lines on account of crossings, open gates, broken fences, etc., are entirely removed.

THE WATER-TUBE BOILER ON TRIAL.

It cannot be denied that the disappointing results that have followed the recent wholesale introduction of the water-tube boiler into the British navy shook, for the time being, the faith of engineers in water-tube boilers as such, and caused something of a revulsion of feeling in favor of the cylindrical boiler of the well-known Scotch type. The steam engineering world has awaited with considerable interest and anxiety the official report on the subject, and now that it has been some time before the public, and there has been an opportunity to weigh the evidence, it is generally conceded that the water-tube boiler, as a type, stands pretty much where it did before, and that its relative merits and demerits have not been affected one way or the other. All that was claimed for the water-tube boiler has been realized, and its failures in the British navy are not chargeable to the boiler, as such. In proportion to its power, it is considerably lighter than the Scotch boiler; it carries considerably less water; and it possesses the advantage (scarcely to be overestimated) of enabling a ship to raise steam and get under way in far less time than was possible with the older type.

According to the memorandum submitted by the British Admiralty, the failure of the Belleville boiler is to be attributed more to the inexperience of the boiler room staff than to any inherent defects in the boiler itself. There is no denying that it has proved to be an extravagant coal consumer; but it seems that after economizers were added, and the staff had become thoroughly familiar with the management of the boilers as thus equipped, the coal consumption per horse power compared favorably with that of the ordinary cylindrical boiler. It has been found that there is a strict relation between the economical results achieved and the degree of training of the crews. When in the course of this elaborate experiment (for it is nothing less) important defects occur in any part of the machinery of new ships, the best method of remedying the trouble is jointly considered by the builders, by the dock yard officials, and by the Admiralty engineers. It becomes necessary to determine whether the defect is to be remedied by a different method of handling the machinery, or whether it calls for some radical change in the plant itself. After a decision has been reached, it is frequently necessary to delay the changes until the ship can be laid off; and even when the alteration has been made, prudence dictates that it should be generally adopted only after it has been given a trial upon one or two ships selected for the purpose. All of this takes considerable time, and progress is necessarily slow.

That the Belleville boiler is not merely valuable for strategical and tactical reasons, but compares favorably with any other type in efficiency, is shown by the recent trials of the sloop "Vestal," which, on her full power trial, with 221 pounds boiler pressure, an air pressure of 0·27 inch, and a total indicated horse power of 1,451, showed a water consumption of 16·8 pounds, and a coal consumption of 1·52 pounds per indicated horse power per hour. At five-sevenths of full power, the water consumption was 15·6 pounds, and the coal consumption fell to the remarkably economical figure of 1·3 pounds per indicated horse power per hour. At half power, with a water consumption of 15·53, the coal consumption was 1·41 pounds per indicated horse power per hour. These results, it will be seen, compare favorably with those which are now obtained on the "Deutschland," whose equipment may be taken as representative of the latest merchant marine practice. This vessel, it will be remembered, showed a full power consumption of 1·45 pounds per horse power per hour.

THE "WISCONSIN" AND THE "VARIAG."

The builders of the "Oregon" are to be congratulated upon the fact that the excellent work which they put into that fine vessel has evidently been duplicated in the second battleship which they have built for the United States navy, the "Wisconsin." At a time when naval men were complaining of the wide disparity which existed between the speeds achieved by naval vessels on government contract trials and their subsequent performance on actual duty, the memorable trip of the "Oregon" around Cape Horn proved that this ship, at least, was an exception to the rule; and as a fitting climax to her performance, in the long chase after Cervera's squadron she showed herself to be the fastest of the battleships, and at least a match for the cruisers. Dispatches from the Pacific coast state that on her trial trip in the Santa Barbara Channel, the "Wisconsin," a sister ship to the "Alabama," whose excellent record of 17·01 knots an hour was recently mentioned in this journal, covered the trial course at a speed of 17·1 knots an hour, thereby constituting herself the fastest battleship in the United States navy. The new battleship is a vessel of over 11,000 tons displacement, and was required to show a contract speed of 16 knots with an indicated horse power of 10,000. That she should have exceeded this speed by 1·1 knots is highly creditable, and suggests that in this vessel, as in a previous warship constructed at these works, the builders have voluntarily enlarged the capacity of the engines and boilers.

Only a few days prior to the trial of the "Wisconsin," the William Cramp & Sons Shipbuilding Company achieved a notable success with the Russian cruiser "Variag," which by the terms of the contract was required to maintain a speed of 23 knots an hour for twelve consecutive hours. It will be remembered that during the first trial, held some two or three months ago, the "Variag" maintained the required speed for several hours, or until the failure of one of the cylinders necessitated postponement. On the trial recently held, the "Variag" maintained a speed of 24·25 knots for twelve hours, a performance which, on account of the duration of the test, places this speedy cruiser among the very fastest of the vessels of her class. While it is true that the two Chinese cruisers, "Hai Tien" and "Hai Chi," of 4,300 tons displacement, achieved a mean speed of 24 knots during four separate runs over the measured mile, this is certainly not more creditable than the maintaining of 24·25 knots for twelve consecutive hours.

THE LATEST DEVELOPMENTS OF WIRELESS TELEGRAPHY.

At the recent annual gathering of the British Association at Bradford, England, Sir William Preece, who, as electrician to the English Post Office, rendered valuable service to Marconi in the introduction of his system of wireless telegraphy into England, delivered a lecture upon his own experiments in the utilization of the Hertzian waves for transmission of articulate speech without the assistance of connecting wires. The first experiments were conducted across Loch Ness in the Highlands of Scotland, as long ago as February, 1894, and they had in view the transmission of Morse signals by means of his electro magnetic method of wireless telegraphy. Two parallel wires, well earthed, were arranged one on each side of the lake, and the apparatus was so arranged that the wire could be systematically shortened with a view to ascertaining the minimum length necessary to record satisfactory signals. During the experiments an attempt was made to compare telephonic and telegraphic signals, and determine whether it was possible to transmit vocal sounds in the same manner in which the Morse signaling was being conducted. It was found that when the length of the parallel wires was reduced to 4 miles on each side of the water, it was possible to exchange articulate speech across the loch at a distance of 1½ miles.

Shortly after this, however, Marconi's practical application of the Hertzian waves occupied the attention of the electrical world to the exclusion of Preece's experiments, but in 1899, after having identified himself conspicuously with Marconi's work, Preece returned to his former investigation. His new experiments were of a more elaborate character, and they conclusively proved the fact that the maximum effects are produced when the parallel wires are terminated by earth plates to the sea itself. The conventional telephonic transmitters and receivers were employed.

At this time a scheme was in contemplation for connecting the lighthouse of an isolated group of rocks known as the Skerries with the coast guard station at Cemlyn, which is equipped with a post office telephone system. It was found, however, that the rough nature of the bottom of the channel and the strong local currents were such as to prevent the laying of a cable, and it was decided to attempt communication by wireless telephony. A wire, 750 yards in length, was erected along the Skerries, and on the mainland another line was carried from a point opposite the Skerries to Cemlyn, a distance of 3½ miles. Each line terminated with an earth plate in the sea. The average distance between the two parallel wires was 2·8 miles, and with this installation telephonic communication was easily maintained between the two stations, and the service has proved to be practical and thoroughly satisfactory.

A similar system of wireless telephony is now in course of erection between Rathlin Island, on the north coast of Ireland, and the mainland. The excellent results which have thus far been obtained prove that under existing conditions wireless telephony is a success, and may be easily and cheaply adapted to commercial needs. Although the system has not been applied to ships, there is no doubt that telephonic communication from ship to ship or from ship to shore could be carried out, the circuit being formed by means of a copper wire terminated at each end of the ship in the sea.

Another development of wireless telegraphy is that of Rosenberg, which is just now in practical demonstration at the Crystal Palace, London. His system is