

occurrence of a similar derailment as to justify us in considering the question. We accordingly asked the General Manager for a report on the matter, and received the following memorandum from him :—

“ With reference to the letter from the New Zealand Tourist League to the Chairman of the Board of Inquiry in regard to the use of all-steel cars, I desire to say for the information of the Board that the new carriages which we are now building, or have been building for a number of years, are virtually the equivalent of all-steel cars. The underframes are of steel sections welded together, which gives the effect of a one-piece unit. The ends of the cars, extending right up to the roof and over the entrance doorways, are entirely of steel, this form of construction providing a very strong and massive anti-collision end. Body-work in between these anti-collision ends is of timber reinforced with steel and provided with steel panels. In addition we are now fitting automatic couplers, which are of very strong construction and are not easily broken apart as the result of a collision or derailment, as very often occurs with the standard type of buffer which we have hitherto used.

“ The League is not correct in its statement that in most countries wooden carriages are no longer built. In many countries, including England and South Africa, semi-wooden cars are built on the lines of the construction which this Department has been adopting over recent years. In mountainous countries like New Zealand it is not possible to adopt very heavy steel construction throughout the car bodies, as the effect of the increased weight of such cars would place great limitations on the number of cars which could be hauled over the various gradients; and this point is, of course, one of great importance.

“ Whilst it is possible to adopt a light form of steel construction for our passenger-cars which would not exceed the weight of the present construction, it is doubtful whether any benefit would be gained in the strength of the vehicle, if we take into account the very strong nature of the steel ends which are now provided, and which may have to be reduced in strength to keep the weight within present limits with the added weight included in the steel-body work. If the League investigated this matter further it would find that many of the latest trains, for instance, the ‘Silver Jubilee,’ which has been operating in England at very high speeds for some time, and which is considered one of the fastest trains in the world, are built on the semi-steel principle and very much on the lines of our present-day cars.

“ In the case of rail cars the matter is somewhat different, as these are not subject to the heavy buffing shocks which take place in a train of cars hauled by a separate locomotive, and it is therefore possible to provide for a suitable light-steel construction for rail cars without exceeding very much the weight of one made in timber.

“ For various other reasons steel construction has been found a better form of construction than wood for rail-car body-work generally.”

In *The Engineer* of 13th May, 1938, the circumstances of a collision between two trains on the Rhodesian railway system on 4th April, 1938, were reviewed. Sir Nigel Gresley, Chief Mechanical Engineer of the London and North-eastern Railway, who is a recognized expert, stated that it was his belief that more lives would be lost in a collision between trains with heavy steel coaches than in a collision between trains of more flexible construction. With heavy steel coaches the impact would be more sudden and severe. “ A solid steel coach,” he said, “ cannot collapse, and act as a buffer for other coaches. In the Rhodesian collision some of the passenger coaches were badly smashed, but many travellers in the remaining coaches escaped uninjured. With heavy steel coaches the shock would be transmitted throughout the train. All-steel coaches are intensely hot in summer and very cold in winter, unless expensive air-conditioning plant is installed.”

We concur in the expressions of opinion quoted above, and desire to add that, in our opinion, the substitution of electricity for gas as a lighting medium for passenger cars has removed, or, at all events, very considerably reduced, the risk of fire that formerly was present in all cases in which a train was seriously damaged as the result of a collision or derailment.

PLANS AND DIAGRAMS PREPARED BY BOARD.

We submit herewith for ready reference a reduced scale plan and profile of the line from Turakina to the site of the accident, together with a diagram which shows the limits of speed prescribed for this section.

On this diagram are shown also certain operating-speed curves, which have been prepared for the purpose of illustrating, first, the operation of a passenger-train which is controlled as closely as possible within the authorized speed-limits, after it has run through Turakina; and, secondly, what may occur in practice. It will be observed that, provided that the visibility is good, that the track and mechanical equipment are in sound order, and that the driver is familiar with the road, a train having the composition of W 4 (for which these curves have been prepared) could be worked across the Ratana Flat with safety up to speeds approaching 60 miles an hour, and yet be under full control for the purpose of negotiating at 20 miles per hour the curve and grade in the vicinity of the scene of the accident.

Similarly, it is possible to illustrate what we believe to be a fair approximation to the operation of W 4 between Turakina and mile 131. It is to be observed, however, that a locomotive does not work under the conditions of a stationary power-plant: it is necessarily a very flexible machine, and its actual performance between stations is, within the limits of its capacity, under the sole control of the engine-crew.

In preparing these speed curves a consistent basis had to be found for computing the engine-power and train speeds over the varying grades. As usual, in the absence of dynamometer car records for the engine and stock actually concerned, it has been necessary to fall back upon data derived from