

in 1869, says, "What are now understood as steep or exceptionally steep gradients are rare in the States." No doubt since 1869 many lines with steeper grades have been constructed, but these particulars suffice to show the fallacy of the generalizations regarding curves and gradients; and, as regards loads, Mr. Brereton quotes no data available for comparison.

Again, Mr. Brereton says, "The English engine is a very heavy affair," &c., and quotes from a newspaper, "The wheel-base is rigid; the whole engine is stiff," &c. There can only be one inference to be drawn from this by an unprofessional reader—viz., that all English-built engines are alike, and are rigid, stiff, and undesirable, and that all American-built engines are the reverse.

It would be unnecessary to remark to a professional man that the English-built engines comprise machines of various types—there are light engines and heavy engines, with long rigid wheel-bases and with short and flexible wheel-bases—and that American-built engines show the same diversities.

The English-built engines vary from the Fairlie, with a rigid base of 5 ft., or a contractor's tank-engine with about the same, and the Adams or Bissel-Bogie fitted stock, up to the London and North-West goods engine, with a 15 ft. 6 in. base, and in weight from eight tons up to fifty tons. The American locomotives will exhibit similar divergencies, and consequently such a generalization as I have quoted is unreliable.

The American Bogie engines of the type we have in New Zealand, with small rigid wheel-base, are, as stated, well suited for bad roads and for sharp curves, but they do not present special advantages for working steep grades. That American engines are not always found most suitable, is practically illustrated by the case on the Iquique Railway, Peru, a line with long gradients of 1 in 25, where Mr. Evans's engine was found to be less successful and more costly to work than the English Fairlies, which are now exclusively used, the American engine being abandoned.

The statements to support the views that American are superior to English-built locomotives are as follow: 1. That the American obtain a larger train-mileage. 2. That the first cost of the American is lower.

Of the first statement I may say it is put forward without a single qualification; and the inference that generally the American engines are 50 per cent. superior to the English is quite erroneous.

There are many different ways of computing train and engine mileage, and with the same amount of running different computers would produce widely differing statements. To compare the train-mileage of two countries in so crude a manner is therefore manifestly erratic.

There are, besides the method of computing, other reasons why the Americans show a larger train-mileage. Mr. Brereton points out one—it is that Americans run continuously and so obtain a greater mileage; the English practice in running places the locomotive at a disadvantage as compared with the American, but this has nothing to do with the efficiency of the machine.

Again, the English averages extend over a greater number of years and take in a large number of old engines. More recent averages give a much higher result. For instance, three years running of single Fairlies on the Great Southern Railway of Ireland showed 25,000 train-miles as an average. The London and South-Western Railway, England, for the six years ending 1874, was working with an average of 25,000 train-miles.

In this colony the English-built engines were working from 25,000 to 30,000 miles a year. It is not, however, rational to make general comparisons without specific data.

In framing the form of statistical returns for locomotives in New Zealand, I consulted Mr. Conyers, and he determined the method of computing the train-mileage, and agreed on the other statistical statements, and the returns on this basis are now rendered to the Commissioners by the Managers, and they contain every information necessary. As there are two American engines, constructed under Mr. W. W. Evans's supervision, now running in the South under somewhat similar circumstances to the English-built, they may to some extent be compared, and Mr. Conyers could readily furnish the data for comparing working statistics: such data, however, must be, even then, received with great caution, because long average periods are necessary to eliminate accidental features, and the number of engines will largely affect the results.

As regards the statements made by Mr. Brereton about cost, I am not exaggerating when I state that the values of a cart-horse and a racer might as reasonably be taken to draw inferences from, as to the respective merits of the animals, as might his figures in the absence of data. I will compare the first cost of an American engine now working in Christchurch with an English engine also working in the district. They are alike in some respects, but not intended for the same service. They are both tender engines, and each have eight wheels, are about the same weight, and approximately the same cost each, and the adhesion weight and cylinder-power are in like proportion in each. The American has four-wheels coupled and two bogies; it cost erected in New Zealand about £2,800. It has a tractive force for each effective pound of pressure of 60 lb. The English engine has six wheels coupled, and one bogie; it cost erected in New Zealand about £2,700. It has a tractive force of 93 lb. for each effective pound of pressure. The comparative cost of the two engines, based on their efficiency for traction, will be—for the American, £46 6s.; for the English, £29.

The English engine is much superior on lines with steep grades and moderate curves, and is much the cheaper. It would not, however, be suitable for the service for which the American is designed, which is a faster engine, nor would it work so satisfactorily on sharp curves. The comparison is not, therefore, worth much except to show how very fallacious are Mr. Brereton's general statements, and when you compare the cost of the American engine (£2,800) with the average cost given by Mr. Brereton (£1,500 to £1,700), it shows still more the necessity for requiring specific data for judging from. The cost of some of the types of engines working in New Zealand is as follows:—10-inch cylinder double Fairlie, £3,200; 14-inch cylinder Christchurch goods, £2,700; 12-inch cylinder American passenger, £2,800; 10½-inch cylinder six-wheel coupled, £1,500; 9½-inch cylinder four-wheel coupled, with bogie, £1,300; 8-inch cylinder four-wheel coupled, £1,000.

The Americans cannot compete with the English in cheapness, or in the class of work they turn out.

These remarks are not intended to depreciate the merits of Mr. Evans's engines, of which there are now eight working in Christchurch. Mr. Carruthers recommended the importation of two on trial,