

The following railways, which have been constructed or are in course of construction under our advice, are examples of this system :—

The Queensland (Australia) Government Railways...	222 miles.
The Railway from Conjeveram to Arconum, India ...	19 "
The Toronto, Grey, and Bruce Railway, Canada, 1st section	90 "
The Toronto and Nipissing Railway, Canada, 1st "	103 "

And also the following, with which we were not connected :—

The Government Railways of Norway ...	101 "
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These railways are all of the 3' 6" gauge, which, while economical, gives sufficient width for powerful locomotives, and to insure great steadiness of running to the trains.

To use a narrower gauge than this for a railway to carry passenger traffic, we believe to be a mistake.

A broader gauge is, for speeds of twenty-five miles an hour, and moderate traffic, in our opinion, quite unnecessary, and involves considerable additional expense, especially if the country be a heavy one.

The question of gauge is, however, one which requires careful and independent consideration in each instance, especially if there be already railways in the country, with which the proposed line is likely to be connected; and we would especially call attention to the fact that the light system can be applied to any gauge. Thus the Carnatic Railway Company of India (guaranteed by the Government) are about to construct their railway of 5' 6" gauge, and 120 miles long, on this system, under the advice of a member of our firm.

The mode of construction adopted on these various lines being very similar, though not identical, may be summarized as follows :—

- 1st. Fencing, on both sides, of either wire or native timber.
- 2nd. Earthworks, having a width at formation level, in cuttings from 15' 6" to 12' 6", on embankments 18' 0" to 12' 6", with maximum gradient of 1 in 40, and minimum curves of 350 feet radius.
- 3rd. Bridges. 1. With masonry piers and abutments. 2. With timber framing. Strong timber trestle work for crossing ravines not exceeding fifty feet deep, does not, where timber is plentiful, cost more than 45s. per foot run for a single line.

The superstructures of the bridges of large span generally consist of iron girders, and of the smaller spans of timber trusses, but in some cases timber has been successfully adopted for spans of 80 feet and upwards.

The bridges are calculated for rolling loads of three-quarters of a ton per lineal foot of single line.

The weight of iron in main and cross girders and bracing is as follows for a single line :—

50 feet span ...	14 tons.
60 " ...	20 "
100 " ...	43 "

- 4th. Permanent way. Flat-bottomed iron rails, 35 to 40 lbs. to the yard, or steel rails 35 lbs. to the yard, laid on transverse hard wood sleepers, generally measuring 6' 6" x 8" x 6" rectangular, laid from 2' 6" to 3' 0" apart, centre to centre, well fished and secured by fang-bolts at the joints, and elsewhere by dogspikes; ballasted with gravel or coarse sand to the extent of 3,000 c. yards per mile of single line.

- 5th. A telegraph erected throughout.

- 6th. Stations, in some cases of iron, but generally of timber, of neat but economical design.

- 7th. Locomotives. Of these three types are now used, viz., goods engines and tenders, the engines weighing 20 tons in running order, and having eight wheels, of which six are coupled. Passenger engines and tenders, the engines weighing about 16 tons in running order, and having six wheels, of which four are coupled. Tank engines, weighing about 13 tons in running order, and having six wheels, of which four are coupled. And there are now in course of construction goods engines having six wheels, all coupled, with side play to leading and trailing wheels, and weighing about 19 tons in running order. All materials used in the locomotives are of the very best quality.

- 8th. Rolling stock. The outside width of carriages varies from 6' 6" to 8' 0", and either the English or American arrangement of the interior is adopted. The stock is made light but of the best materials, the centre of gravity is kept low, and all is arranged for passing round sharp curves with ease. For this purpose the American bogie, or still better, Clark's radial system for six wheels, is adopted. All springs and tires are of the best steel.

- 9th. The working speed varies from 12 to 25 miles an hour, including stoppages; but, when required, trains have been run for distances of 60 miles and upwards, at an average speed of 30 miles an hour, including stoppages.

- 10th. The cost of the railways is as follows, including in each case stations, rolling stock, engineering, and all management expenses :—

The Queensland railways—

Skilled labour, 10s. to 12s. per day.

Ordinary labour, 6s. to 7s. per day.

Materials chiefly sent from England.

Average cost per mile (exclusive of mountain incline), £6,550.

The railway from Conjeveram to Arconum—

Land and portion of roadbed given by Government.

Materials chiefly sent out from England.

Average cost per mile, £3,900.