the price of rails became lower, rails of 52 lbs. per yard were indented for from the colony on the ground, as we understood, that the heavier rails could be obtained at a cost not exceeding per mile of line the amount previously paid for 40-lb. rails. A considerable quantity of these 52-lb. rails have been sent out to New Zealand, yet small in proportion to the quantity of 40-lb. which have been shipped.

We will first consider the relative advantages of the use of 40-lb. iron rails as against the use of steel rails of the same section.

For the purposes of the inquiry, we will assume the price of iron rails as being £6 per ton delivered in London, and the price of steel rails £7 15s. per ton, which we believe to about represent the difference in cost. One mile of 40-lb. rails weighs 63 tons, but, as steel is a little heavier, one mile of these of the same section will weigh 64 tons.

We have no means of knowing the number and weight of trains that pass over the various lines in New Zealand in a given time. In this country it is found that iron rails will bear the passage over them of 120,000 trains, of 200 tons each, before requiring to be removed.

In New Zealand the traffic must necessarily be light, and the speed moderate, while, on the other hand, the rails are light, and the wearing surface of the head of the rail is not so wide as in the heavier rails in England. It is probable, also, that in a new country the permanent way may not be so solidly laid, or maintained so perfectly, as it is generally here, where the loads are heavy and the speed great.

In this country, on the railways where the traffic is light, fifteen years would not be considered a long time for iron rails to last without being renewed. On heavy gradients, or at places where the brakes have generally to be applied, rails will, of course, wear out much more rapidly. We therefore assume fifteen years as being the life of an iron rail in New Zealand under ordinary circumstances; and we are not exceeding the limit of the life of a steel rail under the same circumstances, when we calculate it at three times as long as iron, or forty-five years with light traffic.

The cost of one mile of 40-lb. rails, or 63 tons, delivered in New Zealand, estimating freight and charges at 30s. per ton, will be £472.

On the basis that these will wear out in fifteen years, £31 5s. per annum would have to be laid aside in order to provide £472 at the end of fifteen years, to place new rails in New Zealand for each mile of line, leaving out of the calculation the interest which would accrue.

To this sum of £31 5s. per annum, must be added simple interest at, say, 5 per cent. on the first cost (£472), £23·6 per annum.

From the sum of these two amounts—viz., *£55·1—would come to be deducted the value of the iron rails, if brought to England and sold. For these, £3 15s. might probably be got; or, deducting 30s. for freight, the net value would be £2 5s. per ton to the Government, being a total sum of £142— ... ... *£55·1
Over fifteen years would equal per annum ... ... 9·5
The cost to the Government per annum, per mile of 40-lbs. iron rails would therefore be ... ... £45·6

Steel rails of the same section, as we have already seen, weigh 64 tons per mile. The cost of these and freight will be £9 5s. per ton + 64 tons = £592. This divided over 45 years will give an annual expenditure of £13·1 for the renewal of one mile of steel rails ... ... £13·1
To this must be added, as in the case of iron, 5 per cent. per annum on the first cost of the rails (£592), or per annum ... ... 29·6
£42·7

Again, we must deduct the net value of the old steel rails, which we assume at 45s. per ton, or a total per mile of £144, which, divided over forty-five years, would be equal to 3·2
£39·5

The cost to the Government per annum per mile of steel rails would, therefore, be £13 × £29·6 — 3·2, against £45·6 in the case of iron.

Applying the same data, but arriving at the results by allowing compound interest in providing for the renewals, the figures will work out as follows:—

Iron.—Annual requirement at compound interest to provide £472, the original cost, at the end of fifteen years ... ... £21·7
Annual charge for simple interest on the first cost of £472, at 5 per cent., as before 23·6
£45·3

Deduct from this the annual value at compound interest of the net amount of £142, to be realized for the old iron when rails are worn out ... ... 6·6
£38·7

Leaves £38·7 as the total annual value of one mile of iron rails for the first life of fifteen years.

Steel.—Annual requirement, at compound interest, to provide £592, the original cost, at the end of forty-five years ... ... £3·7
Annual charge for simple interest on the first cost of £592, at 5 per cent., as before 29·6
£33·3

Deduct from this the annual value, at compound interest, of the net amount of £142 to be realized for the old material at the end of the forty-five years ... ... ·9
£32·4