

opened for traffic, by officers of the Railway department of the Board of Trade, who required the opening to be postponed in twenty-eight instances. The total number of inspections which were required to be performed by the officers amounted to fifty-eight.

Of the railways opened during 1853, twenty-five portions of railway, representing a total length of 298 miles, consisted of single line open at the end of 1853, viz., 1708 miles, was between one-fourth or one-fifth the whole amount of railway open. It is to be observed that the length of single line open at the end of 1852 was 1485 miles, and at the end of 1851, 1307 miles. A single line of railway cannot be worked with safety except under special regulations, so framed as to prevent the possibility of engines or trains moving in opposite directions, from meeting on the single line; such regulations are, however, inconsistent with a large amount of traffic. In all cases of single lines opened during 1853, the regulations required generally either that the trains should be worked by means of one engine moving backwards and forwards over the line, or over particular portions of it, or that some particular man should be appointed to accompany the trains moving over the portions of single line. And in cases where the electric telegraph is in use, the regulations required were, that the persons employed to start trains should be distinctly responsible for ascertaining, before starting the trains, that the line is clear so far as the next station.

The amount of capital invested in railways at the end of 1852 was £264,165,680, of which £161,400,256 consisted of ordinary capital, £38,700,655 of preference capital, and £64,064,668 of loans. The amount of capital raised for railway purposes in 1849, was £29,574,720; in 1850, £10,522,967; in 1851, £7,970,151; and in 1852, £16,398,993; thus increasing the amount invested in railways at the end of 1849 from £229,747,778 to £264,165,680 at the end of 1852. The amount of money which was raised by railway companies during 1853 has not yet been returned to Parliament; but it may be assumed not to have been less than that raised during 1852, and it is therefore probable that the whole sum raised by railway companies to the end of 1853 is not less than £281,000,000, of which about £42,000,000 may be assumed to have been preferential capital, and nearly £70,000,000 would appear to have been borrowed on the security of the undertakings.

The number of miles of railway in course of construction on the 30th of June, 1853, was 682 miles, and the number of men employed on them was 37,764. The number of miles open for traffic at that date was 6512, and the number of men employed, 83,409. The number of men employed on railways open for traffic was 9.5 per mile in 1852, and 10.7 per mile in 1853.

The total number of passengers conveyed on railways in the United Kingdom in the year 1853 amounted to 102,286,660; the number in 1852 had been 89,135,729. The total receipts from all sources of traffic amounted in 1853 to £18,035,879, and in 1852, to £15,710,554.

The receipts from goods have increased from £4,750,504 in 1849, to £8,112,477 in 1853, being an increase of from £1090 per mile, in 1849, to £1415 per mile, in 1853; and whilst the receipts from passengers in 1849 were larger than the receipts from goods in the proportion of 53.42 to 46.48, in 1853 the contrary was the case, viz., the per centage of the passenger traffic was 47.45, and of the goods traffic 52.55.

In Scotland the progress of traffic on railways has been similar. The mean length of railway open during the year has increased from 795.5 miles open in 1849, to 987 miles open in 1853. The number of passengers conveyed in 1849 amounted to 7,902,228, and in 1853 to 10,999,224, which represents 9993 per mile in 1849, against 11,246 per mile in 1853. The relative number of passengers of each class conveyed would appear to have slightly varied, the number of first and third-class passengers having increased, and the number of second-class passengers having diminished, the number in 1849 being 720 first-class passengers per mile, 2035 second class passengers per mile, and 6997 third-class passengers per mile, against 1107 first-class, 1971 second-class, 8165 third-class passengers per mile in 1853. The receipts from passengers having increased from £540,778 to £697,712; or from £680 per mile, in 1849, to £713 per mile in 1853; and the proportion of receipts from each class conveyed having been in 1849, £149 per mile for first-class, £196 per mile for second-class, and £331 per mile from third class passengers, against £181 per mile from first-class, £179 per mile from second-class, and £345 per mile from third-class passengers in 1853.

It would, therefore, appear that in Scotland the third-class traffic preponderates considerably both as regards numbers and receipts. There is also in the Scotch lines a preponderance in the receipts from goods traffic over the receipts from passenger traffic.

The amount received from goods in 1849 was £650,640, and in 1853 it was 1,068,016, representing £818 per mile in 1849, against £1075 per mile in 1853. The relative proportions of the two descriptions of traffic were, in 1849, passenger traffic 45.38, and goods traffic 54.62; and in 1853 the receipts from goods traffic amounted to 60.48 per cent. of the whole traffic.

The mean length of railway opened in Ireland in the year 1849 was 428 miles, and in the year 1853 it was 771 miles.

The total number of passengers conveyed in 1849 amounted to 6,059,947, or 14,142 per mile; and in 1853 it amounted to 7,074,475, or 9175 per mile.

The receipts from goods are also largely increasing, and they bear every year an increasing proportion to passenger traffic.

With respect to accidents, it appears that in 1852, 217 persons were killed, and 486 injured on the railways in the United Kingdom out of a gross total of 89,135,729 passengers; of these persons 181 were killed and 413 were injured in England; 24 were killed and 71 injured in Scotland; and 11 were killed and 2 injured in Ireland. In the year 1853, out of a gross total of 102,286,660 passengers conveyed by the railways of the United Kingdom, 305 were killed, and 449 injured; of these 243 were killed and 369 injured in England; 37 were killed and 68 injured in Scotland; and 25 were killed and 12 injured in Ireland.

On an Improvement in the Manufacture of Iron and Steel.

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Scientific revolutions are always caused by the discovery of some entirely new principle; industrial ones by a new and happy application of principles long known, but from which all the results have not yet been obtained.

* From the "Journal of the Franklin Institute."