A BRIEF REVIEW OF RAILROAD HISTORY FROM THE EARLIEST PERIOD TO THE YEAR 1894. PP. 3-51

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BY

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RAILROAD HISTORY.

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The present condition of railroads is the result of a gradual growth and development extending over a long period of years. The need of facilities for transportation began to be felt at an early age, and became more and more urgent with the increase of population and the advance of civilization. To meet these wants the ingenuity of man was exercised, and inventions and improvements were devised and brought into use from time to time as the necessities of the case demanded.

For the transportation of the great blocks of stone used in the construction of the Pyramids of Egypt, about twenty-five hundred years B. C., solid trackways were formed of large slabs of stone, over which, by means of rollers, immense weights were moved with comparative facility.

The ancient Romans also constructed their roads with blocks of smooth stone closely fitted together,

which presented a hard and even surface for wheels. The same practice has been adopted to some extent in modern times in several European cities.

A canal is said to have been constructed by Xerxes in his campaign against the Greeks, and a few other instances are mentioned in history as having occurred at an early period, but the first record we have of their use for commercial purposes is by the Chinese in the seventh century. In the twelfth century they were introduced in Holland, and their use was gradually extended throughout Europe. The celebrated canal between Manchester and Worsley in England was constructed by the Duke of Bridgewater about the year 1760, since which date numerous other works of a similar kind have been built in Europe and America. But their construction being confined to certain localities, and their availability limited in cold climates to a portion of the year, they did not fully supply the want for facilities in transportation. In some sections of country pack horses afforded the only means for the conveyance of burthens; attention was consequently aroused to the necessity of providing some more efficient mode for meeting the demand.

On account of the bad condition of the ordinary roads, the movement of coal especially, which had become an important item in Great Britain, was attended

with great inconvenience and expense, and in the early part of the sixteenth century, rails of timber were laid at the collieries near Newcastle-upon-Tyne, over which, by means of bulky carts provided with rollers, one horse could draw four or five tons.

Changes were subsequently introduced in the construction of the tracks and vehicles, the use of which, however, was confined to the coal districts. The first improvement consisted in making the track more substantial, by securing the wooden rails, which were about six inches square, by means of pegs, to cross ties or sleepers placed two or three feet apart; upon the top of these rails a strip of hard wood was fastened, which could be removed and replaced without disturbing the remainder of the structure.

For many years after the introduction of the wooden railway, the usual load for one horse was a wagon containing about forty-two hundredweight of coal.

In the year 1738 flat iron bars were substituted to some extent for the upper strip of wood. In 1767 cast-iron bars were made to take the place of the top rail. These bars were in lengths of five feet, four inches wide and one and three-quarters inches thick, with holes for spikes to secure them to the wood. Some years later, the rails were cast with a perpendicular ledge upon the outer edge, to keep the wheels from leaving the track,

and subsequently the ledge was transferred to the inner side of the rail. These were called tram or plate roads.

About the year 1789 a new form of cast-iron rail was introduced by Mr. Jessop. Flanged bars and flat wheels were discarded, and a flange was cast upon the tire of the wheels. The rails were cast in lengths of three feet, having a head one and three-quarter inches wide, and were designated edge rails from the fact of the wheel running upon the edge of the rail. They were of the fish-belly pattern; that is, deeper in the middle than at the ends, with the view of combining the greatest strength with the least amount of material. The rails were secured to cross sills by iron pins passing through a projection in the base at their ends, but it being found that the projections were easily broken and the rails rendered useless, a change was made by dispensing with the projection, and providing a separate cast-iron pedestal or chair, which was bolted to the wooden or stone support and into which the rail was secured by a key or wedge.

As the cast-iron rails could only be made straight in short pieces, the numerous joints proved objectionable; the material also was too brittle for the passage of heavy loads at high rates of speed. These difficulties were remedied about the year 1820, by the substitution of

malleable in place of cast iron, which was rendered possible by the improvements introduced in machinery for rolling iron. The rails, the length of which had been increased to fifteen feet, were secured by keys or wedges into cast-iron chairs, which were bolted down to stone blocks or wooden cross sills, placed about three feet apart.

The rails used on the Stockton and Darlington Railway, which was completed in the year 1825, were in lengths of fifteen feet, and weighed twenty-eight pounds per lineal yard; those on the Liverpool and Manchester Railway a few years later were of similar length, weighing thirty-five pounds per yard, all on both roads being of the fish-belly pattern. The form of rail was subsequently changed on most of the English roads, the rails being rolled with the top and bottom surfaces parallel.

The usual width of the old tram roads practically determined the gauge of the present railways. The width of the old tracks, including the two rails, was usually five feet, and the rails being each one and three-quarter inches wide, the space or gauge between the rails was left four feet eight and one-half inches, which width was followed in subsequent constructions, and being adopted on the Stockton and Darlington and Liverpool and Manchester railways, a precedent was established

from which it was difficult to depart. Attempts have been made both in England and America to change the gauge, but with a few unimportant exceptions the gauge of four feet eight and one-half inches continues to be the standard.

The improvement introduced by Mr. Jessop, of transferring the flange from the rail to the wheel, removed one of the difficulties experienced in operating railways. The liability to impediments on flanged rails in connection with the difficulty of construction at junctions, would have been serious obstacles to rapid speed and safe travel.

The next important consideration was to obtain a more efficient and economical motive power. The possibility of using steam for the movement of carriages had occurred to James Watt in his investigations into the properties and applications of steam, and he was so much impressed with the idea of its feasibility as to include steam carriages in his application for a patent in the year 1784. Between 1782 and 1795, Oliver Evans of Philadelphia patented a steam wagon, and made efforts both in England and America to put his designs into execution. In 1802 Richard Trevethic constructed a steam carriage for common roads, and in 1804 he built a locomotive engine, which upon its first trial upon the Merthyr and Tydvil Railway in Wales,