

At first the three companies which offered railway communication between London, Manchester and Liverpool promised to work harmoniously together, but in reality differences of opinion arose, and soon they were at daggers drawn. In order to provide a more direct route between Birmingham and Manchester than that offered by the Grand Junction Railway another company—the Manchester and Birmingham Railway was born. This line never got any farther than Crewe in its construction out of Manchester. As the railway boom was setting in very strongly, and projects for meshing the whole of the British islands were being outlined every hour, the London and Birmingham Railway concluded that it would be able to make a more beneficial bargain with one or more of the newer schemes, and so flouted the Grand Junction Railway. The latter, fearing competition, at once devoted its energies to entrenching its position. It amalgamated itself with the Liverpool and Manchester, as well as numerous other lines, and this consolidation of interests rendered it a very formidable force to attack. Then it determined to carry the war into the enemy's camp. It prepared the plans for a railway running from Birmingham, via Warwick, and Leamington, to a point near Oxford, where it would be able to effect a junction with the Great Western Railway. The latter, in return for giving the Grand Junction Railway entrance to London, was to secure the right to penetrate to Liverpool and Manchester.

The London and Birmingham Railway viewed this move with the greatest anxiety,

as the greater part of its traffic would be filched away, and it would be surrounded by hostile interests. Thereupon the directors, after a solemn discussion of the outlook, decided to recede from their untenable hostile position, made overtures to the Grand Junction Railway, and suggested

that the two opposing forces should settle their differences and combine. The negotiations proved successful, and in 1846 the union was completed, the different concerns being bound into a homogeneous whole under the title of the London and North Western Railway.

When the first railways forming this system were taken in hand, the engineers, owing to lack of experience, generally clung to the theory that a locomotive would not be able to work by adhesion purely and simply over gradients exceeding about 1 in 330. Accordingly, the lines between London and Manchester were plotted so as to conform with this prevailing opinion. This lack of knowledge proved a fortunate circumstance in the long run, inasmuch as the company has been spared that costly realignment and reconstruction which has harassed other railways so sorely, owing to the adverse influence exerted by the heavy grades in their original lines.

Taken on the whole, the Birmingham section of the London and North Western Railway is one of the most level lines in the world, and is conducive to high speeds and economical operation. There is no bank exceeding 16 feet per mile—a rise which is so slight as to be almost negligible—while, owing to the care displayed by Stephenson in the original survey, the maximum difference in level between the highest and lowest parts of the line is only 308 feet. To-day, owing to the care which has been bestowed upon its up-keep, its permanent way cannot be rivalled; indeed, it has been taken as a pattern in other large undertakings throughout the world, notably by President Cassatt when he undertook the remodelling of the Pennsylvania Railway, and by President Hays when he embarked upon the construction of the Grand Trunk Pacific across Canada.

The general belief that a rise of 1 in 330 represented the maximum permissible for working by steam provoked a curious

Formation of the L. & N.W.R.

The Gradients.