

tunnel 2,423 yards in length was inevitable. It seemed a straightforward job, because the borings which were driven in the customary manner, to determine the geological formation through which the bore was to extend, did not present any abnormalities. So the contractor estimated that he could complete the task for £99,000. Considering that up to this time a tunnel exceeding half-a-mile in length never had been attempted, the contractor certainly was daring and plucky to assume such a responsibility. It was decided to drive the tunnel from each end, and also north and south of two shafts, which were to be sunk from the ridge to the requisite level, and which were to be completed as ventilating shafts.

The contractor started operations in June, 1835, but ere many weeks had passed he learned to his dis-

The Kilsby Tunnel. may that the borings were completely unreliable. When

he came to sink his shafts through what he had been led to expect to be sound earth and rock, he stumbled against slippery shale, quicksand and water, of which, strange to say, no inkling had been given in the borings, as they had missed these treacherous spots. The contractor persevered, hoping against hope that he would get through this treacherous strata as he sank his second shaft deeper, but after nine months' heartbreaking disappointments and fighting against overwhelming odds, he threw up the job.

The Kilsby Tunnel became a nightmare. The water trouble scared every other contractor; not one could be induced to quote a revised price for its completion. Accordingly, the railway company was forced to take it over. Robert Stephenson came upon the scene, surveyed the prospect, and finally came to the conclusion that the water trouble was probably quite local; was not fed by subterranean springs, and that, provided adequate pumping plant was erected, the shaft could be

pumped dry. He set up powerful steam-pumps and sank wells near the located line for the tunnel for the purpose of drawing the water away from the main shaft. In all, eighteen of these subsidiary shafts, or wells, were sunk, and with pumps capable of coping with 1,800 gallons per minute, the water dillently was overcome, after a tedious battle lasting nine months. Bearing in mind the imperfect appliances available in those days, and that this was the first large railway tunnel-boring task which had been attempted, one cannot but admire the perseverance, dogged determination, and resourcefulness of Robert Stephenson and his assistants.

By the aid of a small army of 1,300 navvies, who toiled day and night incessantly, the tunnel was completed by October, 1838—a

Cost of the Tunnel.

remarkable performance all things considered, especially when on one or two occasions the working forces received startling frights. Thus, in November, 1836, while the men were at work in the tunnel, there was a sudden and violent inrush of water. A stampede ensued, and the work appeared to be doomed. But examination proved that the incursion was limited. Although the workings were flooded, the men were able to continue their work. Large rafts were fashioned, on which the navvies and the requisite material were floated in and out of the tunnel, often at extreme risk, owing to the ungainly nature of the argosies and the difficulty of manipulating them in the darkness.

Owing to the treacherous character of the earth through which the bore was driven, the tunnel had to be lined throughout, and for this purpose 30,000,000 bricks were used. The two shafts which are used for ventilating purposes are each 60 feet in diameter, by 130 and 60 feet in depth respectively. By the time the rails were laid, the Kilsby Tunnel had run away with over £300,000—over three times as much as the original contract.