

"Notice concerning the Thames Tunnel." By Richard Beamish, M. Inst. C.E.

Thames  
Tunnel.

The paper states that several attempts had been made in former years to effect a communication betwixt the opposite shores of the Thames by means of a tunnel, all of which, however, failed. In 1798, Dodd proposed a tunnel at Gravesend; in 1804, Chapman projected one at Rotherhithe; and in 1807, Vazie commenced the construction of a shaft, 11 feet diameter, at a distance of 315 feet from the river. With Vazie was associated Trevethick, a man of great practical knowledge as a miner, and by indefatigable labour, a drift-way 5 feet in height, 2 feet 6 inches in breadth at the top, and 3 feet at the bottom, was carried 1046 feet under the river. In the spring of 1808, having first ascended from under a rocky stratum, though with a depth of at least 25 feet betwixt them and the bed of the river, the Thames broke in upon them, and not a single brick having been laid, the work was irretrievably lost.

In 1823 the subject of a tunnel was again agitated, and a company was formed, to carry into execution the plans of Mr. Brunel. The first proceeding was to sink a shaft. Twenty-four piles, with a shoulder on each, were first driven all round the circle intended for the shaft. One side of a wooden platform, or curb, was then laid on this shoulder, whilst the other side rested on an iron curb, having an edge below to which it was attached. Through this curb ascended forty-eight wrought-iron bolts, 2 inches diameter, to the height of 40 feet, the height to which it was proposed to raise the shaft. The regular building of the tower on the curb, with bricks laid in cement, was proceeded with, and yet farther bound together by twenty-six circular hoops of timber, half an inch thick, as the brick-work was brought up. At the top of the tower was placed another curb, and the long iron bolts passing through it, having their ends formed into screws, the whole was screwed solidly into one mass, and completed in three weeks. In a week after it was finished sixteen of the piles having been driven, two by two, opposite each other, the whole structure was sunk half an inch, carrying down with it the remaining eight piles, on which it was brought to a rest uniformly and horizontally, thus permitting the sixteen piles to be abstracted by opening the ground at the back. The whole weight supported by these eight piles was about 910 tons (the weight of the shaft). Having been left for three weeks to dry, and gravel having been heaped under the curb, the remaining eight piles were removed, two by two, till the mass rested on a bed of gravel. The machinery, viz., the thirty-horse high pressure steam engine, with gear for raising the excavated soil

was now fixed on the top. The miners were placed inside, and by excavating from around the bottom, the whole descended by its own gravity.

Mr. Beamish then describes the peculiar difficulties which were experienced, previous to the first irruption.

The chasm in the bed of the river, formed by the irruption of 1827, was stopped by bags filled with clay, with hazel rods passed through them, the interstices thus formed being filled with gravel. The irruption of 1828 was met by similar means; but the funds of the company not being then sufficient for proceeding with the work, the shield was blocked up with bricks and cement, and a wall 4 feet in thickness was built within the Tunnel.

The work was then abandoned, and remained untouched for seven years. In 1835 a Treasury loan was granted, subject to the condition, that the most dangerous part of the Tunnel should be executed first. On resuming the works, the first object was to provide a drain for the water from the shield, for which purpose two reservoirs were formed under the middle pier, from which drifts were formed to the bottom of the great excavation and shield. The water was abstracted from the shield at the lowest point, and the pipes of two pumps, worked by the steam engine, being brought into the reservoir, all the difficulty of the drainage was overcome.

The removal of the old and the introduction of the new shield, was a work of no ordinary difficulty. The bricks and cement had, by the strong oxide of iron which the water contained, been converted into a mass harder than most rocks; and not less than 1646 feet of surface, 342 feet of which constituted the ceiling, had to be supported, on the removal of the brick-work, previous to the introduction of the new shield. The means, however, adopted by Mr. Brunel, and which are described in the paper, were perfectly successful.

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April 11, 1837.

#### The PRESIDENT in the Chair.

Mr. Brunel gave an account of the Thames Tunnel.—Having described the nature and difficulties of the undertaking, and the previous attempts which had been made by others to effect a similar work,\* he explained, by reference to sections, the nature of the strata below the river. He had adopted the rectangular form of the present

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\* Vide ante, page 32.