

Problems

The surviving lower parts of the shafts below the line of the railway were closed off when the present tunnel was driven. However, it was inevitable that the timbers that formed part of the capping would eventually decay. This caused problems on more than one occasion. In November 1954 a driver of a Gloucester to Paddington steam train reported that he had 'felt a bump' in the tunnel. On investigation it was found that the lower part of shaft 2A had opened up leaving a 15ft drop down towards the line of the abandoned 1841-43 heading. The tunnel was closed for four days while the shaft was recapped and the state of all the other shafts checked. Since then a lot of extra capping of the shafts has been carried out.

19th Century Tunnelling Techniques

The construction of the Sapperton Canal Tunnel (1784-1789) and Railway Tunnels (1839-1845) were major engineering feats of their age and on a par with the construction of the Channel Tunnel in recent times.

To construct a tunnel more than a few hundred yards in length it was usual to sink a series of vertical shafts from the surface and then work outwards from the bottom of the shaft. Great skill was required to both establish the correct level underground and then the direction to bore the tunnel. An early method of determining the direction to tunnel was to suspend two plumb lines in the shaft. These were then lined up at the surface in the direction of the proposed tunnel. Heavy weights at the ends of the lines were immersed in tubs of water at the bottom of the shaft to stop the plumb lines from swinging. A lighted candle at the tunnel face was kept in line with the two plumb lines and hopefully the required direction was maintained.

Later and certainly during the time that the Sapperton railway tunnel was built it was usual to use a mariners compass to determine the direction to tunnel. Either way, great skill and much checking would be needed to ensure that the different sections of the tunnel would meet up. There are reports of tunnels that were only inches out in a distance of 500 yards – a truly remarkable achievement.

Once the heading had been driven the tunnel could be opened out to full size. Some means had to be contrived with props and stays to prevent the roof from falling in until the newly cut section could be lined with masonry or brick.

Tunnelling was a most hazardous job. The men were working deep in the earth soaked by muddy water and at risk from their own explosions. They normally worked 12 hour shifts, using hammer and chisel by candlelight, and had to endure foul air for much of the time. Sometimes as many as 600 men would be employed on a project.

The vertical shafts were typically 10-20ft in diameter. Men were lowered down the shafts in buckets and the soil and rock brought up the same way. The spoil was deposited at the top of the shafts as can be seen today at the top of both the railway and canal tunnels.