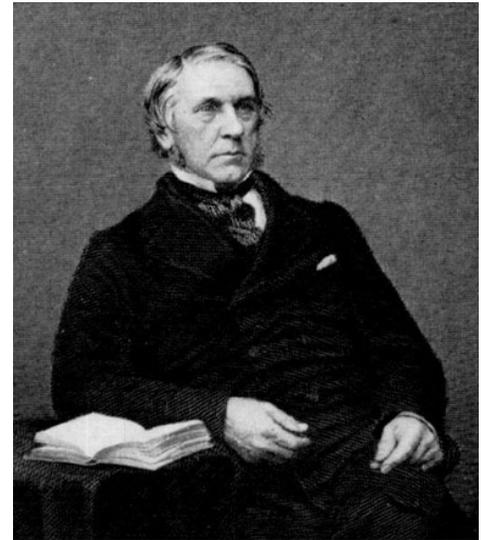


Locke was born in Attercliffe, Sheffield, moving to nearby Barnsley when he was five. By the age of 17, Joseph had served apprenticeships under William Stobart at Pelaw, Tyneside, and under his own father, William. He was an experienced mining engineer, able to survey, sink shafts, construct railways, tunnels and stationary engines. Joseph's father had been a manager at Wallbottle colliery when George Stephenson was a fireman there. In 1823, when Joseph was 17, Stephenson was involved with planning the Stockton and Darlington Railway. He and his son Robert visited William Locke and his son at Barnsley and it was arranged that Joseph would go to work for the Stephensons. The Stephensons established a locomotive works near Forth Street, Newcastle upon Tyne, to manufacture locomotives for the new railway. Joseph Locke, despite his youth, soon established a position of authority. He and Robert Stephenson became close friends.



George Stephenson carried out the original survey of the line of the Liverpool and Manchester Railway, but this was found to be flawed, and the line was re-surveyed by Charles Vignoles. Joseph Locke was asked by the directors to carry out another survey of the proposed tunnel works and produce a report. The report was highly critical of the work already done, which reflected badly on Stephenson. Stephenson was furious and henceforth relations between the two men were strained, although Locke continued to be employed by Stephenson, probably because the latter recognised his worth. Despite the many criticisms of Stephenson's work, when the bill for the new line was finally passed, in 1826, Stephenson was appointed as engineer and he appointed Joseph Locke as his assistant to work alongside Vignoles, who was the other assistant. However, a clash of personalities between Stephenson and Vignoles led to the latter resigning, leaving Locke as the sole assistant engineer. Locke took over responsibility for the western half of the line. One of the major obstacles to be overcome was Chat Moss, a large bog that had to be crossed. Although Stephenson usually gets the credit for this feat, it is believed that it was Locke who suggested the correct method for crossing the bog.

Whilst the line was being built, the directors were trying to decide whether to use standing engines or locomotives to propel the trains. Robert Stephenson and Joseph Locke were convinced that locomotives were vastly superior, and in March 1829 the two men wrote a report demonstrating the superiority of locomotives when used on a busy railway. The report led to the decision by the directors to hold an open trial to find the best locomotive. This was the Rainhill Trials, which were run in October 1829.

In 1829 Locke was George Stephenson's assistant, given the job of surveying the route for the Grand Junction Railway. This new railway was to join Newton-le-Willows on the Liverpool and Manchester Railway with Warrington and then on to Birmingham via Crewe, Stafford and Wolverhampton, a total of 80 miles. During the construction of the Liverpool and Manchester Railway, Stephenson had shown a lack of ability in organising major civil engineering projects. On the other hand Locke's ability to manage complex projects was well known. The directors of the new railway decided on a compromise whereby Locke was made responsible for the northern half of the line and Stephenson was made responsible for the southern half. However Stephenson's administrative inefficiency soon became apparent, whereas Locke estimated the costs for his section of the line so meticulously and speedily, that he had all of the contracts signed for his section of the line before a single one had been signed for Stephenson's section. The railway company lost patience with Stephenson, but tried to compromise by making both men joint-engineers. Stephenson's pride would not let him accept this, and so he resigned from the project. By autumn of 1835 Locke had become chief engineer for the whole of the line. This caused a rift between the two men, and strained relations between Locke and Robert Stephenson.

Locke's route avoided as far as possible major civil engineering works. The main one was the Dutton Viaduct which crosses the River Weaver and the Weaver Navigation between the villages of Dutton and Acton Bridge in Cheshire. The viaduct consists of 20 arches with spans of 20ft. The line was opened on 4 July 1837.

An important feature of the new railway was the use of double-headed (dumb-bell) wrought-iron rail supported on timber sleepers at 2 ft 6 in intervals. It was intended that when the rails became worn they could be turned over to use the other surface, but in practice it was found that the chairs into which the rails were keyed caused wear to the bottom surface so that it became uneven. However this was still an improvement on the fish-bellied, wrought-iron rails still being used by Robert Stephenson on the London and Birmingham Railway.

Lancashire and Carlisle Railway

Stephenson had started his career at a time when locomotives had little power to overcome excessive gradients, he avoided such gradients at all costs, often adding many miles to the line of the route. Locke had more confidence in the ability of modern locomotives to climb these gradients. An example of this was the Lancashire and Carlisle Railway, which had to cope with the barrier of the Lake District mountains. In 1839 Stephenson proposed a circuitous route that avoided the Lake District by going all the way round Morecambe Bay and West Cumberland, claiming: 'This is the only practicable line from Liverpool to Carlisle. The making of a railway across Shap Fell is out of the question.' The directors rejected his route and chose the one proposed by Joseph Locke, one that used steep gradients and passed over Shap Fell. The line was completed by Locke and was a success.

Locke was subsequently appointed to build a railway line from Manchester to Sheffield, replacing Charles Vignoles as chief engineer, after the latter had been beset by misfortunes and financial difficulties. The project included the three-mile Woodhead Tunnel, and the line opened, after many delays, on 23 December 1845. The building of the line required over a thousand navvies and cost the lives of thirty-two of them, seriously injuring 140 others. The Woodhead Tunnel was such a difficult undertaking, that George Stephenson claimed that it could not be done, declaring that he would eat the first locomotive that got through the tunnel.

In the north, Locke designed the Lancaster and Preston Junction Railway; the Glasgow, Paisley and Greenock Railway; and the Caledonian Railway from Carlisle to Glasgow and Edinburgh.

In the south, he worked on the London and Southampton Railway, later called the London and South Western Railway, designing, among other structures, Richmond Railway Bridge (1848, since replaced), and Barnes Bridge (1849), both across the River Thames, tunnels at Micheldever, and the 12-arch Quay Street viaduct and the 16-arch Cams Hill viaduct, both in Fareham (1848).

He was actively involved in planning and building many railways in Europe, including the Le Havre, Rouen, Paris rail link, the Barcelona to Mattaro line and the Dutch Rhenish Railway.

He experienced a catastrophic failure of one of his viaducts built on the new Paris-Le Havre link. . The viaduct was of stone and brick at Barentin near Rouen, and was the longest and highest on the line. It was 108 feet high, and consisted of 27 arches, each 50 feet wide, with a total length of over 1600 feet. A boy hauling ballast for the line up an adjoining hillside early that morning (about 6.00 am) saw one arch (the fifth on the Rouen side) collapse, and the rest followed suit. Fortunately, no one was killed, although several workmen were injured in a mill below the structure. Locke attributed the catastrophic failure to frost action on the new lime cement, and premature off-centre loading of the viaduct with ballast. It was rebuilt at Thomas Brassey's cost, and survives to the present.

Distinctive features of Locke's railway works were economy, the use of masonry bridges wherever possible and the absence of tunnels. An illustration of this is that there is no tunnel between Birmingham and Glasgow.

Locke and Robert Stephenson had been good friends at the beginning of their careers, but their friendship had been marred by Locke's falling out with Robert's father. It seems that Robert felt loyalty to his father required that he should take his side. It is significant that after the death of George Stephenson in August 1848, the friendship of the two men was revived. When Robert Stephenson died in October 1859, Joseph Locke was a pallbearer at his funeral. Locke is reported to have referred to Robert as 'the friend of my youth, the companion of my ripening years, and a competitor in the race of life'.

In 1845, Locke and Stephenson were both called to give evidence before two committees. In April a House of Commons Select Committee was investigating the atmospheric railway system proposed by Brunel. Brunel and Vignoles spoke in support of the system, whilst Locke and Stephenson spoke against it. In August the two gave evidence before the Gauge Commissioners who were trying to arrive at a standard gauge for the whole country. Brunel spoke in favour of the 7ft gauge he was using on the Great Western Railway. Locke and Stephenson spoke in favour of the 4ft 8½in gauge that they had used on several lines.

Locke was elected to the Royal Society in 1838. He served as President of the Institution of Civil Engineers from December 1857 to December 1859. He also served as Member of Parliament for Honiton in Devon from 1847.

Locke died in 1860, apparently from appendicitis, whilst on a shooting holiday. He is buried in London's Kensal Green Cemetery.

Locke's greatest legacy is the modern day West Coast Main Line (WCML), which was formed by the joining of the Caledonian, Lancaster & Carlisle, Grand Junction railways to Robert Stephenson's London & Birmingham Railway. As a result, around three quarters of the WCML's route was planned and engineered by Locke.