

## The Coalbrookdale Railway, 1767 – 68

BY D. GORDON TUCKER

Much has been written<sup>1</sup> on the first railway to use cast iron rails, and it is generally agreed that this was at Coalbrookdale in Shropshire in 1767. However, until Broadbridge<sup>2</sup> in 1971 drew attention to the existence of a contemporary document which mentioned the matter, all discussion and conclusions were based on secondary sources. Although these correctly established the date of the first iron rails as 1767, they left details of the nature of the existing wooden track undetermined, and even M. J. T. Lewis's great work, *Early Wooden Railways*, reached one wrong conclusion.<sup>3</sup> It is a great pity that Broadbridge's transcription is faulty and that he failed to assess the new evidence adequately. I shall take a fresh look at it here. The main conclusion is that the wooden railways at Coalbrookdale used a double rail of the type normally associated with Tyneside, and that the first cast iron rail replaced the upper wooden rail.

The contemporary document concerned is the diary of a tour in Wales and the Borders made in the autumn of 1767, and continuing into the early part of 1768, by Joseph (later Sir Joseph) Banks, who was born in 1743 and was by 1767 an established botanical scientist whose observation and recording, even of non-botanical matters, should be expected to be entirely reliable. There is a copy of the document in the National Library of Wales,<sup>4</sup> and I am grateful to Mr. P. Wakelin and Mr. S. R. Hughes for drawing my attention to it. It was Mr. D. B. Hague who pointed out that the original is in the University Library at Cambridge.<sup>5</sup> Only subsequently did I discover Broadbridge's publication.

Banks recorded his observations of the railways at Coalbrookdale on 14 January 1768. A transcription of the relevant paragraphs, based on the Cambridge original and, I hope, exact, follows:

I must now say a word or two of their rail way as it is the most extensive one I believe in this Part of the Kingdom & the waggons upon it the Best constructed.

it is made with two Frames the side timbers of Each 4 inches square those of the Bottom Frame & Joind together by cross Timbers calld Sleepers which stand about 5 in two yards & keep the side timbers steady to support the upper ones which are pinnd Lenghways upon them with wooden Pinns [small sketch inserted here] these are made of the Firmest heart of Oak that can be got & even that wears out very soon by the immense weight of the Waggons so much so that they have begun at the dale to make the upper barrs of cast Iron & have thoughts of continuing it all their ways

The waggons themselves are made prodigiously strong their Lengh about 10 feet Breadth 4 the weight of Each of them about 22 hundred the axletrees are cast Iron & move with the wheels which are cast Iron likewise the inner Edge of them overhanging about an inch to keep them upon the ways the proper Load of one of these is 2½ tons but they will sometimes carry 4 nay 5 ton with them in which cases they draw with five horses tho their Proper number is only three they have many hills in the road some of them steep down these they go by this contrivance they have a peice of wood cut in the segment of a circle calld a Break to fit Eack wheel these are fastend together by chains one End of which fastend to a staple before the fore wheel the middle Passes under a roller between the wheels & the other End hooks upon the End of a pole 12 feet long calld the Jig pole which rests in a staple fastned on the hind Part of the carriage & acting as a lever is directed by the hand of the driver to confine the breaks close to the wheels causing just as much

Friction as is necessary to make the waggon go at a proper degree of slowness [small sketch inserted here] in case an accident should happen notwithstanding this caution which can arise from nothing but the carelessness of the driver there are peices of wood set upon pins which are Easily swung across the road digonally these catch the wheels from their Proper tracks & immediately convey the carriage against a Little sloping Bank made for the purpose where it immediately stopps [small sketch inserted here].

This portion of Banks's MS is evidently of immense importance, being written only a week or two after the end of the year (1767) in which, as has been established from secondary sources, the world's first iron rails were laid. This contemporary record of the use of iron rails thus clinches that particular issue.

The last paragraph transcribed above, dealing with the waggons and their braking system, and also with the devices which might be called primitive catch points, is very interesting, and shows that Coalbrookdale had adopted the larger style of waggon normally associated with the Tyneside area.

The most interesting matter, and a very controversial one at that, concerns the use of double wooden rails at Coalbrookdale. It is beyond controversy that Banks's observations establish that, when not provided with an iron rail, the track comprised double wooden rails on each side, one rail pinned above the other, as was known to have been a practice on Tyneside from 1760.<sup>6</sup> If the idea had been introduced to Coalbrookdale from Tyneside, the transfer had been quite rapid. This new evidence is important, because Lewis<sup>7</sup> had concluded that 'there is no evidence that the Coalbrookdale system ever used the double way, with two layers of wooden rail . . . '.

At this stage we must discuss the matter of the accuracy of the transcription, for the interpretation of the actual design of the double-railed track depends on this. It is the first few lines of the second paragraph of the transcription which are in question; consequently in Fig. 1 is reproduced a photocopy of the relevant lines of the actual MS. Because the MS is written on both sides of each page and the ink has soaked through, the original MS has a very messy background; this I have painted out in the figure very carefully, avoiding any interference with the wanted script. (I can show the original photocopy to any doubting enquirer.) The first sentence does not make precise sense because of the phrase 'those of the Bottom Frame & Joind together by cross Timbers'. I would suggest that Banks was writing in a hurry and used an ampersand (&) meaning 'and' in place of his intended word 'are'. The sentence is then entirely meaningful, and states that both lower and upper rails of a double rail are of 4-inch by 4-inch cross-section. The ampersand is, however, of a different style from most others in the MS, e.g. it is different from that in the next line, and Broadbridge in his published transcription has taken it to be the figure 9. That it is an ampersand and not a figure 9 is made perfectly definite by the extracts from other parts of Banks's MS given in Figs. 2 and 3. In Fig. 2 (which is taken from p. 97 of the MS) there appears at the beginning of the middle line the identical symbol – and also another in the middle of the second line above it – in a sentence where its only possible meaning is 'and'. In Fig. 3 (taken from p. 118 of the MS) there appear several indisputable nines, which can be seen to be quite different from the ampersand.

It is a pity that Broadbridge made this important transcription error (he made a number of others too, but they are of little consequence), because it evidently led that distinguished historian Barrie Trinder into serious error. Trinder,<sup>8</sup> whilst recognising that 'double way' rails were being used at Coalbrookdale, made what I consider to be an erroneous inference that the lower rail was of 9-inch

square section, while the upper rail on which the waggons actually ran was (correctly) 4-inch square. There are two factors which may have further misled him. One (if he actually saw it, which is not known) is the little sketch in the MS (see Fig. 1). If this is interpreted as a plan view, then we certainly do appear to have a narrow rail pinned on to a wider one. However, it is most unlikely that the upper rail would be on the outer side of the lower rail on one side of the track, but on the inner side of the lower rail on the other side of the track. It is more likely, in view of the verbal description, that the sketch is a rough and hurried attempt at a perspective drawing which has failed to show the real structure of the track. The other factor which may have misled Trinder is his own misreading of a sentence from John Randall's book,<sup>9</sup> which he quotes as saying 'the railways in Coalbrookdale were laid with "rails of plain oblong pieces of wood, 6 ft. x 8 in. x 4 in. in depth"'. What Randall actually said was 'Down the steep banks that enclose the Dale inclined planes were laid with rails of plain oblong . . .'. In other words, it was only on the inclined planes that wider rails were used, not (presumably) on the railways generally. There is therefore no substantiated suggestion that rails wider than about 4 inches were used on the railways.


We thus conclude that both lower and upper rails were the same, of about 4 inches square section. This accords well with the Tyneside practice of the time.

It is also clear that the iron rails were laid on the existing wooden rails, but the upper wooden rails were first removed.

The cross-section of the rails is stated quite precisely as 4 in. square in Banks's account, but there is a good deal of evidence, as given for example by Mott,<sup>10</sup> that rails of 3 in. by 4 in. and 3½ in. by 4½ in. were normal at Coalbrookdale at this time. However, compared with the other matters, this point is not very significant.

The matter of the sleeper spacing is interesting. Lewis, referring to the Tyneside systems,<sup>11</sup> said that 'Main ways . . . generally had their sleepers set at 1-ft. 6-in. centres, sometimes at 2-ft. . .', but here we see the Coalbrookdale railways having a sleeper spacing of only about 15 inches. This contrasts sharply with the spacings of 5.2 ft or 2.7 ft deduced by Mott<sup>12</sup> for a period about ten years earlier.

So far the discussion has been about facts. There is one matter on which I shall allow myself the luxury of speculation. Now Lewis says, in regard to the double wooden rail, that 'the first known example of its use was in 1760 on the Shiremoor waggonway', which was on Tyneside. But if we look at some Coalbrookdale accounts given by Raistrick<sup>13</sup> we find that in June 1754 there were purchased for the railway 1491 yards of rail and 736 sleepers. If these were used for the construction of a new piece of railway, then using single rail the sleeper spacing would be just 3 ft — rather wider than one would expect. But if the rail were double, the sleeper spacing would be 1 ft 6 in. — a more normal spacing. Moreover, referring to the sleeper spacings of 5.2 ft and 2.7 ft deduced by Mott (and previously mentioned) for the years 1754–6, these are of course based on the assumption of single rails; but if the rails were double, the sleeper spacings would be the much more likely ones of 2.7 ft and 1.35 ft. So it is just possible that double rails were used at Coalbrookdale before the first record for Tyneside. But the evidence is slim, and I must repeat that this is pure speculation.

It is made with two framed the side timber of each 4 inches square those of the bottom frame & joined together by cross timbers called sleepers which stand about 5 in two yards & keep the side timbers steady to support the upper ones which are pinned lengthways upon them with <sup>wooden</sup> pins.  These are made of the strongest heart of Oak that can be got.

No. 1 (D. G. Tucker)

... again involved in small portions of water & poured into large casks to the sides of which it traces itself in large quantity & is then valuable allum bringing to the proprietors at this time about 20 pounds a ton.   
 The iron rails were first laid when the lead is first

No. 2 (D. G. Tucker)

bed in which coal predominates or rather several beds is 19 feet in thickness, 3 feet 9 inches of which is the best coal in these positions.

First coal	5:6	
Shaly clay		0:9
Coal	1:6	
Rock		1:6
Coal	2:3	
Rock		1:6
Coal	6:0	
Total coal	15:3	3:9

formed lately under this is a yard of rock & under that

No. 3 (D. G. Tucker)

## REFERENCES

1. (a) W. H. Chaloner and A. Birch, 'The first cast-iron rails: new evidence', *Railway Magazine* 97, 1951, pp. 632-3.  
(b) A. Raistrick, *Dynasty of Iron-Founders*, Longmans Green & Co., London, 1953, pp. 176-181.  
(c) R. A. Mott, 'English waggonways of the eighteenth century', *Trans. Newcomen Soc.*, 37, 1964-5, pp. 1-33.  
(d) B. Baxter, *Stone Blocks and Iron Rails*, David & Charles, Newton Abbot, 1966, p. 40.  
(e) M. J. T. Lewis, *Early Wooden Railways*, Routledge and Kegan Paul, London, 1970, 1970, pp. 260-6.
2. S. R. Broadbridge, 'Joseph Banks and West Midlands industry (1767)', *Staffs. Indust. Archaeol. Soc. J.*, 2, 1971, pp. 1-20.
3. Lewis, op. cit., p. 262. The point is discussed later.
4. Banks, S. S., 'Copy of a Journal of excursion to Wales &c., 1767-1768', Nat. Lib. Wales, Add. MSS 147C.
5. Cambridge University Library, MS. Add. 6294. The portion transcribed in this article comprises pp. 127-8. I am very grateful to the Library (and especially Mr. A. E. B. Owen) for permission to publish part of the MS and for other help.
6. Lewis, op. cit., pp. 166-7.
7. Ibid, p. 262.
8. B. Trinder, *The Industrial Revolution in Shropshire*, Phillimore, Chichester, 1973, p. 123.
9. John Randall, *History of Madeley*, 1880, p. 291.
10. Mott, op. cit., p. 21.
11. Lewis, op. cit., p. 165.
12. Mott, op. cit., p. 11.
13. Raistrick, op. cit., p. 175.