

MANCHESTER AND LEEDS RAILWAY.

Superintendent's Office, Oldham Road, Manchester,
25th August, 1845.

SIR,

I beg leave to hand, for the information of the Right Hon. the Lords of the Committee of Her Majesty's Privy Council for Trade and Foreign Plantations, a tabular report of an accident which occurred on the North Midland Railway to a train belonging to the Manchester and Leeds Railway Company.

I have, &c.,

To G. R. Porter, Esq.,
&c. &c.

J. M. LAWS.

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II.
Returns of
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RETURN of Accident occurring in the course of the Public Traffic.

Date.	Names of Persons Injured.	Description.	Nature of Injury.	Nature of Accident.	Cause of Accident.	Remarks.
1845 Aug. 18.	Mrs. Clegg	Passenger	Severely bruised, said to have her collar-bone broken. She was in a very delicate state of health, but is doing well.	Engine ran off the rails, and went with one carriage down an embankment on the North Midland Railway about 6 miles from Leeds.	It is impossible to state, whether from the line being out of gauge or from a broken chair: the mark of the wheels of the engine, tender and carriage, at the point where they left the rails, is exactly over a joint chair, that must have been broken for some time, as the fracture was not only completely covered, but covered with mud.	A new first class carriage in which the passengers were situated was completely smashed in the upper body, and it is believed the peculiar construction of the carriage was instrumental in saving the lives of the passengers. The whole circumstances have been investigated by Captain Coddington. The parties hurt, with the exception of Mrs. Clegg, are all convalescent, and she is doing well, and expected to be brought from Leeds to Manchester to-day.
	Mr. W. Firth	Passenger	Bruised about the body, and cut in the head.			
	Mr. Hurst	Passenger	Ditto.			
	John Kay	Engine-driver	Ditto.			
	John Luty	Fireman	Ditto.			
	Edw. Kennerly	Guard	Ditto.			

J. M. LAWS.

Railway Department, Board of Trade, Whitehall,
27th August, 1845.

SIR,

In pursuance of your instructions I proceeded, on the 22nd instant, to Normanton, to inquire into the circumstances connected with an accident which occurred on the line of the North Midland Railway, on Monday the 18th instant, to the express train of the Manchester and Leeds Company, as reported by the secretaries of both these Companies.

On arriving at Derby, I was met and accompanied to Normanton by Mr. Barlow, the resident engineer of the North Midland; and at Normanton I was met by Captain Laws and Captain Binstead, of the Manchester and Leeds, who arranged to procure the attendance of the parties present, for the following morning. I then proceeded to the spot where the accident occurred, about six miles from Leeds, and minutely examined the state of the line and the indications the ground presented.

The description of the accident is as follows:—The express train leaves Leeds for Manchester every day at six P. M. On the 18th instant it started about its usual time, and had proceeded about six miles towards Normanton, when the engine ran off the rails towards the left hand, and down the slope of the embankment where it happened which is above 20 feet high; it there was upset, and rested against the fence; the tender was broken away from it, and was carried over the fence into the field; the leading carriage, which was next the tender, was shivered to pieces, the passengers thrown in different directions, and more or less hurt; the second carriage, (there were only two, both first class) was carried along the line several yards, and finally upset across both the up and down lines of rails; the driver, stoker, and guard were flung from their places with great violence, and very severely hurt. Eight passengers were in the train, of whom three were taken back to the Leeds Infirmary. Fortunately there was no life lost, and no limb broken. They were all seated in the leading carriage, next the tender, which was totally destroyed, and their escape with life is almost miraculous.

The evidence which I was enabled to procure is annexed, as well as a copy of an inquiry instituted by Mr. Houldsworth, chairman of the Manchester and Leeds Company. From these documents and from the examination of the spot, which I made myself, I have the honour to report—

That the distance from Leeds to Manchester is 60 miles.

That the time allowed the express train is two hours.

That the books of the Company show that it keeps its time.

That it stops at six intermediate stations to take up and set down passengers.

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That the loss of time, including stopping, waiting, and starting, is reckoned at about five minutes for each station, which leaves $1\frac{1}{4}$ hour for the performance of the 60 miles, or at the rate of 40 miles per hour for its regular rate of speed.

That where the accident occurred the line is perfectly straight, on a descending gradient of 1 in 370, very favourable for speed; and that it is not an unfair presumption that, with an express train, they were going as fast as they could, or, at all events, not less than 40 miles an hour.

That there appears to have been a joint chair at A, where the engine left the line, which was broken in the bed, and that it had been broken for some time previously.

Captain Laws and Captain Binstead, as well as Mr. Johnston, the superintendent of locomotives on the Manchester and Leeds, expressed an opinion that this joint chair, by yielding to lateral pressure, might have exposed the end of the rail within it to meet the flange of the engine wheels, cause them to mount it, and so lead the train off the line. The marks of the wheels were distinctly visible where they had struck the end of that rail; and if no other indications had been found, the conclusion would have been inevitable that this defective chair had produced the accident, which might as readily have occurred to the slowest as to the fastest train. But from minutely examining the line, I found very distinct marks that, for a considerable distance before arriving at this chair, the engine had been oscillating with sufficient violence to derange the chairs upon the sleepers, and their movement on their bed could be plainly discerned from the roughening of the grain of the timber.

Diagram, Figure 1.—The broken chair was at A, and it was there the engine finally left the rails; 42 yards back from A (nearer Leeds) I found, on the left hand, that the chairs had been forced out a quarter of an inch; 22 yards from A, again on the left hand, they had been forced out half an inch; 12 yards from A, on the right hand, they had been forced out an inch, and the rail so bent, that it was necessary to replace it with a new one. The chairs had to be taken up, the pin-holes, which were much elongated, plugged, and the chairs reset. The rail immediately preceding A, on the left hand, was altogether displaced; its middle would be two yards from A. Seeing, therefore, the regularity of interval between these points, I returned to examine the rail on the right hand, at 32 yards from A, but the sleepers there were so covered with ballast that I could not trace any lateral thrust; still sufficient appeared to show an oscillation repeated from side to side at regular intervals of 10 yards each, and increasing in intensity to the catastrophe.

The rail on the left hand immediately preceding A exhibited the greatest marks of violence; its position after the accident (as described to me, for it had been replaced before my arrival) is shown at Figure 2. The chairs at *e d* remained in their places, and that end of the rail was retained by them. The chairs *c* and *b* were both broken, the inner arm in both cases having been snapped off close to the bed; they remained fast to the sleepers, though strained outward. The points of the outside arms, which remained, showed that they had been struck with great violence on the edge next the rail. The rail itself was much bent inwards, as in the figure, and the end was forced out of the joint chair at A.

The end of the rail A had deep indents upon its upper surface, showing the passage of wheels over it.

From these indications I am clearly of opinion the oscillation of the engine had become so violent that, after rebounding from the last point on the right hand, it passed clear over the bent rail on the left; that it alighted on the outside between it and the chair *e*; the flange of the wheel, acting as a wedge, broke this chair in its weakest part, which is low down on the inside; that the same occurred at chair *b*, and that the rail, being thus unsupported, bent inwards from the pressure; and that, finally, the engine mounted the rail at A, and ran off; but I consider that it was off the line before it ever reached the broken chair at A.

A doubt was expressed whether it was possible for an engine to jump over a rail in that manner, and taking its great weight into consideration, the doubt has much force; but I think that a great deal depends upon the disposition of the weight, whether an engine shall move steadily or otherwise. And here I request a reference to the statement of Mr. Johnston, superintendent of locomotives at Leeds, in the service of the Manchester and Leeds Company, under whose charge this engine was. He states the weight of the engine to have been 16 tons.

Carried by the driving wheels	11 tons
„ „ front wheels	3 „
„ „ hind wheels	2 „
Total	16 tons

Here you have an engine, upwards of two-thirds of the total weight being concentrated over a point near the centre, the extremities but lightly supported in comparison, and the hinder end the lightest, so that the springs there are but little pressed. It appears to me quite possible, that when this engine made its last oscillation to the right, the resistance of the rail threw the fore-part up, which the light pressure on the hinder springs would easily permit, and then in its rebound it passed over the rail, where the accident happened.

I have, therefore, come to the conclusion that this accident had its origin in the oscillation of the engine.

There are two causes which would produce this effect. The first is an inaccurate

relation between the width of the rails and the width of the wheels, or the line being out of gauge, as it is called; the other is the speed, which aggravates the serpentine motion.

Upon the first point Mr. Scott, superintendent of locomotives on the Midland, has stated that he gauged the line after the accident, and except the bulges which have been described, "it was in as good gauge as any line need be."

Upon the second point, there can be no doubt that this train was going very fast, and, though an equal speed is safely maintained on many lines, I think an engine disposed as this is not well calculated for the purpose, I find the following description in Tredgold, page 458:—

"In the earlier engines the fire-box was considerably smaller than the present size, and that end of the engine behind the crank axle was but little heavier than the other end before the front axle, so that the engine was nearly balanced upon the axles, and ran steadily along. But the weight of the hind end of the engine has been so much increased by increasing the fire-box, that it has a considerable preponderance. * * * * This excess of weight behind the wheels causes, in the four-wheeled engines, a pitching motion, which makes them rise on the springs of the front axle, and is considered dangerous when running very fast."

If such is the action produced upon a four-wheeled engine by an unequal disposition of weight in the proportion of six to four, it seems to me that a six-wheeled engine, with two-thirds of its weight concentrated over the centre of gravity, and its extremities like the arms of a balance, should be also exposed to the same pitching motion in a high degree.

Major-Gen. Pasley, C. B.
&c. &c.

I have, &c.,
J. CODDINGTON, Capt. R. E.,
Assistant-Inspector of Railways.

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Extract from the Evidence referred to.

"JAMES JOHNSON, superintendent of locomotives at Leeds.—Examined the "Humber" before its starting with the six p.m. train on the 18th. I examine every engine before it leaves the shed. The "Humber" was in very good order; fresh wheels and brasses had been put in within a fortnight. It is a six-wheeled engine, with 14 inch cylinders and 18 inch stroke, five feet six inch driving wheels, and three feet six inch carrying wheels; weight about 16 tons; disposed three tons on the leading pair, 11 tons on the driving wheels, and two tons to the hind wheels."

