

The
VIRTUAL MUSEUM
of the
LANCASHIRE & YORKSHIRE RAILWAY

Accident Reports.

4 August 1856

BoT Report into Accident at
Stubbins.

(2 Pages).

APPENDIX No. 4.

ACCIDENTS APPERTAINING TO THE ROLLING STOCK AND ROAD.

ACCIDENTS FROM ENGINES AND CARRIAGES LEAVING THE RAILS.

EAST LANCASHIRE RAILWAY.

Railway Department, Board of Trade,
Whitehall, August 12, 1856.

SIR,

In compliance with the instructions contained in your letter of the 7th instant, I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, the result of my inquiry into the circumstances which attended the accident, that occurred on the 4th instant, near the Stubbins Station, on the Bacup Branch of the East Lancashire Railway.

A second line of rails is about to be laid upon a portion of this branch, and the permanent way now in use is to be renewed.

A contractor receives an annual sum for the maintenance of the permanent way, and is under agreement to lay down the new line, and renew the old one.

As a preparatory measure, a crossing was put in by the contractor on the 26th ultimo, between the Stubbins and Ewood Bridge Stations, and about a mile and a half from the Ramsbottom Junction with the main line of the East Lancashire Railway, for the purpose of conveying earth with which to form an embankment to carry the second line of rails. This crossing was personally superintended, in construction, by the brother of the contractor, Mr. William Taylor; and, as the contractor had been employed for seven years in the maintenance of the Company's lines, and had, during that period, put in a considerable number of crossings for them, he was allowed to make this alteration on the branch without strict superintendence from the engineer of the Company, or his inspector.

The crossing was put in roughly, and without the attention, accurate workmanship, and careful selection of materials, that ought to be bestowed upon such a work on a passenger line. The rails and sleepers were some of them not good, the chairs were lying obliquely across the sleepers, and were not well secured, and the check rail most required at that particular part of the line was an old one which had been broken in the bending, when adapted to that purpose. I am enabled to record these facts from personal observation, because the officers of the Company very properly kept the crossing in the same state as it was in before the accident occurred, until the inquiries in regard to the accident should be completed.

A day or two after the crossing had been put in, the driver of the branch engine complained to Mr. Taylor that it was not in good order, and begged him to ride with him over it on the engine. Mr. Taylor did so without perceiving anything wrong, but reduced the gauge by $\frac{1}{4}$ " according to his own account, and $\frac{3}{8}$ " according to that of his foreman platelayer; and the driver found afterwards that his engine went more smoothly over the place.

The train which is due to leave Ramsbottom for Bacup at 7.50, left that station at 7.57 on the evening of the 4th instant. It consisted of a tank engine—the Aurora—four carriages, and a van. As the engine was passing the crossing referred to, it suddenly left the line, and was brought to a stand in 62 yards, with its firebox to the front, and its wheels in the air. The permanent way was more or less torn up for that distance, and the carriages were thrown into the position shown on the accompanying diagram (No. 1.), and were some of them much broken. The driver was dashed head-foremost to the ground, on the off side of the line, and was killed on the spot; the fireman was so much hurt that he died two or three days afterwards; and the guard was thrown head-first out of his van, among the ruins of a passenger carriage, without, however, sustaining any material damage: one of the passengers, also, died about the same time as the fireman; the life of a second was for a short period despaired of; and seven more suffered, some of them very seriously.

The engine—the Aurora—has twice before run off the line, once within 150 yards of the same spot, and once on the Wigan and Southport line, between New Lane and Bescar Lane. In the former case, which occurred in January last, no other reasons can be given than a generally bad state of the line, and, perhaps, great speed; but in the latter case, there were a great many keys, including a joint key, out, which was quite enough to account for the circumstance.

The Aurora, which is a six-wheeled engine, with driving wheels in the centre, has been in the possession of the Company for nine years. It was formerly used with a tender, but in June 1854 it was altered to a tank engine, for the service of the Bacup Branch. The East Lancashire Company have not yet provided at their principal station, Bury, any means of determining the weight upon the different wheels of an engine, and I am therefore not able to ascertain them in this case with accuracy; but it is stated that before the Aurora was altered, the weights on her six wheels were understood to be as follows:—on the leading wheels 6½ tons, on the driving wheels 8½ tons, and on the trailing wheels 2½ tons. Since the tank has been fitted on her back, the proportionate weight on the driving wheels is no doubt increased, and she would therefore have a greater tendency to a "rocking-horse" motion than before, besides being the less steady for the loss of her tender.

I merely mention these circumstances, however, to show that at high speeds, this engine would, *ceteris paribus*, have a greater tendency to leave the rails than one of more steady construction,—in which the weights on the wheels were more equalized, the centre of gravity was lower, and to which a tender was attached; and not for the purpose of attributing the present accident to her build, or to the speed at which she was going: for, as I shall presently show, the state of the permanent way, as it was observed to be after the accident, was sufficient to account for the catastrophe without taking any of these circumstances into consideration. At the same time, I may add, that, while the guard states confidently that the speed was not greater than usual before the engine left the line, his own evidence as to time shows that the train had made up about a minute and a half out of the seven minutes that it was late in leaving Ramsbottom; and the evidence of the passengers is very strong to the effect that they were travelling at an unusually high speed.

I shall now proceed to show what was to all appearance the real cause of the accident.

The crossing, where the engine left the rails, and the neighbouring parts of the line, were attentively examined by several officers of the company as soon as they reached the spot after the catastrophe; and their evidence leaves no doubt whatever upon the following points, which will be best understood by the accompanying drawing (No. 2).

The keys at A, B, C, were found to be out, the joint at D, slack, and the key at E to be also a slack one.

As I have before stated, the check rail G H, though not absolutely in two pieces, had been fractured while in process of bending, nearly in the centre, and it would therefore have had but little power of resistance to a pressure applied to it from the exterior at any part between its centre and B. Now, this crossing is situated on a curve of 40 chains radius, and, judging by the eye, the curve appears to be sharper at this point, where it comes near the straight line which succeeds it, than on other portions. This, however, is not so important in the present case as the fact that the crossing was, as stated, on a curve of 40 chains radius; for, though the tendency for an engine to run off the line when the flanges of its wheels cease to receive support from the rails, increases with the sharpness of the curve, or, in other words, in the inverse ratio of the radius of curvature, still the radius of 40 chains,—a safe curve enough on a properly constructed permanent way,—is quite sufficient for the present argument. The tendency of an engine to leave the line at a tangent to any curve on which it may be travelling, increases, also, as the square of the velocity at which it is travelling, and, therefore, other circumstances being equal, the Aurora would, if travelling at unusual speed, have been the more inclined to run off the line, as she did, on the *outside* of the curve.

There were, then, many circumstances to aid in producing the fatal result; but these may all be omitted in accounting for the accident, for, all combined, they would not perhaps have occasioned it if it had not been for a cause of still greater importance; and that cause would probably have been attended with somewhat similar consequences even with the steadiest engine, on a curve of even longer radius, and at less speed.

As I have already stated, the keys at A and B, intended to support the portion of the check-rail, G H, from external pressure were found "out," and lying by the sides of their chairs on the ballast after the accident, and the check-rail itself was broken in the centre; so that the check-rail was in a position to yield even to a comparatively slight external pressure applied between its centre and B. Now the tendency of the wheels of an engine travelling over the rails marked as "main line;" in the diagram, would be, for the reasons previously referred to, to press towards the left of the drawing, which represents the outside of the curve, and the duty of the half of the check-rail G H in which A and B are situated, is so to guide the off wheel of the engine as to ensure the flange at the interior of the near wheel dropping inside the point O. If it does not do that duty there is every probability that the flange of the near wheel will drop *outside* of the point O, on a curve, and that the engine will thus be thrown off the rails.

In the case now under consideration, all the circumstances point to the fact that this was precisely what occurred, for, as the keys at A and B were found to be "out" after the accident, and as their having been "out" was calculated to produce such an effect, the only inference which can fairly be drawn is that their having been "out" was the immediate cause of the occurrence.

It appears that the key at A was a sound one, and that the key at B was quite the contrary, and would not, even if it had been "in," have been of much use.

Accidents appertaining
to the Rolling Stock
and Road.

Accidents from engines
or carriages leaving
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The only other point to which it is necessary that I should allude, is the super-elevation of the outer rail, by which is meant the extra elevation which is given to the outer rail according to the nature and position of a curve, for the purpose of counteracting in some degree the effect of centrifugal force. When I visited the spot, the crossing was stated to be in a similar state in that respect to that in which it was at the time of the accident, and, if so, I have no fault to find on that account.

This accident may be stated, in conclusion, to have been caused principally, if not entirely, by the defective condition of the check-rail of the crossing. The foreman platelayer employed by the contractor states that he had visited the crossing at five o'clock on that afternoon, and found all the keys "in" at that time. If he had noticed them "out," he would then no doubt have driven them "in;" but he would not be so much inclined to be careful under a system which could allow so defective a crossing to be used; and the contractor's brother, who was too much trusted by the engineer of the Company, must be blamed in this respect.

There is a general remark of great importance to which this occurrence leads, namely, that it is highly desirable, in positions such as the check-rail of a crossing on the inside of a curve, where, as in the present instance, the circumstance of a key being "in" or "out" may make the difference of life or death to a driver and his passengers, that the ordinary wooden key, which is always liable to drop out, when a line is not well boxed up, should be superseded by a fastening of a more permanent nature.

In the case of most lines joint-keys are now going out of use, and fish joints, secured with bolts and nuts, are supplying their place; and on this very railway the engineer has ingeniously introduced an iron key for the purpose of superseding the wooden key in the intermediate chairs, which appears, so far, to answer his expectations, and which is not liable to be shaken out during the passage of the trains. But it is of much greater importance that a more secure fastening should be supplied in the positions of the particular keys which dropped "out," and, to all appearance, thereby caused the present accident.

It is only fair to add that the general manager, by the pains which he took, in issuing orders and personally visiting the branch after the alterations were commenced, did much to ensure safety. I understand that the true cause has not been hitherto discovered by the public, or by the several coroner's juries that have investigated the circumstances of the accident, and that some blame has been thrown upon him personally in this matter; and I am therefore happy in being able to bear this testimony in his favour.

The Secretary of the
Railway Department, Board of Trade.

I have, &c.
H. W. TYLER,
Captain Royal Engineers.

GREAT NORTHERN RAILWAY.

Railway Department, Board of Trade,
Whitehall, June 19, 1856.

SIR, I HAVE the honour to acquaint you, for the information of the Lords of the Committee of Privy Council for Trade, that I have inquired into the circumstances connected with an accident that occurred on the Great Northern Railway on the 16th January, about three miles south of the Tallington Station.

The train to which the accident occurred was the mixed express, leaving York for London at 10 a.m.

The two guards, who were riding in vans, one in the front of the train and the other in the rear, thus describe the accident.

About three miles south of Tallington the rear-guard's attention was drawn to the appearance of the ballast, which he perceived flying about; he put his brake on, and, looking out of the window, saw some men pointing to the carriages. He was on the point of turning the wheel which makes the communication with the driver, when the latter sounded the alarm whistle; the train was soon brought to a stand-still. It was then found that a first-class carriage, standing third in the train, had fallen over on to the near side, and had in that position been dragged along about forty yards, owing to the breaking of the tire of one of the leading wheels; the carriage was full of passengers, only two of whom appeared to be hurt.

From the marks in the line the tire appears to have broken about half a mile from the place where the train was brought up; the carriage was thrown off the rails on to the middle space, and was retained in its upright position until the speed slackened, when it fell over on its side.

The alarm was first given by a Captain Baem of the Guards, who was in the damaged carriage, but who managed to get out and to climb on to the roof of the leading carriage of the train, and gave the alarm to the driver.

An examination of the tire at once suggested the cause of its breaking; it gave at the weld; and it was evident from the appearance of the fractured parts that union of the metal had been confined to the edges of the weld. The wheel had been running about three years. The tire was composed of Lowmoor iron, and had been welded by Messrs. Rayner and Burn; it had been twice in the lathe, and its thickness was reduced to 1½ inch.

From all that I can learn on the subject, I believe that as long as the edges of a weld are perfectly united a flaw in the centre cannot by any known means be detected. It was stated that the wheels of the carriage to which the accident occurred were sounded in the usual manner that morning before the carriage was sent out. The accident does not appear to me to have been caused by negligence.

The Secretary of the
Railway Department, Board of Trade.

I have, &c.
GEO. WYNNE,
Lieut.-Colonel Royal Engineers.

LANCASHIRE AND YORKSHIRE RAILWAY.

Railway Department, Board of Trade,
Whitehall, December 13, 1856.

SIR, IN compliance with the instructions contained in your letter of the 11th instant, I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, the result of my inquiry into the circumstances which attended the accident, that occurred on the 3rd instant, near the Thornhill Lees Station of the Lancashire and Yorkshire Railway.

This station is about 40 miles from Manchester.

The 8.40 a.m. express train from Manchester to Normanton, consisting of an engine and tender, three carriages, and a van, running at 40 miles an hour, had passed it about half a mile on the day in question, when the driver suddenly perceived his tender jumping violently. He therefore shut off his steam, and whistled for the guard's break; but he found it necessary to keep his engine in forward gear, in order that support might be afforded to the tender, by the engine and van pulling in opposite directions.

After running in this manner for about 1,200 yards, the train came to a stand without breaking a coupling, and with the leading wheels of the tender off the rails. It was then discovered that the off leading tyre of the tender had been fractured, and was disengaged from the wheel, and jammed fast between the break block and the framing.

The passengers sustained no injury, owing to the judicious conduct of the driver in not stopping the train too suddenly. The tyre was manufactured by the Company. It was not kept for inspection, because the Company were not aware that their Lordships were about to cause inquiry to be made, and I have not therefore had an opportunity of seeing it; but I understand that the fracture was a clean one, displaying no defect, and that it was neither at the weld nor through a bolt hole.

It was freezing at the time, and in frosty weather the best of tyres are liable to give way when subjected to any considerable concussion. From the evidence of the driver, as to the place at which he first perceived his tender jumping, I was in the first instance led to believe that the fracture might have been caused by a blow received at a bad joint which occurs at an alteration of the permanent way from bridge rails on longitudinal, to double-headed rails on transverse sleepers; but it appears that the platelayers observed marks on the ballast, and in the snow, which proved that the tender leading wheels must have been off the rails for some distance before reaching this spot. At the point where the wheels first left the rails, the line is laid with the ordinary bridge rail on longitudinal sleepers, and is curved; but the driver was fortunate in having a long piece of straight road on which gradually to reduce the speed of the train.

Whether the fracture was caused by the leading wheels of the tender leaving the line, or whether the latter was the effect of the casualty to the tyre, cannot now be determined; but the discrepancy between the statements of the driver and those of the platelayers would seem to lead to the former supposition; though it must be admitted that a driver may easily be mistaken as to the exact spot where he has first discovered so alarming a symptom when travelling at a speed of 40 miles an hour.

In any case, the joint to which I have above referred requires to be improved, and that, apparently, both in packing and in construction.

The Secretary of the
Railway Department, Board of Trade.

I have, &c.
H. W. TYLER,
Captain, Royal Engineers.