

had increased to about six miles an hour, from the tender breaks having been eased off. He then said to his fireman, "I'll give three or four whistles to see if the guard is attending to his break or not," and told his fireman to apply the tender break. He gave the whistles, but found the train not checked and the speed increasing, and so believes the guard's breaks were not applied.

He continued whistling for the guard's breaks, keeping his own applied, till about half a mile from Baxenden, when the speed had become 15 miles an hour. Soon after this he reversed his engine and put on contrary steam, but without apparent effect. He whistled for the Accrington distant signal both before seeing it, and when opposite to it (continuing also the break whistles), the speed having now increased to about 30 miles an hour, from which point it kept increasing until the collision occurred in the manner before described. The driver and fireman escaped without serious injury; the former feels confident that the guard's breaks were never applied, from his not having felt their effect. He also states that after the collision he spoke to the guard, who muttered something in reply, could not stand straight, and smelt strong of drink; this being the only *direct* evidence to the fact of the guard not having been sober, and this not impartial evidence.

In contradiction to the driver the guard states that he began applying his break when about one third of the distance down the Accrington incline, in consequence of the driver's whistling; that, as he continued whistling, he applied it harder, but that the wheels would not skid, and that the speed gradually increased until the collision occurred; that seeing that there was no chance of stopping, he got out on the van step, and was thrown off it by the collision without serious injury. He explains his not having told the driver about not stopping at Baxenden, by his having supposed that the ticket collector at Salford would have informed him. He himself had ascertained there were no Baxenden passengers as he passed along the train to his van at Salford.

The passenger engine and tender were thrown off the road, and also the composite carriage next the tender. The rest of the carriages all kept the rails. The whole of the rolling stock was more or less damaged, and the break gear so much injured that it was impossible to say whether the breaks had been applied or not.

In considering the causes which led to this accident it must, in my opinion, be attributed primarily to the guard of the train having been in an unfit condition to take charge of it. His conduct at Salford before starting, his not applying his break promptly at

Helmshore, his not informing the driver that they were not to stop at Baxenden, and his not helping to regulate the speed at the commencement of the Accrington incline, with the working of which he was well acquainted, all lead to the conclusion that he must have been drinking at Manchester and was not in a proper state to act as guard to a train. His appearance and what I could learn of his antecedents point also to the conclusion that he was addicted to drink; and it was, I think, an unwise proceeding of the superintendent at Accrington to have sent in a man of this character to act as guard to a special train over a portion of line requiring most careful working, particularly when he would have two hours or more to wait in Manchester with nothing to do, and consequently in a position of temptation to a man of his habits.

I cannot acquit the driver of the train of all blame. He evidently had an impression that there was something wrong with the guard, and should therefore have kept the control of the train down the Accrington incline entirely in his own hands, which he could have done had he properly regulated his speed in the first instance. This is another case which points out the extreme desirability of placing the control of continuous breaks in the hands of the driver as well as of the guard.

The night goods inspector at Accrington should not have permitted the goods train which arrived at 11.55 p.m. to commence shunting on the main line (an operation taking on an average 10 minutes) with a special passenger train due at 12.10 a.m., as this was transgressing the spirit of rule 217.

As far as possible to guard against the recurrence of such accidents as the above I would strongly recommend that the absolute block telegraph system of working should be introduced between Baxenden and Accrington, that every train or engine should come to a dead stand at Baxenden before commencing the descent, and that the main down line should be kept clear for some distance on the Skipton side of Accrington while trains are descending the bank, so that in case of the control of a train being lost, there may be a portion of level line to pull it up in.

It is also highly desirable that there should be an interlocking and concentration of points and signals in Accrington yard. The absence of such arrangements is almost sure sooner or later to lead to some serious accident.

I have, &c.,
The Secretary,
Railway Department,
Board of Trade.

C. S. HUTCHINSON,
Lieut.-Col., R.E.

Printed copies of the above report were sent to the company on the 5th May.

LANCASHIRE AND YORKSHIRE RAILWAY.

Board of Trade
(Railway Department),

SIR, 1, Whitehall, S.W., 14th April 1870.

I HAVE the honour to report, for the information of the Board of Trade, the result of my inquiry, ordered by your minute of the 5th ult., into the circumstances attending an accident which occurred on the 2nd ult. near Clayton Bridge station, on the Manchester and Ashton branch of the Lancashire and Yorkshire Railway, from a passenger train running off the rails, and its engine then coming into collision with a goods train approaching in the opposite direction.

Four passengers are returned as having been slightly bruised and shaken.

The line between Manchester and Ashton is double, and the up road to Manchester between Droyladen and Clayton Bridge is laid with double-headed rails,

weighing 80 lbs. to the yard, in lengths of 21 ft., fixed in chairs weighing 47 lbs. each. The sleepers are 10 in. by 5 in., rectangular in section, laid at central intervals of 3 ft., except at the joints, where they are only 2 ft. 8 in. Each chair is secured to the sleeper by two trenails and one iron spike. The rails are fished at the joints. The line is fairly ballasted. The present permanent way was laid down five or six years ago, and appears to be in good order.

Between Droylsden and Clayton Bridge the line consists of a series of reverse curves of 40 chains radius, the gradient being a descending one of 1 in 133 for the whole distance, which is nearly 1½ miles. In the immediate vicinity of the spot where the run off occurred, which is 68 chains from Droylsden, and close to an over-bridge, a right-handed curve about 12 chains long terminates, and a left-handed one com-

mences, there being an intervening straight portion of only about one rail's length.

On the morning of the 2nd ult. a train consisting of a nearly new tank engine, running tank in front, a break van with a guard, one second-class carriage, one first-class and one second-class carriage, in the order stated, and all coupled together with Fay's patent breaks, left Staleybridge at 8.20 a.m. (correct time), having to stop only at Ashton and Miles Platting. The train left Ashton at 8.25 (also correct time), and was running at a speed of 30 to 40 miles an hour when at the point previously alluded to as being about 68 chains from Droylsden, or 2 miles 24 chains from Ashton, the driver felt his engine give a sudden jerk, and then immediately drop off the rails. He at once shut off steam, and was turning round to the reversing lever, when something struck him on the side and twisted him round. On recovering himself he found his engine had stopped about 170 yards from the point where it had first left the rails, with its right-hand wheels (in the direction in which it was running) in the 4 ft. of the down line, and its left-hand wheels in the 6 ft. Neither the driver nor fireman was much hurt, only shaken. The couplings between the engine and van gave way; the latter ran up a bank on the right side of the line, and then fell over on its left side. The guard, who had felt something go wrong about the time the engine dropped off the rails, applied his break and stuck to his break handle till he was thrown down on the bottom of his van and shaken. None of the rest of the couplings gave way, but the first carriage was tilted up on its right wheels with its front end resting against the rear end of the van; the second carriage was leaning against a retaining wall on the left of the line, about half-way over; and the third carriage was in a similar position to the second. There were from 30 to 35 passengers in the train, four of whom are returned as having been injured but not seriously. Immediately on his engine stopping, the driver jumped down and ran towards Clayton Bridge to try and stop a goods train which he saw approaching. This, however, he was not in time to do, and the two engines came into collision, that of the goods train being knocked off the road, the passenger engine having a hole made in its tank, and its buffer beam broken. There was otherwise no very serious damage to rolling stock.

The permanent way was a good deal knocked about, and 10 rails, 40 chairs, and 60 sleepers had to be renewed.

The tank engine which ran off the rails was, as before stated, nearly a new one, having commenced to run only on the 19th Nov., since which time it had been constantly at work. It was much liked by the driver, who had had no fault to find with it. It measures 24 ft. 9 in. from buffer beam to buffer beam, with a wheel base of 13 ft., the axle of the driving wheel being half-way between that of the leading and trailing wheels; the driving and trailing wheels are coupled, and 5 ft. in diameter, the leading wheels $3\frac{1}{2}$ ft. The cylinders are inside ones. The weight of the engine in full working order is about 31 tons, of which there are $6\frac{1}{2}$ tons on the leading wheels, $13\frac{1}{2}$ on the driving wheels, and $11\frac{1}{2}$ on the trailing wheels. As far as could be ascertained by means of the only engine weigh-table which the Lancashire and Yorkshire Company have at their Manchester locomotive shops, the engine, when weighed during the inquiry on the 24th ult., had a half a ton more weight on its right leading and one ton less on its right driving wheel than on the corresponding left wheels, but these results may have been more due to the defective state of the weigh-table than to the actual condition of the engine. The coal tank is at the back of the foot plate and holds rather more than a ton of coals, there being about a ton in it at the time of the accident. There are two water tanks; one at the back of the coal tank and above the level of the foot plate, holding about 930 lbs. of water, and the other beneath it and the

bottom of the other tanks, holding about 3,350 lbs.; these were also nearly full when the accident occurred.

With reference to the cause of this accident, it appears that on the previous evening, as the same driver (with the same engine) with a train from Staleybridge was passing the spot where the run off occurred he felt his engine oscillate and give a jerk, the same thing being perceived by the driver of a London and North-western train which followed. The Lancashire and Yorkshire Company's driver reported what he had felt to his guard at Miles Platting, who again shortly afterwards on the return journey to Staleybridge informed the station-master at Clayton Bridge. Meantime, however, the London and North-western driver had made signs to the ganger in charge of the line between Droylsden and Ardwick junction (whom he had seen at work near Clayton Bridge), which led the ganger to infer that something was wrong, and he immediately went towards Droylsden until he found a disturbance in the road close to the point of junction between the two 40 chains curves with only the one rail's length of straight line between them near the over-bridge. He states that he found the centres of two adjoining rails, on the Manchester side of the straight rail, next the six foot (i.e. on the outside of the curve), bulged about an inch, the spikes being partly drawn and the trenails broken off; that there were also spikes partly drawn and trenails broken on both sides of this spot; that fresh seats were made for the chairs, which were re-spiked and re-trenailed, from 20 to 30 fresh trenails having been put in; that 12 or 14 trains passed over the spot during the night, and that at 6 o'clock the next morning it appeared on examination all right; (the driver of a London and North-western train which preceded the one that met with the accident, also states that he felt nothing wrong as he passed over the spot soon after 8 a.m.); that on arriving at the spot soon after the accident, he found the first disturbance at a point about six chains on the Droylsden side of the over-bridge, whence for about four chains the road was twisted and one chair wrenched off; that three rails (on the Manchester side of the straight line) next the six foot were then bulged; that for another two chains there was a good deal of disturbance, and that then the engine broke off the end of a rail and escaped into the six foot, and afterwards made its way into the down line. This statement agrees with what I was able to observe myself on reaching the scene of the accident about six hours after it had occurred, and when the line had been repaired. The line was then fairly true to gauge, and the cant of the reverse curves carried out as well as was practicable under the circumstances before described. The sleepers appeared sound. I think therefore the accident must be ascribed to running a tank engine at a high speed (probably 40 miles an hour at least) over a portion of a line where there is not a sufficient piece of straight line between two reverse curves to permit of the cant being properly carried out to nothing, and where consequently any oscillation already produced would tend to be aggravated and to produce a great strain upon the rails and chair fastenings.

It is also possible that the repairs executed the previous evening may not have been thoroughly performed, and the chair fastenings have consequently given way more easily than they ought to have done.

If also the inequality of weight on the right and left driving and leading wheels, as shown by the engine weigh-table, existed at the time of the accident, it no doubt would have helped to keep up an oscillation once commenced.

This accident points to the inexpediency of using tank engines for running at express speeds, a tender being most valuable in helping to check incipient oscillation.

It also, I think, raises the question as to whether for the outer chairs on curves two spikes and a trenail (or something equivalent) should not be used as a

preferable mode of fastening to one spike and two trenails.

An alteration should be made at the junction of the reverse curves near the over-bridge, so that the cants of the rails may be properly carried out.

It is very desirable that the company should have at their locomotive works an engine weigh-table, on which dependance can be placed. A weigh-table which

gives a difference of 19 cwt. in the weight on one of the wheels of an engine, according to which end is placed first on the table, can hardly be considered a satisfactory one.

I have, &c.,
The Secretary C. S. HUTCHINSON,
 (Railway Department), *Lieut.-Col. R.E.*
 Board of Trade.

Printed copies of the above report were sent to the company on the 6th May.

LONDON AND NORTH-WESTERN RAILWAY.

Board of Trade
 (Railway Department),
 Whitehall, 28th Feb. 1870.

SIR,

In compliance with the instructions contained in your minute of the 9th inst., I have the honour to report, for the information of the Board of Trade, the result of my inquiry into the circumstances which attended the collision that occurred on the 6th inst. just outside Coventry station on the London and North-western Railway.

Twelve passengers are reported to have received shakes and bruises. The injuries are believed to be very slight.

On the afternoon in question, the train which is due to leave Leicester at 5.40 p.m. for Coventry arrived in due time at the latter station.

This train returns from Coventry to Leicester with the passengers for Leicester and intermediate stations who arrive at Coventry from Leamington by the train which is due to leave Leamington at 8.30 p.m., and to arrive at Coventry at 8.58 p.m.

As soon as the passengers had alighted from the Leicester train, the driver unhooked his engine, ran round his train, and pushed it back past the Leamington junction (which is at the south east end of Coventry station) into a long siding at the east side of the branch line to Leamington. He then went to the coal shed adjacent to the siding, to take coals, and remained at the coal shed until the station porter, who had assisted to put the train in the siding, returned to bring it out. The porter, when he left the Leicester train in the siding, had locked the points, so that the train could not leave until he returned to unlock the points. When he did so the driver again attached his engine to his train, which consisted of one first-class, a break van, a third-class, a first, a second-class carriage, and a third-class break van. He then proceeded to draw his train out of the siding on to the "up" line of rails to Leamington, so as to be ready to cross on to the "down" line by a crossover road at the south side of the junction, and proceed into the Coventry station as soon as he could obtain the permission to do so from the signalman at the Leamington junction.

As the driver of the Leicester train drew his train out of the siding he whistled for the signal to proceed on to the down line and pass the junction, but the junction signalman showed him a red light with his hand lamp, and the driver stopped his train, with his engine close to the points of the crossover road leading to the down line and into Coventry station.

The Leicester train had been standing for about ten minutes, when the junction branch signal for the down line was lowered for the train which leaves Leamington at 8.30, and is due at Coventry at 8.58 p.m. It appears that it has been customary for this signal to be lowered also for the Leicester train to come out of the siding at the east side of the branch, and proceed into Coventry station. The Leicester train, as a rule, follows the Leamington train into Coventry station. The driver of the Leicester train had only been driving the train for about a month,

and the 6th February was the first Sunday that he had been on duty.

He had invariably followed the Leamington train during the week days on which he had been working, but there was a little difference in the hours of running on a Sunday, and he was not aware that there was a Leamington train to precede him on the Sunday, as well as on the week days. He neglected to look at his time table, and conceived that the signal that was lowered for the Leamington train was meant for him. He accordingly started his train, and his engine had just got over the crossover road and reached the "down" line, when it was run into by the engine of the Leamington train. The engine of the Leicester train was only slightly damaged; it remained on the rails; but the front carriage of this train was thrown across the up and down main lines to Rugby.

The passenger train consisted of an engine and tender, a break van, a post-office van, two composites, a third-class, a composite, a break van, a third-class, and four composite carriages, coupled in the order given.

It left Leamington two minutes late, and was approaching the Leamington junction, near Coventry, at its proper time, at a speed of about four miles an hour, when the driver saw the Leamington train close in front of him. He had no time to do anything before the collision occurred. The engine of the passenger train remained on the rails, and was only slightly damaged; but one of the carriages was thrown on its side against the bank, and ten other coaches of this train left the rails. They came to a stand on their wheels. The steps, some few panels, and some of the glasses were broken.

The Leamington branch, which is a single line, joins the main line on a 12 chain curve, and the approach to the junction, which is a double junction, is in a cutting. The points and signals are worked from a junction signal hut placed opposite to the points, and elevated above the lines of rails. The points and signals are not arranged on the locking principle.

The signalman should not have opened the points of the crossover road leading from the up to the down line on the branch until the Leamington train had passed the junction, and until he intended the Leicester train to move on to the down line. His doing so, was calculated to mislead the driver of the Leicester train, who had been in the habit of receiving the down line branch signal to move forwards into Coventry station.

The system of using the same signal for more than one line of rails is certain to cause accidents of this kind. It appears that the station master at Coventry and the superintendent were not aware that it was so used by the signalman; they were under the impression that hand signals were used for the shunting operations such as the Leicester train was doing. I recommend that separate signals be provided for all lines that join the passenger lines, and that the whole of the signals and points be arranged on the locking principle as soon as possible.

The driver of the Leicester train showed a great