

train had passed the west cabin. If he had tried to take off his home-signal, he would have found that he could not have moved the signal-lever, as the points were in the wrong position. Fortunately both trains were moving very slowly. The engine-drivers did their best to stop their trains as soon as they observed their danger, but the distance was too short for them to do so.

This accident was caused by the signalman in the east cabin using a hand-signal to do what a semaphore-signal is provided for. It is a bad and dangerous practice, which should be stopped.

The signalman had been on duty about 4 hours and 20 minutes when the collision occurred.

The Company propose to substitute distant-signals in lieu of slotting the down home-signals from the west cabin.

This alteration will facilitate the working of this busy station, and I think it is desirable to signal the through crossing junctions with the main up through line, with the main down through line, and with the down platform line, but no interlocking can prevent accidents of the kind, if drivers are hand-signalled past fixed stop-signals.

The Assistant Secretary,
(Railway Department,) Board of Trade.

I have, &c.,
F. H. RICH,
Colonel, R.E.

APPENDIX.

DAMAGE TO TAFF VALE RAILWAY STOCK.

Third-class coach No. 19.—Two foot-boards broken.
Brake third No. 229.—Two foot-boards and one side panel broken.

Engine No. 15.—One leading sand-pipe bent.

DAMAGE TO GREAT WESTERN STOCK.

Great Western third-class coach No. 753.—Four axle-guards and one sole-bar bent; one long foot-board

broken; one draw-bar, one axle, and one buffer-rod bent.

Brake-van No. 354.—Wing pillars grazed; eight step hangers, one long foot-board broken; one draw-bar one axle, and one buffer-rod bent.

Engine No. 46.—Both feed-pipes between engine and tender bent, and feed bags burst; cost of repairs, 5s. 9d.

Cost of clearing line, 11. 18s. 7d.

Printed copies of the above report were sent to the Great Western and Taff Vale Railway Companies on the 30th September.

LANCASHIRE AND YORKSHIRE RAILWAY.

Board of Trade, (Railway Department,)
31st July 1890.

SIR,

I HAVE the honour to report, for the information of the Board of Trade, in compliance with the Order of the 23rd instant, the result of my enquiry into the circumstances attending the collision, which occurred on the 22nd instant, at Liverpool Exchange (terminal) station on the Lancashire and Yorkshire Railway.

In this case the 6.30 p.m. passenger train from Chester, due at Liverpool at 7.30 p.m., when entering the station on No. 5 platform line overshot its proper stopping place and about 50 yards beyond it came into collision with the first of two empty carriages which were standing against the hydraulic buffers at the end of the platform line.

Complaints of injury have been received from 14 passengers.

The train consisted of a six-wheeled (four wheels coupled) engine and tender (running engine in front) and five vehicles, the one next the tender being a third-class brake carriage with guard, the automatic vacuum-brake applying to the coupled wheels of the engine, to the tender wheels, and to twenty out of the twenty-eight wheels of the vehicles, and in it the engine and tender escaped without damage, but the five vehicles were slightly damaged. The two empty carriages were also slightly damaged.

No wheels were knocked off the rails.

The hydraulic buffers, which have a stroke of about five feet, were pushed in about four feet by the force of the collision, and were no doubt useful in preventing more serious consequences than might otherwise have been the case.

Description.

The new Exchange station at Liverpool is approached for about a quarter of a mile on a falling gradient of 1 in 260. Cabin A at the entrance of the station is about 75 yards from the outward end of the platform, about 320 yards from the buffer-stops and about 295 yards from the place of collision. Cabin B is about 150 yards from cabin A, and Sandhills station, where the train had last stopped, is about $1\frac{3}{4}$ miles from the Exchange station.

The Preston train was in the habit of stopping about 75 yards from the buffer-stops clear of the points of a crossing between Nos. 4 and 5 platform lines so as to enable the engine to run round its train by means of this crossing; it was a customary thing for empty carriages to be standing at the end of No. 5 platform line, where two of them were standing on the present occasion.

Rule No. 16 of instructions issued in January 1890 to engine-drivers and guards respecting the automatic vacuum-brake is as follows:—

“16. Engine-drivers must test the continuous brake before passing the distant-signal of any terminal or junction station at which the train has to stop, and the speed of the train must be reduced. Engine-drivers must always enter terminal or junction stations at which their trains have to stop (especially such as Manchester (Victoria), Bolton, Liverpool, Bradford, Blackburn, and Wigan, which are worked under the station yard working arrangement, and where trains form connections) at such a speed as to enable them to stop the train clear of any preceding train by the application of the ordinary hand-brake only, and guards must watch the speed of their trains and assist the engine-drivers by the use of the hand-brake. Unless the brake is working properly when thus tried, the engineman must whistle for the guard's hand-brake, stop the train, and inform the guards that the continuous brake is out of order, and the hand-brake must be relied upon for working the train. Special care must then be taken in approaching stations at which the train has to stop.”

On 13th February 1890, the further additional notice was issued:—

“Excessive speed of passenger trains entering Exchange station, Liverpool.

“Strong complaints having been made of the excessive speed at which trains are entering Exchange station, Liverpool, engine-drivers are hereby cautioned that they must enter the station at such a reduced rate of speed as will enable them to stop the train at the proper place, clear of any preceding train or obstruction, by the application of the ordinary hand-brake only. Any driver disregarding this instruction will be severely dealt with.”

“(Signed) JOHN F. ASPINALL.”

Evidence.

1. *James Wright*, platform inspector at Liverpool Exchange station; 18 years' service, six years platform inspector.—I was on duty on the 22nd instant when the 6.30 p.m. train from Preston was entering the station at 7.39 p.m. I was standing on platform No. 4 by the subway close to No. 5 line, on which the train arrived. I did not notice anything unusual in the speed till the engine was passing me, when it was fully ten miles an hour—faster than customary. As the engine was passing me, I saw the driver reverse, and heard him give two brake whistles; before this I had heard no brake whistles. I did not notice what the fireman was about, though he was next the platform, but my attention was taken up with watching the train and seeing whether it would collide with two empty carriages which were standing against the buffers. From the way the train was running, I thought the blocks must have been skidding the wheels, and that the latter were sliding along the rails. The speed appeared to increase as the train neared the empty carriages, and the tail of the train had passed me by about two carriage lengths when it suddenly stopped without rebounding. The speed must I think have been at least 10 miles an hour when the collision occurred. I saw the driver jump off on to the platform just before the collision. He kept his feet. I should not have liked to jump on the engine as it passed me. There was one guard in the train next the tender. I saw him standing up by the brake as he passed the subway. I saw one

person cut in the temple, and another appeared to be insensible, and was taken to hospital. There were not more than 40 or 50 passengers in the train. About half an hour after the collision, I spoke to the driver, who appeared quite himself, and had no appearance of drink about him. I did not notice the rails of No. 5 line being wet from carriage washing.

2. *James Ratcliffe*, guard; 29 years' service, nine years a passenger guard.—I commenced work at 8.50 a.m. on July 22nd, to remain till 9.35 p.m., with three hours continuously off duty in the middle of the day. I was in charge of the train leaving Preston at 6.30 p.m. We started seven minutes late waiting a train from the north. We left Burscough junction eight minutes late, and from this the train consisted of engine and tender, running engine in front, a third-class brake, a third-class, two composites, and a third-class carriage, five vehicles in all. The automatic vacuum-brake was applied throughout the train. The vacuum gauge in the van showed 19 inches on leaving Preston, and remained pretty uniform, having been $18\frac{1}{2}$ inches at Sandhills, the last stop. In an ordinary stop, the gauge will go down to seven or eight inches. After leaving Burscough junction we stopped correctly at all stations, without overrunning any platform, with the use of the vacuum-brake. We left Sandhills, the last stop, at 7.37 p.m., nine minutes late. I do not think the speed between Sandhills and Liverpool exceeded a

maximum of 25 miles an hour, nothing more than usual or which excited my alarm. The driver shut off steam at the advanced-signal of the Exchange station junction cabin, about half-way between this cabin and cabin B, the speed being then at its highest. This is the usual place at which many drivers shut off steam, though some do it a little sooner. About the stop-signals of cabin B, the driver applied the vacuum-brake with full force, reducing the vacuum gauge to zero; the speed was thus reduced to about nine miles an hour at the end of the platform, a little faster perhaps than usual. I put my hand-brake on slightly about cabin B, and I had it hard on passing through the slips. The speed was considerably checked up to cabin A, where it was about 10 or 11 miles an hour, but after this the brakes seemed to have had very little effect. The driver whistled for the brakes at the end of the platform, and he reversed his engine at the subway, without applying steam. He jumped off about a carriage length before the collision, when the speed was about six or seven miles an hour. I did not see the fireman go to his hand-brake till after the engine had passed the subway, when I was working hard at my brake. I felt very little of the collision, as I was holding on to the brake wheel. After the collision I heard the driver say the brake had failed. He was quite sober. I have often been with him before and have never known him make any similar mistake. The collision occurred about 7.40 p.m. The evening was fine and warm. The rails seemed a little greasy about the subway. I felt no rebound after the collision. I believe sand was applied after the engine was reversed.

3. *Edward Martin*, signalman; 10 years' service, five years signalman.—I have been employed in cabin A, Liverpool Exchange station, about three years. I came on duty on the 22nd at 2 p.m. to remain till 10 p.m. I work block between my cabin and cabin B. I saw the Preston train pass about 7.37 p.m., and noticed nothing unusual in the speed at which the train passed. The proper signals were taken off for it.

4. *John Lindley*, driver; 42 years' service, 33 years driver.—I have been accustomed to run into the Exchange station for many years both before it was altered and since. I commenced work on July 22, at 2.5 p.m. to sign off at 10.30 p.m. My engine was No. 650, a six-wheeled engine with the driving and trailing wheels coupled, and a six-wheeled tender, with the automatic vacuum-brake applying to both engine and tender. The engine and brake were in good working order and had worked all right on the two previous journeys. I left Preston at 6.37 p.m., seven minutes late, fireman Woods (who has been with me about four months) being on the engine. As far as Burscough junction the train consisted of six coaches, but we dropped a Southport carriage at Burscough junction, and after this the train consisted of five vehicles with the automatic vacuum-brake fitted throughout. I made all the stops between Preston and Sandhills (about nine) with the vacuum-brake, without overrunning any platform; the gauge usually shows from 18 to 20 inches, and I use about half that for an ordinary stop. We left Sandhills still about seven minutes late. I shut off steam near the advance-signal of the Exchange station junction, when the speed was about 20 miles an hour, the same as usual. On approaching B cabin, when the speed was still about 20 miles an hour, I applied the vacuum-brake

at the usual place, using about 10 inches of vacuum and reduced the speed to about 10 miles an hour. On approaching A cabin after blowing up the vacuum to about 17 inches, I again applied the brake, without producing any effect, and I gradually used up all the vacuum but still without affecting the speed. On entering the station and finding I could not stop, I reversed the engine and whistled for the brakes. I gave the engine steam directly after reversing. The fireman put on his hand-brake, just after I reversed and opened the sand-valves. The speed was reduced to four or five miles an hour on striking the empty vehicles; just before the collision I stepped off on the platform and slipped down on one knee. If things had gone right I should have stopped clear of the crossing. It is a mystery to me why I did not stop, having used the means of stopping which I generally did. There was nothing wrong with the brakes either on the engine or train so far as I know, and in the trials made after the collision, the brakes worked all right. I did not notice whether the rails were wet or greasy on this occasion; they often are so. On finding the brake would not act at cabin A, I did not tell the fireman to apply his hand-brake as I was expecting the continuous brake to act every moment. I did not look round the train after the collision to see whether the blocks were rubbing. There was no rebound in the train after the collision. Shortly after the collision, I blew up the vacuum to about 20 inches and applied the brake by direction of one of the inspectors, but I do not know how the blocks behaved.

5. *George Woods*, fireman; 10 years' service, five years fireman.—I have been Lindley's fireman about two months, and I was with him on July 22nd, when my hours and his would be much the same. The running of the 6.30 p.m. train from Preston went all right up to Sandhills. The vacuum brake was used for all the stops and we overran no platforms. The gauge showed about 18 inches vacuum when we left Sandhills. Steam was shut off about the junction advance-signal, the speed being about 30 miles an hour. The vacuum-brake was applied on approaching B cabin, the speed being reduced to about 10 miles an hour at A cabin, 10 inches vacuum having been used. Lindley then blew up the vacuum on passing A cabin to about 18 inches, and used the brake again on coming into the station, first using about 10 or 12 inches without producing any effect on the speed, and then using up all the vacuum, but still without any effect. He then reversed the engine soon after entering the station (about 50 yards), and he opened the regulator and whistled for the guard's brake after reversing. I put my hand-brake on about the same time that the driver reversed, not thinking it necessary to do so earlier, and opened the dry sand valves before we reached the subway. The speed was reduced by these means to about four or five miles an hour, when we struck the empty vehicles. I remained on the engine and was not hurt. There was no rebound. I cannot account for the present collision. The proper place to stop with this train was short of the crossing.

6. *William Weston*, carriage examiner.—About 10 minutes after the collision I asked driver Lindley to blow up his vacuum and apply the brake. He did so. I examined the blocks on the front vehicle and found them tight on, and carriage examiner Moss told me they were tight on the other four vehicles.

Conclusion.

There appears to be no other reasonable explanation to account for the occurrence of this collision than that the driver of the train through an error of judgment allowed it to enter the station at so high a rate of speed that he not only failed to stop at the usual place, but overran this place by about 50 yards, the engine then coming into somewhat violent collision with the first of two empty carriages standing against the

hydraulic buffers at the end of the platform line, forcing these buffers back about four feet.

The total weight of the train amounted to about 112 tons, and of this weight there was about 84.5 tons on braked wheels, viz. 22.3 tons on the coupled wheels of the engine, 18.5 tons on the tender wheels, and 43.7 tons on the wheels of the vehicles.

From the fact of the continuous brake having acted properly throughout the journey, from the train not being rebounded after the collision, and from the behaviour of the continuous brake on its being tried immediately after the collision, there is no reason to suppose that the brake was not in proper working order.

If the driver was, as he stated, able to reduce speed between cabins B and A (about 150 yards apart) from 20 miles to 10 miles by the use of about 10 inches of vacuum, he should have continued to let the train run on as far as was necessary with this same application of the brake, until there was sufficient speed left to enable the train to be stopped by the tender hand-brake at the usual stopping place, 245 yards from cabin A. Instead of doing this he appears to have released the brake at cabin A by re-creating the vacuum, and then not to have been sufficiently prompt in re-applying it or in having the tender-brake applied or in whistling for the guard's brake. It is possible that the difficulty of stopping may have been increased by the rails being wet and slippery from carriages having been recently washed on No. 5 line. Lindley has been 33 years a driver, and is a man of excellent character. He had been on duty about 5½ hours out of a spell of 8½ hours when the collision occurred.

It will be observed that the rule for the use of continuous brakes in entering terminal or junction stations does not absolutely forbid their use. There may be some such stations on the Lancashire and Yorkshire Railway where it would be highly inconvenient to observe the rule if altered so as to forbid their use; but for all ordinary terminal and junction stations the rule should in my opinion be made absolute that the continuous brakes should be used only in cases of emergency.

I have, &c.,

The Assistant Secretary,
Railway Department, Board of Trade.

C. S. HUTCHINSON,
Major-General, R.E.

Printed copies of the above report were sent to the Company on the 3rd September.

LONDON AND SOUTH-WESTERN RAILWAY.

Board of Trade, (Railway Department,)
Whitehall, London, S.W.,

28th July 1890.

SIR,

I HAVE the honour to report, for the information of the Board of Trade, in compliance with the instructions contained in the Order of the 14th instant, the result of my enquiry into the causes of a collision which occurred on the 12th instant, near Eastleigh, on the London and South-Western Railway.

In this case a light engine, which had left Salisbury for Southampton at 8.37 p.m., when approaching Eastleigh upon the up line from Salisbury, came into collision at 9.16 p.m. with the tail of the 7.30 p.m. up goods train from Salisbury, which had just started forward, after standing for about 34 minutes at the up home-signal at Eastleigh north signal-cabin. The light-engine left the rails, and ran for about 35 yards before coming to a stand, and the goods train, which consisted of engine and tender, and 33 goods waggons and two brake-vans, was divided by the shock of the collision; the engine, tender, and 30 leading vehicles, running forward for about 100 yards, and the five rear vehicles being thrown off the rails and much damaged, the rear brake-van being broken up.

At the moment of the collision, a return Midland excursion train from Portsmouth to Bath, *via* Salisbury and Templecombe, consisting of engine and tender, 12 passenger carriages and two brake-vans, was passing upon the down line, and a piece of timber about 10 feet in length, part of the top rail of the body of the goods brake-van, was dashed through the side of the rear brake-van of the passenger train, killing the London and South-Western guard, who was sitting on the guard's projecting box on the six-foot side, and passing close by the Midland guard and a Somerset and Dorset guard, who were sitting at the other side of the brake-van.

No passengers were injured.

A return of the damages to the rolling-stock is appended.