convenient situation on the west of the main line platform; and that these signals shall be properly interlocked with one another and with the siding points. It will not then be possible for the signalman to let anything out of any one of the three sidings at the same time that a train is shunting back into those sidings, or to allow a train to shunt back into the sidings when any one of the three signals is lowered for a train to go out of the sidings.

I have, &c.,
H. W. Tyler.

The Secretary,
Railway Department,
Board of Trade.

LANCASHIRE AND YORKSHIRE RAILWAY.

Sir, *Burnley, 8th September* 1871.

In compliance with the instructions contained in your minute of the 5th instant, 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 2nd instant, between a pilot-engine and a passenger train, near the Burnley station, on the Lancashire and Yorkshire Railway.

The Burnley station is 46 miles from Liverpool, 6 miles from Accrington, and 10 miles from Todmorden; and the line from Burnley to Todmorden is constructed, with steep gradients and numerous curves, through a very hilly country.

On leaving Burnley, where there is a level portion at the station, 4 chains in length, the gradients rise 1 in 69 for one mile, 1 in 193 for rather less than a mile (76 chains), and 1 in 68 for 2 miles and 30 chains. It is the practice, in the case of heavy excursion trains passing Burnley from Accrington for Yorkshire, to allow them to run through the Burnley station without stopping, and to employ a pilot-engine, sent previously to Burnley for the purpose, to follow them, when required, from a siding at Burnley, and to assist them up the inclines above referred to. The engine so following, usually overtakes the excursion train between Burnley and Towneley (which are three-fourths of a mile apart), and, joining it while in motion, assists it by pushing it up the gradients of 1 in 69, 1 in 193, and 1 in 68, above referred to. As soon as the excursion train arrives at the summit of the last-mentioned gradient of 1 in 68, the pilot engine, being no longer required, drops behind the train, and returns to Burnley or Accrington, as the case may be, leaving the train to pursue its journey, without stopping, towards Yorkshire.

The excursion train now in question, left Liverpool punctually at 7 p.m. on its return journey to Huddersfield, consisting of an engine and tender, 18 carriages, and 2 break-vans. It was accompanied by two guards, one of whom rode in a van in the front, and the other in a van at the tail of the train; and each van was coupled to three carriages, working continuously with it, with Newall's patent breaks. After stopping at Ormskirk and Blackburn, it passed through Accrington at 8.50 p.m. without coming actually to a stand; and, running forward, it passed through the Burnley station at about 20 miles per hour. The engine-driver did his best, indeed, to keep up the speed of the train through Burnley, in order the better to surmount the rising gradients east of Burnley; and he saw, as he passed, the assisting engine in the siding at Burnley, which would, he was aware, follow him from that station, in order to assist him up the heavy gradients referred to. After passing through Burnley, the excursion engine-driver found the speed of his train slacken, after he commenced to ascend the gradient of 1 in 69, from 20 to 12 or 14 miles an hour; and while he was travelling at the latter speed, and at about two-thirds of a mile from Burnley, he felt a shock from the rear, and surmised that the pilot engine, which he knew was following him, had come into collision with his train. He did not consider, however, that anything had happened to prevent his continuing his journey towards Todmorden, where he was next due to stop; and he ran down the falling gradients to Todmorden at a speed of 15 or 16 miles an hour.

The guard in the leading van also felt a shock about two thirds of a mile from Burnley, and knew that it was caused by the pilot-engine; but he looked out of his van along both sides of the train without being able to see that anything was the matter with the carriages; and he did not therefore apply his breaks before reaching Todmorden. The guard in the hind van was looking out, expecting the pilot-engine to come up to the rear of his van, and saw it approaching. It appeared to him to be travelling at considerable speed until it approached to within about 30 yards of his van; and he then thought that the pilot engine-driver shut off his steam and slackened his speed. It next appeared to this guard that the driver reapplied his steam, increased his speed, and came against the break-van with a considerable shock; and, seeing that the shock was coming, he jammed himself in between the break-wheel and the end of his van, the better to receive it. He was thrown, first forward against the van end, and then backward against the break-wheel; and his hand-lamp having been put out by the shock, and thrown off the foot-board of the van, he proceeded to seek for it in the dark. When he recovered it, he found that the lamp-wick had been knocked down in the socket, and he had therefore some difficulty in re-lighting it. On looking out at both sides of his van, he could see nothing wrong with the train; and he did not apply his breaks until he reached the summit of the incline, 4¼ miles from Burnley; but he then turned them on to see whether the couplings were complete throughout the train. The carriages appeared to him to be all connected together, and he kept his breaks slightly applied until the train was brought to a stand at Todmorden.

On reaching Todmorden, he made an examination of the train, and found that the draw-bars of two carriages near the middle of it had been pulled out by the shock of the collision, but that the carriages were still coupled together by their side-chains. He also found that two of the screw-couplings had been fractured, and that one of them had been jerked off the hook of the draw-bar. The body of the van in which he was riding had been shifted slightly on its framing, and the buffers behind his van were slightly damaged. Out of about 700 passengers who were riding in the train, four have, up to the present time, complained of injury.

The pilot-engine, which came thus into collision with the excursion train, left Accrington about 7.45 p.m. the same evening for Burnley, for the special purpose of assisting excursion trains up the Burnley incline. The engine-driver had performed the same duty on previous occasions, and he was an experienced servant of the company, having been 10 years on the line, and having acted as engine-driver for three years. After leaving Accrington at 7.45 this engine-driver found, in passing Rose Grove, 1½ miles west of Burnley, that there was an excursion train ahead of him. He joined that train immediately after passing Rose Grove, and assisted it to Burnley, and through that station, and up the incline beyond it, as far as Coppy Pit siding, on the summit of the Burnley inclines. Being no longer required for that excursion train, he returned to Burnley, and went with his engine into the siding at that station, to wait for the excursion train now specially under consideration, which he knew was due to leave Liverpool

at 7 p.m. He waited in the siding at Burnley for 20 or 25 minutes; and at the end of that time he saw the excursion train approach the station, and pass through it without stopping, at a speed, as it appeared to him, of 20 or 25 miles an hour. He followed the excursion train from the siding as quickly as he could, knowing that it was absolutely necessary for him to overtake it before it reached a tunnel which is on the first gradient of 1 in 69, and about one mile from Burnley. It was dark, and 9.15 at night. After leaving Burnley, he lost sight of the train for a short distance, owing to the curve on the east of that station; and when he caught sight of it again, he found that it was only about 100 yards in front of him, as well as he could judge by the three red lights which he saw at the tail of it. He shouted to his fireman to apply his break, while he shut off his steam, and reversed his engine; and he soon afterwards struck the train, but, as it appeared to him, without much violence. He continued to assist it up the incline in the usual manner until he reached the summit. As the train proceeded forward after the collision, there was an interval between it and the engine, of about 30 yards; but the driver of the engine saw, while drawing quietly up again to the tail of the train, that the light in the van had been knocked out by the shock. He therefore directed his fireman to go across the buffer-plank, and ask the guard whether any damage had been done. The fireman stepped over accordingly to the guard's van. He found it in darkness, and assisted the guard to re-trim and re-light his hand-lamp; and, finding that nothing serious had occurred, he returned and reported the result to the engine-driver. About 200 yards from the summit, the driver of the pilot-engine dropped gradually behind, to ascertain whether the couplings of the train were all right; and finding that they were so, and that the whole train was proceeding forward, he then returned to Burnley. On reaching Burnley he carefully examined his engine, and found that it had not received any damage; and about 25 minutes later another excursion train arrived, and he assisted it in a similar manner up the incline.

This collision occurred, then, in the course of a practice which is stated to have been carried on, on this and other parts of the line, for the last 20 years,—of employing a pilot-engine to assist heavy passenger trains in surmounting steep gradients, the engine joining the train whilst both are running at a considerable speed. The speed on this occasion was rather greater than usual, inasmuch as the excursion train was comparatively a light one, and the engine-driver was able to pass through Burnley in approaching the incline, at 20 miles an hour. The driver of the pilot-engine was the more liable, for this reason, to make the mistake or miscalculation which, on his part, was the cause of the accident. This is, no doubt a convenient mode of working, in so far as the avoidance of delay to the trains so assisted is concerned; and the engine-drivers become very expert, in running up behind the trains, and in joining them without shock, while they are travelling at considerable speed. But there must always be some risk in the operation; and the more so when it is carried on in the dark, and round curves on which the view of the following engine-driver is more or less obstructed, and when, as in this particular case, the engine-driver is compelled to join the train which he is following within a limited distance of the point from which he starts. This practice is stated to have been carried on at Burnley for 20 years without any previous accident, although on certain busy days as many as 12 or 14, and sometimes even 20 trains in a day have been so assisted. At the same time, it cannot but be considered that it would be a safer arrangement to cause the pilot-engine to join the train while it is at rest, than to allow it to follow and catch it up while in motion, when it is required for duties of this description.

As regards the question, whether it is desirable, in the case of assisting trains up heavy gradients by means of pilot-engines, to attach these pilot-engines *behind* the trains, there is much to be said on both sides. On the one hand there is undoubtedly some risk of the engine at the tail of a long train not working perfectly in unison or harmony with the engine in front of it; and especially of the rear engine not being stopped, in the event of anything happening to one or more carriages in the middle of such a train, in time to avoid risk or accident to the passengers. But on the other hand, the most fatal accidents have sometimes occurred from the fracture of couplings in very heavy trains, and from portions of those trains having run back down steep gradients, and come into collision with other trains which were ascending those gradients; and the fatal effects of those accidents would no doubt have been avoided if assisting engines had been employed at the tail of those trains.

I have, &c.,
H. W. Tyler,
Lieut.-Col. R.E.

The Secretary
(Railway Department),
Board of Trade.

LANCASHIRE AND YORKSHIRE RAILWAY.

North Dean,
Sept. 26th, 1871.

Sir,

In compliance with the instructions contained in your minute of the 23rd instant, I have the honour to report, for the information of the Board of Trade, the result of my inquiry into the collision that occurred on the 11th September at the North Dean station on the Lancashire and Yorkshire Railway.

In this case, the 6.40 p.m. passenger train from Liverpool for Normanton came into collision, at 11.7, while approaching the North Dean station, with the 8.50 p.m. goods train from Halifax for Wakefield, which usually leaves North Dean about 10.0 p.m., while the latter train was shunting back into a siding on the west of that station.

The North Dean station, at which the branch from Halifax and Bradford joins the main line of the Lancashire and Yorkshire Railway Company, is 31 miles on the east of Manchester. The main line is straight for a mile and a quarter to the westward, but the Halifax branch runs into the station on a sharp curve from the northward, and on a gradient of one in forty-five. There is a signal-cabin on the south side of the main line at the station, containing a locking-frame by Messrs. Yardley and Company of Manchester; and the levers in this locking-frame are used for working the safety points of the sidings as well as the main line junction points, but not the point connections of the sidings with the main lines. There are sidings on both sides of the line, and at both ends of the station; the goods traffic as well as the passenger traffic through this station being very heavy and important. But I need only now refer to the sidings on the north side and at the west end of the station. The points leading to those sidings are 108 yards on the west of the signal-cabin, and are not worked by the junction signalman, but are worked by a lever on the ground, opposite to them, and by any porter or shunter who happens to be near them, and who is required to work them. Further westward, and 38 yards from the siding points, there is on the line of the siding a safety-switch, which is worked from the signal-cabin; and five yards still further to the westward there is a signal applying to the siding, and also worked from the signal-cabin. The safety-switch, as originally constructed, was necessarily opened by the signalman from the cabin whenever an engine or train entered the siding, as well as when they required to come out of the siding; but about 12 months since it was found, having regard to the siding-accommodation at the station, inconvenient in the practice of working that goods waggons should be capable of being