trains were a few minutes late, and about 10 minutes before 8 o'clock they passed each other at this level crossing. The gatekeeper was standing east of the up line between the Lancaster and Carlisle and the Newcastle and Carlisle railways, the large gates belonging to the former company, on each side of the railway, being closed against the public road, in consequence of the drivers of the two trains having sounded their whistles in order to get the distant signals, which cover this level crossing and the railway crossing of the two companies on the up and down lines, taken off, the regulations of the company requiring that the gates shall be closed across the public road before the signal man is allowed to take off the distant signal from danger to admit a train. The gatekeeper expected that the down train would first reach the crossing, but it turned out otherwise, and the up train arrived first, and as the two trains were passing each other and the crossing he caught a momentary glance of a man on the opposite side of the line, through the openings between the carriages, standing on the west or down side of the line, but saw no more of him until the carriages had passed, when he was found about seven yards north of the crossing, one of the wheels, it is supposed, of a carriage of the down train having passed over his right arm. The arm was subsequently amputated, and he is now doing well. It is believed that he passed through the wicket gate west of the railway, on the opposite side of the railway to which the gatekeeper was standing, and that he had his attention directed solely to the advance of the up mail train, and that, without looking southwards, he waited until he thought the up train was getting clear, and then walked deliberately and came against the down train. He is stated to have been perfectly sober. The driver of the down train informed me that he did not see any person attempting to cross, and if he had done so he could not have arrested the progress of the train in the short distance visible in front of him at that part of the line.

There is a gas lamp at the side of the wicket gate through which Telford must have passed, but the night was very dark and wet.

I do not think any blame is attributable to any of the company's servants.

I am informed that the Lancaster and Carlisle Railway Company have deposited plans, and intend to introduce a bill in the next session of Parliament, proposing, among other matters, to deviate their line at this spot so as to do away with this level crossing of the public road.

I have, &c.

The Secretary,
Railway Department,
Board of Trade.

W. Yolland,
Lieut.-Col., R.E.

LANCASHIRE AND YORKSHIRE RAILWAY.

Railway Department, Board of Trade,
Whitehall, July 23, 1858.

Sir,

I am directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Colonel Yolland, R.E., the officer appointed by them to inquire into the circumstances connected with the boiler explosion which occurred on the 11th June between Mirfield and Heckmondwike on the Lancashire and Yorkshire Railway.

My Lords trust that as this accident has occurred from the worn-out condition of the boiler the directors will take steps to cause the internal conditions of the boilers on their railway to be more frequently examined.

I am, &c.

The Secretary of the
Lancashire and Yorkshire
Railway Company.

Douglas Galton,
Captain, R. E.

Railway Department, Board of Trade,
Whitehall, July 20, 1858.

Sir,

In compliance with the instructions contained in your letter of the 15th ult., 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 connected with the explosion of the boiler of No. 158 locomotive engine on the 11th June between Mirfield and Heckmondwike on the Lancashire and Yorkshire Railway, by which the fireman and a platelayer on the line were injured.

The engine was taking a goods train from Bradford to Holmfirth; and the line, after leaving Bradford, is level for 12 chains, then it rises 1 in 50 for 53 chains, then level for 10 chains, then a rise of 1 in 400 for 49 chains, next level for 6 chains, and after that a fall of 1 in 280 for near a mile to Lowmoor station.

From Lowmoor, for a distance of 4¾ miles, there is a continuous fall of 1 in 100 to Heckmondwike station; Cleckheaton station being situated on the incline.

From Heckmondwike it is level for a few chains, and then it falls 1 in 190 for a distance of 1 mile 37 chains, and then 1 in 269 for 49 chains. From this point the line rises 1 in 500 for 22 chains, and next 1 in 400 for the same distance, to Mirfield station, where a considerable portion of the waggons making up the train were intended to be left. The regulated load for this engine to take over this line of railway to Holmfirth is about 15 loaded waggons, equivalent to about 90 tons.

The engine is a four-wheeled four-coupled goods engine, built by Mr. William Fairbairn, and delivered to the company in 1846. It has 15-inch cylinders and 24-inch stroke. The diameters of the wheels are 5 feet, and the wheel base 7 feet 8 inches. It has run 229,346 miles altogether, but was retubed in June 1855, since which time it has run 55,334 miles, and it was last in the workshops from January 12th to April 16th, 1858, when 60 tubes at the top were taken out, and repaired, and two new longitudinal stays were put in, and the spring balances proved, besides minor repairs to the engine.

The size of the boiler is 11 feet 5½ inches long, outside measurements, and 3 feet 9 inches, inside diameter. It is furnished with 121 brass tubes, 2 inches outside diameter. The area of the heating surface of the copper fire box is 61·3 feet, and of the tubes 744·3 feet. It is furnished with two safety valves, fitted with Salter's spring balances. The valves are 2⅝ inch diameter, and the balances have ferules fitted to them, to prevent their being screwed down to a greater pressure than that authorized. The boiler plate was originally $\frac{7}{16}$ inch thick.

The boiler had been worked up to 85 lbs. pressure on the square inch, till the engine went into the workshops in January last; but on coming out the locomotive superintendent, Mr. Jenkins, reduced the pressure to 75 lbs., in consequence of the quality of the iron near the fire box having apparently deteriorated. On the day on which the explosion took place, the safety valves were adjusted to 70 and 75 lbs.; that next the driver being at 70 lbs.

The boiler is furnished with a gauge glass and three gauge cocks, but is not supplied with a steam-pressure gauge.

The circumstances which preceded the explosion are as follows:—

The engine left Bradford on its way to Holmfirth at 12h. 55m. p.m., with two loaded and one empty waggon; it reached Lowmoor at 1h. 10m., took on 17 loaded and three empty waggons, and left at 1h. 20m.; reached Cleckheaton at 1h. 25m., took on one empty waggon, and left at 1h. 30m. The train

reached Heckmondwike at 1h. 45m., took on one empty waggon, and left at 1h. 55m., intending to stop at Barraclough's siding, to take on some loaded coal waggons, and then to proceed to Mirfield, and drop 20 loaded and five empty waggons.

The driver states that he filled up his tender before leaving Bradford, and again on arriving at Lowmoor; that he turned off the feed cock on arriving at Cleckheaton, and did not turn it on again until about a half mile before he reached Heckmondwike, and then he turned on the left feed cock, at the time when the water stood half way up the gauge glass; that on stopping at Heckmondwike the water stood about ¾ up the gauge glass, equal to about 5½ inches above the bottom of the glass; that on running down from Lowmoor to Heckmondwike he used no steam, but turned it into the tender, and that the damper of the ash-box was shut. He also says that there was no steam blowing off, either at Lowmoor or Heckmondwike; that a little steam was used in starting from Heckmondwike; that he thinks a little steam was blowing off while running, with the damper closed, to the place were the explosion took place, about a mile from Heckmondwike, and that the engine and train ran 300 yards after the explosion before it was stopped, inside the distant signal used to cover Barraclough's siding. The driver says the explosion took place at 2 h. 5 m., when he was running down the gradient of 1 in 190 at the rate of 7 or 8 miles an hour.

On one point the driver is distinctly contradicted by the guard, who maintains that steam was blowing off while the engine was at Lowmoor.

The driver states that he was standing on the left and the fireman at the right side of the engine, and that he was about to put fuel on the fire when the boiler exploded. The fireman, who is understood to have been leaning forward at the side of the engine, was seriously scalded, but the driver was unhurt.

The effect of the explosion was entirely to detach the central plate of the cylindrical part of the boiler, 11ft. 4½in. long by 3ft. 10in. wide, and weighing 5¾ cwts., and to project it to the left a distance of 70 yards perpendicular to the line of the railway, and some of the water or steam scalded a platelayer at work on the line, who was also struck by some fragment. The other parts of the cylindrical shell of the boiler towards the ends were left intact; but a single tube on each side at the top was pulled out of the tube plate at the smoke box end, and slightly bent outwards, apparently by something having struck them. The casing of the boiler was thrown against the hedges on each side of the line. The valve box was torn off, the eccentric rod broken, and one of the connecting rods was bent. The stays to this piece of boiler plate remained attached to it, having been wrenched off from the frame.

Patches had been placed on the boiler plates adjoining to that which was detached where the stays that support it on the framing had been fixed.

The fireman of the locomotive department, who arrived at the spot from Mirfield in about a quarter of an hour after the explosion occurred, informed me that the safety valves worked with perfect freedom; and the driver denies that any means were taken of tampering with them while on the way from Bradford, and there does not appear to be any reason for doubting his statement.

The copper fire box is slightly cracked just inside the door, but that has evidently been the result of delay in getting out the fire after the accident happened, as there were no appearances of overheating on the crown and upper parts of the fire-box.

I examined the boiler and the plate forced off. The latter was joined together by a line of rivets running longitudinally immediately under the centre of the boiler, and the rupture appears to have taken place along this line of rivets, and thence along the rivets on each side round the boiler joining this plate to the plates at both sides.

The probable causes that produced the explosion were very apparent. A considerable portion of the plate, commencing about half-way up the tubes, and extending underneath the boiler, was very much corroded, the iron being eaten out from round holes, some of which were an inch in diameter, and very deep, and running into one another, reducing the original thickness from $\frac{7}{16}$ to $\frac{3}{16}$ inch in some of these holes, and in other parts near the fractured parts to $\frac{5}{32}$ inch.

The corrosion, whether produced by galvanic action, or by the chemical action of the water on the iron, extended to the adjacent plates of the cylindrical part of the boiler.

The locomotive superintendent informed me that he had never seen a piece of boiler plate in a worse state, and that he should not consider such a boiler safe at 100 lbs. pressure on the square inch. He attributed the corrosion to the peculiar quality of the water in the district in which the engine had been employed; but as it had been at work in the same locality since 1851 without producing any sufficiently remarkable results to attract particular attention when the boiler was retubed in 1855, the explanation scarcely appears to be sufficient.

He also pointed out that the quality of the iron close to the edges of the rivets had apparently become more brittle than the adjacent parts of the same plate.

On the whole, there does not appear to be any grounds for attaching any blame to the engine driver, as it seems very certain that the boiler burst at the ordinary pressure owing to its worn-out condition.

I have, &c.

Captain Galton, R.E. W. Yolland,
&c. &c. *Lieut.-Colonel, R.E.*

LANCASHIRE AND YORKSHIRE RAILWAY.

Railway Department, Board of Trade,
Sir, *Whitehall, October* 14, 1858.

I am directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R.E., of his inquiry into the circumstances attending the collision which occurred on the 6th ultimo at the Lostock junction of the Lancashire and Yorkshire Railway.

My Lords regret to learn from this report that, notwithstanding the numerous accidents which have occurred from the absence of systematic working in the case of excursion trains, the directors of the Lancashire and Yorkshire Railway Company still continue to run those trains without the same provisions for safety which are considered essential in the case of other trains.

My Lords trust that the observations of the inspecting officer upon this accident will receive the careful consideration of the directors.

I am, &c.

The Secretary to the Lancashire and Yorkshire Railway Company. Douglas Galton,
Captain, R.E.

Railway Department, Board of Trade,
Sir, *Whitehall, October* 1, 1858.

I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 8th September I have inquired into the circumstances attending the collision which occurred on the 6th September on the Lancashire and Yorkshire Rail-