GREAT WESTERN RAILWAY.

Railway Department, Board of Trade,
SIR,— *Whitehall, 20th November* 1862.

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you, to be laid before the Directors of the Great Western Railway Company, the enclosed copy of the report made by Captain Tyler, R. E., the officer appointed by my Lords to inquire into the circumstances connected with the explosion of the boiler of an engine at Paddington on the 8th instant.

I am, &c.

The Secretary of the Great Western Railway Company. JAMES BOOTH.

SIR, *No.* 1, *Whitehall, 25th November* 1862.

In compliance with the instructions contained in your minute of the 12th 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 8th instant near the Paddington station of the Great Western Railway, from the explosion of the boiler of a locomotive engine.

The engine in question, the Perseus, was at work on Thursday the 6th November, and was taken into the Paddington locomotive shed, which is about a mile from the Paddington passenger station, at 20 minutes past 5 o'clock on the following morning, after bringing the mail train from Swindon. The driver, an experienced man, who had served the Great Western Company altogether 21 years in that capacity, washed out the boiler in the course of that day. He also put in a new gauge glass, examined the safety-valves, and saw that the boiler was filled with water before leaving the engine, apparently in good order, about 8 p.m. At twenty minutes or a quarter to six on the morning of Saturday the 8th a loud explosion was heard in the direction of the shed, and this was found upon examination to have proceeded from the Perseus, which remained a mere wreck. The "lighter up" and two cleaners who were engaged on and under the engine when it blew up, all lost their lives.

The driver did not come on duty till half past 8 o'clock, two hours and fifty minutes after the explosion occurred. He was destined to take the 10·15 a.m. passenger train from Paddington to Swindon. An engine-driver who passed the Perseus 10 minutes before the explosion, observed that there was an ample quantity of water in the gauge glass, and that it was not blowing off steam. An engine-cleaner who passed by at the same time also states that it was not blowing off. There is no evidence to show the time at which the fire was lighted, because the man who lighted it, Christopher Thompson, was unfortunately killed; but it would probably have been lighted up at 2·30 a.m. so as to be ready for use at 6 a.m. It was intended to be employed as a pilot-engine, or for any extra duty that might be required until 9 a.m., before proceeding in charge of its regular driver to Swindon at 10·15.

The Perseus was constructed at the works of the Great Western Railway Company at Swindon, and was turned out in June 1850. It was an eight-wheeled engine, weighing 32 tons in working order, and standing upon a wheel-base of 18 feet 8½ inches. The diameter of the cylinders was 18 inches, and the length of the stroke 24 inches. The driving wheels were 8 feet, and the other six wheels, four feet 6 inches in diameter. The barrel of the boiler was 10 feet nine inches long and four feet nine inches in diameter, measured in the inside of the smoke-box and fire-box rings. The interior diameter of the middle ring was four feet 9 $\frac{13}{16}$ inches. The original thickness of the plates was $\frac{3}{8}$ of an inch for the upper plates of the smoke-box and fire-box rings, $\frac{7}{16}$ths of an inch for the lower plates of those rings, and $\frac{7}{16}$ ths of an inch for the two plates of the middle ring. The plates of the former rings were rivetted together with lapjoints at the sides, and those of the latter rings with similar joints at the top and bottom of the barrel. There were 303 brass tubes in the interior, each of which was two inches in diameter on the outside, and $1\frac{3}{4}$ths of an inch in the inside, originally. The total heating surface was 1,768 square feet, including 156 in the fire-box and 1,611 in the tubes. There were two safety valves, each $4\frac{3}{4}$ inches in diameter, of which one, out of the reach of the engine-man, acted on a spiral spring set to 120 lbs., and the other, provided with lever, ferule, and spring-balance, was screwed down to a pressure of 115 lbs. on the square inch above that of the atmosphere.

The barrel, or cylindrical portion of the boiler, was destroyed by the explosion, while the firebox remained complete. Of the three rings which formed the barrel, the middle ring opened along a furrow near the rivets of the bottom joint, and was blown into 8 pieces. It was torn away from the fire-box ring round the line of the rivet-holes, except for a few inches, and it carried away with it the upper part of the smoke-box ring. The greater portion of it, with this last piece attached, was projected through the roof of the shed to a distance of 223 feet, measured horizontally, to the southward. A smaller portion, weighing 21 lbs., was thrown 200 yards to the north-eastward. The rest of the smoke-box ring remained attached to the smoke-box, and was flattened down on the south side, while the north side was nearly in its original position. The fire-box ring was torn across the whole plate along the bottom in an irregular line, and was turned up over the fire-box. The tubes from the sides and bottom were some of them broken and bent outward. The tube-plate at the smoke-box end was uninjured; that at the fire-box end was bulged outwards, in consequence of the bending of the tubes, both of those that were fractured and of those that were still complete. The fire-box itself was forced backwards, and the smoke-box drawn forwards, the boiler-feet having been broken and torn from the framing. The left (south) leading spring was broken, the framing was bent, and the inner framing broken. The cranked-axle was much bent. The funnel was blown forward about 50 feet.

The engine itself was lifted up and thrown about 30 feet to the east and off the rails, to the north of of the line, with its south wheels in the pit over which it had been standing. The north rail was considerably depressed, and the south rail less so, as the engine fell, probably, after it had been lifted up. The shed was much damaged for 80 yards; a window was blown out, and a clean breach made through the roof over the site of the explosion.

The bursting pressure of the engine when it was new may be assumed at less than 450 tons, as against a working pressure of 120 tons. The factor of safety became gradually reduced until the engine, weakened by corrosion, was unable to sustain its ordinary working pressure. Extensive corrosion had taken place near the line of rivets at the bottom of the middle ring, and the weakness along this line has no doubt caused the explosion. There were also marks of pitting at the bottom of the fire-box ring.

In addition to former cases of the same description, I may quote three recent instances which have occurred, of explosions of locomotive boilers, at their ordinary working pressures, in consequence of internal corrosion along the sides of the joints. The particulars are as follows:—

Railway Company.	Date.	Site.	Working pressures above that of atmospheric.	Original Bursting Pressure.	Total Age.	Age after retubing.	Mileage total.	Mileage since retubed.
					yrs. mo.			
London and North Western (Southern Division).	4 July 1861 -	Near Rugby -	120	520	9 9	3 8	336,368	139,483*
North Eastern -	23 October 1861.	Stella Gill -	100	800	7 9	2 5	149,518	44,928†
London and North Western (Southern Division).	5 July 1862. -	Harrow -	120	490	9 2	1 8	182,114	66,272‡
Great Western (present case).	8 Nov. 1862. -	Paddington -	115	447	12 5	7 5	304,000	175,000§

* Running with the Irish mail train. † About to start on its last trip for the night with a mineral train.
‡ Standing, whilst shunting at Harrow, after arriving with a coal train from Camden. § Getting up steam in locomotive shed.

The present explosion is a further proof that additional care and attention are much required in the maintenance of the steam boilers of locomotive engines. The common practice, of allowing them to run from four to seven years without any internal examination, and without applying to them any test which would discover weakness arising from hidden defects, is a most dangerous one. The locomotive superintendents on some railways are in the habit of employing the simple, safe, and economical test of hydraulic pressure, up to about 180 lbs. to the square inch, and they do so judiciously; but the greater number of locomotive superintendents, and those of some of the principal railways, object to such a test, as being unnecessary and undesirable. If such a test had been applied to the present boiler a few months before it exploded, its weakness would no doubt have been discovered.

But more frequent examinations are also necessary, at intervals of, say every three years or every 75,000 miles; and during those examinations any plate in which indications of furrow are observed ought to be at once replaced by a new one, instead of being left in its place for a further period of uncertain length. It is in any case, in my opinion, most unsafe to allow an engine to run on without any examination of the interior of the boiler, as the Perseus has done, at full pressure, for 7 years and 5 months, and for a duty of 175,000 miles.

I have, &c.

The Secretary,
Board of Trade,
Whitehall.

H. W. Tyler,
Capt. Royal Engineers.

LANCASHIRE AND YORKSHIRE RAILWAY.

Railway Department, Board of Trade,
Sir, *Whitehall, 26th November* 1862.

I am directed, by the Lords of the Committee of Privy Council for Trade, to transmit to you, to be laid before the Directors of the Lancashire and Yorkshire Railway Company, the enclosed copy of the Report made by Colonel Yolland, R.E., the officer appointed by my Lords to inquire into the circumstances connected with the collision which occurred on the 7th instant near Bury on the Lancashire and Yorkshire Railway.

I am, &c.

The Secretary of the
Lancashire and Yorkshire
Railway Company.

James Booth.

Railway Department, Board of Trade,
Sir, *Whitehall, 24th November* 1862.

I have the honor 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 collision that occurred on the 7th inst. between two passenger trains belonging to the Lancashire and Yorkshire Railway Company, three-fourths of a mile east of Bury old station, when ten persons were slightly injured.

The Lancashire and Yorkshire Railway Company have been engaged since last August in replacing the wooden viaduct over the river Roach on their line between Bury and Heywood by one of a more permanent nature, built in brick; and during the greater proportion of that time the traffic over the viaduct in both directions has been conducted over a single line of rails, the up-line from Bury. The length of this piece of line, worked as a single line, is about 300 yards.

In order to provide for the safety of the trains, fixed signals for the up and down lines had been erected east and west of the viaduct, which always stood at "danger," and which could, therefore, only be regarded as caution signals intended to inform the drivers of their near proximity to the viaduct; a conductor was appointed to proceed with every train along the single line, across the viaduct; pointsmen were told off to attend to the points, at each end of this piece of single line; and signalmen, in addition, were provided for the signalling of both up and down trains, the superintendent, Mr. Blackmore, having directed that every train must be brought to a stand before arriving at the points on either side.

The morning of the 7th instant was exceedingly foggy, so that at the viaduct objects could not be seen at a greater distance than 30 yards.

The 10h. 35m. a.m. up short passenger train from Bury old station, was delayed in getting away by a slight collision having previously taken place in the Bury yard in the shunting of a goods train, and by which collision some waggons were knocked off the rails. It left at 11h. 30m., and after passing the up fixed signal, 713 yards west of the commencement of the single line, it ran over a fog signal placed on the rails by the fogman, and was stopped 20 or 30 yards west of the crossing of the cross-over road leading from the up to the down road, over which cross-over road all down trains that passed over the single line over the viaduct would have to proceed in order to regain the down line.

The signalman informed me, that as soon as the short passenger train had passed he placed two more fog signals on the off rail of the up road, a few yards nearer to the viaduct than the outside down distant signal worked from Bury old station, and in about five minutes the 10h. 0m. a.m. Liverpool up train arrived, and ran over the fog signals, exploded one of them, and immediately after ran into the preceding