

TRALEE AND DINGLE LIGHT RAILWAY AND TRAMWAY

COPY OF REPORT

TO THE

BOARD OF TRADE

BY

MAJOR FRANCIS ARTHUR MARINDIN, R.E., C.M.G.,

WITH

RICHARD ADAMS, ESQ., Q.C., LEGAL ASSESSOR,

OF THE

INQUIRY INTO THE ACCIDENT AT CAMP ON MAY 22, 1893,

HELD IN

TRALEE COURT HOUSE ON JUNE 7TH
8TH, 9TH, AND 10TH, 1893,

TOGETHER WITH THE

EVIDENCE AND APPENDICES.

Presented to both Houses of Parliament by Command of Her **Majesty.**



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1893

TRALEE AND DINGLE LIGHT RAILWAY AND TRAMWAY.

Board of Trade, 8, Richmond Terrace, Whitehall,
London, S.W., 28th June 1893.

Sir.

I HAVE the honour to report, for the information of the Board of Trade, that in compliance with the instructions contained in the Order' of the 29th ultimo, under the provisions of the "Regulation of Railways Act, 1871," 34 & 35 Vict., c. 78., s.s. 7 and 8, I have held a public and formal inquiry into the causes of, and the circumstances attending, a fatal accident which occurred on the 22nd ultimo near Camp, on the Tralee and Dingle Light Railway and Tramway, being assisted by Mr. Richard Adams, Q.C. The inquiry was opened in the court house at Tralee on Wednesday the 7th instant, and was continued upon the three following days, 25 witnesses being examined during the proceedings. Upon the 7th instant, accompanied by Mr. Adams, I made an examination of the scene of the accident, and upon Sunday the 11th instant I travelled over the line with an experimental train, composed of the same number and description of vehicles as that to which the accident happened, but not of the same weight, as the cattle waggons were not loaded.

The following gentlemen appeared to represent certain interested parties, viz.:-

Mr. Thomas Huggard, solicitor, for the Tralee and Dingle Light Railway Company.

Mr T. Harrington, M.P., instructed by Mr. Murphy, for the Tralee Commissioners.

Mr. B. O'Connor Horgan, solicitor, for the guard of the train, Thomas O'Leary, and for two injured persons.

Mr. Charles Morphy, solicitor, for the representatives of the deceased driver, Alfred Redshaw, for Lord Ventry, and for other ratepayers.

Mr. Daniel G. O'Reardon, solicitor, for two injured persons.

I am indebted to these gentlemen for the assistance rendered by them in the investigation, and to the Company for plans and sections of the line, and drawings of the engine and rolling-stock.

The evidence, which was given on oath, was taken down verbatim, and is appended to this report.

History of the Railway.

The Tralee and Dingle Light Railway and Tramway was constructed under the Act of 1860, 23 & 24 Vict., c. 152, "to facilitate internal communication in Ireland by means of Tramroads or tramways," as amended by subsequent Acts of 1861, 1871, 1881, and 1883.

In accordance with the provisions contained in these Acts, the undertaking, promoted in 1884, was in July 1884 considered and approved by the grand jury of Kerry and by the Town Commissioners of Tralee, who had before them the deposited plans and sections, the report made by the county surveyor, dated 5th July 1884, and the report of the Board of Works, dated 11th July 1884, copies of which are attached. The scheme was unopposed, was duly passed by the Committee of the Privy Council, and the construction of the line, in accordance with the plans deposited, was finally authorised by an Order in Council, dated 17th September 1888; a copy of the plan being afterwards sent to the Board of Trade, in pursuance of section 52 of the Order in Council, on the 15th October 1888.

There were deviations authorised in 1889, but those were not within some distance of the scene of the accident, and do not affect the case under consideration.

The line was commenced in 1888 was finally completed in 1891, and, under the powers conferred by the Regulation of Railways Act, 1842, 5 & 6 Vict. c. 55, ss. 3, 4, 5, and 6 (copies of which sections are appended), was inspected by the Board of Trade in December 1890, and re-inspected in March 1891, in which month it was opened for traffic.

The entire capital of the line is 150,000*l.*, all of which has been expended, and on 120,000*l.* of which there is a guarantee of 4 per cent. interest by the cess payers of three Baronies and the Tralee Sanitary District in the following proportion, viz.

					£
Corkaquiny -	-	-	-	-	60,000
Clanmaurice -	-	-	-	-	15,000
Trughenackmy -	-	-	-	-	39,000
Tralee (Sanitary District)	-	-	-	-	6,000

The Treasury recoups the guaranteeing bodies to the extent only of 2 per cent. on 120,000*l.*, and these bodies are liable for any excess of the working expenses of the line above the income, which excess during the past year amounted to about 2,600*l.*

Description of the Line.

The line is single, except at stations, and the gauge is 3 ft.

The main line from Tralee to Dingle, on which the accident happened, is 31 miles 52 chains in length, of which 27 miles 61 chains are laid along the side of the public road, and may be considered as a tramway, the remaining 3 miles 71 chains being a light railway through fields and mountain land.

The permanent-way, which is laid in accordance with the specification, mostly consists of:-

1. Flat-bottomed steel rails, weighing 45 lb. per yard, fished at the joints, and secured to the sleepers by six $\frac{5}{8}$ inch fang-bolts, and 16 dog-spikes, to each 30-ft. rail.
2. Transverse sleepers of larch, Scotch fir, or oak, laid 1 ft. 8 in. apart at the joints, and 2 ft. 10 in. apart elsewhere, the smallest of the sleepers being 5 ft. 11 in. in length and 8 in. x 4 in. in section.
3. Ballast of broken stone.

The steepest authorised gradient has an inclination of 1 in 30, and the sharpest authorised curve has a radius of 3 chains.

Scene of the Accident.

The scene of the accident was near Camp Village, 10 miles 59 chains from Tralee, at the west end of Curraduff Viaduct over the small River Finglass, the rocky bed of which is 31 ft. 3 in. below the level of the rails. The viaduct has two masonry arches of 35 ft. span on the skew, with a masonry parapet, and it is upon a 3-chain curve.

This curve, which extends from 10 miles 54 $\frac{1}{2}$ chains to 10 miles 61 chains, is provided with a check rail inside the low rail, and the high rail has a super-elevation of between 4 $\frac{3}{4}$ ins, and 5 ins. Upon this curve the low rail and check rail are laid on cast-iron chairs, secured to the sleepers by large fang-bolts (Great Southern and Western type), the high rail is secured to the sleepers by 11 large fang-bolts in each 30-ft. length with alternate spikes, and, as upon other sharp curves in the line, iron tie-bars are fitted to hold the rails to gauge.

The curve is a left handed one to trains running from Dingle to Tralee, and it is approached from the west by a piece of straight line 6 chains in length, following a right-handed curve of 9 chains radius.

The summit level of the railway is at 13 miles 60 chains, or about 3 miles west of Curraduff Viaduct, and from this point the line falls steeply to the viaduct, the gradient shown on the authorised plan being as follows:-

Falling 1 in 31 for 1 mile 52 chains, falling 1 in 30 for 1 mile 1 chain horizontal for about 3 chains, falling 1 in 30 for 23 chains, and then horizontal for about 7 chains across the viaduct.

These gradients have been slightly modified, and to some extent improved, for there is a length of 16 chains on 1 in 35 half-way down the incline and, at the foot of the incline, instead of the 1 in 30 gradient running suddenly out on to a horizontal piece across the viaduct, the gradients from Camp Village to the viaduct, a distance of a quarter of a mile, are actually 1 in 35, 1 in 80, and 1 in 100 across the viaduct.

From the summit, at 13 miles 60 chains, to Skylough level crossing, at 12 miles 36 chains, the line is a railway through fields, but from this point to Camp Village it is for nearly the whole distance a tramway along the side of the road, the last few chains from Camp to Curraduff Viaduct being again off the road.

Description of Train.

The train to which the accident happened was a special fair train timed to leave Dingle at 1.5 p.m., Lispole at 1.30 p.m., and Annascaul at 2 p.m., and to arrive at Castle Gregory junction at 3.10 p.m. and Tralee at 4 p.m.

It was made up as follows :- Engine, seven cattle waggons laden with pigs, one third-class carriage, and guards van.

The following are the weights and lengths over the buffers of the different vehicles composing the train:-

	Weight.		Length over Buffers.	
	Tons	Cwts.	Ft.	In.
Engine (with tank and bunker half full)	28	0	28	11
Cattle-wagon	2	15	16	1
Third-class carriage	3	10	29	1
Guard's van	2	15	16	1

The passenger carriage had two four-wheeled bogies, and the cattle waggons and the guards van were four-wheeled vehicles.

The total length of the train, including the engine, was 186 ft. 8 ins., and the total weight, including the weight of the engine, and the weight of the passengers and the live stock (estimated at $2\frac{1}{2}$ tons, and 14 tons respectively), was 70 tons.

Description of Engine.

The engine was built by the Hunslet Engine Company at Leeds, was used by the contractors when constructing the line, and was handed over to the Company in 1891.

It is an eight-wheeled tank-engine, with six wheels coupled, and a leading two-wheeled bogie pony truck. The centre pair of the coupled-wheels are not flanged.

The wheel-base is as follows:-

			Ft.	In.
Bogie-wheels to leading-wheels	-	-	6	10
Leading—wheels to driving wheels	—	—	4	3
Driving-wheels to trailing—wheels	- -		4	6

The estimated weights on the different pairs of wheels, with tanks and bunker full, are

			Tons.
On bogie-wheels			$6\frac{3}{4}$
On leading-wheels			$7\frac{3}{4}$
On driving-wheels			$7\frac{3}{4}$
On trailing-wheels			$8\frac{1}{2}$
Total			$30\frac{3}{4}$

The diameter of the coupled wheels is 3 ft. $\frac{1}{2}$ in., and that of the bogie-wheels is 2 ft.

The diameter of the cylinders is 1 ft. 1 in., and the length of stroke is 1 ft. 6 ins.

The repair books in the shops do not seem to have been very carefully kept, but, as far as can be gathered from the evidence, this engine was put into a proper state of repair when it was first acquired by the Company, and was last thoroughly repaired in November 1892, since which time it has run 8,695 miles. It was also in the shops for repair on 14th February, 18th March, 24th to 26th March, and 20th to 22nd May. Upon this last occasion a new right-hand side trailing-spring was put in, and the brake-blocks were adjusted, and it was stated in evidence that it was in good running order when it left the shops.

Brakes.

The whole train, including the cattle waggons, was fitted with the automatic vacuum-brake, capable of being applied by the driver, or by the guard if necessary, and working blocks upon every wheel on the train, except the bogie wheels of the engine, so that, out of the total weight of 70 tons $63\frac{1}{2}$ tons were upon braked wheels.

In addition to this there were ordinary screw hand-brakes upon the engine and the guard's van, and side levers for working the blocks on one pair of wheels of each of the cattle-waggons.

The automatic vacuum-brake was supplied by the Vacuum-Brake Company, and, although the parts were in proportion to the size of the stock, and therefore smaller

than those fitted to ordinary trains, they were of the usual pattern, except that the valve in the guard's van was not fitted so as to open automatically upon a sudden application of the brake by the driver.

Mode of Working.

The line is ordered by the Board of Trade to be worked, and the Company has given an undertaking to work it, dated 2nd March 1891, in accordance with the following rule:-

“The line between (1) Tralee and Camp Junction, (2) Camp Junction and Annascaul, (3) Annascaul and Dingle, (4) Camp Junction and Castle Gregory, shall be worked by only one engine in steam, or by two or more coupled together, at one and the same time, such engine or engines to carry a distinct staff for each of such sections”

Limits of Speed.

The speed of trains throughout this light railway is limited by the Order in Council to 25 miles an hour at any point, and by Board of Trade Order, dated 13th May 1891, issued after the inspection of the line, and following the special recommendations of Major-General Hutchinson, C.B., the officer who made the inspection, the speed was restricted at certain places, to the following extent, viz.:- To 12 miles an hour where the railway is laid along the side of a road, to six miles an hour through any town or village, to two miles an hour at certain street and road crossings, and to five miles an hour.

(1.) At the oblique crossings of all roads when approached on the level or on a falling gradient;

(2.) On the sharp curves on each side of the viaduct at 10 miles 58 chains on the journeys from Dingle to Tralee.

A further limit was imposed by the Company, enjoining a speed of six miles an hour all the way down the incline from Glen-na-galt to and beyond Curraduff Viaduct as will be seen from the following extracts from the instructions issued to the servants of the Company, applying, among other matters, to the use of brakes and speed of trains:-

“Instructions to Engine Drivers and Guards. Before starting at the beginning of each journey the train must be examined to see that the brake fittings are in good working order and tested, also that the engine and all vehicles are properly coupled and in working order, and that the tender hand-brake is in proper working condition, and carriage and waggon axles oiled and trimmed.”

* * * * *

“Before starting the guard must see that the proper vacuum is registered by the indicator in his van for the effectual use of the brake.

“All up trains must come to a dead stop at the top of Glen-na-galt incline, and, if more than three vehicles are on, to pin (*sic*) down the waggon brakes, and the speed to Scraghbeg Cottage not to exceed six miles an hour. After passing this point the brakes may be lifted. The engine hand-brake must also be used on this incline.”

* * * * *

“Speed of Trains, &c. The speed of trains on approaching the junction should not exceed five miles an hour, and should be reduced to two miles an hour when passing over the facing-points. Drivers must, be prepared to pull up at once if at any station or gate the signals are against them.

“The speed between Tralee terminus and Great Southern and Western Company's terminus not to exceed two miles an hour. The speed over the crossings on the line to be reduced to 10 miles an hour, and over the crossings near Tralee to five miles an hour. The speed on the county roads, where the line is tramway not to exceed 12 miles an hour, and where the line is fenced off not to exceed 25 miles per hour, slowing off to 10 miles an hour for the sharp curves or down the steep gradients of 1 in 30.

“The drivers must always be prepared to pull up if necessary when on the road in passing restive horses, cattle, &c.

“In crossing the road at Blennerville from the curve to the station the speed must on no account exceed two miles an hour.

“In crossing tile road at $17\frac{3}{4}$ miles not to exceed two miles an hour.

“At the oblique crossings of all roads the speed must not exceed five miles an hour.

“On the sharp curves on each side of the viaduct at 10 miles 58 chains not to

“exceed five miles an hour.

“In crossing Lispole Bridge 10 miles an hour.”

Details of the Accident.

The train, due to leave Dingle at 1.5 p.m., did not start until about 1.30 p.m., according to the evidence of the guard, who speaks from recollection only as he has lost his notes, and it seems, from the description given by this man, to have lost time all the way. It was in charge of Alfred T. Redshaw, the locomotive superintendent of the line, acting as driver, with fireman Richard Dillon, and permanent-way inspector Bernard Loughlin on the engine, and guard Thomas O’Leary in the guard’s van. The vacuum-brake was, by the direction of the driver, and in spite of the guard’s remonstrance, cut off before the train started, in order to save the steam which it is necessary to use in keeping the small ejector running, and, in consequence apparently of having no continuous brake in working order, the train, which left Lispole at about 2 p.m., overran the station at Annascaul, which is near the foot of a steep incline, by a considerable distance, and had to set back past the station to take water at the water-column.

The guard then refused to travel any further without the brake being brought into use, and the train started with a vacuum of about 16 inches, but had not proceeded for above 200 yards when it came to a standstill on a rising gradient of 1 in 32, and had to back into the station again to make a fresh start. After re-starting it again got into difficulties, which, as described by the guard, continued for the greater part of the way to Emalough a distance of $2\frac{3}{4}$ miles, the engine coming to a stand at several places, and being unable at two places at least to start again for nearly half an hour.

About half way up the incline, between Emalough and the summit, the train again stopped, and, after some discussion between the guard and the driver, the vacuum-brake was cut off upon reaching a level piece of line, and the train proceeded without any further stop until it reached Glen-na-galt the summit, where, as usual, it was brought to a stand.

In accordance with the regulations the side levers working the waggon-brakes were then pinned down by the guard, assisted by the permanent-way inspector Loughlin, who was riding upon the engine throughout the journey, and after a short delay the driver, after blowing up the vacuum to 17 inches, as stated to be shown by the gauge in the guard’s van, started his train. It is unfortunate that there is no accurate record of the time and place of all the delays, and of the time at which the train commenced the descent of the incline to Curraduff Viaduct; but, whereas this train was due at Castle Gregory junction, three-quarters of a mile beyond Curraduff Viaduct, at 3.10 p.m., it would appear from the evidence of Walter Darcy that the accident occurred soon after 20 minutes to 5 p.m., and therefore probably the train left Glen-na-galt at about 25 minutes to 5.

Owing to the death of all the men (three) upon the engine, the only servant of the Company who can speak to the subsequent events, between the time that the train left Glen-na-galt and the time at which the accident happened, is the guard, Thomas O’Leary, and according to his statement, the driver made an unusually quick start and entirely lost control over his train very soon after it had started, but, judging from the evidence of John Driscoll the gatekeeper at Skylough crossing, about a mile down the incline, and to some extent from the evidence of Mr. Singleton Goodwin, the county surveyor, who, when walking towards Castle Gregory junction, saw the train from a distance, the speed at this point, although greatly in excess of the regulated speed of six miles an hour, does not appear to have been so great as the guard estimates it to have been. However, whether or not the driver had lost control over his train before reaching Skylough crossing, it is certain that he must have done so shortly afterwards, for there is little doubt that when the train reached the viaduct the speed was very high, probably nearly 40 miles an hour, and after entering the sharp curve west of the viaduct the engine left the rails on the right-hand side over the high rail of the curve, and with the exception of the rear van which remained upon the line, across the rail, with the leading end against the parapet of the viaduct and with the coupling broken, and, the third-class carriage which came to rest upon the embankment, with the leading end downwards the [whole?.....]

into the bed of the river, the waggons being piled up in a heap and completely wrecked, and the engine being found on its left side at the far side of the river, 49 yards from the point where it left the rails, turned nearly at right angles to the line, with the leading end pointing towards the viaduct.

The cab was detached, and the three men who had been riding on the engine were underneath it terribly injured, Redshaw living for only a few minutes, and Dillon and Loughlin dying the same evening after their removal to Tralee.

There were about 37 passengers in the train, nine of whom were in the guards van, which remained on the line, and the remainder in the third-class carriage, and of these passengers it is stated that 13 were injured, some of them seriously.

(A nominal roll of the killed and injured persons is appended).

There were about 50 pigs killed and a great number injured, the engine and seven cattle waggons were practically destroyed, and the passenger carriage and guard's van were much damaged.

Causes of the Accident.

In this case it is most remarkable that there was no trace left upon tile top of either the high rail of the curve, or the check rail inside the low rail, of any wheel flange running over the rail, that there was very little disturbance of the road, and that the first mark upon the permanent-way of any wheel having left the rails was outside the high rail upon the end of a sleeper. There was a cut upon this sleeper, the thirtieth sleeper east of the commencement of the check rail, and 78 feet east of the commencement of the 3-chain curve, the 22 next sleepers towards the viaduct had the ends cut off, and two sleepers were driven forward, the fastenings under the high rail being drawn, but the fastenings under the low rail and the check rail not being disturbed.

The radius of the curve at the point where the first mark occurred was three chains, and, although nearer to the viaduct I found that the curve became sharper, having a radius of only $2\frac{1}{2}$ chains, that was probably due to the line being somewhat hastily restored after the accident.

The gauge round the curve was fairly regular, ranging between $\frac{5}{8}$ in. and 1 in. slack, and the super-elevation was even, being between $4\frac{3}{4}$ ins, and 5 ins. The check rail was not much worn.

There was nothing whatever in the condition of the line, or of tile engine, to lead to the conclusion that the run-off was caused, or was contributed to, by any fault in the permanent-way or rolling-stock, and it may be as well here to mention that, although it was hinted in the evidence of Mr. Hickson, the engineer of the line, that a fang-bolt which was found in the bed of the river two days after the accident might have been upon the rail where the engine ran off, there was no such mark upon either the fang-bolt or the rail as would probably have been found if the bolt had been run over by an engine wheel when lying upon the rail, and I am satisfied that the accident was not due to any obstruction of this kind or to any interference with the rails elsewhere.

It is indeed quite unnecessary to search for any explanation of the fact of the engine leaving the rails, beyond the speed at which both the evidence, and the position of the train after the accident, show that it must have been running, and it is perfectly clear that the immediate cause of this deplorable disaster was excessive speed upon a very sharp curve, where the Board of Trade have imposed a limit of five miles an hour, which limit cannot be disregarded with safety.

It is, however, not so easy to account for the train having been allowed to attain such a high rate of speed in coming down the incline from Glen-na-galt, and the fact that, owing to the death of the three poor fellows who were upon the engine, there is no direct evidence forthcoming as to the action of the driver, the pressure of steam upon the engine, or the behaviour of the vacuum-brake after leaving the summit, makes it all the more difficult to come to a positive conclusion.

What is almost certain is, that the evidence of the guard, which is the only evidence referring to the application of the continuous-brake, cannot be absolutely correct; but it is not to be wondered at that a man in his position should be unable to remember, with entire accuracy, the sequence of events during the terrifying journey down this incline.

He states that the whole of the wagon-brakes were pinned down before the train started from the summit, as no doubt they were, that the driver blew up the vacuum to 17 ins., which it may be remarked was 1 in. under the amount at which it is ordered to be maintained, that the engine was started at an unusually high speed, that

he at once put on his hand-brake, and that the vacuum-brake was applied at full power before the train had run for more than 20 or 30 yards.

Now, however sharply the engine was started, it could hardly have attained such a speed in a distance of 30 yards, with the brakes pinned down upon seven out of the nine vehicles in the train, and the guard's brake applied upon another, that it would not have been brought to a stand if the vacuum-brake had been applied and kept on at full power, even with the rails in the worst possible condition for stopping upon as they undoubtedly were upon that afternoon, and with only 17 ins. of vacuum.

It may therefore, I think, be assumed that, if the guard be correct in stating that there were 17 inches of vacuum when the train started, he is mistaken as to the point where the brake was first applied at full power.

The guard says further, and he is supported by the evidence of Thomas Rearden one of the passengers in the van, that he did not open the valve in his van to apply the vacuum-brake, until just before the engine went over the embankment, although he did release and re-apply his hand-brake about a mile down the incline, when he thought that the wheels of his van were skidding.

He believes that the vacuum-brake remained on all the way down, at least he did not at any time perceive any indication upon his dial of the driver having blown up the vacuum; but, as he was for part of the time looking out of the window, he may be, and probably is, mistaken on this head.

He estimates the speed at 30 miles an hour at Skylough crossing, and at that point was under the impression that the driver had lost control over his engine, and he describes how rapidly the speed increased, although he states that he could see fire flying from the engine wheels, which were evidently skidding at the time.

It appears from the evidence of the fitter, Charles Ellerker, that the brake-blocks on the engine had been adjusted that morning, and that the brake upon this engine when it was attached as pilot-engine to the morning train from Tralee to Dingle worked satisfactorily, as also appears to have been the case from the evidence of driver Harry Quinn, who was driver of the train-engine on that train; while the carriage-examiner, James Murphy, states that, when the vehicles composing the train were last examined at Tralee, at a date which he cannot fix, but believes to have been about two or three days previously, the brakes upon them were in good order.

In order to ascertain what would be the effect of the application of the vacuum-brake upon a train of nine vehicles, running at different speeds, upon inclines of 1 in 32 and 1 in 30, I arranged to travel up from Dingle on a train made up exactly in the same order as that to which the accident happened, and, although it was not practicable to have the train loaded in a similar manner, and the rails were in very good condition, instead of being very greasy as upon the afternoon of the accident, the experiments, while they cannot be taken as an absolute indication of what probably happened upon that occasion, were not without value.

The total weight of the train was 25 tons 10 cwt., or 55 tons 10 cwt. including the engine, but excluding the weight of the few people who were travelling in it, while the engine, the only one available, weighed about 2 tons more than the No 1. engine, the one which was wrecked by the accident.

I found that with 120 lbs. of steam the vacuum could be blown up to 20 inches in 15 seconds, by the use of the large ejector, but that a vacuum of only 11 ins, could be obtained by the small ejector in four minutes; that when the valve in the guard's van was fully open, after applying the brake, a vacuum of 15 inches could be obtained by the use of the large ejector, but that the brake blocks remained on upon half the train; that when the brakes were applied, and both ejectors shut, the brakes leaked off all the vehicles except the engine and four waggons, in $7\frac{1}{2}$ minutes, and off the whole train in 9 minutes; that when the small ejector was not kept running the vacuum sank to 5 ins. in $\frac{3}{4}$ minute, and to zero in $2\frac{1}{2}$ minutes; and that with 79 lbs. of steam it was possible to obtain a vacuum of 15 ins., but no more. One of the washers on a connecting hose-pipe had been found to be defective, and was replaced, but it was evident from the above results that there was a leak in some other place which could not be detected, and this was also shown by the fact that, when running, with the brake-handle in the running position and the small ejector therefore open, the vacuum could not be maintained above 15 ins., and the large ejector had to be used to blow up the vacuum before applying the brake. The following were among the stops I made on the journey:-

1. Gradient, falling 1 in 30; speed, 24 miles an hour: 20 inches of vacuum. Stopped in 120 yards by use of the vacuum-brake only.
2. Gradient, falling 1 in 32; speed, 25 miles an hour; 17 inches of vacuum. Stopped in 156 yards by use of the vacuum-brake only.

3. Gradient, falling 1 in 32; 17 inches of vacuum; started as sharply as possible from rest; vacuum-brake applied after running 50 yards. Stopped train in 50 yards.

In coming down the incline to Curraduff with the waggon-brakes pinned down, the engine hand-brake on, and the guards-brake rubbing, the speed never exceeded seven miles an hour, although the vacuum-brake was only once momentarily applied.

The result of these experiments certainly confirmed my opinion, that, if proper care be used, the brake power available on these trains is ample to enable a driver to keep control over his train on the incline of 1 in 30, even if the brakes are in a somewhat leaky condition, as was the case in the train by which I travelled.

If, however, a driver with a brake in this condition were to allow his train to get at all out of hand, it is probable that, unless he were very experienced in the handling of the brake, he would soon find himself without any brake power left.

It is clear from the evidence that the driver of the train to which the accident happened had the greatest possible difficulty in maintaining a proper head of steam when coming up from Dingle to Glen-na-galt, so much so, that he deliberately acted in contravention to the well understood rule, and most improperly put the vacuum-brake out of work altogether in order to save the small amount of steam used to maintain the vacuum when running. The unfortunate man was not a trained driver, although he had on several occasions driven trains upon this line, and the difficulty he experienced in keeping up steam is precisely what might have been expected under the circumstances, for it is well known that the maintenance of steam is one of the duties in which a well-trained driver has the greatest possible advantage over an inexperienced one. It is stated that before starting down the incline from Glen-na-galt he blew up the vacuum to 17 ins., but there is no evidence to show what amount of steam he had upon the engine, and it is more than probable that he had not very much.

Although in some respects it can only be a matter of surmise, it is my belief that the driver started from the top of the incline at far too a high a rate of speed (and for this there may have been a reason to, which I will refer presently) that, when he endeavoured to check the speed of his train he found that, owing to the greasy state of the rails, the brakes were not taking effect so quickly as he expected, that he then began to try to blow up a more effective vacuum, which, owing partly to want of steam, and partly to the brake-pipes and connections being leaky, he was unable to obtain, and that after doing this two or three times, he lost all the brake power he had had, and was powerless to do more than keep his engine hand-brake hard on, as the sparks seen by the guard to be flying from the wheels of the engine, (but not, it should he noted, from the wheels of the other vehicles,) show that he did actually do. As a last resource, and having under the circumstances done everything in his power to avert the disaster, he evidently reversed his engine, although this would have had but little effect, and he and his fireman pluckily stuck to their engine doing their best to the last moment.

While therefore, the immediate cause of the accident was, as I have stated, excessive speed, I consider that the running away of the train to which the ultimate catastrophe must really be attributed, was due:-

- 1st. To the too rapid start made from the top of the incline.
- 2nd. To the train being in charge of a driver with insufficient experience in regard to the maintenance of steam, and the manipulation of the continuous-brakes.
- 3rd. To the very greasy state of the rails.
- 4th. (Probably.) To the brake connections being in a leaky condition.

A possible reason for the driver starting too quickly may be found in the fact that, owing to loss of time on the journey, he was nearly two hours late, and was anxious to get ahead as fast as possible out of the way of the regular train which left Dingle at 3.30 p.m., and had already left Annascaul, and, if this be so, a heavy responsibility falls upon the Company, who, in contravention of an undertaking given by them to the Board of Trade, have been running trains not carrying a staff, and with tickets only, without having first established block-working, for if block-working had been in force, the 3.30 p.m. train would not have been allowed to leave Annascaul until the preceding train had reached Castle Gregory junction, and the driver of the special train need not have been in any anxiety about it. As it was, a second and worse accident might have occurred, if the guard, Thomas O'Leary, had not been prompt in going or sending back to stop the 3.30 train, and if the driver of this train had not had it well under control.

Alfred T. Redshaw, the driver, was a young man of excellent character, who had been in the service of the Company in charge of the locomotive shops for about

7 $\frac{1}{2}$ months, and had come with first rate testimonials, as a fitter, after 11 years service with the Great Northern Railway Company (Ireland); but although Mr. Parkes, the manager of the Tralee and Dingle Railway Company, himself not a trained driver, gives it as his opinion that Redshaw was a competent driver, and he had several times acted in that capacity, the man had never been trained as a driver, and it does not appear that any steps whatever were taken to ascertain whether or not he was able to drive, but that his statement that he could do so was accepted as correct. Now it is the greatest possible mistake to suppose that because a man is a good locomotive fitter he can drive an engine, or that because a man can drive an engine under ordinary circumstances, he is as fit as a properly trained driver to cope with such difficulties as would appear to have arisen on this occasion, and I consider that it was most improper to have allowed this man to undertake the duty of driving, especially upon a line of such a character as the Tralee and Dingle Railway, without first ascertaining that he was a thoroughly competent driver.

Richard Dillon, the fireman, who had been only a month in the service, during which time he had been working regularly between Tralee and Dingle had been properly trained on the Great Southern and Western Railway, and came with a recommendation from the district locomotive superintendent of that Company.

Bernard Loughlin, the permanent-way inspector, had been a year in the service of the Company, was well acquainted with the line, and had previously been for many years in the service of the Great Northern Railway (Ireland).

The daily hours of duty of these three men were from 7 a.m. to 7 p.m., with two hours off during the day.

In conclusion, although in my opinion it is perfectly safe to run round a properly laid 3-chain curve upon a 3-foot gauge, at a speed of five miles an hour, and although there should be no danger of a train exceeding this speed at Curraduff Viaduct if due care be observed and the limit of speed when coming down the incline be strictly adhered to, yet, having in view the grave risk due to the position of this curve at the bottom of the steep incline, if from any cause a descending train should happen to get out of control, I consider that it is most desirable that, if by any possibility it can be managed a deviation of the line in a southerly direction, which would improve both the gradients and the curves, should be made.

The difficulty in the way of this improvement being carried out, and indeed the difficulty in the way of providing the highly trained staff necessary upon a line of this description, of maintaining the rolling-stock in a proper condition both as regards quantity and state of repair, and of effecting other desirable improvements upon this is cheaply-made line, is undoubtedly want of money.

The guaranteeing bodies are already heavily rated, the amount of rate due for the guaranteed interest on the capital of this railway, and the excess of the working expenses over the receipts, being, I am informed, 2s. 2d. in the pound, in one barony, while the costs of this accident, which must be very heavy, will fall upon the working expenses for the current half-year, and therefore on the cess payers in the guaranteeing area.

Under these circumstances it is difficult to see how the sum necessary to make any improvements in the direction which I have indicated, which are most desirable in the interest of the public, could be raised without some grant in aid.

I would strongly recommend the Company to have their engines carefully examined by an experienced locomotive engineer with the view of ascertaining whether they can be improved in such a way as to render them more capable than they appear to be, of taking a heavy train up the steep inclines, and, if nothing can be done, to limit the load to such a weight as the engines are able to cope with, employing assistant engines when the load exceeds that weight; and I would also recommend them to adopt a similar course in regard to the vacuum-brake, which does not appear to me to be in first-rate order, upon some of their stock at any rate, and to issue more definite instructions as to the method of working this brake, especially in regard to the amount of vacuum to be maintained, and to the continuous and constant use of the small ejector.

The Assistant Secretary,
Railway Department, Board of Trade.

I have, &c.,
F. A. MARINDIN,
Major, R.E.

I concur in the above Report.

RICHARD ADAMS, Q.C.