

doubled over boiler, footsteps and back sand boxes knocked off, brake shaft torn off and gearing damaged, brake, reversing and regulator handles damaged, 3 gauge and 1 lubricator cocks knocked off back of boiler, safety valve columns knocked off.

A. G. Moore's Waggon, No. 307.—1 tram, 1 headstock, 1 side rail, end door and end cleading broken, 4 buffer rods and side knees bent, 1 axle box broken, and guard plates bent, &c.

A. G. Moore's Waggon, No. 333.—1 tram, 1 headstock and 2 end standards broken, side and end cleading damaged, 4 guardplates bent, &c.

Central Railway Waggon, No. 26,232.—Underframe and body completely wrecked.

Central Railway Waggon, No. 46,047.—Underframe and body completely wrecked.

A. G. Moore's Waggon, No. 320.—2 trams, 2 headstocks, 2 side rails and 1 slot broken, end and side cleading damaged, buffer rods and 4 guardplates bent, &c.

Central Railway Waggon, No. 14,512.—1 tram broken and springs damaged.

Damage to Permanent Way.

15 sleepers broken; 38 chairs broken; 3 rails twisted.

Printed copies of the above Report were sent to the Company on the 19th January, 1904.

GLASGOW AND SOUTH-WESTERN RAILWAY.

Railway Department, Board of Trade,
8, Richmond Terrace, Whitehall, London, S.W.,
August 28th, 1903.

SIR,

I HAVE the honour to report, for the information of the Board of Trade, in compliance with the instructions contained in your Minute of the 27th July, the result of my enquiry into the collision that occurred on that date in St. Enoch Station, Glasgow, on the Glasgow and South-Western Railway.

In this case the 6.50 a.m. special train from Ardrossan to Glasgow on arrival at St. Enoch Station came into violent collision with the buffer stops at the end of No. 8 platform, with fatal results.

The second carriage from the front was completely wrecked. Thirteen passengers were killed on the spot, three subsequently died of injuries received, 17 were seriously hurt and taken to hospital, while 47 others were injured, but were able to proceed to their homes. The total casualties were 16 killed and 64 injured.

The train consisted of a four-coupled engine, six-wheeled tender, nine six-wheeled coaches, three eight-wheeled (bogie) coaches, and a brake van, marshalled in the following order, viz. :—

No. 461, third-class, six wheels.
No. 131, " "
No. 101, " "
No. 83, composite, eight wheels (bogie).
No. 118, first-class, " "
No. 86, third-class, six wheels.
No. 6, first-class, "
No. 427, third-class, "
No. 143, " "
No. 24, first-class, "
No. 120, first-class, eight wheels (bogie).
No. 142, third-class, six wheels.
No. 61, brake van, "
Total, 13 vehicles, equal to 14½.

The weight of the train was :—

					Tons.	Cwt.
Engine and tender	...	...	...	...	59	16
Seven third-class	...	...	...	...	94	10
Bogie composite...	...	...	...	...	21	19
Two first-class ...	...	...	...	...	28	16
Two bogie firsts...	...	...	...	...	42	16
One van ...	...	...	...	...	12	17
Total	...	...	...	...	260	14

The train was fitted throughout with the automatic vacuum brake, which was in good working order.

The shock of the collision was such as to throw the rear ends of the carriages near the front of the train upwards, thus permitting the leading end of the underframe of the second coach to get below the rear end of the frame of the first coach (as shown on the diagram in the Appendix), the result being that, as the second coach was pressed forward by the momentum of the train behind it, the body of it was completely "telescoped," and many of the passengers in it were killed and others severely injured.

The front buffer beam and two buffers of the engine were broken, and the rear end of the leading carriage was smashed in, but so far as the rest of the train was concerned the damage was trifling, and consisted chiefly of broken windows and bent buffers.

The buffer stop consisted of a solid wooden beam, heavily strutted in rear, and carrying the usual pattern of spring buffers, the structure being backed up by a mass of concrete below the platform behind it. The buffer beam was broken, and the buffers and castings wrenched off, but the concrete backing was not moved, nor was the surface of the platform in any way disturbed or cracked. It was in fact evident that the momentum of the whole of the train, except engine, tender, and leading vehicle, was absorbed by the destruction of the second coach.

The permanent way was uninjured.

Description.

St. Enoch Station has been recently enlarged and now contains 12 platforms, all signalled and used for either the arrival or departure of trains. The station is fan shaped in plan, and is approached by four lines of way, two for arrival and two for departure. The general direction of the platform lines is east and west, but the lines of approach across the River Clyde have a north-south direction. There is therefore a sharp curve through an angle of 90° at the entrance to the station. Six of the platforms on the north side (Nos. 1 to 6) form the old station, and six (Nos. 7 to 12) on the south side form the new station.

The platforms vary in length :—

Old.		New.	
No. 1	being 946 ft. long.	No. 7	being 654 ft. long.
No. 2	" 852 "	No. 8	" 617 "
No. 3	" 842 "	No. 9	" 985 "
No. 4	" 842 "	No. 10	" 652 "
No. 5	" 788 "	No. 11	" 610 "
No. 6	" 1,122 "	No. 12	" 695 "

It may be noted that with the exception of No. 9 all the new platforms are shorter than those in the older part of the station. Nos. 7 and 8 differ also from all the other platforms inasmuch as they are almost entirely outside of the station roof, that is to say they commence and terminate at a more easterly point than all the others.

The signalling arrangements are of the most modern description. At the east end of the station the whole of the lines are spanned by a signal bridge or gantry, upon which the signals for all the platforms are erected. Each signal is immediately over the line to which it refers, and is clearly identified by a conspicuous numeral attached to the post carrying the semaphore arm. A driver therefore entering the station receives an unmistakable indication of the platform to which his train is being admitted. About 250 yards outside the signal bridge there is a two-armed semaphore signal, which indicates to a driver whether he is to enter the old station or the new.

On the occasion in question the train was signalled into No. 8 platform in the new portion of the station, and the driver admits that he knew it.

At the entrance to No. 8 platform there is a curve of nine chains' radius to the left, which extends nearly the whole length of the platform, and the line is practically level.

Although no question arises as to the signalling, it is desirable to note the positions of the signal-boxes in the neighbourhood of the station, because they are referred to in those portions of the evidence in which the speed of the approaching train is described.

St. Enoch Station signal-box is situated on the east side of the lines 45 yards on the inside (*i.e.*, the station side) of the signal bridge, and opposite to the entrance to No. 8 platform.

Clyde Junction signal-box is 185 yards outside, *i.e.*, to the east of, the St. Enoch box, being at the north end of the viaduct over the River Clyde.

The Company's regulations as to the speed of trains approaching St. Enoch Station are as follows :—

(a.) At the north end of the viaduct over the Clyde there is a conspicuous speed-board with "10 miles an hour" marked on it.

(b.) In the usual weekly circulars issued by the Company a notice to the same effect has appeared for a long time past under the heading "Slowing of trains"; "Clyde Junction all lines; 10 miles per hour."

(c.) In the weekly circular dated the 16th July (the very circular in fact in which notice is given of the running of the special train from Ardrossan to which the accident occurred) this special warning from the Superintendent of the Line appears :—

Restriction of Speed of Trains.

I observe that Engine-drivers are not giving attention to the Speed Notices in operation from Port Eglinton to Gorbals Junction, and from Clyde Junction into St. Enoch, which are as under—

Clyde Junction and St. Enoch	...	...	...	10 miles per hour.
Gorbals Junction and Port Eglinton Junction	...	...	...	15

Engine-drivers are hereby enjoined to see that their trains are kept within the speeds named at the places mentioned.

in which, it will be observed, special reference is made to the speed between Clyde Junction and St. Enoch Station.

(d.) In the official publication known as "The Appendix to the Working Time Table" the following regulation exists :—

Speed of Trains Entering Terminal Stations.

Engine-drivers of Passenger Trains must approach Terminal Stations with great care, and at reduced speed, having their trains completely under control, as directed in Rule 5 of Vacuum Automatic Brake Regulations.

The lowering of the fixed signal, or signals, to enter a Terminal Station does not indicate that the line is clear throughout, and Engine-drivers must assume that the through platform or dead-end bay to which their train is signalled is occupied by a train or other vehicles, until they can satisfy themselves from personal observation that the through platform or dead-end bay is clear.

The following are the Terminal Stations to which the foregoing Instructions apply :—
St. Enoch, &c., &c.

(e.) In the General Regulations for working the vacuum automatic brake, Rule 5 (f) contains the following :—

"Engine-drivers must enter such stations (*i.e.*, any terminus or other principal station), or a dead-end bay at any station, at such a speed as to enable them to stop the train at the proper place by the application of the ordinary hand brake only, and guards must watch the speed of the trains and assist the Engine-drivers by the use of the hand brake when necessary."

This Rule, if it means anything at all, means that trains are to enter terminal stations at "hand brake" speed, and taken in conjunction with (d) makes it clear that a driver entering such stations should be prepared to stop at any point by means of the hand brake.

Evidence.

Henry Northcote, driver, states: I have been in the Company's service 18 years, and I have been a driver for seven years. I have been mostly employed as driver on goods trains, and for the last two or three years I have been employed on passenger trains as required. On the 27th July I came on duty at 5.30 a.m. at Ardrossan engine sheds to work the 6.50 a.m. Isle of Man special to St. Enoch. My engine was No. 221, six-wheeled engine, with four coupled wheels in front and a single trailing axle, and with a six-wheeled tender. The engine was fitted with the vacuum brake working blocks on the four coupled wheels and on all the tender wheels. The train consisted of 13 carriages including a van, equal to 14½; there were three bogie coaches, the remainder being six-wheeled. The brake pipe was properly connected between the engine and train. The brake was tested before we left Ardrossan and was working pro-

perly. We left Ardrossan nine minutes late. We were booked to arrive at 7.43, and we actually arrived at 8.5. Everything went right till we reached Glasgow. The first booked stop was Paisley, and the train stopped there without difficulty. After passing Paisley the next booked stop was Eglinton Street Station; but I was stopped by signals outside Eglinton Street Station for two or three minutes. I then drew into the station, and after starting from the platform I was stopped a second time by the guard. The signals after this were clear into St. Enoch. On passing Gorbals Junction I shut off steam. I had less than half steam on up to that point after leaving Eglinton Street. I applied the brake shortly after passing Gorbals Junction. I was then carrying 18 to 19 inches of vacuum. When I passed Gorbals Junction I was running at 15 to 16 miles an hour. I released the brake on passing Clyde Junction. I was passing Clyde

Junction at 10 miles an hour, with brakes off. Seeing that I was entering platform No. 8 I again applied the brakes, and then released them all but five inches. I was then entering the platform. The brake was slightly on all the way from Clyde Junction. I was entering the platform at eight miles an hour. I instructed the fireman to keep a good look out and tell me if he saw any obstacles, meaning carriages, in the way. When he saw that nothing was in the way, he shouted "All is clear, Harry." It was then that I released the brake all but five inches. Shortly after that he shouted "Stop Harry there's the buffers." I was then about 45 yards from the buffers. The speed might then have been seven miles an hour. I then applied the brake full power, and reversed the engine and put on full steam. At the same time the fireman had applied the sand. The engine is fitted with the steam sanding apparatus. At the applying of the full amount of brake power, the two needles on the one brake gauge fell to zero; this indicated that the vacuum brake on the engine was useless. One of the needles, namely, that applying to the vacuum chamber on the engine, should have remained stationary. The brake had operated correctly all day, and the needle had remained stationary up to that time. I cannot explain why it failed on this occasion. I have known the same thing happen previously, but on engine No. 236. I have driven No. 221 on previous occasions, the last time being on Saturday 25th. I was in St. Enoch Station on that date. There was nothing wrong then. I have been in and out of St. Enoch old station as fireman on many occasions, and also as driver. But I have only been into St. Enoch Station four times as driver since the extensions have been completed. No. 8 platform is a new platform, and I have never been turned into No. 8 before with a train. I did not know that No. 8 platform was shorter than the other platform. At the time the fireman called out "All is clear" I was thinking that the platform was 100 yards longer. I was ignorant that any platforms had buffers outside the main roof of the station road. I thought it was 100 yards longer than it is. I know that six new platforms had been constructed in the new part of the station, and I have taken trains into Nos. 10 and 11 new platforms on previous occasions, but I have never been before into Nos. 7 and 8. There is a limit of speed laid down between Gorbals Junction and Clyde Junction of 15 miles an hour, and between Clyde Junction and St. Enoch 10 miles an hour, meaning that the speed on passing Clyde Junction should be 10 miles an hour. I was running engine first. I know brake rule No. 5, which means that trains should enter a terminal station at hand brake speed, and I feel sure I could have pulled up the train by the hand brake if the platform had been as long as I thought it was. I have copies of the rules and regulations and of the Appendix to the Working Time Book, and of the special notices, and I knew that a special notice had been issued by the superintendent of the line on 16th July regarding the observance of the rule as to speed. It was a misty morning and the rails were greasy. I had a long experience as fireman on passenger trains with several express drivers of long service, and all my work at that time was in and out of St. Enoch. I knew St. Enoch Station before the extensions were carried out exceedingly well. After the fireman called out to me to stop, I told him not to jump, I thought he was better off where he was. I believe that the engine struck the buffers at a speed of five miles an hour. I was hurt on left

thigh; a lot of coal was thrown from the tender on to the foot-plate. There was not much water in the tender tank. The fireman was hurt in the back.

Hamilton Kerr, fireman, states: I have been in the Company's service four years, and I have been firing constantly for two years. I have been regular fireman since May, 1902, but I did a great deal of firing in 1901. On the 27th July I came on duty at Ardrossan at the same time as driver Northcote. We left Ardrossan nine minutes late. The brake was in proper condition on leaving Ardrossan, so far as I knew, and the train was stopped by it at Paisley and Eglinton Street. I remember the driver telling me to keep a look out to see if there was any other train in the platform, but I cannot say for certain where we were when he did so. I do not know much about St. Enoch Station. I have only been into St. Enoch three times as fireman. I saw that the signal was off for No. 8 platform, but I did not know whether it was a long platform or a short one. I was keeping a look out as we entered the platform, and when we got round the curve I saw the buffer stops. I think I told the driver on entering the platform that the platform was clear of carriages. Shortly after that I called out to him to stop, because I saw the buffer stops. I had not applied the hand brake on coming into the station, but as soon as I called out "stop" I put the hand brake on hard, and I applied sand. The driver applied his vacuum brake at the same time. After the collision I looked at the vacuum brake gauge, and I saw that both needles were down to zero. Nobody directed my attention to the gauge. I did not look at the gauge until four or five minutes after the accident. I was somewhat hurt in the back and head. I did not hear my driver tell me not to jump. I never thought of jumping. When I called out to the driver to stop I thought that the train would strike the buffer stops, but I did not think the collision would be severe. I cannot say whether the driver had his vacuum brake on slightly on entering the station. I was not watching him.

Hugh McCallum, spare guard, states: I have been in the Company's service 21 years, and I have been guard all the time. I have been passed as a passenger guard for six years, and I have worked passenger trains regularly the last six years. As a rule I work goods trains in the winter and passenger trains in the summer. On the 27th July I came on duty at 6.20 a.m., at Ardrossan, to work the 6.50 special to Glasgow. The train consisted of 13 coaches, including a van, equal to 14½. The vacuum brake was on all the carriages and it was properly connected up. It was tested before leaving Ardrossan and was in proper order. I instructed the driver as to the number of coaches on the train. The train was rather light. I had accommodation for about 600 passengers, but there were only about 400. The front portion of the train was better filled than the remainder. Everything went right till we got to St. Enoch. The train was stopped properly at Paisley and Eglinton Street. So far as I can judge the highest speed between Eglinton Street and Clyde Junction was 15 miles an hour. I think at Clyde Junction the speed was somewhat over 10 miles an hour. At Clyde Junction the vacuum brake was applied, and then released again, after passing Clyde home signal. When we reached the platform we were going at fully eight miles an hour, and it struck me that the driver was going rather fast. I did not then know what platform we were going into. If we

had gone into a long platform and it had been clear of all trains, there would have been no danger. But the speed was too fast for a terminal station. I applied the hand brake at the middle of Clyde bridge—I did not know then what platform we were going into—and it was hard on when we entered the station. I did not touch the vacuum brake. When my van was near the home signal of Clyde Junction I became aware that we were going into No. 8. I knew No. 8 was a short platform. When the engine was about half-way down the platform the driver applied the vacuum brake with full force. I know the driver, having worked both goods and passenger trains with him. As far as I know he is a careful driver. He had handled the train properly all through the journey. I believe it would have been better if I had applied the vacuum brake myself while my van was on the bridge, instead of waiting for the driver to do so, but I thought the driver had full control of the train, because he had released the brake after applying it. I do not think the speed was much reduced from eight miles an hour when the engine struck the stops. I was not thrown down, and was not hurt. The shock in the van was not severe and there was no rebound. I had no idea that the collision had been so severe until I reached the front of the train. When crossing Clyde Bridge I noticed that the vacuum gauge was registering 18 inches.

Mr. Alfred Lane states: I am works manager of Messrs. Dubs and Co. On the afternoon of the 27th I was asked if I would test the brake on engine No. 221, which was then outside the engine shed at St. Enoch. I tried the brake in the usual way, and found that the vacuum, 20 inches, could be maintained in the reservoir with the small ejectors working. The brake was applied and released several times, and the vacuum both in train pipe and reservoir each time rose to 20 inches. After the application on the foot-plate I got down and a driver then applied the brake from the foot-plate; this was done to test the brake gear, which was also found to be in working order. The indicator of the gauge of the reservoir moved slightly when the brakes were applied, but there was no sign of the needle dropping to zero, as stated by the driver. In my opinion the brake on the engine was in good order. I also went subsequently to test the brakes on the carriages by means of another engine, and I found those brakes also in good working order. My firm did not build the engine, nor did they supply the brakes.

John Auld states: I am locomotive foreman at St. Enoch. On 27th July I reached St. Enoch in consequence of a call at about 9.10 a.m., with the breakdown train, but I could not get to work with it till about 11 a.m. I took the engine and carriages to the shed, and as I heard rumours of the failure of the brakes, I took care that the engine was not touched by anyone till Mr. Manson arrived. Mr. Manson arrived at 3.20, and he and I at once tested the brakes. We found that the brakes on the engine were in perfect working order. Mr. Lane subsequently arrived and made the same tests that we had already made, and with the same result. I have found the reservoir needle on certain engines fall on making a reduction of the vacuum in the train pipe, but this is always caused by some defect, either in the ball valve or the rolling ring, or through the top of the brake cylinder being cracked, or by a leakage of any sort. But there was no sign whatever of any such defect on the engine in question.

James McMurray states: I am locomotive foreman at Ardrossan. I know driver Northcote well. I regard him as a sober man. He has been a Rechabite for a number of years, which means that he is a total abstainer and a church-goer. I have always found him a careful, steady driver, and have never had occasion to find fault with him. I remember some complaint being made by Northcote concerning the brake of engine No. 236 some weeks ago. This was rectified at the time. It might have been caused by the ball valve not being clean, or some such defect. In June a similar complaint was made about No. 221 by driver Patterson. The defect then was either in the ball valve or the rubber ring. In order to make sure I caused a new rubber ring to be put in on that occasion. I saw No. 221 on Saturday, and I had no report whatever on Saturday night to show that the engine was not in perfect working order and fit to go out on Monday morning. On Saturday I booked Northcote for the duty on Monday, and I regarded him as fully capable of bringing the train safely into St. Enoch. He has not been very often into St. Enoch this year—only about three or four times. The first time he went to St. Enoch this year he had a passed driver with him who knew the signals and road thoroughly. I had no doubt about the fireman's experience. He is a good fireman and has generally worked on goods trains.

John Douglas states: I have been 29 years in the Company's service, 13 years as assistant station master at St. Enoch. On 27th July I commenced duty at 7.10 a.m. to work till 7 p.m., having 1½ hours off for dinner. About 8.5 a.m. I was standing on No. 8 platform, about 25 yards from the buffer stop, when I saw the special train from Ardrossan coming round the curve on No. 8 road at a speed of about 12 miles an hour, and, thinking it was running too fast, I ran forward to meet it, signalling with my hands to the driver to stop. When I reached a point about 50 yards from the buffer stop and almost abreast of the engine, I concluded, from the rattle of machinery and the emission of steam from the chimney, that the driver reversed and applied steam just as he passed me. The brake was applied on the train before the collision as there was no rebound; the carriages remained stationary with buffers pressed home to the sockets. I did not see any appearance of sand having been put on the rails to assist in stopping the train. I did not speak to the driver after the collision. In addition to the telescoping of the two front carriages, there were two cases of buffer-locking, one about the middle of the train, the other near the rear. I at once sent for doctors and telephoned for ambulance vans and also to the Central Police Station for assistance, and to the locomotive sheds for the breakdown squad. I do not think the driver saw me. He seemed at that time to be doing all he could to stop.

John Mathie states: I have been 20 years in the Company's service, four years as station inspector at St. Enoch. On 27th July I commenced duty at 7.15 a.m. to work till 10 p.m. The usual Monday shift is from 8 a.m. till 10 p.m., other days from 10 a.m. to 10 p.m., with two hours off for meals. I went into the signal-box at 7.55 a.m. to arrange with the signalman about the despatch of return empty trains to the various terminal points, and was in the box when the train from Ardrossan arrived at 8.6. I was looking out of the window to see what train was approaching, and as it passed the box I saw that it was running at an unusually high speed, and I

remarked to the signalman that the driver did not seem to realise what dock he was running into. Both signalmen came to the window, and one of them, I cannot say which, said "I am afraid he will strike the buffers." When the engine passed I saw the driver standing up looking straight ahead, with one hand on the continuous brake handle, the other hand on the regulator. I cannot say whether the brake was applied when the train passed the box, but I am almost certain all the wheels of the carriages were revolving, and none of them were skidding. I estimate the speed of the train when it passed the signal-box was about 20 miles an hour. After a portion of the train had entered the platform, I observed that the speed was considerably checked, and when the engine was a short distance from the buffers I saw steam rise from the chimney, and concluded that the driver had reversed the engine and applied steam at that point. Steam was shut off the engine when I first saw it approaching from Clyde Junction. The impact with the stop buffers caused a very slight rebound of the rear portion of the train. I went from the signal-box to No. 8 platform and asked the guard, who was in the van in the rear, if he had noticed where the vacuum was exhausted, and he replied he was not sure of the exact spot—whether it was immediately before the train struck, or just as it struck the buffers. (The separation of the brake pipe between the telescoped carriages would destroy the vacuum, if the full application of the brake before the collision had not already done so.) I asked him if his hand brake was applied, and he said "Yes, I might test it"; and I did so, and found it so hard on that I could not release it. I then went to the front of the train and rendered what assistance I could. The same driver worked a train into St. Enoch Station on the Saturday night previous, into No. 9 platform road. This was at 6.40 p.m.

Robert Laird states: I have been 15 years in the Company's service, 11 years as signalman and five years in St. Enoch signal-box. On 27th July I commenced duty at 3 a.m. to work till 2 p.m., which is the usual Monday morning shift, all other shifts are eight hours. I was operating that portion of the locking frame connected with the new station, and had this train from Ardrossan offered from Clyde Junction at 8.3 a.m., when after making the road into No. 8 platform, and pulling off the signals, I plunged, accepting it, and the train arrived at 8.6. When the train was passing the box it seemed to be running faster than trains usually do, but it did not occur to me to give the driver a caution hand signal, as he was entering an empty dock. The speed of the train when it was passing the box was, in my opinion, about 12 miles an hour. I have seen trains running quite as fast into one of the longer docks stopping without any difficulty. After the train had entered the platform I said to inspector Mathie that I had doubts whether the train would be stopped before striking the buffers. Steam was shut off when I first saw the train approaching from Clyde Junction, but when it was two or three engine lengths from the buffer stop I saw steam emitted from the chimney, and I concluded

that the driver had reversed the engine and applied steam at that point. I cannot say whether the brake was applied on the train when it passed the signal-box.

William Kerr states: I have been 16 years in the Company's service, 13 years as signalman, and two and a-half years in St. Enoch signal-box. On 27th July I came on duty at 3 a.m. to work till 2 p.m., the usual Monday morning shift, the other shifts being eight hours. I was working the portion of the locking frame connected with the old station, and had nothing to do with the acceptance of the Ardrossan train. My attention was first called to this train by signalman Laird, who said "I think this man is coming a little quick." I went to the window just as the engine was passing under the signal bridge, and at that time I judged the speed of the train was from 12 to 15 miles an hour, and that the driver would have no difficulty in stopping at the proper place. I noticed, however, that the wheels of the train were revolving and not skidding. Continuing to watch the train I noticed that there was very little reduction of speed after the train passed the cabin. I saw the steam coming from the chimney when the engine was only a short distance from the buffer stops, and I formed the opinion that the driver had reversed and applied the steam at that point. The morning was fine.

John Watret states: I have been 23 years in the service, all the time at St. Enoch, and station foreman for about 12 years. On 27th July I came on duty at 6.45 a.m. to work till 6 p.m., with one and a-half hours off for dinner. When the Ardrossan train arrived I was standing at the buffer stop of No. 8 along with Howitson, who said "Good God, look at the speed this driver is coming at," and turning round I saw the train about six engine lengths distant, and as far as I could judge the speed was about 12 miles an hour. When the train was about three engine lengths from the buffer stop I judged, from the noise the engine was making, and the steam from the funnel, that the driver had reversed the engine at that point. For my personal safety I then moved away from the buffer stop, but returned immediately after the collision, when the driver, who had just stepped off the footplate, said "Oh! dear me, this is awful." I then left him and proceeded along No. 6 platform to get assistance.

David Howitson states: I have been 13 years in the Company's service, all the time at St. Enoch. On 27th July I came on duty at 3.30 a.m. to work till 3 p.m., one hour off for meals. When the train from Ardrossan arrived I was standing at the buffer stop of No. 8 platform, and first saw the train when it was about six or seven engine lengths from the buffer stops, and at that moment I think the speed was about 15 miles an hour. When the engine was about two lengths distant from the buffer stops I heard the steam applied, and I concluded that the driver had reversed the engine immediately before applying steam. For my own safety I then moved away from the buffer stops, returning after the collision occurred to give what assistance I could.

Conclusion.

This collision, which so far as the loss of life attending it is concerned, is one of the most disastrous that has occurred for many years, must be attributed to want of care on the part of driver Henry Northcote in entering the station at too high a rate of speed, and to inattention on his part as to where he was going.

The facts are simple enough. The train, which was bringing holiday makers back from the Isle of Man and elsewhere, was composed of thirteen well built modern vehicles, all fitted with the continuous vacuum brake, and well equipped in every respect. It contained accommodation for 600, and was carrying 400 passengers, most of whom were seated in the front part of the train. It had a satisfactory run from Ardrossan to Glasgow, and on arrival at the terminus it was signalled into No. 8 platform. There was no cause for undue haste, and no reason whatever why the train should not have been brought to rest in the station with perfect safety.

I have already quoted the rules concerning the speed at which trains should enter a terminal station, from which it is clear that the speed at the entrance to a platform should be such that a train can be stopped at any point by the use of the hand brake only.

In the present instance the driver states that he entered the station at a speed of eight miles an hour, but the evidence of six witnesses, including the assistant station master, the station inspector, and two signalmen, clearly proves that the speed was about 12 or 15 miles an hour, which cannot possibly be regarded as hand brake speed within the meaning of the rules.

But even so, Northcote could have brought his train safely to rest by means of the continuous brake had he applied it in sufficient time. He knew he had been signalled into No. 8 platform, but he says that, not being well acquainted with the station since its enlargement, he forgot that No. 8 is a short platform and does not extend as far as the western end of the station. This is probably the correct explanation of his action, but it can hardly be regarded as an excuse. For if he had any doubt in his mind as to his knowledge of the station, it was his duty to have so informed his foreman, when he was selected to work this train. Had he done so, he either would not have been sent with the train, or if sent he would have been given a "pilot man" or some one acquainted with the place to guide him. Having accepted the responsibility of taking the train to St. Enoch, he must bear his burden. Moreover, whether he knew the station or not, and particularly if he did not know it, it was, as has already been pointed out, incumbent on him to enter it at such speed that he could have stopped the train wherever necessary by the use of the hand brake only. Even if he had been admitted to a long platform, as he says he expected, there might, and probably would, have been a train already there, in which case the space available for Northcote's train would have been no greater than that afforded by No. 8 platform, and Northcote's train instead of striking the buffer stops would have run into another train.

In telling his story Northcote makes a statement that, when at the last moment he applied his vacuum brake with full force, both needles of the brake gauge, namely, that showing the vacuum available in the reservoir on the engine, and that showing the vacuum in the brake pipe dropped to zero. This, if correct, would indicate that there was something wrong with the reservoir on the engine (the needle connected with which should have remained stationary or nearly so), and that the vacuum brake on the engine was not operative, but it would not have affected the brakes on the rest of the train. There is, however, no corroboration of this statement. On the contrary, there is the evidence, not only of the officers of the locomotive department of the Company, but of an independent witness connected with one of the large firms of locomotive builders in Glasgow, to the effect that the engine brake and the train brakes were, when tested shortly after the accident, found to be in perfect order. The brakes were further tested in my presence two days later (the engine not having been removed in the interval from St. Enoch), and again they were found in good order. Moreover, Northcote admits that the brakes were all working satisfactorily throughout the journey, and had been used in Eglinton Street Station a few minutes before he reached St. Enoch. He also says that he had 18 inches of vacuum when he reached St. Enoch Station, and this is corroborated by the guard. So that his unsupported suggestion that the engine brake was defective at the moment when the emergency arose, carries no conviction with it. And again, it comes to this: if he had obeyed the rules and had entered the station at hand brake speed, no harm would have resulted, even if the vacuum brake on the engine had been in any way defective. The station is admittedly a bad one to enter owing to the curve, and it is difficult for a driver to see the end of No. 8 platform until he is half-way along it, so that at all times it is necessary to be careful. It is not improbable that if the brake on the engine had been of the "rapid acting" description the speed might have been much reduced before the collision occurred. But this pattern of brake is hardly known in the United Kingdom, and it was Northcote's business to regulate the speed according to the brake power available, and to the rules.

The plain fact is that Northcote entered the station at too high a speed, so that

when it was suddenly brought to his mind by his fireman that the platform did not extend to the western extremity of the station (his engine was then only 15 yards from the buffer stops) it was impossible for the brakes, even though aided by the reversal of the engine, to stop the train, or even to reduce its speed to any material degree, before the engine reached the buffer stops. The evidence of the eye witnesses, as well as the more definite evidence of the terrible results of the collision, render the conclusion unavoidable that the speed of the train, when it struck the stops, was not less than 12 miles an hour.

Driver Northcote has been in the Company's service 18 years, during seven of which he has been a driver. He is usually employed on goods trains, but for the last three years during the summer months he has been frequently employed on passenger trains. He is said to be a strictly sober man and bears an excellent character, and I regret to have to record the opinion that the responsibility for this fatal collision must rest upon him. He had been on duty 2 hours 36 minutes.

Suggestions have been made, that in order to guard against the consequences of collisions of this nature, one, and even two, vans or empty coaches should be placed in front of every passenger train. On long distance trains it usually happens that a luggage van is so placed, and on local trains there is generally a compartment for a guard and a small amount of luggage at each end of the train. Some companies, moreover, make it a practice on all trains to lock up the two front compartments of the carriage next to the engine, when this does not happen to be a van, and no doubt some measure of safety is thus provided, though in this instance no benefit would have been derived from either of such measures. But it does not seem to me practicable to call upon railway companies to provide on every train a van or an empty carriage, still less two empty carriages, next to the engine. On workmen's trains, for instance, or suburban trains, or excursion trains, upon which little or no luggage is carried, and in which seating accommodation is generally insufficient, it would be impossible to attempt it. And when the total number of trains of all sorts that are in daily service is borne in mind, it will be apparent that a large number of empty vehicles would have to be hauled about the country, if any regulation, such as that suggested, were made obligatory. Not only would this necessitate a large and unproductive increase in the rolling stock of all railways, but it would also entail a general increase in the length of platforms, and seriously affect the working expenses. Moreover, end-on collisions are at least as frequent as head-on collisions, and if the precaution is to be carried out logically, the same measures would be as necessary at the end of every train as at the head. Greater security is in my opinion to be obtained by careful working, by strict enforcement of rules, by good discipline, and by improved, *i.e.*, rapid acting, brakes.

The question of the speed of trains approaching St. Enoch Station had attracted the attention of the Glasgow and South-Western Railway Company during the week prior to the accident, as is evident from the notice dated 16th July, which I have quoted on pages 2 and 3 (*c*). This notice, however, refers only to the speed to be observed during the approach to the station, and does not state what the speed is to be at the entrance to the station. The existing rule in force on all railways as to the speed of trains entering such stations has already been quoted on page 3 (*e*), in which it is said that the speed is to be such "as to enable them (drivers) to stop the train at the proper place by the application of the ordinary hand brake only." It would be more satisfactory if in lieu of or in addition to these words, the rule stated in precise terms the speed (say six miles an hour) at which trains may enter terminal stations.

In conclusion I would make the suggestion that the time has come for a reconsideration of the brake question in this country. I do not now refer to the dual system which unfortunately exists, some Companies having the vacuum and some the Westinghouse, though this is all-important, and will have to be faced if freight trains are to be fitted with continuous brakes. But I refer to the fact that the brakes employed on the passenger rolling stock in the United Kingdom, whether they belong to the vacuum class or to the Westinghouse class, are not of the most modern description. Since automatic continuous brakes were first adopted in this country, improvements have been made in them whereby their rapidity of action has been largely increased, and the distance, or time, within which a train can be stopped has been proportionately reduced. Both the Vacuum Brake Company and the Westinghouse Brake Company have for some years past been able to supply quick-acting brakes, the advantage of which in times of emergency cannot be gainsaid. These improvements, though adopted abroad, seem to have been ignored in the United Kingdom, where, so far as I know, only one railway company has done anything, even experimentally, towards fitting its passenger stock with a quick-acting pattern of brake. The speed and weight of trains are ever on the increase,

and the rapidity with which brakes can be brought into operation becomes daily of more importance. It is therefore surprising to find that the modern improvements in brakes have not been adopted in the United Kingdom, and that English railway rolling stock is still being fitted with the same patterns of brakes as were introduced twenty-five years ago.

I have, &c.,
H. A. YORKE.

The Assistant Secretary,
Railway Department, Board of Trade.

APPENDIX.

LIST OF DAMAGE TO PLANT IN COLLISION WITH STATIONARY BUFFERS IN NO. 8 ROAD, ST. ENOCH STATION, 27TH JULY, 1903.

Engine No. 221.—Front buffer beam and side platform damaged; two buffers and two sand boxes broken.	No. 86, Third-class Carriage.—Gable panels damaged.
Tender No. 221.—Buffer beam damaged and intermediate screw coupling bent; left buffer broken.	No. 6, First-class Carriage.—Two headstocks broken.
No. 131, Third-class Carriage.—Body smashed.	No. 427, Third-class Carriage.—No damage.
No. 461, Third-class Carriage.—Both gables and underframe smashed; two pairs of wheels displaced.	No. 143, Third-class Carriage.—Four quarter lights cracked and one buffer bent.
No. 101, Third-class Carriage.—Two quarter lights cracked.	No. 24, First-class Carriage.—No damage.
No. 83, Bogie Composite Carriage.—No damage.	No. 120, Bogie First-class Carriage.—One headstock broken; buffer locked with No. 142 third-class carriage.
No. 118, Bogie First-class Carriage.—Headstock broken, and one quarter light broken; buffer locked with No. 86, third-class carriage.	No. 142, Third-class Carriage.—Three quarter lights cracked; one buffer bent; one buffer, one buffer guide, and one lampholder broken.
	No. 61, Brake Van.—No damage.

Printed copies of the above Report were sent to the Company on the 22nd October.

GREAT EASTERN RAILWAY.

Board of Trade (Railway Department),
8, Richmond Terrace, Whitehall, London, S.W.,
September 17th, 1903.

SIR,

I HAVE the honour to report for the information of the Board of Trade, in compliance with the Order of the 7th September, the result of my inquiry into the circumstances under which a collision occurred at about 7.18 p.m. on the 2nd September between a passenger train and the buffer stops at Fenchurch Street Station on the Great Eastern Railway.

In this case, as the 6.40 p.m. up passenger train from Woolwich to Fenchurch Street, consisting of an engine and 12 vehicles, was entering Fenchurch Street Station on No. 5 platform line, it came into collision with the buffer stops at the end of that line.

The speed of the train at the time of the collision was not great, so but little damage was done to rolling-stock, but 11 passengers have notified the Company of personal injuries sustained. The front guard of the train was also slightly injured.

The engine of the passenger train was a four-wheels-coupled tank engine, running bunker first; it was fitted with the Westinghouse automatic brake, working blocks on the four-coupled wheels, and with a hand brake working the same blocks.

The train consisted of the following vehicles, attached to the engine in the order given :—

One brake.
Two second-class carriages.
Two first-class carriages.
Six third-class carriages.
One third-class brake.