LONDON, MIDLAND AND SCOTTISH RAILWAY.

Ministry of Transport,
7, Whitehall Gardens,
London, S.W.1.

5th March, 1929.

Sir,

I have the honour to report, for the information of the Minister of Transport, in accordance with the Order of the 9th January, the result of my Inquiry into the circumstances of the accident which occurred at about 9.1 p.m. on the 8th January at Ashchurch, on the London, Midland and Scottish Railway.

The 7.20 p.m. up express mail train, Bristol to Leeds, came into violent side-long collision with a shunt of goods wagons, which were being propelled over the trailing crossover, from the up to the down main line, at the north end of the station.

I regret to report that two passengers, a Company's servant who was travelling as a passenger, and driver F. T. Crabtree of the express, lost their lives, all being killed instantly. There were some 45 passengers in the train, and 11 were injured (in one case seriously), necessitating detention in Tewkesbury Hospital: while 13 others and 12 members of the Post Office travelling staff received minor injuries or suffered from shock effects. The fireman and front guard of the mail were also injured and seriously shaken.

At the moment of the collision, the speed of the express is estimated to have been 50 to 55 miles an hour, and the shunting movement (23 empty wagons with one loaded next the engine) was taking place at about 5 miles an hour in the opposite direction. The resulting wreck was exceptional, and it is remarkable that fatalities were not more numerous.

The permanent way was destroyed over a distance of some 75 yards. From the first point of contact with the wagons, the engine came to rest on its left side in 91 yards. It was evidently derailed at once and ploughed its way deeply beneath the rails and sleepers of the adjacent siding. The reversing gear was found jammed in the running position. The damage sustained is shown in Appendix I. The engine was No. 1060, of the standard compound type 4-4-0, with a 6-wheeled tender No. 2865, the weight in working order being 104 tons 8 cwt. It was fitted with the steam brake, vacuum controlled, operating blocks on the coupled and tender wheels.

The train comprised ten corridor 8-wheeled bogie and four 6-wheeled vehicles, the latter being marshalled second, fourth, sixth and seventh. Appendix II gives general information in regard to the stock. The vacuum brake was operating on all wheels except the centre pairs of the 6-wheeled vehicles, and the evidence shows that it was tested for continuity when the engine was attached at Gloucester, and that it operated satisfactorily when the train was brought to a stand at Cheltenham, the last stopping place.

The total weight of the engine and train was 417 tons 18 cwt.; and the overall length some 755 feet. The leading nine vehicles, with the exception of the fifth, an all-steel brake van, were destroyed; while the tenth and eleventh were completely, and the twelfth partially, derailed. In regard to the goods wagons, nine were also destroyed and three others damaged.

In regard to the weather, it had been dry and very cold all day. Towards evening it became misty, temperature dropped considerably, and it was freezing hard at the time of the accident, and throughout the night. Action had been taken to call out the fogmen at 8.25 p.m.; but they had not arrived at their posts, the up main line distant and outer home signals.

The evidence as to the density of the atmosphere, is to some extent conflicting; the fog being apparently patchy and drifting; but there is no doubt that at the time the express approached, visibility on the south side of the station did not exceed 50 yards, and, according to the account of the driver of a goods train which had just passed on the down line, it was no more than 20 yards.
Effects of the Collision, Damage, etc.

The attached plan gives a diagrammatic representation of the relative positions assumed by the vehicles when they came to rest in a confused mass of broken bodies, distorted steelwork and debris, piled above the engine to a height of at least 25 feet, blocking both main lines and the sidings on either side.

It will be observed that the leading bogie vehicle occupies the second position, at right-angles to the direction of travel. It was overturned and its steel frame badly buckled. The second, a 6-wheeled brake van, was at the bottom of the wreckage, interlaced with the frame of the first, underneath the third, and destroyed. The body of the third, a bogie vehicle, was completely smashed, and passed over the first and second, coming to rest tilted over with its leading end level with the engine buffers, and its rear end slightly in advance of them. Its steel frame was buckled beyond repair, and assumed the position shown. The fourth, a 6-wheeled brake van, was wrecked against the tender of the engine, having followed a similar course more or less parallel to the direction of travel.

The fifth, an all-steel van of the latest construction, was thrown into a position nearly at right-angles to the line, the leading end being on top of the mass of wreckage, and the rear end resting in a field. The bogies were damaged beyond repair, but the main frame was little affected. With the exception of the hoiling and buckling of panels, ends, etc., and the loss of a pair of folding doors, the body was also practically intact and repairable, the remaining doors either working quite freely, or merely requiring slight force to open them inwards due to jamming on the floor. Three of the new Spencer type shock-absorbing buffers were undamaged, the fourth having its head broken off. Out of 16 windows (6 drop and 10 fixed) in this vehicle, 9 were not even cracked. Compared with the four on either side of it, the behaviour of this vehicle, under the terrific shock which it must have sustained, provides perhaps a better illustration than that recently afforded at Dinwoodie (where the same type of vehicle was then at the head of the train) of the strength, frame and body as a whole, of this modern all-steel construction.

The sixth and seventh, 6-wheeled vans, came to rest on the tender and the engine respectively, the latter passing over the former and turning on its side, both being damaged beyond repair. The eighth coach collapsed when being drawn out of the debris; the ninth, also badly smashed, was leaning on its side, though fortunately its electric lighting did not fail. The tenth and eleventh were derailed and heavily knocked about; the twelfth and fourteenth had buffer castings, wooden headstocks, etc. broken; while the thirteenth, another all-steel van, was undamaged.

Eight of the vehicles were electrically lighted, including all those carrying passengers. The remaining six were gas fitted, namely the second and sixth vans, the three Post Office coaches, and the rear brake van. In the case of the first two named, gas escaped at once from the four cylinders, due to breakage of high-pressure pipes, the cylinders not being punctured. A slight escape also apparently took place in one of the Postal vans on the low-pressure side, due to fracture; but this was attended to.

Fortunately no fire resulted from these escapes; and the action of the station staff, particularly of Foreman Bunn, who was handling the shunt movement in question, is commendable. Bunn is in charge of the local Fire Brigade, and, with others to assist him, he was able to connect up seven lengths of hose from the Provender Store, ready to play on the wreckage within about ten minutes of the accident. The only fire, a very small one, which occurred subsequently and emanated from the engine ashpan, was thus dealt with in a few minutes.

Description.

Ashchurch is situated on the Company's main line between Bristol and Birmingham, and is 134, 7½, and 3½ miles north of Gloucester, Cheltenham and Cleeve, respectively. It is the junction of the branch lines to Evesham and Tewkesbury, east and west, and there is a single line chord which connects the two branches on the north side of the station, the lay-out therefore being in the form of a triangle with the main line running dead straight, north and south, down the centre, and crossing the chord on the level.
The two branch line junctions on the south side of the station are controlled and worked from the Junction box, and the chord crossing and its junctions with the branch lines on either side, from the Level Crossing box. These boxes are separated by a distance of 170 yards, the up and down main line platforms intervening, with the station building located in the angle between the up main and the Tewkesbury branch platform.

The attached diagrammatic plan shows all dimensions relevant to this case; as also the signals, etc. concerned, namely:—

A. — The Junction up main worked distant, with fixed distant bracketed on either side of it and relating to the two branches. These signals have red arms and lights and their height is 26 feet.

B. — The Junction up outer home, height 15 feet 6 inches.

C. — The Junction up main inner home, with the Crossing distant C1 carried beneath it, and the two corresponding branch signals on either side, height 35 feet.

D. — The Crossing up starting signal, height 13 feet 9 inches.

E. — The ground frame, electrically controlled from, and in telephonic and bell communication with, the Crossing box; and working the trailing connection in the up main, which serves the Provender Store group of sidings, where shunting was in progress prior to the approach of the express.

F. — The Crossing up advanced starting signal.

G and H. — Shunt signals (the former being led by the latter) worked from the Crossing box, controlling the shunt movement from the up to the down main over the trailing crossover No. 27 on the north side of the crossing.

The above-mentioned running signals are all located on the left-hand side of the up line.

I also draw attention to the general falling gradient of the up line to mile 80, to the position of a road overbridge on the south side of mile post 81, and to the two level crossings on either side of the distant signal post. The first crossing gate house is located on the right-hand side of the line and the second on the left-hand side. But for these, over the 11 miles after leaving Cleere, the absence of conspicuous land marks is noticeable, the line being in low bank or shallow cutting, and on the straight with the exception of a right-handed curve of 75 chains radius, ¾ mile long, approaching the bridge and rather more than a mile from the distant signal.

Between the up outer and inner homes, there is also the down group of sidings (to which the shunt movement was bound) on the right-hand side of the up line, with a large goods shed, which stands back 15 yards from this line. At the time of the accident there were three wagons at the south end of the nearest siding, and the other two sidings were practically full, some 50 wagons standing therein.

It will be noted that the distances from the Junction signals C and A to the Crossing signal D (just ahead of which the collision took place) are 324 yards and 1,670 yards, respectively.

The Crossing box contains 75 working and 3 spare levers, and the Junction box 50 working and 2 spare. The arrangements at the former box are such that signal D is locked normal either by the trailing crossover No. 27, or by the electric bolt lever which releases the ground frame, or by the occupation of a track circuit, which is installed in rear of signal F, through the ground frame trailing connection, and back nearly to the crossover.

Signal C is slotted from the Crossing box, its lever in that box being also locked by crossover No. 27, and controlling the corresponding lever in the Junction box by an under bolt. There is a brass disc behind the lever in the Junction box to indicate when this bolt has thus been withdrawn. The Crossing up main distant signal C (1) is preceded by this slot and by signals D and F. This lever in the Crossing box also releases the Junction up distant signal lever A by a similar under bolt, and there is a corresponding brass disc in the Junction box to indicate when that bolt has been withdrawn.
Thus, unless all stop signal levers B, C, D, and F are pulled, as also the Crossing distant lever C (1), the mechanical locking does not permit of the release of the Junction distant lever A. On the other hand, with the crossover No. 27 set and shunt signal H cleared, none of these signals can be lowered except B.

The Crossing box is provided with repeaters working in connection with the weight bars on the control of signals C and C (1), and the Junction box has a corresponding repeater for the weight bar of signal C, the light of which is also indicated. The arms of signals B and C are also repeated and their lights indicated in the latter box. There is a track circuit, 100 yards in length, in rear of B, which when occupied operates an indicator and gives an audible warning of the approach of trains.

The fog objects of the Junction and Crossing boxes are respectively signals C (back lights), distant 138 yards, and the down homes for the Junction box, distant 116 yards.

There is interlocking block working between Cleeve and Ashchurch Junction on the up main, its functions, among others, being such that (1) the lever of signal C must be in its normal position before “line clear” can be pegged; (2) that the Cleeve up starter (on the right-hand side of the line) is released for one acceptance only; and (3) that “Train on Line,” once pegged, cannot be removed until the treadle in advance of C has been operated.

Between the Junction and Crossing boxes, and beyond, on the up road, ordinary 3-position block instruments are in use, the length between the two boxes being treated in the usual way as a block section, the following relevant Block Telegraph Regulations being applied:—

4.—Line clear or giving permission for a train to approach.

(b) Where the signal box in advance is less than a quarter of a mile ahead, permission for a train to approach must not be given to the signal box in rear until the “train out of section” signal has been received from the signal box in advance.

(e) Except where special instructions are issued to the contrary, during fog or falling snow, until the fog signalmen arrive at their posts, and at signal boxes where fog signalmen are not employed, the “is line clear” signal must not be acknowledged to the signal box in rear until the “train out of section” signal or the “obstruction removed” signal has been received from the signal box in advance, nor must the “blocking back” signal from the box in advance be acknowledged if permission has been given for a train to approach from the box in rear.

8.—Train out of section.

(b) During foggy weather or falling snow, the “train out of section” signal must not, except where special instructions are issued to the contrary, be given until the train has proceeded at least a quarter of a mile beyond the home signal, and is continuing its journey, or has been shunted clear of the main line.

The use of the “blocking back inside home” block telegraph signal is not authorised on this, a portion of the Midland, Division of the system.

In addition, the only special instructions to the signalmen at Ashchurch which bore upon this case, relate to the Junction box, and were as follows:—

(1) In clear weather, and in foggy weather or during falling snow when the fog signalmen are in attendance at your distant and outer home signals for the line from Cleeve, permission may be given in accordance with Block Telegraph Regulation 3 for a train or engine to approach from Cleeve when the line upon which the train or engine requires to run is clear to the inner home signal applicable to that line.

(2) In foggy weather or during falling snow when the fog signalmen are not in attendance at the distant and outer home signals, the instructions in Block Telegraph Regulation 5 will apply at your signal box to trains and engines approaching from Cleeve, provided the line upon which the train or engine requires to run is clear to your inner home signal.
Report.

The 6.25 p.m. through freight, Gloucester to Birmingham, hauled by 6-wheeled coupled tender engine No. 3502, arrived at Ashchurch at about 7.20 p.m. with one loaded wagon, 42 empties and a brake van, in charge of driver E. Reynolds, fireman R. B. Trotman, and guard F. H. Gardener. The train was due to proceed on its journey again at 10.25 p.m. Shunting in connection with it is performed by the engine on arrival, and after certain preliminary movements had been carried out, foreman Bunn, accompanied by shunter J. Rudd, obtained occupation of the ground frame E at about 8.20 p.m. in order to carry out the necessary work at the Provender Store sidings. The release of the frame was obtained in the usual manner, after signalman G. A. Horne of the Crossing box had operated his electric control lever.

To permit, however, of the passage of the 8.5 p.m. up, Gloucester to Birmingham, mail train, which was running to time and was booked to stop at Ashchurch, Horne intimated by the bell to Bunn, at 8.29 p.m., that the frame was required to be closed, and this was effected at 8.33 p.m. The train arrived at 8.36 p.m. in charge of driver W. T. Rudkin, fireman G. R. Gardener and guard W. Milller. After its departure at 8.40 p.m. Bunn again obtained the use of the frame, in order to continue his work, and he apparently retained use of it till about 8.56½ p.m., or a little later, as will be explained.

By this time he had received permission from Horne, as the result of conversation on the telephone, to make the shunt in question—a propelling movement, which, according to circumstances, sometimes takes place between the passage of the above-mentioned mail train, and that which followed and was involved in the accident—to effect the transfer of wagons from the Provender Stores to the down sidings on the south side of the station, preparatory to dispatch of the stock concerned by the early morning trains from the latter sidings.

In accordance, therefore, with the arrangement thus made at the above-mentioned time, the engine and 24 wagons had drawn out of the Provender sidings on to the up main, when Horne closed the frame by replacing his controlling lever, set the crossover road and cleared the two shunt signals G and H. The movement had reached the crossover, and some 9 or 10 wagons had cleared, when the collision occurred.

The section speeds of the second up mail train are given in Appendix III. It was due to leave Gloucester at 8.26 p.m. and to arrive at Derby at 11.1 p.m.; but it left six minutes late, viz. at 8.32 p.m. and arrived at Cheltenham at 8.46 p.m., eight minutes late, having lost two minutes on the journey. Two minutes, however, were made up at Cheltenham, and the train left there at 8.52 p.m., viz. six minutes late. It is booked to pass Ashchurch at 8.57 p.m., eleven minutes after leaving Cheltenham, representing an average speed of 30½ miles an hour; but having regard to the bookings, to the observed speed in passing Cleeve and Ashchurch Junction boxes, and to the effects of the collision, it would appear that nearly two minutes may have been made up between Cheltenham and Ashchurch, representing an average speed of about 48 miles an hour, the collision having taken place just after 9.1 p.m.

On the previous journey that day, driver Crabtree with fireman G. A. Cleveley had worked the 4.40 p.m. passenger train, Derby to Gloucester, which arrived 24 minutes late, viz. at 7.7 p.m., the wait at Gloucester before the commencement of the return journey in question having therefore been 1 hour 25 minutes. The hours of these two men were from 3.14 p.m. till 12.1 a.m., giving 15½ hours rest, and this was the second day on which they had so worked during this particular turn of duty.

Evidence of those in charge of the shunt movement.

Foreman Bunn is a man with 28 years service and has been at Ashchurch for 6 years. His account of what transpired was to the effect that at about 9 p.m.—he only knew the time by guessing as he had no watch—he operated the ground frame telephone bell twice, heard Horne’s acknowledging reply by the same number of bell beats; and, speaking first, said to Horne: “How is the fast mail running? We are ready to go to Ashchurch Junction with about 20 wagons on.” He at once received the reply “Right, come on then.” This was all that was said, and he exercised no pressure upon Horne. He received
no reply to his first question, which, however, was his usual way of intimating that he was ready to make the movement to the south yard; he did not hear Horne tell him to hurry, and for all he knew the express might then have been leaving Cheltenham.

On the other hand, he said there was no urgency for the movement, and had Horne told him how the mail was running, or had asked him whether it would have been quicker to clear the up line, or to make the transfer on to the down line, he would have said the former, as he could have released the frame in a few moments, the engine at the time standing on the lead of the connection just foul of the up line and occupying the track circuit. In fact all that was required, before releasing the frame, when the conversation took place, would have been to have moved the wagons back a few yards into the sidings.

Bunn, however, said that, having received permission to make the shunt, the engine commenced at once to draw the wagons out of the siding on his instructions, and they came to a stand on the main line clear of the connection about a minute after the conversation with Horne had taken place. He forthwith replaced the three levers of the ground frame (out-going signal, points, and "asking") when shunt signal G was promptly cleared, and Reynolds immediately commenced the backing movement. Bunn was closely following the engine on foot when he heard what he assumed to be the express approaching. He hand-signalled to Reynolds to expedite the movement; but immediately afterwards he heard a detonator explode, and when the collision occurred he was smothered in dirt; and, though dazed, was not hurt.

Questioned in regard to practice, he said that when ringing up the box to advise the signalman that he was ready to make this shunt, the wagons and engine were usually standing clear of the main line in the siding, in which case the track circuit indicator in the box would show clear; but there was of course no definite custom in this respect. He also thought that there was no unusual delay in making the movement on this occasion, having regard to the state of the weather; and he estimated roughly that from the time he spoke to Horne, four or five minutes elapsed before the collision occurred.

Shunter Rudd could only confirm that he heard Bunn speaking on the telephone to Horne to say that the wagons were ready to be transferred to the South yard; but he thought that when this conversation was taking place the final movement on to the main line was already in progress. He was standing near signal G when it cleared, and he gave Reynolds a hand signal. He did not have to use his whistle, and Reynolds subsequently told him that he (Reynolds) could see the signal from the engine. Rudd therefore said that visibility at that time, at the ground frame, at least corresponded to the length of the 24 vehicles, and he judged it to be 300 yards, viz. "somewhat hazy." Rudd got on to the engine as it passed him, and as the movement proceeded towards the station—slowly because the down line junction home signal at the south end of the platform could not be seen—range of vision considerably decreased. Foreman Bunn confirmed this by saying that when the previous up train had passed at 8.40 p.m. he had observed signal F from the ground frame, distant 325 yards, and conditions at the ground frame 15 minutes later were much the same.

Driver Reynolds also said that he observed both shunt signals G and H at a range corresponding to the length of the 24 wagons which he was propelling; but that visibility certainly decreased as the station was approached. He referred to the condition as a slight haze in the neighbourhood of the frame. He was unaware of the approach of the express, and was evidently taken by surprise.

Guard Gardener had walked on towards the station, ahead of the shunt, and was near the crossover when the collision occurred. He judged that visibility there was then limited to about 100 yards, and remarked that, since the arrival of his train at Ashchurch at 7.20 p.m., fog had been coming up in patches.

Calling out of the fogmen.

On the other hand, conditions in this respect on the south side of the station were evidently much worse; and Rudd, who lives a mile on the north side of Cleeve, and has been a shunter at Ashchurch for the last 10 years, spoke descriptively of past experiences when coming to work and when calling out the
fogmen. Owing to the presence of Pamington brook, which passes under the line near the up outer home signal, fog apparently comes across the valley and hangs about in dense patches. In the whole of his experience Rudd had never noticed it so bad as it had been this winter. Riding to work on his bicycle he had had to get down and walk many times after perhaps travelling for half a mile in clear weather. These conditions particularly prevailed in the neighbourhood of the stream, and, when calling out the fogmen several times, he had noticed "it has been clear as a bell when I have got a mile away in the direction of Tewkesbury."

Signalman F. Barnett of the Junction box said that the fog came up apparently from the Cleeve direction about 8.23 p.m. when he noticed that his up inner home signals (back lights) became obscured, distant 138 yards. He then sent control reporter G. T. Harrison, who was on duty in the box, to advise the station staff that the fog signalmen were required, viz. for the up distant and outer home signals, and at the box. At the same time he advised Horne in the Crossing box, and although Horne could see his fog sighting object, the down home for the Junction box, distant 116 yards, the latter wisely agreed that his fogmen should also be called at the same time. However, according to the evidence, up to the time when Horne left duty at 10 p.m., visibility at his post did not become such that fogmen should have been required, and this also confirms the evidence of Rudd and others as to the prevalence of dense conditions local to the south approach to the station.

In this respect driver Rudkin, of the first mail, said that in passing through Cleeve the weather was hazy; but as he approached Ashchurch where he stopped at 8.36 p.m., the fog became thicker and range of visibility of signals A, B, C and C (1), which were all in their clear positions for this train, amounted to about 50 yards. He said that all these signals were alight and showing well. Driver Spiers of a down goods train, which passed Ashchurch at 8.56 p.m., also considered that his view of the down advanced starter, which is located near signal B, was no more than 20 yards. Spiers passed the second mail about three-quarters of a mile on the north side of Cleeve.

In regard to the actual calling out of the fogmen, parcels porter Venn was advised by Harrison at 8.28 p.m. that the men were required. Venn left the station by bicycle at 8.40 p.m., after he had attended to the first mail. He reached the caller-up, sub-gauger C. Steel, who lives near the branch line in the Tewkesbury direction, about 1½ miles from the station, at 8.58 p.m., having had to walk part of the way owing to the fog. Steel, after getting his food ready, left his house by bicycle at about 9.15 p.m. He had six men to call, the round being 6½ miles, and he said it generally took him a couple of hours.

He went to plate-layer Stevens first, reaching his house at 9.23 p.m. Stevens, who is posted to signal B, left at 9.30 p.m. and bicycled 1½ miles to the Junction box, which he was able to reach at 9.48 p.m. and, being an ambulance man, he went at once to render what assistance he could. After traversing 4½ miles, Steel reached underman Rose's house at 9.55 p.m., Rose being the fourth man to be called on the round, and living a mile from the station. His post is the Junction box, which he reached at 10.20 p.m. The atmosphere was clear when he left his house by bicycle, but the fog delayed him on the journey, and he had to get off and walk.

Underman Hugman, whose post was signal A, was the fifth on Steel's round, and lives a mile away from Rose; but he had left by bicycle at 9.30 p.m. (viz., before Steel arrived) having been advised of the accident. He arrived at the Junction box at 9.48 p.m.—his house also being a mile from, and on the east side of, the station—and at once proceeded to his post, reaching there about 10.15 p.m. He found all three signals in their warning positions, and showing red lights, at a distance of 50 yards, at which he placed his detonators. He estimated he could have seen the lights at a range of 50 yards; but they were not particularly good as he thought the spectacles were covered with hoar-frost. He said that he had acted as foreman here half a dozen times, and could be at his post in 20 minutes after being called; but if he had to bring food with him it would take him half or three-quarters of an hour.
Subsequent Inspection by the Signalling and Electrical Staff.

Lineman Banner was the first man with any knowledge of signalling to arrive on the scene. He reached the Junction box at 10.30 p.m. (after signalman Barnett had been relieved) when, according to him, the weather was then clear. He tried to lock the signal, but noted that the up distant, outer and inner home, signal levers were normal, and that the repeaters showed "on." He walked up the line towards Cleeve and noted that all the signals at each location were in their danger positions and showing good red lights. He could see the inner homes from the site of the outer home and viewed the distant signal, where he met Huggins, at a range of 50 yards. He could also see at this time the outer home from the level crossing 450 yards away. He understood that signalman Barnett had placed a detonator on the up line in front of the express, and he found the exploded case next morning at the side of the 6-foot rail, 104 yards from the box, viz. 34 yards in advance of the inner homes. Banner had received no complaints in regard to the working of signals here while he had been in charge, a matter, however, of only a few days since the 1st January.

District Signal Inspector E. Elks arrived at the Junction box about 1.30 a.m. next morning, and similarly found all levers normal and the repeaters "on." He tested the mechanical locking in both boxes, as far as it was possible, and found it in order. The trailing crossover point lever No. 27, in the Crossing box, was of course in the frame. He sent his assistant to examine all the up line signals, and the latter reported all at danger and confirmed the previous evidence in regard to their lights. Mr. Elks had been in the district for 30 years and had known Ashchurch all this time. He had received no official reports or complaints in regard either to incorrect working or failure of any signals here; but soon after the Charfield accident he had heard rumours of an alleged failure about December 1927, and of another in October last year. He could make nothing of the former, and in regard to the latter he was not apparently concerned at the subsequent investigations which will be referred to hereafter.

District Electrical Assistant A. J. Ault arrived at 1.55 a.m. in the ballast train from the direction of Cleeve, and he then observed the junction up distant signal lights at a range of about 200 yards, the weather at that time being misty. At 2:30 a.m. he walked up the line to this location, examined the run of wire thereto by means of an acetylene lamp, and found nothing unusual. He was accompanied by a lineman who cleaned the spectacles of the three signals, and with reference to the opinion (already mentioned) of underman Huggins, who was also present, Mr. Ault hardly noticed any difference as the result. In fact he estimated that such hoar-frost as existed may have reduced visibility by no more than 10 per cent.

He was the first to make tests of the electrical repeater apparatus. He ascertained, by inserting a milliammeter in the circuit at the post, that when the arm was depressed 3° from the horizontal the instrument in the Junction box should show "failed," and that when the arm was at 40° from the horizontal the instrument should have shown "off." He returned to the box and had the arm thus moved at the post three times to the above-mentioned positions, while he observed the repeater operate correctly on each occasion. He also carried out similar tests in connection with signals B and C. At the same time Mr. Ault noted that the light repeaters in the Junction box were indicating satisfactorily. At 2:00 p.m. on the 9th, he tested the interlocking block instruments in connection with the inner home, and found the locking in order. These tests satisfied him that the electrical equipment was in proper working order, and he added that he had received no reports of fault or failure in regard to any of the apparatus concerned in this case. The station has been part of his charge for 5½ years.

Evidence of Signalmen.

Signalman T. Harrison of Cleeve received the "out of section" signal from Ashchurch Junction for the first up mail at 8.36 p.m. The next train on the up road was the 7.20 p.m. mail which he accepted from Cheltenham High Street at 8.46 p.m. and received the "entering section" signal at 8.56 p.m. He received "line clear" for this train from Ashchurch Junction at the latter time and the train passed his post at 8.59 p.m. travelling at its normal
speed, which he estimated as 50 miles per hour. He transmitted the "entering section" signal at this time; but, as he did not receive "out of section" for it, he telephoned at 8:10 p.m., and was then advised of the accident. Harrison stated that when the train passed through Cleeve there was a little haze in both directions, but he could see his up starting signal, distant 350 yards. At 8:45 p.m. his fog sighting object, the down home (distant 215 yards) became obscured, and he sent for the fogmen. However, five minutes later it was clear, though at 10 p.m. the fog came on again, confirming therefore the previous evidence as to its patchiness and drift, which Harrison thought was from west to east.

Signalman T. Barnett, of the Junction box, has 42 years' service, has been a signalman for 39 years, and at this post for some 18 years. As already mentioned he had called out the fogmen at 8:25 p.m. His evidence was to the effect that the first up mail was accepted at 8:28 p.m., he received the "entering section" signal for it at 8:32 p.m., and offered it forward to the Crossing box at the same time. Horne, however, not having obtained the release of the ground frame, was not in a position to accept the train till 8:33 p.m., when Barnett noted the operation of his brass indicators that Horne had pulled over the two levers in the Crossing box working the controls on signals C and C (1). Barnett at once pulled over his levers working signals C, B and A, and noted by observation of the repeaters that the arms of B and A and the weight bar of C had obeyed the levers. He was quite certain that the instruments were then operating correctly.

The train arrived at 8:36 p.m. Barnett said he placed the lever of A back in the frame after he saw that the indicator relating to the track circuit at B showed "occupied"; and his emphatic evidence was that he again observed his repeater, which indicated that the arm of A had obeyed the lever and had returned to its warning position. He similarly replaced the levers of B and C to normal and noted that the repeaters also actuated satisfactorily. He could of course see none of these signals at the time. He received the "out of section" signal from Horne for this train at 8:40 p.m., and before the ground frame E could be released once more, as has already been explained, Horne had also to replace to normal his levers relating to signals C, C (1), D and F.

Barnett's evidence in regard to the second mail is as follows:—He was offered and accepted the train under Rule 3 at 8:55 p.m. and he received its "entering section" signal at 8:58 p.m., but in then offering it to the Crossing box, it was not accepted. In view of this refusal, the existence of fog, the absence of fogmen, the distance between the two boxes, and the fact that he knew then that the shunt was in progress, he immediately left the box with detonators and his hand lamp to carry out Rule 85. He went up the line in the direction of Cleeve and reached the overbridge when he heard the express approaching. In the position described by lineman Barnett—34 yards in advance of signal C—he placed one detonator (duplex type, dated 1926) which he heard explode, but he slipped on a sleeper owing to ice, and did not have time to place a second further on. Prior to this he was exhibiting a red light, and immediately after he slipped the train passed him—with steam apparently applied—at its usual speed of 50 to 60 miles an hour. He could give no idea as to the range at which he was able to see it. He noted the time when he got back to the box at 9:2 p.m.; but having regard to the delay in his return, the speed of the train, and the distance from Cleeve, the actual time of the collision was doubtless nearer 9:1 p.m.

On reaching the box, the first thing Barnett did was to look at his repeaters in connection with signals A, B and C. They were all still showing "on," and he at once drew control reporter Harrison's attention to them. Harrison confirmed this by saying that all the levers were normal, that he had not touched them while Barnett was out of the box, and that he observed the instruments perhaps three or four minutes after the collision. Barnett stated that usually the train is accepted by the Crossing box, and it is therefore very rarely checked when approaching Ashchurch. He recollected one occasion a month or two previously when it was held up for five minutes.

Horne, of the Crossing box, has 23 years' service, has been a signalman for 17 years, and has served at Ashchurch since May last. He confirmed the acceptance, arrival, and departure times of the first mail; as also the return of
his signals to danger and the operating of the corresponding repeaters C and C (1) to their "on" positions. Thereafter, as already explained, he released the ground frame at the request of foreman Bunn, and the following account describes the circumstances in which the shunt in question was permitted to be made:—Immediately after the acceptance of the second mail at 8.55 p.m. Barnett rang up Horne on the telephone and said "I have got the 7.20 p.m. from Bristol signalled," Horne replying "All right." This information was given to Horne in accordance with usual custom so that he could clear the up line if occupied, and he had received no previous information in regard to the running of the train.

At that time the down goods train was passing, and Horne received the "out of section" signal for it from Barnett at 8.56 p.m. Horne thereupon offered the shunt to Barnett, who accepted it, both registers agreeing in this respect. Barnett thus became aware for the first time that this movement was to be made; but, as is evident, his acceptance of the express a minute earlier, under Rule 3, in accordance with his instructions, was in no way prejudiced, and there was no reason for action on his part. In fact, Barnett said it often happened that a shunt of this kind was offered to him by the Crossing box after he had advised the signalman there of the acceptance of this mail; but this was the first occasion it had occurred in fog before the fogmen had arrived.

On receipt of the message from Barnett, Horne apparently observed his indicator relating to the track circuit in rear of signal E, and noted that it showed "occupied." He proceeded at once to ring the bell to the ground frame, four times in accordance with the code, "to intimate to the staff there that I required the up line clearing." However, as he was ringing, Bunn appears to have simultaneously operated his bell push, with the result that Bunn did not hear the four rings. Compared with Bunn's evidence, already given, Horne's account of the conversation is that Bunn spoke first saying "We are ready to come back." Horne replying "Come back as quickly as possible." Horne stated that nothing further was said, and that he made the decision to shunt at that moment. His recollection was that after he had received Barnett's acceptance for the movement he turned from the block instrument and replaced the ground frame control lever, the frame thus being cleared within, he thought, half a minute of his conversation with Bunn, viz. at about 8.56½ p.m.

Horne said that there was no delay in closing the frame, setting the crossover and clearing shunt signals G and H; but he contended that there was considerable delay in respect of the subsequent movement towards the station, which, according to him must have taken minutes to traverse the short distance of 300 yards, assuming that the collision occurred at 9.1 p.m. He thought that this delay must have been due to the state of the weather.

In spite of his apparent intention to clear the up line by setting back the vehicles into the sidings, he suggested that his decision to make the shunt was taken because—having seen that the track circuit was occupied—he assumed that the vehicles were on the up main ready to come back, and that it would have been as quick to move them through the crossover road to the down main as into the sidings again. In fact he went so far as to say that he thought it would have been quicker. It will be noted that he failed to take the obvious step of verifying this with Bunn, and the point, therefore, can hardly have weighed with him at the time.

On the other hand, when questioned, his statement on the subject was as follows:—"I cannot say that Bunn insisted on the shunt being made or that if I had desired the wagons to be put back into the siding I should have had any trouble. The shunt had got to go down to the junction and had I wanted it inside there might have been an argument." At the same time he recognised that the frame could only remain in use at his pleasure, and contrary to Barnett's evidence he said that he had worked like this before in foggy weather.

Evidence of 7.20 p.m. mail train staff.

Rear guard E. Whittemore, of 35 years' service, had worked this train in his turn for three years, during which time he had known driver Crabtree. When the engine was attached at Gloucester he tested the brake in his van (the last but one from the rear) and found it operating satisfactorily. The run to Cheltenham in clear weather, and the stop there, were quite normal. After leaving
Cheltenham he was sorting letters and parcels and did not look out at Cleeve, which he estimated was passed at 60 miles an hour. Thereafter, when standing at his rack, finishing his work, he felt a full brake application. He was not particularly surprised and did not at the moment look out; but a few seconds later he was thrown to the floor. He judged very roughly that the brake was applied as the engine was passing the Junction box at this speed; the collision, he thought, taking place at 50 miles an hour. In rendering assistance subsequently, he made use of the ambulance material and appliances in his van, as also of the two emergency oil lamps provided for the purpose.

Fireman F. C. Molson was completing his day’s turn of duty, and was returning to Derby, after joining the train at Cheltenham. He was riding in the fourth vehicle, and fortunately escaped. Though injured and severely shaken, he went back to the Crossing box, satisfied himself that the obstruction was protected in both directions, and subsequently rendered conspicuous service in assisting passengers. To the best of his recollection he thought the brake was not applied previous to the collision, nor did he hear a detonator explode; but he was engaged at the time throwing mail bags across the van.

Fireman Cleveley is 25 years of age, has been in the service for 10 years, and has served in his present capacity for 7½ years. He had been working with driver Crabtree on the London, Bristol and Manchester link since July, 1928, running between Derby and Gloucester 4 weeks in 13. This was their second trip on this particular turn of duty, the last previous occasion, when they had been over this route, being on 24th November.

Such knowledge as Cleveley had of the road had been gained on the link referred to during the last six months, and also while firing on goods trains for the same period four years ago. He could describe the signals approaching Ashchurch, and knew they were on the left of the line; but he did not know the road well enough (in respect of the relative positions of bridges, level crossings, etc.) to be able to locate himself in relation to these signals in fog.

As will be realised, Cleveley also had a remarkable escape and was badly injured and shaken. He gave his evidence very well, and to the following effect:—The out-going run had been quite normal and during the wait at Gloucester of 1¾ hours, the engine was turned, the fire cleaned, Crabtree effected his general examination, oiling, etc., both men had their food, and neither left the engine.

Following the short run from Gloucester, the stop at Cheltenham—where it was inclined to be hazy—was made as usual, and the last words spoken by Crabtree were when he inquired in regard to the guard’s signal before starting away. Cleveley commenced building up the fire at once, putting on perhaps a dozen shovels full and sweeping up afterwards in his customary manner. He tired with the top door down, opening and closing only the bottom door, and he did not think that glare could possibly have affected Crabtree’s vision, having regard to the position in which Crabtree stood on the right-hand side of the footplate. There is moreover a shield on this side of the fire door, which I noted when examining the foot-plate arrangements.

Cleveley said that when approaching Cleeve, where visibility was much the same as it was at Cheltenham, they were both looking out, speed being normal at the time, and judged as 40 to 45 miles an hour. Cleveley saw a green light, drew his head in, and looked at Crabtree, who also turned round and nodded in his usual way. Cleveley assumed that this was the Cleeve distant signal, and forthwith proceeded to fire again. He put on five or six shovels full round the back of the box and a couple in front, sweeping up again afterwards. He thought this occupied about a minute, and thereafter, while looking out again over the side, Crabtree doing the same, he thought the fog seemed to be getting thicker.

Cleveley then looked at the pressure gauge—one injector having been on during the run from Cheltenham—and decided to fire again, his practice being the sound one of “little and often.” He applied three or four shovels full on this occasion, Crabtree he thought still looking ahead outside the cab. He estimated that this took half a minute, and, on completion, he immediately closed the fire door again and looked out, to realise that the fog seemed quite dense.
His statement of what transpired is as follows:

"I had not had my head out many seconds when we ran over a detonator. I shouted 'whoa' and my mate put on the brake at once. When I heard the detonator I was looking forward with my head out and continued to look forward with my head out. I did not even look round at my mate and cannot say what he was doing, but I heard the brake go on. I heard the brake directly I shouted. Crabtree did not say anything. I am certain my mate was standing up at the time. Immediately after the brake went on, I saw the lights of Ashchurch platform and immediately after that the collision occurred. I saw the signal (D) against the water crane, which was showing a red light. This was the only signal I saw after passing the green light at Clevee."

Questioned in regard to this statement, Cleveley, when timed by watch, estimated very roughly that about 20 seconds elapsed from the moment when he closed the fire door on the last occasion till the collision occurred. If this is correct, having regard to the speed of the train, it seems likely that he did in fact look out a few seconds before the inner homes were reached—his vision at that moment no doubt being adversely affected as the result of his last firing operation. But previous to that it seems clearly probable that he was actually engaged in his work while the distant and outer homes were passed. I assume, in fact, on his evidence, that he commenced to fire on the last occasion when in close proximity to the former signal.

Cleveley was emphatic in thinking that Crabtree did not make a practice of depending upon him to view signals. Indeed, Crabtree's custom was to cross the foot-plate when distant signals came into view on the fireman's side first; but he did not do so on this occasion. This had no significance to Cleveley at the time, as he had entire confidence in Crabtree. Moreover, as the line is straight, there would normally be no difficulty in seeing the signals here, and therefore there was no necessity for Crabtree to shift position. On this occasion also, Cleveley failed of course to receive the usual nod; but according to his explanation, up to the time the detonator exploded, he was imagining that the distant signal was still being approached. He did not therefore expect the nod, and not having seen the signal himself, he did not turn to look at Crabtree.

In fact, until he realised the situation, Cleveley apparently thought, when he shouted, that the detonator indicated that the distant signal location had been reached, and his evidence makes it clear that, so far at any rate as he was concerned, he had certainly failed to locate himself when approaching this station.

Other evidence.

In this connection, driver Rudkin (stationed at Saltley), of the previous mail, said he had passed through Ashchurch for 20 years, in charge of all classes of trains, at all times of the day, and in fog conditions. He explained in the following words what is no doubt the method by which drivers, approaching on the up road, locate themselves:

"There is an overbridge about half a mile before getting to the level crossing with a gate house on the right-hand side. No sooner do I pass this gate house than I am on the distant signal about 150 yards away. After this signal, there is another level crossing with a gate house which is on the left side. After that I look for the bridge by the siding, the outer home signal being nearby. I also get a good idea of the position of this signal by the distance I have come from the last gate house. There is nothing else I know of which gives me my location. If I had passed the bridge on the Cleeve side of the distant signal, and I had not picked up the distant signal, I should treat it as at danger."

Questioned as to his experience of viewing signals generally and of locating these particular landmarks in relation to whether he was driving a left or right-handed engine, his preference was for the latter type, to which he was accustomed; but, knowing both, he was strongly of the opinion that no more difficulty existed (by moving across the foot-plate when necessary) in observing signals with one than with the other, and similarly he considered that both were equally good for locating landmarks.
I refer to this point as the fact was stressed at the inquiry that Crabtree had a right-handed engine on this occasion, whereas he had been recently dealing with a left-handed one. Lieut.-Colonel H. Rudgard, Assistant to the Motive Power Superintendent, pointed out that Crabtree had been mainly used to the former type (the one concerned in this case), and the records show that during the previous six months he had handled this type for the greater number of times, though on the day before the accident and during the week previous to that (on a London service) he had had No. 933, a left-handed engine.

Colonel Rudgard, however, thought that this feature did not materially affect the capability of a driver to locate his position in fog, as, by experience, such landmarks should be impressed on the mind, and he confirmed driver Rudkin's evidence in saying that the bridge and level crossing concerned in this case were so used. In fact, he would have expected Crabtree, who had worked over this road for the last five years, to have thereby been able to know where he was in relation to the distant signal, when approaching Ashchurch on this occasion.

By a coincidence, when joining for duty on the date of this accident, Crabtree had been seen by deputy-foreman Hall at Derby, and had signed a new road card; and after making certain alterations, he initialled it, as required, to certify his knowledge of various sections of line, including the route in question. I understand that Crabtree had also signed on another recent occasion as having made himself acquainted with the Regulations referred to in Appendix W, the Motive Power Superintendent having only, as recently as 12th November, specially drawn the attention of all drivers to the Notice.

Crabtree's eyesight had been tested in August, 1924, when it was found to be satisfactory, and having attained the age of 60 on the 29th September last, he was on the list to be examined again in accordance with the agreed procedure.

Crabtree had nearly 39 years' service and had been registered as a driver since 10th January, 1908. Colonel Rudgard had known him for 20 years and said he was an efficient engineman, experienced in high-speed work, posted to the chief link at Derby, operating expresses to and from Bristol, Manchester and London. There is also satisfactory evidence that Crabtree was in normal health, and competent to handle the train in question.

Summary of evidence.

The foregoing evidence shows that:—

(1) When the second mail entered the section at Cleeve, distant 3½ miles, under full line clear, the vehicles and engine forming the shunt were on the up main line and about to move back towards the station with the trailing crossover No. 27 set.

(2) Clear signals at Cleeve, where there was only a slight haze, had been seen by both enginemen, and the express approached Ashchurch at about 60 miles an hour. A patch of dense fog, however, existed on the south side of the station, the fog signalmen had not arrived, and visibility was reduced in this locality to no more than 20 to 50 yards, smoke from the down goods train which had just previously passed, possibly making matters worse.

(3) Fireman Cleveley may have been actually firing when signals A and B were passed; but if not, he was looking out, and having little or no knowledge of location, failed to observe them, as well as C; and was, according to his account, still thinking that A was being approached, when he heard the detonator, shouted, and the brake was applied by Crabtree, Cleveley immediately observing D at danger.

(4) The Junction box signal levers A, B and C had been replaced by 8.36 p.m. when the first mail arrived, signalman Barnett having, according to his evidence, noted by observation of their respective repeaters that all the arms had duly responded.

(5) The Crossing box signal levers C, C 1, D and F had similarly been replaced by 8.40 p.m., or soon after in the case of the two last-named, and their repeaters also confirmed this.

(6) None of these levers was again moved before the accident took place, and immediately afterwards the repeaters still indicated that
signals A, B and C were at danger. In fact, having regard to the locking, which has been described, it was impossible to pull levers D and C while the shunt was in progress, and therefore levers C, 1, and A also remained locked; and finally,

(7) All signals at A, B and C locations were observed to be at danger and showing good red lights about 1½ hours after the accident. They are fitted with long burning lamps.

Investigation of Alleged faulty working of Signals.

On such evidence, and as the result of inspection apparently revealing nothing defective in the equipment, it would not be unreasonable to conclude that driver Crabtree, having unfortunately failed on this occasion to observe the warning indication of signal A, disobeyed danger indications at B, C and D. But, as the result of the accident in this vicinity last and the subsequent trial of the driver concerned, much attention has been paid, and quite rightly, to any instances in which it has been thought by drivers or others that defective or incorrect signal working had taken place.

In consequence, a number of complaints of this nature have been brought to notice during the last few months; and no doubt they included a proportion of "danger-side failures" which had occurred temporarily or otherwise, some of the cases taking the form of the distant signal showing a clear indication while the stop signals ahead were at danger. Whether such failures— for which, of course, all mechanical and electrical apparatus is liable—have been found to occur to a greater or lesser extent than has been normally noted in the past, is not relevant to this inquiry; but it is desirable perhaps to describe the circumstances in which they may usually be expected to arise.

Apart from interference of wires by ill-disposed people, provided the locking in a frame is correct and in order, "failure" in respect of a signal, which is worked mechanically by one wire, may be generally assumed to come about by the arm not returning to its horizontal position when the lever is replaced to normal. This may be caused by wire contraction, wire jamming or being subject to excessive friction as the result of frost or contact with obstruction, insufficient counter-weighting, etc. Or again, a stop signal wire may break, so that the arm, in remaining at danger, would fail to respond to the lever when pulled, with the result that the distant signal might subsequently be lowered. Such incorrect indications, however, should of course be noted at once by the signalman, following observance of the electric repeating apparatus which is installed to assist him for this purpose. He has also the usual means at his disposal by which the length of the wire may be adjusted, should be consider, for instance, due to drop of temperature, that undue contraction has taken place. Factors therefore such as the conscientious scrutiny by the signalman of the repeater, his truthfulness, and the reliability of the repeater equipment itself also bear on the question. Thus many avenues exist whereby suggestion is liable to throw suspicion upon not only the mechanical and electrical equipment, but upon the fallibility of the signalman concerned.

At my adjourned inquiry on 17th January, the representative of the Associated Society of Locomotive Engineers and Firemen, to which driver Crabtree belonged—in support of a theory that the distant signal on this occasion may have been hanging off and may have returned to its warning position as the result of vibration when the train passed—stated that his Society's attention had been called to recent complaints relating to the incorrect working of signals. I decided, therefore, to investigate these matters, so far as Ashchurch was concerned, and at my request the names of the various complainants, and all available particulars were forwarded to the Chief General Superintendent and also to me.

In all, six cases were thus submitted, and the Company's officers forthwith made searching inquiries into each, examining a large number of witnesses, including a number of the Ashchurch signalmen, whose evidence I also heard on the 31st January. It transpired that two of the cases went back as far as the autumn of 1927, and two to some time during the last four months of 1928. the
dates of the alleged occurrences being quite indefinite. The remaining two related to the 16th and 20th October last, immediately following the Charfield accident.

None of these cases, however, had been brought to the notice of the Company's officers prior to my adjourned inquiry, except the last-named. Even that case was not heard of at Headquarters until the 20th November in connection with the above-mentioned trial, when steps were at once taken, and a local inquiry was held on the 5th December. Even at that inquiry, I understand that no mention was made by any of the witnesses, some of whom were concerned in both cases, of the faulty working which was said to have occurred four days earlier on the 16th October.

The two oldest cases were based on the statements of two drivers who are brothers, one referring to signal A, and the other, on two consecutive occasions, to signals C and C1, the dates respectively being after the Crossing box was opened in October, 1927, and either before or after that time. Both men said that they reported to one signalman at the Junction box; but contrary to their instructions, had not carried matters further on either occasion. Altogether nine witnesses were heard; but the evidence was so contradictory that it is impossible at this late date, having regard to the absence of reports from any of the men concerned, to form a definite opinion as to whether irregular signal working had taken place or not.

The next two cases, of the autumn of 1928, referred to the working of signal C1, which was said to have been in its warning position when A was clear, neither of the drivers concerned thinking at the time that this was a matter for comment. In fact it was only the result of discussion following this accident that caused these cases to be brought forward. Six witnesses gave evidence. Two of the signalmen had not heard of such a thing, but two others had known it to occur once or twice—probably before the Crossing box was opened—the lineman, when called, attending to the signal at once. It will be realised, of course, that these are not instances of failure on the side of danger, the slot weighting being necessarily adjusted to a minimum, with a bias against the arm assuming the clear position. Such cases, therefore, in which the arm may have stuck in the "on" position when it should have been "off"—resulting only in traffic delay—have no significance, except to illustrate further the failure on the part of those concerned to report the defect.

In the last two cases of the 16th and 20th October, signalman Barnett was concerned on each occasion. The first referred to a driver's complaint that signal A was clear when B and C were at danger, the second to A and B being clear with the Tewkesbury branch line inner home also clear. Barnett stated that he had no recollection of the first occasion when he himself operated the signals; whereas, when questioned, he admitted that the second case was brought to his notice by the driver concerned; but on that occasion, having just assumed duty, he was not responsible for operation.

In all there were 11 witnesses, and here again, after careful consideration, I am afraid that I cannot arrive at a definite conclusion, in view of the lapse of time, and failure promptly to report the occurrences officially, signalman Barnett and the linemen (Signals and Telegraphs) being just as responsible in this respect as the enginemen. I was impressed, however, with the statements of the latter, and, taking the evidence as a whole, I am inclined to think that they may not have been mistaken, particularly as the occasions immediately followed the Charfield accident.

In the experience of lineman Wood who had served at Ashchurch for 15 years, this distant signal had given no trouble beyond that which usually results—having regard to its distance from the box—from lack of wire regulation. This feature in itself, apart from the possibility of certain obstruction by material on the line at this time, and certain defects in alignment of wire to which the linemen also referred, may have been sufficient, at low temperature, to have detracted from the easy return of the arm to danger on the replacement of the lever to its normal position.

However, it is quite evident that Barnett was satisfied in his own mind, as the result of trial immediately after the complaint was made, that, on the 20th October at any rate, the signal and its repeater were working properly, and
the matter appears to have had so little significance to him that he could not remember the similar occurrence four days previously. But the fact remains that the linemen made examinations following both complaints, and being equally satisfied, similarly allowed matters to rest, in spite of the unusual circumstances. It is also quite clear that had the drivers not been content merely to advise Barnett of what they thought was a defect—and of course a serious defect—the rights and wrongs of both cases would have received prompt attention. The Rules on the subject are given in Appendix V.

The explanation that apparatus, whatever its nature, is found by the men immediately concerned to be working satisfactorily after a complaint has been made, is not acceptable. It is such equipment, wrongly thought to be in order, which may involve danger. On the other hand, failure on the part of a signalman to report officially a complaint made to him by a driver might be presumed to indicate that the irregularity could probably have been avoided had the signalman complied with Rule 58, Appendix VI.

It is appropriate to add here that the evidence of Mr. H. E. Morgan, Signal Assistant, Western Division, showed that out of the total cases reported, during the previous 100 days, only seven danger-side “failures” in which the distant signal had been “off” with the stop signals “on,” had been noted and dealt with on this division, which has a route mileage of 1,560, and includes 30,000 worked distant signals. Assuming an average of 25 movements (“on” and “off” being counted as one movement) this represents a record of something like one distant signal “failure” in 1.4 million operations.

Mr. J. Sayers, Telegraph Superintendent, also gave similar information relating to the extraordinary reliability of electrical repeater apparatus. He had taken out the figures for the last two years for the whole of the Company’s system, embracing 16,124 equipments, and had been able to authenticate only 22 cases on the danger-side, representing 1 in no less than 10 million movements. He had not the slightest hesitation in saying that, since their installation, the instruments at Ashchurch had correctly repeated the positions of the signals.

Special examination of signalling equipment.

With the above-mentioned complaints in mind, I made a detailed examination on the 1st February of both boxes, and of all signals concerned, underbolts, repeaters, runs of wire, etc. I was informed that the whole of the equipment was in the condition in which it existed at the time of the accident, with the exception that only routine oiling had subsequently been effected.

I tested and found all relevant locking correct and in order, and the repeater apparatus conformed to the Company’s latest standard. The runs of wire from the Junction box to signals A and B were straight, and at no point, except one near the box, were there any signs that unusual friction existed. The counter weights of both signals also appeared to be sufficient to ensure the return of the arms to danger under normal weather and working conditions.

The design is such that the travel of the wire at the lever is 22 inches and at the signal 8 1/4 inches, leaving 13 3/4 inches of slack. In 1,500 yards of this wire, a variation in temperature of 20° results in expansion or contraction to the extent of 7 inches, the difference being capable of adjustment in the usual manner by means of the regulators which are provided for signals A and B. In the case of A, a very severe test was made by relieving all tension when the lever was normal in the frame, and then taking up as much as 28 or 24 inches of slack, equivalent to a variation of temperature of more than 60°. Even then the signal could be worked, the arm, as indicated by the repeater, only failing to return fully to the horizontal when the lever was moved back slowly.

With the exception, therefore, of the one point where a little unnecessary friction was taking place in the run of wire, and the fact that a post or two carrying the wires required renewal, I could find nothing which appeared in any way likely to affect adversely the proper operation of the signals in question, and all, with their repeaters, were working entirely satisfactorily. Moreover, as I have previously stated, there had been no complaints in this respect since those referred to immediately after the accident at Charfield.
Conclusions.

(1) I think there is no justification, therefore, for supposing that any of the equipment on the 8th January was incapable of performing its functions accurately, provided wires were properly adjusted and levers were worked in the usual manner. Nor is there any suspicion of sabotage, or unauthorised interference. The question then for decision is whether, after the passage of the first mail at about 8.36 p.m., signalman Barnett did in fact obey Rule 58, and observe the movements of his repeater instruments while he replaced levers A, B and C, thus assuring himself that the arms of these signals truly returned to danger.

His evidence depends solely upon his "confirmed habit" in this respect. But, as there was nothing at the time to rivet his attention particularly upon these instruments, the point is open to doubt. Hence the suggestion that the arm of A, for instance, may then have been left hanging off, and that vibration, resulting from the passage of the second mail some twenty-five minutes later, was sufficient to overcome friction and cause the arm to assume its correct position. There is, I think, no question that all the signals were at danger immediately after the accident, when Barnett reached the box; but his instruments then had a special significance to him.

It follows that a state of affairs, such as is suggested, could only have arisen as the result of one or more of the factors already mentioned, which affect operation at a distance from the box, but which, with apparatus in good order, are all within the signalman's control or capable of being noticed by him, viz. incorrect wire regulation under change of temperature, increased friction at pulleys and joints due to the action of frost, unduly slow replacement of the lever, etc.

In regard to the first named, Barnett had certainly not found it necessary to make any adjustment since he came on duty at 2.00 p.m.; and, unlike his colleagues, it was not apparently his custom to make frequent use of his regulator. But he is a man of long experience; he was at least aware of the report made to him on the 20th October, and he also subsequently informed his mate of the circumstances of that case; he was presumably alive to the significance of the suggestions made during the proceedings before the magistrates following the accident at Charfield, and he was interrogated on the subject at the Company's inquiry on the 5th December. It is unlikely, therefore, that he would have been so negligent as to disregard his repeater instruments, particularly on a very cold night. Moreover, he had had no difficulty since the above-mentioned occurrence, and certainly not during the afternoon in question. There is no one to refute his emphatic evidence, and, though it cannot be regarded as an impossibility, particularly in frosty weather, an authentic case of a signal arm assuming its proper danger, from a false-clear, position, as the result of vibration by a passing train, must be very rare.

In view, therefore, of what I have seen, of the improbabilities and lack of proof to the contrary, and of the fact that this is not a box in which work is so heavy that a signalman's attention might be deflected from his important duty of observance of his instruments, I can hardly conclude otherwise than by accepting Barnett's evidence, viz. that all the signals in question were displaying their proper danger indications when the second mail approached.

(2) The regrettable death of driver Crabtree precludes direct evidence in regard to the circumstances in which he thus failed on this occasion to obey these indications; and, so far as he was concerned, it is only possible to surmise what happened. In the first place, it is difficult to understand how he could have failed to locate himself, when approaching the station. There was firstly the short curve, which might have been noticed at speed, then the overbridge, then the two level crossings with the gate houses on either side, and, lastly the sidings full of wagons on his side (the right-hand) of the line. Yet all these landmarks were passed, as well as signals A, B, and C, before his attention was drawn to the situation by the explosion of the detonator and Cleveley's shout.

In my opinion the type of engine had no material bearing on the point; but Colonel Rudgard's description of Crabtree as a "stolid, slow-thinking man" probably indicates, more truly than anything else, the underlying cause of why the accident happened, and why, on the contrary, it would not have occurred had
a more actively-minded man been handling the train. Though an experienced driver with a good knowledge of this road, it would seem that Crabtree may not have been so receptive as others in accustoming himself to, and memorising, less significant objects, such as these, in relation to signal location.

I assume, too, having regard to the weather conditions at Cheltenham and Cleeve, that he was not anticipating any difficulty in viewing signals at Ashchurch. When, therefore, running at high speed, he entered the patch of dense fog on the south side of the station, it would appear that it must have taken him an unusually long time to realise the fact, darkness of course making perception in this respect infinitely more difficult and prolonged. If this were the case, he would have been expecting to view the three lights at location A in the usual manner, from the right-hand side of the footplate, and this was the reason why he did not alter his position.

Even if he became aware of the existence of fog and realised the possibility of experiencing difficulty in viewing these signals, hesitation for no more than 30 seconds, in regard to the time-interval relationship between this location and the bridge and first level crossing, would have brought him to the outer home, and therefore into the danger zone, before he realised it. A few more seconds, and matters were beyond recovery. The factor also of speed misjudgment in this respect cannot be overlooked, speed at the time somewhat exceeding schedule. It is also not unreasonable to suppose, as explained by Cleeve, that when the detonator was heard, Crabtree thought for the moment that he was still approaching the distant signal.

On the other hand, of course I recognise that it can be argued that he might have known where he was, and in obtaining a fleeting view of this signal in a false-clear position, he concluded that the stop signals ahead were clear. Or again, in noticing Cleeve’s action to resume firing when approaching the station, he may have assumed that Cleeve had sighted the signal in its clear position, and, having failed to see it himself, he thus incurred the gravest of risks, and failed unwarrantably to obey the rules, to which his attention had so recently been drawn.

In considering, however, these and other alternatives, there is the one predominant feature that Crabtree failed to apply the brake—the first thing a driver does when entering fog, particularly at high speed and in the vicinity of signals—until the detonator was exploded, 334 yards from the site of the collision and 1,380 yards in advance of the distant signal. Even then the application was apparently so slowly made that speed was not reduced to less than 50 miles an hour, having regard to the resulting wreck. That, to my mind, suggests very strongly that, for the short space of time referred to above, he had entirely failed to locate himself, though he had not appreciated the fact. Further, that he may not even have realised that he had entered fog, the density of which permitted of the very restricted view of only 20 to 50 yards, making observation of signals at a speed of 60 miles an hour exceedingly difficult. In my opinion, therefore, it must be assumed that he missed seeing signals A, B and C altogether, as the result probably of the transitory and mistaken impression that he was still approaching the first named.

In respect of Cleeve’s failure to assist on this occasion, I accept his evidence, and think it probable that he was actually firing when signals A and B were passed. In any case, his knowledge of the road and of landmarks, etc., in relation to the positions of these signals and the station, was not sufficient to have made him a reliable observer in bad weather.

(3) The shunt movement.—In regard to the shunt movement itself, it will be realised, as was the case at Charfield, that only very little more time was required before the obstruction in the path of the mail would have been removed, in which event this accident would not have occurred.

The evidence is somewhat contradictory. Horne, having said that his observation of the track circuit indicator made him think that the vehicles were on the main line ready to move back towards the station, nevertheless proceeded to advise Bunn by bell code that he required the up main line to be cleared. Yet, following the brief exchange of words on the telephone, he readily changed his mind without further consideration or attempt to ascertain from Bunn what the
position really was. Having regard to Bunn's evidence, and the speed at which
the movement was necessarily made, I am not convinced that the ground frame
was released as soon as Horne suggested, and I certainly cannot accept the excuse
that "argument" was to be anticipated had he insisted upon the return of the
vehicles to the sidings. Had this been the relationship between the two men it
would indicate failure on Horne's part to exercise the authority which of course
he possessed.

I think it is clear that he simply authorised the shunt to proceed in the usual
way, anticipating that there would be sufficient time to clear it before the mail
arrived. The passage of the goods train on the down line at 8.56 p.m. had
apparently no bearing upon the movement, nor did it affect the decision to make
it, or the time it was made. The salient fact is that Horne had been advised
a minute previously, at 8.55 p.m., that Barnett had accepted the mail, and it is
difficult to defend the decision, if only on the ground that delay to the mail
might thereby have resulted. But Horne had no evidence to show that the
fogmen had arrived at their posts, and he must have known from experience that
sufficient time had not elapsed to permit of their presence.

In my opinion, therefore, having regard to the weather conditions which he
knew prevailed at the Junction Box, distant only 170 yards, Horne not only
exercised poor judgment from an operating point of view, but is open to the
criticism of having failed to act with the caution which is expected of an
experienced signalman. In fact, he took an unnecessary risk, there not having
been any urgency for the shunt to be made. I do not suggest, however, that his
procedure, or that of Barnett, on this occasion, in any way contravened existing
Regulations and special instructions.

(4) Fog block working—Having regard to the existence of the outer home
signal D, the arrangements provided for the treatment of the short length between
these two boxes as a separate block section for operating purposes, in spite of
fog conditions and the absence of fogmen. This being so, once the "out of
section" signal had been transmitted by Horne for the first mail at 8.40 p.m.,
Barnett was authorised to accept the second mail under Regulation 3, irrespective,
and without the knowledge, of Horne's subsequent infringement of the clearing
point of "at least a quarter of a mile" beyond signal D, the transmission of the
"out of section" signal having been contingent upon this clearance.

On the other hand, had Horne been making a movement via the same cross-
over No. 27, for instance in respect of the transference of an up goods train to
the down line, in order to allow the second mail to pass, he would not have been
permitted, under Regulation 8 (b), to transmit the "out of section" signal for
the train until the up line had been cleared, in which case Barnett, if offered the
mail in the meantime, could only have accepted it under Regulation 5, in
accordance with Regulation 4 (e) and Clause 2 of his Special Instructions. It
is obvious that such a movement is similar to that which was taking
place on this occasion, and the Regulations, therefore, as they stood and as they
were being applied to this station, were illogical in regard to the operation of the
"out of section" signal in fog.

Or again, had Horne, before releasing the frame after the passage of the
first mail, been obliged to advise Barnett by utilising the "blocking back inside
home" block telegraph signal, that he was occupying the up line again, the
instruments would have been standing at "train on line," and Barnett would not
have been entitled to accept the second mail, otherwise than in the same way
and under the same special instruction. Had Crabtree thus been "warned"
at Cleve, as at least I think he should have been, this accident would probably
have been averted.

But to avoid it possible even this method of acceptance in fog, at any rate
before the fogmen have arrived at their posts, the mail, in my opinion, should
have been refused by the Junction box, and only accepted under Regulation 3
after it had been so accepted by the Crossing box, which in turn should have
been prohibited from thus accepting until the "out of section" signal had been
received from Bredon. In this manner, the two boxes at Ashchurch would be
treated as one block post, in the circumstances described, the fullest measure of
fog-block working being thereby imposed until the fogmen had taken up their
duties.
(5) Calling out of the fogmen.—On this occasion there appears to have been no avoidable delay in complying with the arrangements which had been made for this purpose, and it is quite clear that none of the men concerned could, in the circumstances, have been at their posts before the mail arrived, viz. within 28 minutes of the signalman’s decision that they were required. Procedure, however, which normally does not have the effect of permitting the full service in this respect to become available earlier than within 1½ to 2 hours, is open to criticism.

It appears that the policy of allocating a particular man to each fog signalling post rather than sending the first man who reports for duty to the distant signal, is liable to result in unnecessary delay in serving this, the most important, signal. In this instance the caller-up, who was unable to leave his house until three-quarters of an hour after the signalman’s instructions had been given, had to proceed 2½ miles before reaching the third man on his round, who lived at the level crossing gate house, only a quarter of a mile on the north side of the up distant signal. This man, however, was destined for work at the down distant signal, 1½ miles away from his house on the other side of the station, and the caller-up had to proceed for a further 3 miles before he reached the house of the fifth man on his round, whose post was the up distant signal.

Communication by telephone between the Junction box and the caller-up would facilitate matters, though, had it existed on this occasion, it would not, I think, have enabled even Stevens, the first man to be warned, to reach his post (the up outer home) in time. On the other hand, had the gatekeepers at the level crossings on either side of the up distant signal been thus connected to the box and provided with the necessary equipment at their houses, it is possible that both the distant and outer home signals could have been served by the time the train arrived. By such means also the accident might presumably have been prevented.

Summary, Remarks and Recommendations.

On the evidence, I consider that there are insufficient grounds for believing that, when the second mail approached, any of the signals concerned in this case were displaying other than their correct indications, viz., warning (red light) at A and danger at B and C. Having regard, however, to the high speed of the train and the abbreviated view (possibly no more than 20 yards), observation of these signals would in any event have been extremely problematical. Whether, therefore, a “false-clear” indication existed or not at A or B, driver F. T. Crabtree was responsible, in the absence of fogmen, for not having cautiously brought the train under proper control in accordance with Rule 143.

That this was not done, indicates, in my opinion, that Crabtree, though an experienced express driver, not only lost sense of location for a comparatively short space of time, but probably also failed to realise the situation, when, at night, unexpectedly entering thick fog covering the signal area on the approach side of this station.

The accident is therefore a serious reminder of footplate difficulties. The same alertness of mind and judgment, quickness of eye and hand, are not common to all. Momentary lapse or hesitation, resulting from psychological or physical factors, when operating at high speed, may neutralize all signalling safeguards. During the last 30 years, more perhaps has been done towards the protection of the signalman from error than towards assisting the driver in this respect. Weight of trains and power of locomotives have increased by 50 per cent., and more recent developments of block working procedure and signalling practice, with the object of attaining closer working while maintaining speed, add still further to the driver’s responsibilities.

(a) This is, therefore, another instance, similar to that of Charfield, which confirms the utility of Automatic Train Control, as affording, under modern conditions, desirable assistance to the driver, particularly when running in fog. A system like that which is installed at the distant signal on some sections of the Great Western Railway would assuredly have prevented this accident.

(b) In the meantime, pending the adoption of such, or other similar, means to this end, any departure from conservative principles of block working in fog, before the fogmen arrive at their posts, is to be deprecated. In framing the instructions applicable to Ashchurch, in spite of the close proximity of the two
boxes, the Company evidently considered that a suitable measure of safety existed in the circumstances described; but in view of this accident, I am informed that action has been taken towards ensuring more restrictive working, acceptance under Regulation 3 from Cleeve being now made contingent upon acceptance by the Crossing box. I recommend that corresponding consideration be given to other situations, where short sections exist.

(c) Had this decision not been arrived at, I should have suggested the introduction of the "blocking back inside home" block telegraph signal, for application when the ground frame is in use, or when a movement similar to that in question is being made. As already explained, in view of the working which had been authorised, this precautionary Regulation alone would probably have prevented the accident. I therefore again draw attention to it, as I did, for the same reason, in my report upon the accident which took place on the 3rd September, 1925, at Hope.

(d) I understand also that the organisation here for calling out the fogmen is being reviewed. The measure of expedition with which this service is put into operation must necessarily depend upon the sufficiency or otherwise of the traffic density obtainable under fully restrictive fog-block working. But in any case, on a line of this character, it is desirable to reduce to a minimum the period of time during which operation is carried on without fogmen, and I am sure that some improvement could reasonably be effected here.

(e) In regard to the alleged incorrect working of signals in the past at this station, there is reason to believe that, in two of the cases investigated, assuming the occurrences took place, the defect was on the side of safety; while the evidence in connection with the four other cases was so contradictory and the time which elapsed before attention was drawn to them so long, that it is not possible to assess definite responsibility. But this Inquiry did result in showing that such matters were not being reported officially, and this is certainly detrimental to the interests of the service and safe working generally. No doubt suitable action will be taken to ensure compliance with the Rules and departmental instructions on the subject, particularly on the part of drivers and the maintenance staff.

I further recommend that general attention be called to the necessity for strict observance of Rule 58. Having regard to the immunity from danger-side failure of signal and repeater apparatus itself, I think that the fallibility of signalmen in respect of compliance with this Rule may be a feature which has not been sufficiently realised. Following the cases of the 16th and 20th October, it is significant that no further complaints arose at Ashchurch, and this shows, perhaps more than anything else, that since then greater care was exercised to see that wires were properly adjusted and that signals obeyed their levers.

In connection with this subject, the adequacy of balance weighting is of importance, having regard to the increasing distance at which signals have now to be worked. In view also of the liabilities consequent thereon, I call attention to the security afforded by interlinking the distant signal with the block apparatus, the arm thus being proved in its normal position prior to acceptance of the train.

I have the honour to be,

Sir,

Your obedient Servant,

A. H. L. MOUNT,
Lieut.-Colonel.

The Secretary,
Ministry of Transport.
APPENDIX I.

**Derby Engine No. 1660.**

- Left trailing spring broken.
- Left bogie spring out of position.
- Bogie casting side bracket broken and frame stretcher bent.
- Right injector broken off, and feed and steam pipes both sides.
- Left brake cylinder broken.
- Brake gearing and hangers badly damaged.
- Three mud boxes broken and gearing and piping.
- Left piston rod bent.
- Three piston tail rod sleeves broken.
- Steel buffer plate bent and front rail plate torn.
- Foot plating bent and torn.
- Smoke box front and door and hand rail bent and torn.
- Ashpan, damper and gear bent.
- Exhaust cocks broken and gearing.
- Vacuum and C.W.A. pipes broken.
- Front draw bar bent.
- Cab damaged, and hand rails bent, both sides.
- Leading foot steps broken off and others bent.
- Rail guards bent.

**Tender No. 3965.**

- Right middle axle flange damaged.
- Leading wheels out of gauge 1/10 inch.
- Five axle boxes broken.
- Two middle axle boxes horn cheeks broken, right side.
- Foot plating bent and torn.
- One framing stretched and side plate bent.
- Life guards cut off.
- Water pick up casting broken off tank and gearing bent.
- Water pick up stanchion broken.
- Brake handle stanchion broken.
- Brake shaft and brackets broken.
- Four brake hangers broken.
- Intermediate draw bar and side links bent.
- Trailing draw gear broken.
- Footsteps bent.
- Vacuum and C.W.A. pipes broken.
- Feed bags broken.
- Brake gearing badly damaged.

**Gloucester Engine No. 3502.**

**Tender No. 9234.**

- Vacuum bag swan neck broken.
- Rail guard bent. Left side.

APPENDIX II.

<table>
<thead>
<tr>
<th>Order Vehicle</th>
<th>Class, Particulars and Special Fittings</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>on Train No.</td>
<td>L.M.S. 8-wheel Corridor Composite Brake.</td>
<td>Completely smashed.</td>
</tr>
<tr>
<td>1</td>
<td>Built at Wolverton in 1886. Steel underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solebars and headstocks 6&quot; × 3½&quot; × ½&quot; channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crossbars 10&quot; × 4&quot; × 1&quot; channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wood body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight 32 tons.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Length 57 feet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lighting—electric. A.V. brake.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ordinary buffers, with Spencer india-rubber springs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emergency tools, ambulance box, fire extinguisher and buckets.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 arcetylene lamp.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>L.M.S. 8-wheel Brake Van.</td>
<td>Completely smashed.</td>
</tr>
<tr>
<td></td>
<td>Built at Derby in 1896. Composite underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solebars 11&quot; × 4&quot; oak, reinforced with 11&quot; × 4&quot; × ½&quot; steel angles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Headstocks 19&quot; × 4&quot; oak.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crossbars 11&quot; × 4&quot; oak.</td>
<td></td>
</tr>
</tbody>
</table>
2 17 L.M.S. 6-wheel Brake Van.—Continued.
Wood body.
Length 31 feet.
Weight 13 tons.
Lighting—gas (2 cylinders).
A.V. brake.
Ordinary buffers, with 19-plate laminated springs.
Emergency tools, ambulance box, fire extinguisher and buckets.
1 electric, and 2 oil safety, hand lamps.

3 74 M. & N.B. 8-wheel Bogie Corridor Composite.
Built at Derby in 1907.
Composite underframe—
Solebars and crossbars 10\" × 4\" × \(\frac{1}{2}\)\" steel channel.
Headstocks 12\" × 4\" oak.
Wood body.
Weight 29 tons.
Length 54 feet.
Lighting—electric.
Dual brakes.
Ordinary buffers, with 19-plate laminated springs.

4 175 M. & N.B. 6-wheel Brake Van.
Built at Derby in 1908.
Composite underframe—
Solebars 11\" × 4\" oak, reinforced with 11\" × 4\" × \(\frac{3}{4}\)\" steel angle.
Headstocks 12\" × 4\" oak.
Crossbars 11\" × 4\" oak.
Wood body.
Weight 13 tons.
Length 31 feet.
Lighting—electric.
Dual brakes.
Ordinary buffers, with 19-plate laminated springs.
Emergency tools, ambulance box, fire extinguisher and buckets.
1 electric, and 2 oil safety, hand lamps.

5 597 L.M.S. 5-wheel Bogie Brake Van.
Built by Cammell Laird's in 1928.
Steel underframe—
Solebars and crossbars 10\" × \(\frac{3}{4}\)\" × \(\frac{3}{4}\)\" channel.
Headstocks 19\" × \(\frac{3}{4}\)\" × \(\frac{3}{4}\)\" channel.
Steel body.
Weight 96 tons.
Length 50 feet.
Lighting—electric.
A.V. brake and Westinghouse pipe.
Spencer shock absorbing buffers, with indiarubber springs.
Emergency tools, ambulance box, fire extinguisher and buckets.
1 electric, and 2 oil safety, hand lamps.

6 3126 L.M.S. 6-wheeled Parcels Van.
Built at Wolverton in 1899.
Composite underframe—
Solebars and headstocks 9\" × 4\" × \(\frac{1}{2}\)\" steel channel.
Longitudinals and diagonals 8\" × 3\" oak.
Wood body.
Weight 11 tons.
Length 30 feet.
Lighting—gas (2 cylinders).
A.V. brake and Westinghouse pipe.
Ordinary buffers, with Spencer indiarubber springs.

597 L.M.S. 5-wheel Bogie Brake Van.
Bogie damaged beyond repair. Steel body framing, panels, solebar, cant rail and a number of iron pillars on one side bent and buckled, a number of panels holed and a pair of folding doors torn off.

6 Damaged beyond repair.
<table>
<thead>
<tr>
<th>Order</th>
<th>Vehicle No.</th>
<th>Class, Particulars and Special Fittings</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Built at York in 1921.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steel underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solebars 10&quot; × 3\frac{1}{4}&quot; × 23·55 lbs. channel steel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headstocks 10&quot; × 3\frac{1}{4}&quot; × 22·21 lbs. channel steel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crossbars 10&quot; × 3\frac{1}{4}&quot; × 22·55 lbs. channel steel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wood body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight 14½ tons.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lighting—electric.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dual brake.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ordinary buffers, with Spencer's india rubber springs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emergency tools, ambulance box, two fire extinguishers and buckets.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 safety oil lamps.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4349</td>
<td>L.M.S. 8-wheel Corridor Third.</td>
<td>Completely smashed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Built at Wolverton in 1926.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steel underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solebars 9&quot; × 3\frac{3}{4}&quot; × \frac{1}{4}&quot; steel channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headstocks and crossbars 10&quot; × 3\frac{1}{4}&quot; × \frac{1}{4}&quot; steel channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wood body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight 30 tons.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Length 57 feet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lighting—electric.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dual brakes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shock absorbing buffers, with Spencer's india-rubber springs.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3944</td>
<td>L.M.S. 8-wheel Corridor Composite.</td>
<td>Completely smashed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Built at Derby in 1906.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composite underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solebars 10\frac{3}{4}&quot; × 4\frac{3}{4}&quot; oak, reinforced with 11&quot; × 4\frac{3}{4}&quot; × \frac{3}{4}&quot; steel channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headstocks 12&quot; × 4\frac{3}{4}&quot; oak.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crossbars 12\frac{3}{4}&quot; × 4\frac{3}{4}&quot; oak.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wood body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight 25 tons.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Length 50 feet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lighting—electric.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dual brakes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laminated buffer springs, with Spencer's shock absorbing buffers in front of headstock.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1883</td>
<td>M.&amp;N.E. 8-wheel Bogie Post Office Sorting Van.</td>
<td>All panels and framing on both ends, upper and waist panels on one side badly damaged. Two wood headstocks, two buffers and castings broken. Steam and vacuum train pipes, bolster centre pins and friction castings damaged, and both bogies displaced and damaged. No leakage of gas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Built at Derby in 1907.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composite underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solebars and crossbars 10\frac{3}{4}&quot; × 4\frac{3}{4}&quot; × \frac{1}{4}&quot; steel channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headstocks 12\frac{3}{4}&quot; × 4\frac{3}{4}&quot; oak.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wood body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight 24 tons.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Length 54 feet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lighting—gas (3 cylinders).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dual brakes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ordinary buffers, with 19-plate laminated springs. Fire extinguisher.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Built at Derby in 1907.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composite underframe—</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solebars and crossbars 10&quot; × 4\frac{7}{8}&quot; × \frac{1}{4}&quot; steel channel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headstocks 12&quot; × 4\frac{7}{8}&quot; oak.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wood body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight 25 tons.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lighting—gas (3 cylinders).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dual brakes.</td>
<td></td>
</tr>
</tbody>
</table>
Order Vehicle on Train. No. 11

M. & N. E. 8-wheel Bogie Post Office Tender.—Continued.

Ordinary buffers with 16-plate laminated springs.
Fire extinguisher and buckets.

12

M. & N. E. 8-wheel Bogie Parcel Post Van.

Built at Derby in 1899.
Composite underframe—
Solebars 10\(\frac{1}{2}\) × 4\(\frac{1}{2}\) oak, reinforced with 11\(\frac{1}{2}\) × 4\(\frac{1}{2}\) steel channel.
Headstocks 18\(\frac{1}{2}\) × 4\(\frac{1}{2}\) oak.
Crossbars 12\(\frac{1}{2}\) × 4\(\frac{1}{2}\) oak.
Wood body.
Weight 20 tons.
Length 48 feet.
Lighting—gas (2 cylinders).
Dual brakes.
Ordinary buffers with 16-plate laminated springs.
Fire extinguisher.

Wood headstock broken, two buffer castings and stepboard broken, leading bogie derailled.

13

L.M.S. 8-wheel Bogie Brake Van.

Built by Birmingham Carriage and Waggon Co., 1907.
Steel underframe—
Solebars and crossbars 10\(\frac{1}{2}\) × 3\(\frac{1}{2}\) × \(\frac{1}{2}\) channel.
Headstocks 14\(\frac{1}{2}\) × 3\(\frac{1}{2}\) × \(\frac{1}{2}\) channel.
Steel body.
Weight 25 tons.
Length 50 feet.
Lighting—electric.
A.V. brake.
Spencer's shock absorbing buffers, with indiarubber springs.
Emergency tools, ambulance box, fire extinguisher and buckets.
1 electric, and 2 oil safety, hand lamps.

Undamaged.

14

L.M.S. 9-wheel Bogie Brake Van.

Built at Wolverton in 1910.
Steel underframe—
Solebars 9\(\frac{1}{2}\) × 3\(\frac{1}{2}\) × \(\frac{1}{2}\) channel.
Headstocks and crossbars 10\(\frac{1}{2}\) × 2\(\frac{1}{2}\) × \(\frac{1}{2}\) channel.
Wood body.
Weight 23 tons.
Length 50 feet.
Lighting—gas (3 cylinders).
A.V. brake.
Ordinary buffers with Spencer’s indiarubber springs.
Emergency tools, ambulance box, fire extinguisher and buckets.
1 Acetylene lamp.

Steel headstock bent, one buffer casting broken.
No leakage of gas.
### APPENDIX III.

Section speeds 8.36 p.m. train Gloucester - Derby.

<table>
<thead>
<tr>
<th>Station</th>
<th>Time</th>
<th>Min.</th>
<th>(From Bristol)</th>
<th>Mite.</th>
<th>Blanked Speed M.P.H.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloucester</td>
<td>5.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheltenham</td>
<td>8.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ex-Cheltenham</td>
<td>8.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashchurch</td>
<td>8.57</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abbots Wood Junction</td>
<td>9.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dunhamstead</td>
<td>9.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromsgrove</td>
<td>9.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackwell</td>
<td>9.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selby Oak</td>
<td>9.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birmingham</td>
<td>9.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ex-Birmingham</td>
<td>10.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solihull</td>
<td>10.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Orton</td>
<td>10.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kingsbury</td>
<td>10.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamworth</td>
<td>10.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wootton Junction</td>
<td>10.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burton</td>
<td>10.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ex-Burton</td>
<td>10.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.S. Junction</td>
<td>10.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derby</td>
<td>11.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### APPENDIX IV.

**NOTICE TO DRIVERS AND FIREMEN.**

*Rules and Regulations with regard to the observance of Fixed Signals.*

Instances of signals being passed at danger occur from time to time owing to the drivers failing to carry out the Rules shown below, especially No. 143.

**No. 74.** The absence of a signal at a place where a signal is ordinarily shown, or a signal imperfectly exhibited, or the exhibition of a white light at a place where a red or a green light ought to be seen, must be considered a danger signal, and treated accordingly, and the fact reported to the signalman or station-master.

**No. 143.** The engine-driver and fireman must carefully observe all signals, and when from fog or falling snow, or from any other cause, the fixed signals are not visible as usual, the speed must be reduced, and every possible precaution used, especially in approaching stations and junctions, so that they may be able to stop the train short of any obstruction, should the signals be against them.

**No. 144.** In foggy weather, or during falling snow, the engine-driver must travel cautiously, keeping a sharp look-out for the fog-signalmen, who, will, if the signals are off, show him a green hand-signal held steadily in the hand. When the fog is so dense that the fixed signals cannot be seen by the engine-driver on approaching or passing them, he must, unless he sees the fog-signalman's green hand-signal, assume that the fixed signal is at danger, and act in accordance with rule 74.

*General Superintendent.*

Derby, December, 1921.
APPENDIX V.

Rule 58.—The signalman on duty must see that the points, signals, interlocking, electric and other apparatus are kept in perfect working order; and he must immediately report to the Stationmaster under whose supervision he acts, and to the Inspector of permanent way, or other person in charge of repairs, any case in which the points, signals, or interlocking arrangements are out of repair, or not properly cleaned and oiled; and the Station-master must, where necessary, telegraph the circumstances to the proper authorities. The signalman is responsible for exhibiting outside his signalbox the board prescribed to indicate the state of the electric and other apparatus connected with his signalbox, and he must immediately report any defect to the Station-master.

Rule 191.—(a) Should an engine driver or guard observe any irregularity in the working of signals, or should he see any cable or other obstruction on the line, or any defect in the signals, works, permanent way, or telegraph, he must report the same at the first station at which the train stops, but if the circumstances be of a serious character he must stop the train at the first signalbox to give information.

(b) The engine driver must, if necessary, also stop before reaching the signalbox to give information to platemakers or other servants of the Company.

(c) The engine driver must also, if he see cattle on the line, or observe anything wrong on the line opposite to that on which his train is running, sound his whistle and exhibit a danger signal to any train he may meet; he must also, when practicable, place detonators on the opposite line of rails.

(d) At the end of his journey, the engine driver must report the circumstance to his superintendent, or foreman, or clerk in attendance, and the guard must also report the case in his journal.

(e) Before booking off duty, the driver must report the state of his engine and tender.

APPENDIX VI.

Signals to be examined. Rule 58.—The signalman must satisfy himself that his fixed signals work well, are kept clear, and show properly. Care must be used in putting a signal to danger; it is not sufficient merely to move the lever, but the signalman must, at the same time, watch the signal so as to ascertain that it obeys the lever and goes fully to danger. Where a fixed signal is out of the signalman’s sight and its working is indicated by a repeater in the signalbox, he must satisfy himself by observation of the repeater that the fixed signal is working properly, and if a signal light repeater or indicator is also provided, see that the repeater or indicator shows the lamp is burning properly. He must also take care that the signal wires are kept properly adjusted by means of the regulating screws or links, so as to compensate for the expansion and contraction caused by variations of temperature.

Wires to be regulated.