

APPENDIX II.

DAMAGE TO ROLLING STOCK.

Brake third, No. 477 :—Two trans bent ; one bogie casting plates bent ; two buffer spring headstock bent ; two diagonal knees bent ; two brackets bent ; two buffer spindles bent ; three wooden diagonals broken ; two bogie centre window glasses broken ; one net rod bracket beams bent ; two bogie male castings broken ; two broken.

Copies of this Report were sent to the Company on the 23rd August.

LANCASHIRE AND YORKSHIRE RAILWAY.

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

SIR,

22nd May, 1913.

I HAVE the honour to report for the information of the Board of Trade, in compliance with the Order of the 3rd May, the result of my enquiry into the causes of the collision which occurred on the 1st May between two passenger trains at Sandhills, on the Lancashire and Yorkshire Railway.

In this case the 1.2 p.m. express from Leeds to Liverpool collided with the rear of the 2.58 p.m. electric train from Aintree to Liverpool on the down east line close to Sandhills No. 2 Signal Box. The driver and guard of the express were slightly injured and twenty passengers complained of slight injuries.

No wheels of either trains were derailed but the body of the rear car was lifted up off the rear bogie.

The express consisted of a 10-wheeled engine fitted with the automatic vacuum brake on the four coupled wheels and trailing wheels, and on the six wheels of the tender, and of the following vehicles, viz.: a 4-wheeled horse box and four bogie coaches, fitted throughout with the automatic vacuum brake.

The brakes in this train are stated to have been in excellent order.

The electric train consisted of five bogie cars, viz.:—

Motor	...	...	...	...	...	...	...	No.	3052
First Trailer	...	...	...	...	...	...	...	"	415
Motor	...	...	...	...	...	...	...	"	3053
Driving Trailer	...	...	...	...	...	...	...	"	3129
Driving Trailer	...	...	...	...	...	...	...	"	3100

all fitted with the automatic vacuum brake on all wheels.

The brakes were not working well on this train as will be described later.

The collision occurred at 3.16 p.m.

Details of damage to Rolling Stock are given in the Appendix.

Description.

There are four pairs of passenger lines approaching Liverpool at Sandhills No. 2 Signal Box, viz., two from the direction of Bank Hall and Southport, and two from the direction of Walton Junction and Manchester.

The former two pairs are known as the east and west lines, and the latter the north and south lines.

A short distance north-east of No. 2 Signal Box, the two pairs of lines from Bank Hall converge into a single pair of lines called the up and down west lines, and just opposite the Signal Box, the two pairs of lines from Walton Junction converge into a single pair called the up and down east lines.

There is also a junction between the up and down north lines and the west lines, viz., a facing connection in the down north line leading to the down west line through No. 42 points, and a corresponding connection from the up west to the up north line.

The home signals at No. 2 Signal Box for the down south and the down north lines are on a long overhead bracket 150 yards east of the Signal Box.

There is a road overbridge known as Stanley Road Overbridge, the centre being 300 yards east of the Signal Box. This bridge is about 28 yards in width, and prevents a

good view of the down north and down south home signals, the first sight of them being obtained when only 193 yards away from them.

The down distant signals are under the home signals for No. 3 Box, 216 yards outside the home signals.

As the sections between the adjacent Signal Boxes are so short, the usual rules as to the lowering of the distant signals are in force.

The gradient of the down line approaching Sandhills No. 2 from Walton Junction is a falling one of 1 in 304, changing to 1 in 574, falling at Stanley Road Overbridge to the Signal Box. The point of collision was 50 yards west of No. 2 Signal Box.

The brakes on these electric cars are normally operated at from 21 to 23 inches of vacuum.

The essential difference between this brake and the ordinary vacuum brake on a steam locomotive is that in the latter the ejector is in combination with the valve controlling the brake, and the movement of the handle operates the air and steam valves simultaneously, whilst in the brake for the electric trains, the electrically driven pump is quite separate from the driver's valve and is not started or stopped by any movement of the same. Therefore a deviation from the usual method of creating vacuum directly through the train pipe has been instituted, and the pump whilst running continuously is only connected to the train pipe when it is necessary to release the brake through the electrically actuated valve.

These E.A. valves on all cars of a train are connected in parallel and are all operated simultaneously by a switch situated on an extension of the spindle of the driver's valve.

The following instructions issued to motormen apply in this case :—

NOTICE TO MOTORMEN

When the pump fails on the leading car and the E.A. valve on the rear car cannot be lifted from the front car, motormen should take the E.A. valve fuse and brake control handle to the rear and put the driver's valve on the rear car in the equalising position, leaving the rear pump working continually through the E.A. valve on the train pipe. In this way the brake can be operated from the front. Should the E.A. valve also fail on the rear car the rear driver's valve must again be placed in the equalising position and the pump left working on the train through the bye pass in the driver's valve, the brake being still operative from the front car.

Motormen must use caution when working this, but they must understand there will be practically full brake power on all cars of the train.

Evidence.

John Smith states : I joined the service in December, 1890, and have been a signalman 21 years, and in Sandhills No. 2 box, five years. On May 1st, I came on duty at 2 p.m. to work until 10 p.m., and had worked the same turn the day previous. I have an assistant signalman and a booking boy to assist me. I received "Is line clear" signal from Sandhills No. 3 for the 2.58 p.m. electric train from Aintree to Liverpool at 3.5, accepted it same time, received "On line" 3.12, and the train arrived at 3.14. It was accepted by No. 1 Box at 3.5 p.m. but I cancelled it at 3.9 to give preference to the Leeds express, and I gave "Out of section" at 4.16 p.m. All my signals were at danger against the train which was on the down north line, and No. 42 facing points were lying for the down east line in their normal position. The 1.2 p.m. Leeds to Liverpool train was offered me at 3.8 but I did not accept it, and I accepted it at 3.12, first reversing No. 42 facing points, receiving "On line" at 3.14, and the train arrived at 3.16, "Out of section" being given at 3.58. It was offered to No. 1 box at 3.9 and accepted same time. The train was on the down south line, and all my signals were off for it. The 3 p.m. Aintree to Liverpool train via Linacre road was offered me by Bank Hall Junction at 3.11, but I did not accept it on account of the other Aintree train, but I accepted it at 3.14. I received "On line" at 3.14 and the train arrived at 3.15. It was accepted by No. 1 on the down west at 3.11 and left me at 3.20. "Out of section" given and received at 3.21 p.m. On accepting the Leeds express I set my No. 42 facing points from the down north to the down west and I pulled off Nos. 90 and 91 signals for the down south line.

I saw the electric train coming slowly and arrive at my home signal (86) at 3.14 p.m. Bank Hall had already informed me that the 3 p.m. train ex Aintree (via Linacre Road) was waiting my acceptance. I reversed 42 points and accepted it. This had the effect of setting my junction from down north to down east, which is the normal position of 42 points. Before I pulled off for the train from Bank Hall I noticed that the 2.58 p.m. ex Aintree was coming forward past my down north home signal which was at danger. I immediately threw on Nos. 90 and 91 signals against the Leeds express and reversed No. 46 points to prevent them being run through by the electric train. I gave no signal to the motorman of this train. I was afraid I might stop him, and I wanted him to go ahead. At this time the Leeds express was just in sight. The electric train passed my Box and the Leeds train, which had reduced speed considerably, came past my cabin and in contact with the rear of the electric train about 15 yards past the Canal Bridge. I then pulled off for the train from Bank Hall. I sent the "Obstruction danger" to No. 1 at 3.24 on the up east. The collision took place at 3.16. I looked out of the cabin and to the best of my belief and observation I satisfied myself it had come to rest, and when I accepted the Leeds train I had No. 42 points set for the down west. When I noticed the electric train moving forward I was some distance in the Box from No. 42 lever, and I had no time to reverse these points as the train was then on the lock-bar.

Edward Morley states : I have been in the service since June, 1894. 18 years a signalman,

and in No. 2 Box since September, 1906, as assistant signalman. I came on duty on May 1st at 2 p.m. to work until 10 p.m. and had worked the same turn the day previous. I did not see the 2.58 p.m. ex Aintree arrive at our signals, and my attention was first drawn to it by signalman Smith, saying "here's Aintree coming." I cannot say whether the train had ever stopped at the home signal, but I heard Smith remark to the train-booker, "Aintree up," which is an indication to the boy to book the arrival of the Aintree train at his signals. I work at the west end of the Box and forward train signals to No. 1 Signal Box.

Thomas Edward Houghton states: I have been a train-booker 3 years 10 months at Sandhills No. 2 Signal Box. On May 1st I was busy at the telephone at the time the electric and steam trains arrived at our signals. Signalman Smith said to me "Aintree arrived," by which I understood the train had come up to the home signals and I entered the time at 3.14 p.m.

Fred Barlow states: I have been in the service since July, 1894, and a signalman 18 years, and at Sandhills No. 3 box, six years. On May 1st, I came on duty at 2 p.m. to work until 10 p.m. and had finished the day previous at 2 p.m. I received "Is line clear" at 3.7 p.m. for the 1.2 p.m. from Leeds to Liverpool from Kirkdale West, and accepted it at 3.8 on the down south line. It was offered to No. 2 at 3.7 and accepted at 3.11 p.m. I got "On line," 3.11, the train passed at 3.14. I gave "Out of section" at 3.14. I received same at 3.57. All my signals were off for the express. The 2.58 p.m. Aintree to Liverpool train was offered me by Kirkdale West on the down north line at 2.57, and I accepted it at 3.2, at which time it was accepted by No. 2 Box. I received "On line" at 3.11, and the train passed at 3.13. I gave "Out of section" at 3.13, receiving same at 4.14 p.m. My home signal was off for this train, but not my distant signal nor the distant signal for No. 2 Box, which is underneath my home signal.

Walter McLaren states: I have been in the service 18 years, a signalman 17 years, and in Bank Hall Box 12 years. On May 1st I signed on duty at 2 p.m. to work until 10 p.m., and signed off the day previous at 10 p.m. I received "Is line clear" signal for the 3 p.m. ex Aintree via Linacre Road, from Bootle London and North Western Junction at 3.9, and accepted same time. I got "On line" at 3.11, at which time the train was offered to Sandhills No. 2 but not accepted. The train arrived at 3.12 and was accepted by No. 2 at 3.13 p.m., and departed same time. I gave "Out of section" at 3.13 p.m. and received same at 3.20 p.m. My train-booker rang up No. 2 Box and told them the train was waiting in the platform.

George Roger Gough states: I joined the service in 1876, and have been a booked driver since 1891. On May 1st I signed on duty at 7 a.m. and finished at 5.30 p.m., signing off the day previous at 4.20 p.m. I was working the 1.2 p.m. Leeds to Liverpool train with engine No. 718, which is a ten-wheeled engine fitted with automatic vacuum brake on the driving and trailing wheels, also on the six wheels of the tender. My train consisted of four bogies and a North-Eastern loaded horse box next the engine, fitted with the vacuum brake on all wheels of the train. I shut off steam in Kirkdale Tunnel. I was travelling on the down south line, the distant signals for Sandhills Nos. 3, 2 and 1 being off. On coming under Stanley Road Bridge I noticed an electric train

between No. 2 Box and the home signal on the crossing and about the same time I observed the home signal for No. 2 thrown on. I immediately applied my brake, opened the sanders, reversed the engine and gave her steam. Between Kirkdale and Stanley Road Bridge I should be travelling about 45 miles an hour and had reduced speed to about 15 miles an hour when I came in contact with the electric train about five yards on the Liverpool side of Sandhills No. 2 Box. When we came to a stand the front two coaches of the electric train were about five yards in advance of the three trailing cars, the rear of which was again about five yards from my engine buffers. The smoke box of my engine was damaged, also the buffer beam and vacuum pipe. My brakes were in good order. I had 20 inches of vacuum at the time.

Albert Saunders states: I have been in the service about seven years and a booked fireman twelve months. On May 1st I signed on duty at 7 a.m. and off at 5.30 p.m., having signed off the day previous at 4.20 p.m. As we were underneath Stanley Road Bridge I noticed the home signal for Sandhills No. 2 at danger. I then observed the electric train go across on to the line on which we were travelling. It was then well across about a bogie length clear of the points. My mate applied the brake, opened his sanders, reversed the engine, and gave her steam. We hit the electric train just on the Kirkdale side of the Canal Bridge. The rear portion of the electric train was about 10 yards away when we came to a stand. We were running 40 to 50 miles an hour when we saw the signal at danger, and about 12 when the collision occurred. One lady in the electric train complained when I went down of being slightly shaken. I saw the home and distant signals off at No. 3 Box.

Joseph Dixon states: I have been in the service since October 1877, and a guard since 1885. On May 1st I came on duty at 8.25 a.m. to work until 6.10 p.m., and had finished at this time the day previous. I was in charge of the 1.2 p.m. Leeds to Liverpool train and my train consisted of engine No. 18718, N.E. horse box 156, loaded Leyburn to Aintree (attached at Manchester) Bogie Third Van 1581, diner 214, Bogie Vestibule Third 2699, and Bogie Third Van 365, five coaches equal to seven and a half. We passed Walton Junction with nearly 20 inches of vacuum. We had a clear road with all signals off. The driver commenced to reduce speed close to Sandhills No. 3. The train came to a sudden stop and I was thrown down among the parcels, and have no clear recollection of what happened. No complaints of injury were made to me. The brake was in perfect order on the journey. I went back to No. 3 Box to protect my train, and when it was brought back I joined and went into Liverpool with it. I was shaken by the mishap.

William Scott states: I entered the service in 1891, and have been booked motorman since April 1905. On May 1st I signed on duty at 8.5 a.m. at Southport, and finished responsible duty at 3.25 p.m. I signed off the day previous at 7.5 p.m. I was working the 2.58 p.m. train from Aintree to Liverpool, which consisted of motor 3052, trailer first 115, motor 3053, driving trailer 3129, and driving trailer 3100, all fitted with the vacuum brake. When we got to Orrell Park, the next station, just as we stopped the pump fuse blew on car 3052. I put another fuse in and that blew directly. I got the pump put in on car 3053 by guard Cook, and then proceeded to Walton Junction, although I had only from 10 inches to 12 inches vacuum. We started from

Walton Junction with only about 8 inches of vacuum in the train pipe. As I noticed I should not be able to get through the tunnel I brought my train to a stand clear of the junction, and took my brake handles and fuse to motor No. 3053, and put the fuse in, the handle equalising "brake off" position, and then returned to the front motor, and proceeded with my handle in the running position. On stopping at Kirkdale, the next station, all the train was at the platform, but I had travelled about 15 yards further than I intended. We left Kirkdale with the starting signal off, and the home signal was off for Sandhills No. 3, but the signals for No. 2 Box were against me. I should say we had about 16 inches of vacuum leaving Kirkdale. We usually have 20 to 22 inches. I applied my brake fully in order to bring my train to a stand at the home signal for No. 2, which I saw when I got to Stanley Road overbridge. I was running 18 to 20 miles an hour then. On finding I was unable to stop at the home signal, and that I was going on to the fast line, the fast line signals being off, I notched my train in series, and continued running until I was on the straight, and then shut off current. Immediately after I shut off current my train was run into from the rear. On examination after the accident I found the couplings between motor 3053 and car 3129 had broken. There would be about a couple of coach lengths between these cars. The rear car No. 3100 was lifted up at the rear end, and there was a short distance of a few yards between that car and the buffers of the engine. I did not come to a stand at the home signal, and it was never off for me. I did not sound the horn. On the 2.35 p.m. trip, Liverpool to Aintree, the pump on motor 3053 fused at Kirkdale causing three minutes delay, and after replacing the fuse I was able to get the proper vacuum, about 18 inches, from there to Aintree, and on application with a proper vacuum the brakes acted correctly and pulled the train up without difficulty. On the return trip I applied the brake as soon as I came in sight of Sandhills No. 2 home signal at danger. Had I had proper vacuum I should have run a bit closer to it before applying the brake. The vacuum was about 16 inches on starting, after stopping clear of the junction at Walton Junction, and this improved as I approached Kirkdale. The stop at Kirkdale was not quite normal and we slipped about 10 to 15 yards. When I took charge of this trip at 2.35 at Liverpool, it was the first time I had had this set on this date. I have experienced the same conditions in working a train as regards the single pump and having the driver's valve in the equalising position, and also the E. A. valve not working, but on the other occasions my trailers, which have been standard cars, have been in front of the last motor and not behind as in this instance. My instructions are to run in series between Kirkdale and Sandhills, and I was doing this. I did not stop longer than usual at Kirkdale, therefore the brake only took about 15 seconds to come off. At no time during this journey did I use the hand brakes as they are practically useless for any quick action. From Aintree to Orrell Park I had no trouble with the brake, and applied it for the first time after leaving Aintree to stop at that station.

Robert Cook states: I joined the service in May 1898, and have been head motor-guard since 1906, and was assistant motor-guard from the installation of the electric service and assistant guard on the steam trains previously. I was guard of the 2.35 p.m. Liverpool to Aintree train and my train consisted of motor 3052, trailer 1st 415, motor 3053, driving trailer 3129, and driving trailer 3100. We

were in the reverse order going to Aintree. I came on duty on May 1st at 2.25 p.m. to work until 11.20 p.m., and had finished the day previous at 10.50 p.m. I was riding in motor 3052, the rear car going to Aintree. On leaving Liverpool I noticed the vacuum was beginning to go down from 18 inches to seven or eight inches, although the signals were all off, and we travelled slowly to Sandhills, where I went through to the motorman. He said "Go back and try the back pump." The pump was put on in 3052; after that the vacuum was all right and the train travelled all right to Aintree. On the return trip we started from Aintree at 2.58 p.m. and stopped at Orrell Park, where the motorman got out and shouted that his pump had failed and told me to put in the pump at 3053. We proceeded to Walton Junction, and stopped, where I noticed the brake was not coming off as it ought to. One side (the reservoir) was at about 20" and the other (the train pipe) about 10-15". Before we got to Kirkdale I went through the train to the motorman and advised him to stop just clear of Walton Junction. He then left his equalising handles on in No. 3053 and returned to the front. We made a slow stop at Kirkdale but the train did not over-run the platform. At Sandhills No. 3 I noticed the home signal was off and the distant for No. 2 at danger. Approaching No. 3 we went slowly, and before reaching No. 3 I looked out and saw that the distant for No. 2 was against us, but the main line signals were off for the express. I did not see No. 2 home signals and we did not stop at them. I should think we should pass them somewhere about 15 miles an hour, and having seen the main line signals off, I thought we were being turned to the west lines. I looked out of my van when we were just opposite No. 2 Box and we should be travelling about 15 miles an hour. I saw the engine of the express was quite close to us and held tight. The impact was rather severe, and my train came to a stand. There was no excitement among the passengers in the car in which I was riding, which was No. 3053, the middle one of the train. I went back to the rear cars, but there did not appear to be very much excitement. There was one woman passenger who could not get out by herself and she was assisted out. The remainder of the passengers alighted unaided. I found my train had broken in two, the front three cars being separated from the last two cars. There was about twenty-five or thirty yards between the two portions. I should say the engine would be about forty yards from the rear of my train. There were no wheels off the road in my train, but the rear car was lifted up and damaged. No passenger made any complaint of injury to me. I am positive we did not stop at Sandhills No. 2 home signal, and that our speed on passing it was a fair one. I should not think there would be more than about 25 passengers in my train. When the vacuum was satisfactory, the brake seemed to act all right on application. We appeared to be going slowly approaching Sandhills, but the brake did not appear to have much effect.

Mr. Povey, traction department inspector, Formby, stated: I examined the electric cars after the accident to see the condition of the brakes, etc. The piston stroke of a normal brake is between 3" and 4". The strokes found on car 3129 were 5" at one piston and 4" on the other; car 3053, 2½" one end, 1½" at the other; car 415, 3" one end, 3¼" at the other; car 3052, 1¾" one end, 2¼" at the other; car 3100 could not be taken. Car 3053 had the bogies slightly out of position as a result of the collision, and this might have effect on the piston stroke: the brakes on the whole of the cars I consider were in normal condition. The brakes were thoroughly examined at Meols Cop on the

2nd instant, and no fault found, and I cannot understand why the motorman was unable to bring the train to a stand. The examination of the brake shows that its condition at Sandhills No. 2 was the same as at Kirkdale. A slight fusing took place on the socket of car 3100, which was fouled by the lubricator on the engine and caused a slight arcing which operated the breakers at the sub-station. The circuit breakers blew at 3.15 p.m. at Bank Hall sub-station, and Aintree and Seaforth also operated. Bank Hall was put on at 3.16 p.m. The brake equipment on this set of carriages was examined on the 30th April, and the electric vacuum pumps and driver's valve were examined on the 23rd April. Nothing was reported regarding them by the motormen on the day previous

to the accident. On the day of the collision the motorman with this set of cars reported the electrically actuated valve sticking in motor 3053. Three tests were made by the staff, viz., at 9.30 a.m.; 10.30 a.m. and 12.40 p.m., and the valve was found to be working freely. No further report was made before motorman Scott took over the cars. After the collision the valve in No. 3053 was found to be sticking. The way in which Scott was working was in accordance with his instructions when the pump in the leading car had failed. When working in this way the braking is reduced because the full vacuum cannot be maintained. It is hard to say by how much the braking power would be reduced, but possibly by as much as 30 per cent. as a maximum.

Conclusion.

The circumstances attending this collision are clearly detailed in the evidence of signalman John Smith, who was on duty at Sandhills No. 2 Signal-Box at the time of the occurrence.

As will be seen from the description above, the up and down south lines and the up and down north lines converge at No. 2 Signal Box into what are known as the up and down east lines. Just before reaching the Signal Box, there is a facing connection leading from the down north line to the down west line, through points described in the evidence as No. 42 points.

Signalman Smith accepted the 2.58 p.m. train from Manchester to Liverpool on the down north line at 3.5 p.m., with No. 42 points in the normal position leading to the down east line. But at 3.8 p.m. he was offered the 1.2 p.m. Leeds to Liverpool express on the down south line, and wishing to give precedence to this latter train, he sent the cancelling signal to Sandhills No. 1 Box for the electric train at 3.9 p.m. Then, in order to accept the Leeds express, he had to reverse No. 42 points so as to lead from the down north to the down west line, as otherwise he would have two trains approaching simultaneously to run on the down east line. Having done so, he accepted the express at 3.12, and as it had been accepted by No. 1 Box, he pulled off his home and distant signals for it. He received the "Train entering section" signal for the express at 3.14 p.m. In the meantime, at 3.11, he was offered the 3 p.m. Aintree to Liverpool train via Linacre road from Bank Hall Junction, but he could not accept it on account of having already accepted the train on the down north line with No. 42 points set for the down west road, on which the 3 p.m. train would have to travel. The 2.58 p.m. train was then approaching the home signal for the down north line, which was at danger, and signalman Smith states that he looked at it coming at a slow rate of speed, and concluded that it had come to a stand at the home signal; and so, in order to accept the 3 p.m. train, he set No. 42 points back in their normal position leading from the down north to the down east line. Unfortunately the brakes of the 2.58 p.m. electric train were not working normally and, although motorman W. Scott says that he did his best to stop at the home signal, his train ran past it out on to the down east line, immediately in front of the Leeds to Liverpool express. Signalman Smith saw what had happened too late to reverse No. 42 points again, but he immediately threw the home and distant signals for the down south line to danger in the face of the express.

Driver Gough, of the express, as soon as he had got under the Stanley Road bridge, 150 yards from the home signal, caught sight of the electric train on the crossing, and also saw the home signal at danger. He immediately did all he could to stop his train, and succeeded in reducing its speed from about 45 to about 15 miles an hour before the collision occurred, which was just 350 yards beyond the Stanley Road bridge.

The collision was thus due to signalman John Smith reversing No. 42 points before the 2.58 p.m. train had actually come to a stand at the down north home signal, and to motorman Scott running past that signal when it was in the danger position.

Signalman Smith was quite entitled to accept the express on the down south line after having accepted the 2.58 p.m. electric train on the down north line, provided No. 42 points were set for the down west line, but he should not have changed those points so as to lead on the down east line, until he had seen the electric train actually at a stand. He says he was under the impression that it had come to rest at the home signals, but according to the motor guard it was travelling 15 miles an hour at that point, and it is certain that it never came to a stop. The home signals are 150 yards north-east of the

Signal Box and there is a clear view. This is a very busy box and probably signalman Smith thought that as the electric train was approaching slower than usual with the home signal at danger it was sure to stop at it, and so did not actually watch it up to the signal, and when he saw it had passed that, had no time to change No. 42 points again, as the locking-bar is only 40 feet ahead of the signals.

He is a man with long service and an excellent record, and had been on duty for an hour and a quarter at the time.

Motorman Scott gives a clear account of the trouble he experienced with the brake equipment on his return journey from Aintree to Liverpool. He was driving in motor car No. 3052. On reaching Orrell Park, the first stopping place, the pump fuze blew, and when he put another fuze in circuit, that blew at once. So he got the motor guard R. Cook to put the pump on the other motor car (the third car of the train) No. 3053 into use, and proceeded to Walton Junction, the next station.

On leaving Walton Junction he found he was unable to create sufficient vacuum in the train pipe to keep the brakes off, so he brought his train to a stand and proceeded to carry out the instructions provided for such an emergency, and then proceeded to Kirkdale. There he slightly overran the usual stopping place (but not the platform) by about 15 yards, and he left that place with about 15 inches of vacuum. On approaching Sandhills the home signal for No. 3 Signal Box was "off" but the distant signal for No. 2 Box, underneath, was "on," which signal is 266 yards back from the home signal for No. 2 Box, which was also at danger. Owing to a wide overbridge known as Stanley Road bridge, the home signals for No. 2 Box are only visible 193 yards away, and Scott says he first saw the home signal when under the bridge 150 yards away. He had previously cut off the current and, although he states he applied the brake fully at the overbridge when running at a speed of 18 to 20 miles an hour, he was unable to come to a stand before passing the home signal, and so, for reasons already explained, his train ran out on to the down east line just in front of the express.

When he found he was going on to the down east line, and saw the signals "off" for that line he switched on current again until he had got on to the straight, but then shut it off, as he thought it would be better to have current cut off when the collision occurred.

From the examination made after the accident, it was found that the pump failed in motor No. 3052 because there was a hot bearing in the pump motor. It was also found that the electrically actuated valve on motor No. 3053 was not working freely owing to the plunger sticking, and so the connection between the train pipe and pump was not fully open. This was the reason why Scott could not create sufficient vacuum to keep the brakes off after leaving Walton Junction.

When he stopped and put the brake handle in motor car No. 3053 in the "Brake off" position, this made free communication between the train pipe and pump, enabling a vacuum to be maintained in the train pipe, but owing to the next stop at Kirkdale being close there was not sufficient time to create a normal vacuum of 20 to 22 inches as when working under the then existing conditions it would take 6 to 7 minutes to do so.

Scott says he had 16 inches after leaving Kirkdale, which was sufficient for him to have perfect control of the train if he ran with caution, but the power of the brake would be reduced proportionately to the smaller vacuum. Scott is a motorman with an excellent record, and was fully aware of the condition of his brakes at the time and was quite satisfied that he had sufficient power to control his train, but he approached Sandhills No. 2 Box at a higher speed than was warranted under the circumstances (the distant signal being at danger), and made an error of judgment in not applying his brake sooner knowing that he might expect to find the home signal at danger also. He had been on duty seven hours and a quarter at the time.

The Company might be asked to consider the question of improving the view of the down north and down south home signals at Sandhills No. 2 Signal Box, the present distance at which they are visible being very short.

I have, etc.,
E. DRUITT, *Lt.-Col.*

The Assistant Secretary,
Railway Department, Board of Trade.

APPENDIX.

DAMAGE TO ROLLING STOCK.

Steam Train.

Engine 718: Smokebox door sides bent; vacuum pipe in front of buffer-plate broken; flange of cylinders to which smoke-box is attached broken; front buffer-plate bent; front draw-hook broken; lamp stands broken; lap plate and hand rails bent; *step of front smoke-box broken*; lubricator on smoke-box destroyed.

North Eastern Horse Box 166: One sole-bar plate bent.

L. and Y. Side Corridor Bogie Third Van 1581: One buffer casing broken, one steel headstock and one drawbar bent, and cradle and rubbers minus.

L. and Y. Bogie First Dining Car 214: Three buffer knees broken.

L. and Y. Centre Corridor Bogie Third 2699: Two centre casting bolts broken.

L. and Y. Side Corridor Bogie Third Van 635: One buffer spring and four centre casting bolts broken.

Electric Train.

L. and Y. Third Motor Car 3052: Four auto-coupling cradle bolts broken.

L. and Y First Trailer 415: One auto-coupling bracket broken.

L. and Y. Third Motor 3053: One main plug box and one figured door light broken; gangway frame bent, and two boisters knocked out of position.

L. and Y. Third Trailer 3129: One end light, two steel headstocks, one auto-coupling cradle, one auxiliary spring cup plate, one auto-coupling rod handle and bracket, four centre casting bolts, one corner pillar, one vacuum alarm horn, one six-way plug box, one door light and one auto-coupling broken, and one gangway frame bent.

L. and Y. Third Trailer 3100: One headstock, one vacuum valve, one main train pipe, three body truss rods, one gangway frame, one vestibule door, one end light, one head indicator, one alarm horn, two corner pillars, one door pillar, one figured light, twelve floor boards, three footboards, and one buffer block broken; two steel sole bars, one auto-coupling spindle, two longitudinals, brake pull rods, one gangway frame, end panels, motorman's cab door and side, and one footboard leg iron bent; one auto-coupling pulled out and broken, and one bolster knocked out of position.

Copies of this Report were sent to the Company on the 21st June.

LONDON AND NORTH WESTERN RAILWAY.

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

16th July, 1913.

SIR,

I HAVE the honour to report, for the information of the Board of Trade, in compliance with the Order of the 1st July, the result of my inquiry into the causes of the collision which occurred on the 25th June between a passenger train and a goods train at Crewe on the London and North Western Railway.

In this case the 8.50 p.m. passenger train from Euston to Carlisle collided with the 10.20 p.m. goods train from Crewe to Mold Junction, at Crewe South Junction.

No one was injured, but the guard of the goods train has suffered from shock since the collision occurred.

Five wagons of the goods train were derailed and damaged.

The passenger train consisted of a four-wheels-coupled bogie passenger engine, and six-wheeled tender, with steam brakes on the four coupled wheels of the engine and the six tender wheels, and of six bogie coaches (including a sleeping saloon), equal to 9½, fitted with the automatic vacuum brake on all wheels with the exception of the centre pair of the six-wheeled bogies of the sleeping saloon, controlled by the same handle as the steam brakes on the engine wheels.

The goods train consisted of a six-wheels-coupled goods engine with a six-wheeled tender, with steam brakes on all wheels of the engine and tender, and of 36 loaded coal wagons, three other loaded mineral wagons, two empties, and a 10-ton brake-van.

Details of damage to Rolling Stock are given in the Appendix. There was none to the permanent way.

The collision took place at 12.40 a.m.

Description.

The outer down home signals for trains approaching Crewe South Junction are on an overhead gantry and are six in number, the right-hand two referring to the down fast line, the centre two to the down slow line, and the left hand two to the down loop line. This gantry is 370 yards south of the signal-box. Two hundred and twenty yards