

# LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

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

22nd May, 1916.

SIR,

I have the honour to report for the information of the Board of Trade, in compliance with the Order of the 13th April, the result of my Inquiry into the circumstances under which a passenger train left the rails between Crowborough and Buxted, on the London, Brighton and South Coast Railway, at about 8.27 a.m., on the 5th April.

In this case, as the 8 a.m. down passenger train from Tunbridge Wells to Brighton, consisting of an engine and six vehicles, was running between Crowborough and Buxted, the whole of the train, with the exception of the rear vehicle, was derailed to the left of the line on which it was running. The engine turned completely over, and was found lying upside down by the side of the line. The three leading vehicles were completely derailed, and were found standing on their wheels, but leaning over in either direction; the three rear vehicles came to rest standing upright, the leading one being completely derailed, the second one having only its front bogie off the line, and the rear one having all its wheels on the rails. The engine and three leading vehicles were considerably damaged, and the fourth and fifth vehicles to a less extent.

Five passengers have notified the Company of personal injuries sustained, but it is believed that none of these is of a serious nature. The driver and fireman were also injured, and in the case of the former the injuries are of a serious character.

Details of the damage done to rolling-stock and to permanent-way are given in the Appendix.

The engine of the train was a four-wheels-coupled tank-engine, with one trailing pair of wheels. It was fitted with the Westinghouse automatic brake, working blocks on all the six wheels, and with a hand-brake working the same blocks.

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

|                                 |           |
|---------------------------------|-----------|
| 1 Third Class Bogie Brake ..... | 8 wheels. |
| 1 Bogie Composite .....         | 8 „       |
| 1 Third Class Bogie Brake ..... | 8 „       |
| 1 Brake .....                   | 6 „       |
| 1 Bogie Composite .....         | 8 „       |
| 1 Brake .....                   | 6 „       |

These vehicles were all fitted with the Westinghouse automatic brake, working blocks on all the wheels except the centre pair of each of the six-wheeled brakes.

All the brakes are reported as having been in good order.

## *Description.*

Crowborough and Buxted, between which stations this accident occurred, are situated  $4\frac{1}{2}$  miles apart, on the Tunbridge Wells and Lewes branch of the London, Brighton and South Coast Railway. The line, which is a double one, runs approximately north-east and south-west, the down line from Crowborough to Buxted, on which the train concerned in this accident was running, being on the south side. At a point situated just over two miles from Crowborough there is a bridge over the line, known as the Burnt Oak bridge, and it was immediately after the train had passed under that overbridge that its derailment occurred. For a down train approaching this overbridge the gradient is a continuously falling one, varying from 1 in 66 to 1 in 80 for over  $1\frac{3}{4}$  miles, and for the last 350 yards before reaching the bridge the line is on a gentle right-hand curve of 65 chains radius.

The line is laid with bull-headed rails, 30 feet in length, weighing 84 lbs. to the yard, and secured in chairs weighing 41 lbs. each. The sleepers are of the usual dimensions, and there are 12 of them to each rail length. The ballast is of gravel, the soil in the vicinity of the line being of clay. The line approaching the overbridge was in excellent condition. The curvature was regular, and the outer rail was provided with suitable superelevation.

The positions in which the various vehicles of the train were found lying after the accident were as follows:—The engine was lying on the left-hand side of the line at a spot situated 181 yards on the down side of the Burnt Oak bridge; it was turned completely over, and was lying nearly at right angles to the line, its bunker end being a few feet from the rails. The next three bogie vehicles were all also completely derailed to the left of the line, and were uncoupled from the engine and from each other; they were all found standing nearly parallel to the line, but were all leaning over to one side or the other; the leading end of the first vehicle was close up against the bunker end of the engine. The fourth vehicle, a six-wheeled brake-van, was completely derailed, but was standing partly over the line and partly to the left of it. The fifth vehicle, a bogie carriage, had its front bogie derailed to the left of the line, but the wheels of its rear bogie were still on the rails. The sixth vehicle, a six-wheeled brake-van, was standing upright on the rails; its rear end was just 75 yards beyond the first derailment mark. The three rear vehicles were still coupled together.

The first marks connected with this derailment which could be found on the line were situated just 16 feet on the down side of the Burnt Oak bridge. At this spot there commenced on the left-hand rail a very distinct wheel mark, about 24 feet in length, which ran from the inside to the outside edge of the rail. From this mark it is evident that one of the wheels of the train crossed the left-hand rail at that point. Immediately ahead of this wheel mark, marks commenced on the chairs both outside the left-hand rail and inside the right-hand rail, many of the chairs being broken; these marks on the chairs, which continued for a distance of about 70 yards, appeared to be all made by one pair of wheels, but from that point forward the marks increased, the sleepers on the left of each rail, as well as the chairs, being also marked. At a short distance further forward the line was distorted to the left of its proper position, the sleepers were broken, and two 30-foot left-hand rails were torn out of the line. This condition of the line continued for about 80 yards up to the point at which the engine was found lying.

### *Evidence.*

*Fireman P. Savage* states:—I have been in the service of the Company nearly eight years and I have been a passed fireman for nearly three years. On the 5th April I was acting as fireman on the engine of the 8.0 a.m. down train from Tunbridge Wells to Brighton. I was working with driver John Paige. My engine was a four-wheels-coupled tank-engine with one trailing pair of wheels. It was fitted with the Westinghouse automatic brake working blocks on all six wheels and with a hand-brake working the same blocks. My brakes were in absolutely good order. I came on duty that morning at 7.15 to work until about 7.15 p.m. I had come off about 9.45 p.m. the previous night. We left Tunbridge Wells punctually at 8.0 a.m. and Crowborough was the last station we stopped at before the accident occurred. Up to the time we left Crowborough our brakes had been acting well and nothing unusual had occurred to the running of the train between Tunbridge Wells and Crowborough. We left Crowborough between 8.21 and 8.22 a.m. I work on the right-hand side of the engine. The first thing I noticed in connection with this accident was that the engine began to roll momentarily. The engine had commenced to roll just after we had passed the Burnt Oak overbridge. I had been working on engine 273 almost continuously for the last month. That engine has a habit of rolling when it goes round a curve. I thought that the roll which we felt on this occasion was the

usual roll which we feel on that engine when going round a curve. The next thing that I knew was that my mate said to me "We are riding on the chairs." I at once turned round to apply my hand-brake, the driver at the same time shutting off steam and applying the Westinghouse brake. After going a few yards the engine left the rails, turned sideways, and overturned. My opinion is that at first it was not all of the engine wheels which were derailed. My impression is that at first it was only the four front wheels of the engine which were derailed. I estimate the speed of the train when passing under the Burnt Oak bridge at 25 miles per hour. The brakes seemed to act well as soon as they were applied. I do not think that any of the vehicles of the train were derailed before the engine was derailed. No further conversation passed between me and the driver. I think I have probably run over this line on the same engine about half a dozen times and I have generally noticed that the engine rolled about when rounding the curve near Burnt Oak bridge. I have been mostly employed on the same class of engine. No. 273 was becoming a little rough at the bunker end and was therefore liable to roll. I do not however consider that the rolling was sufficient to derail the engine. Big engines also roll when rounding curves. Had the derailment not occurred I should not myself have have reported the fact of the rolling. About 100 yards before we reached the whistle board on the

up side of Burnt Oak bridge, the Westinghouse brakes were steadily applied. Steam was still on at the time and was never shut off until we found we were off the road. Before the brakes were applied I estimate we were running at about 30 miles per hour, that would be about the maximum usual speed between Crowborough and Buxted.

*Conductor G. W. Bradley* states:—I have been between 17 and 18 years in the service of the Company, and have been conductor about 2 years. On the 5th April I was acting as guard of the 8.0 a.m. down train from Tunbridge Wells to Brighton. I came on duty that morning at 7.45 a.m. to work until 6.30 p.m. I had come off duty the previous night at 6.30 p.m. My train consisted of a tank engine and six vehicles attached to the engine in the order given:—

|                       |           |
|-----------------------|-----------|
| Bogie Third Brake ... | 8 wheels. |
| Bogie Composite ...   | 8 "       |
| Bogie Third Brake ... | 8 "       |
| Brake ...             | 6 "       |
| Bogie Composite ...   | 8 "       |
| Brake ...             | 6 "       |

The vehicles were all fitted with the Westinghouse automatic brake working blocks on all the wheels, except the middle pair of the two six-wheeled brake vans. My brakes were in good order. I was riding myself in the third vehicle of the train, the bogie third brake. We left Tunbridge Wells punctually at 8.0 a.m., and left Crowborough at 8.21½. Nothing unusual had occurred to the train between Tunbridge Wells and Crowborough. The first I knew of this accident was by looking out of the side window of my van, and I saw that the train was beginning to roll a bit. I think that it was just before my van went under the Burnt Oak overbridge that I noticed the vehicles rolling. I estimate the speed of the train at that time at about 25 miles an hour. At that time the Westinghouse brake was applied. I think it had been applied about a quarter of a mile back. At the time I noticed the train rolling, the vehicle in which I myself was riding was not rolling. It was the vehicles in front of me which were rolling. When I first saw that the train was rolling I thought that it was only the engine which was rolling. I at once endeavoured to get to the Westinghouse tap to apply the brake. Whilst I was trying to get to the tap I was shot forward and hung on to the partition in the brake-van. I could then feel that the vehicle in which I was riding was off the road, and in a very few seconds the vehicle came to a stand. When I first saw the engine rolling, I thought it had probably left the rails and at that time I do not think that any of the vehicles in front of me had left the rails. I am well acquainted with the line between Crowborough and Buxted. I have never known any trouble in running round this curve before. I cannot account for the derailment of the engine. I was looking out of the window on the near side of my van. It was a narrow window, so that I had not a very good view of the engine. I have been travelling for upwards of two years over this part of the line. I have never had any occasion when we reached Buxted to stop in order to lose time. Twenty-five miles per hour is the speed at which trains usually run when they reach the Burnt Oak Bridge.

*Recalled later:*—When I started from Crowborough I looked at my watch and it was 8.21½. It was 8.27 when the derailment occurred. Directly I got on to the ground after the accident occurred I looked at my watch and it was 8.27.

*Assistant-Ganger Thomas Tidy* states:—I have been 23 years in the service of the Company and have been assistant-ganger about 15 years. I am now stationed on the Crowborough tunnel length which takes in from Crowborough to about half way to Buxted and includes the scene of this accident. At the time this accident occurred I was working under the Burnt Oak overbridge. I was taking out clay from under the sleeper ends in order to put in ballast instead. I had been doing this on the down line and I had completed it at the time that this train arrived. I had packed up three sleepers under the down line in this way that morning. Two trains had run over the down line before the 8.0 a.m. train arrived and I had completed my work before any of these trains passed the spot. I was standing near when the first two trains ran by and nothing occurred to these two trains. At the time that the 8.0 a.m. train arrived I was standing about 40 or 50 yards on the Buxted side of the Burnt Oak bridge. I did not, however, notice that train at all until it was just off the road. At that time the engine of the 8.0 a.m. train was about 20 yards on the Buxted side of the bridge. I then noticed that the engine was off the line. I should say that it was the two front wheels that were off. I cannot form any estimate as to its speed. At that time I do not think any of the vehicles of the train were off the line. The engine ran on for about 90 yards and then the whole lot seemed to turn over together. I did not notice when any of the other wheels of the engine left the line. I was standing at the time on the outer end of the sleepers of the up line. The engine appeared to me to be derailed on the outside of the down line. It appeared to me that when the vehicles of the train left the line they all did so together. I cannot say why the engine was derailed. I considered that after I had packed up the sleepers, the line was in a quite satisfactory condition for a train to run over it. After the first train had run over that morning we were at work again on the sleepers under the bridge fettling up the line, and after the second train had run over we again packed up under the sleepers a little. About seven more trains ran over the line after the accident before any more packing was put under the sleepers at the overbridge. I had similarly dealt with eight sleepers under the bridge on the previous day, leaving three to be done on the morning of the accident. The ganger had been present when we had done the others the day before. Trains usually run middling fast over this bit of line. The sleepers marked "A" on the plan shown to me are those which I packed up the day before the accident, and those marked "B" are those which I dealt with on the morning of the accident.

*Platelay Frank Hart* states:—I have been in the Company's service nearly 23 years and have been a platelayer all that time. On the 5th April I was working under the Burnt Oak bridge under assistant-ganger Tidy. I had been working there the day before with him also. We had been digging clay out under the down road. We had been taking out clay and putting in stone and ballast. We had done six on that day. We did three more on the morning of the 5th. There were two trains run over the line that morning before the train to which the accident occurred. We were packing in the four-foot under the sleepers up to the time that the 8.0 a.m. train arrived. I had noticed the two first trains run over the line that morning and they seemed to run over it all right. When the 8.0 a.m. train arrived, I was standing in the four-footway of the up road, underneath the overbridge. I thought that the 8.0 a.m. train was running at a rather higher

rate of speed than usual when it reached the bridge. Just before the engine reached the bridge where we had been working, I noticed that the engine was rolling, but at the time the engine passed us I think that all its wheels were on the line. I then noticed that the engine seemed to leave the road just after it had passed me. It looked to me as if there were only two wheels off in the first instance, but I cannot say which. It seemed to me that then a crash came all at once. In my opinion the line where we had been repairing the sleepers was quite perfect for a train to run over. I cannot say what it was caused the engine to leave the rails just after passing the overbridge. After the accident I examined the bit of road which we had been repairing that morning and in my opinion it was all right. The important work of packing under the rails was done before the first train ran past, and after that we were only packing in the four-foot. When the 8.0 a.m. train was approaching us I drew platelayer Parson's attention to the speed at which it was coming. Parsons was standing with me in the four-footway of the up line at the time. I made this remark before anything had happened to the train.

*Platelayer Alfred Parsons states:*—I have been altogether 9½ years in the service of the Company. I have been a platelayer just over three years. I was working on the 4th and 5th April under assistant-ganger Tidy. On the 4th April we packed up about eight sleepers under the Burnt Oak bridge on the down line and we packed up three more sleepers under the bridge on the morning of the 5th April. We dug out the clay underneath the sleepers and substituted rock and ballast on top. I saw two trains run past over the line before the 8.0 a.m. train. We finished packing up the last sleeper just before the 8.0 a.m. train ran past. We first packed up the outside portions of the sleeper and that was done before any trains ran past. After the first train ran past we were only packing up in the four-foot. I saw the line after the first two trains had run over it. I considered it was then in a fit condition for another train to run over. We were working on the down line when the 8.0 a.m. train approached, and we stepped off the line when the engine was about 70 yards from us and stood in the four-footway of the up road whilst the train ran past. Tidy was not standing with me, but Hart was standing with me. He got off the down road just before me. I noticed that the train was going at a high speed and seemed to be jumping about a bit. It appeared to me to be a distinctly higher speed than that at which trains run past. Platelayer Hart drew my attention to the speed at which the train was going and said, "She will be off the road." When the engine passed me I do not think it was off the line at all, but just after the engine passed by us it seemed to leave the rails with one pair of wheels. I think that they were the front pair of wheels. I did not notice anything more that happened to the engine until the whole train left the line. When the vehicles of the train passed me, I do not think any of them were derailed. I do not think that any of the vehicles left the line until the engine and all left, and that I think was about 90 yards from the overbridge. After the train had passed me I did not look at the bit of line which we had been repairing that morning. I thought I heard the brake applied as the train passed me, but I cannot be sure. As far as I know nothing more was done to the portion of line under the footbridge until the next day. As the engine approached me it seemed to be jumping, not swaying. It seemed to be an up and down motion.

*Driver H. Payne states:*—I have been 43 years in the service of the Company, and have been an engine-driver for 35 years. On the 5th April I was the driver of the engine of the 7.30 a.m. down train from Tunbridge Wells to Buxted. I am acquainted with the Burnt Oak overbridge near Buxted. I remember passing it with my train that morning on my way to Buxted. I am well acquainted with the line. When I passed the spot that morning the men were at work, but I did not notice anything unusual when running over the line. I have never noticed anything wrong with the line under the bridge. I did not notice anything wrong with the line when I ran past. I noticed nothing whatever to account for the train which followed mine being derailed.

*Mr. F. B. Brown states:*—I am district engineer of the line and have held that appointment for about five years. I visited the scene of this accident at about 11.0 a.m. on the 5th April on arrival of the breakdown gang, and at once made an examination of the line. I produce plan No. 15217 showing the marks on the line and the positions in which the various vehicles of the train were found. I examined the line back from the point at which the first marks of derailment were found to the Crowborough Tunnel, which is about a mile in distance, and I was unable to find any derailment mark over that portion. I made a special examination of the portion of the line under the overbridge where the men had been recently at work. The lines under the bridge I found to be a little low. I suppose they had sunk a little, but could see nothing whatever to account for any derailment. The dropping of the lines which I noticed would certainly not be sufficient to account for the derailment. I consider there can be no doubt that the derailment occurred just past the overbridge, with two wheels of some vehicle. I think they must have been two wheels of the engine. I base this opinion on the fact that I do not think the wheels of any vehicle except an engine would have smashed the chairs in the way in which they were broken. I consider the permanent-way is in fairly good order. It was laid 28 years ago. The rail is an 84lb. bull-headed rail. The chairs are about 40lbs. each, and sleepers of the usual dimensions. This piece of line has never given me any trouble before. I specially noticed the sleepers on which the men had been at work on that day and on the previous day. I considered that they had been left in a condition in which it was safe for a train to run over. They were all packed underneath, but in the case of three of them the boxing had not been inserted. The sleepers themselves were all properly supported. Trains are allowed nine minutes to run from Crowborough to Buxted, which with starting and stopping, works out at an average speed of 31½ miles an hour. I believe that non-stop trains are allowed about eight minutes for the journey, and that, including the starting from Crowborough, works out at an average of 35 miles an hour. Under these circumstances I should estimate the highest speed of a non-stop train at about 40 miles an hour. I consider that the road is absolutely safe up to a speed of about 50 miles an hour. The line was not laterally disturbed for a distance of 112 yards beyond the point of derailment. There was nothing in the condition of the permanent-way which I could discover to account for this accident. The object of the work which was being carried out by the platelayers was to provide a better foundation for the rails. Clay would cause the road to be more or less springy. Foundations of that nature are liable to make the road slightly out of true, but

when the 8 a.m. train went over the line the foundations would have been quite all right. The men were working on both rails of the down line. Some years ago the line was slightly lowered under the bridge to give a better clearance. I formed the opinion that this accident was entirely due to very high speed. In the first place I would draw your attention to the fact that the engine travelled 176 yards before it came to a stand from the point of mounting. It was not simply turned over on its side but turned absolutely upside down. I produce a photograph showing its position. Enormous force must have been exercised to do that because the whole of the weight of the engine had to be lifted up, the cab being higher than the boiler and also the dome. This all shows evidence of speed. Another point I would like to mention is that I think the engine was being pushed by the train. If that were not so, I cannot see any reason why the engine should have slued round to nearly right angles. The position of the vehicles of the train points also to the fact that the vehicles were pushing the engine. I think what probably caused the accident was very high speed running, brakes put on too suddenly close to the bridge, and the train, the vehicles of which weighed 112 tons 15 cwt., while the engine only weighed 43 tons 10 cwt., suddenly giving the engine a very hard push and pushed it off the road. If it had not been pushing it all the way along I do not see any reason why, supposing there were only two front wheels of the engine off the line, it should not have kept practically parallel to the line, the engine having no bogie to lead it away. It had a 15-foot rigid wheel-base. I consider that an engine with no bogie in front of the leading coupled wheels is more liable to box the road. The engine was a six-wheeled one, with standard thin tyres on the middle wheels, with the result that these middle wheels would not keep the engine from boxing, and practically as regards the flanges, it was a four-wheeled engine. I have no evidence to substantiate the brakes having been suddenly applied just before the overbridge was reached, and am simply giving it as my opinion. I am not aware there are any engines of this description running on the main line.

*Henry Walls* states:—I am permanent-way inspector and have held that appointment for 16 years. I arrived on the scene of this accident at 10.20 a.m. on the 5th April. I was aware that some of the platelayers had been at work on the permanent-way of the down line under the Burnt Oak overbridge. They were working there under my instructions. I noticed when walking through a few days before that the line was a bit "washy," and I told the ganger that he had got to take out the clay and put in some hard core and ballast. I did not see the work whilst it was being carried out. I examined that bit of the line after the accident. I found it was in good condition but slightly low. I found that the low rail was about  $\frac{3}{16}$ ths of an inch low in five yards and the high rail was about  $\frac{1}{8}$ th of an inch low in the same distance. In my opinion the work had been properly carried out. In my opinion the line was in a fit state for an engine to run over. I myself saw the marks of derailment near the bridge. I formed no opinion as to the cause of the derailment unless it was fast running, and I did not see the train running myself. I have been in charge of this bit of the line for over nine years. I have never had any trouble at that point before. Nothing was done to the portion of the road under the bridge on the day of the accident. On the following day the sleepers were packed up a bit. That was done by my men in the ordinary

course of duty without instructions from me. I did not consider it necessary myself to give any instructions for any repairs to be carried out. I know this portion of the line well. I had travelled over the line on both the two previous days on an engine, and I had not noticed anything wrong with the line at this point. I took particular notice as the men were working there. As a rule men come down the slope pretty fast and apply the brakes just before reaching the bridge. On several occasions on arrival at Buxted station it has been necessary to delay the train in order that it should not start before its time. I examined the line thoroughly after this accident and found it in thoroughly good order, and could find nothing to account for this accident. I found the gauge all correct. The super-elevation should be  $1\frac{1}{2}$  inches and it varied from  $1\frac{1}{2}$  inches to  $2\frac{1}{4}$  inches. I last walked over this road on the 30th March, and I found no special work to be done except what I ordered the ganger to do. It was in consequence of my having walked over the line that I ordered that work to be done. I have once reported that the trains were running from Crowborough to Buxted too fast. About 12 inches of clay was taken out under the sleepers.

*Mr. L. Billington* states:—I am chief mechanical engineer to the Company and have held that appointment about four years. The engine concerned in this accident, No. 273, was actually built in April 1880. It is a local passenger type of engine, four-wheels-coupled, with trailing pair of wheels. The leading wheels have a laminated spring, the drivers have spiral springs and the trailers are laminated. The axle-boxes have wedges for adjusting any question of wear in the boxes. These engines are only used for purely local passenger trains. It is the most numerous type on our line. There is no actual limitation of the speed at which these engines are to be run, but a light engine with a 5 ft. 6 in. wheel would not be called upon to do much over 55 miles an hour. This engine has actually run 1,100,000 miles in its life, and since coming out of the shops in October, 1913, has run 75,359 miles. That was the last occasion on which it was in the shops. The work carried out on the engine when last in the shops was motion and brake-work repairs, new tyres on the wheels, boxes lined up, and general adjustment. She had been in the shops in March, 1913, when she had heavy boiler repairs. As to the tyres, the leading tyres are turned with a  $\frac{7}{8}$  inch radius in the root of the flange. The driving wheels have a thinner flange; the trailing, the same as the leading, and the diagram I produce shows the actual amount of wear at present on the tyres. After the accident the triple-valves were examined when it was found to be made up with dirt, which no doubt was due to the fact that when the engine turned over a considerable amount of dirt had been carried over from the reservoir, but on the cleaning away of this dirt the triple-valve was found to be quite effective. This type of engine is largely used for traffic on the branch line from Tunbridge Wells to Lewes. I have never received any reports of this engine being liable to roll about and I have never received any special report with regard to this engine, No. 273. The drivers have never expressed any dislike to this class of engine. I myself have often travelled on these engines. I have noticed no liability out of the usual for them to roll about. I should not think of putting these engines to work on trains which are timed to run at over 55 miles an hour, but I consider that up to 50 miles an hour they are quite safe. I examined this engine after the accident. The damage to the working parts of the engine was really very slight. I examined the

wheels of the engine. I could find no marks on the wheels from which I could draw any conclusion as to the cause of this accident. There were marks on both of the wheels of having been off the line and of having hit some object. I examined the gauges of the wheels after the accident and found that the leading pair of wheels were a quarter of an inch out of truth. The trailing pair were practically true to gauge and the rear pair were also true to gauge. I did not discover anything in the condition of the engine which would account for its derailment. I do not consider 75,000 miles a long mileage for that class of engine. The axle-boxes have been micrometered and it was found that the greatest play between the face of the box and the horns is not greater than  $\frac{1}{16}$  of an inch, showing that there is not an excessive amount of wear. None of the springs of the engine were found to be broken.

*Examiner John Dale* states:—I have been about 25 years in the service of the Company, 20 years as carriage-examiner. I am now stationed at

Tunbridge Wells. I examined the vehicles of the 8.0 a.m. before it left Tunbridge Wells on the 5th April. They were standing alongside the departure platform when I examined them. I did not find any defect in them at all. As far as I could see everything was in a good condition and fit to run.

*Examiner Sidney Adams* states:—I have been 35 years in the service of the Company, and have been carriage-examiner for 27 years. I am now stationed at Lewes. I visited the scene of this accident at about 11.0 a.m. on the 5th April, and when I arrived there I examined the rolling-stock of the train. I found nothing whatever in the condition of the rolling-stock to account for this derailment. I made a special examination of the whole train. I found all the wheels in good condition. I tried their gauge and they were all correct to gauge. There were no bent axles. After the vehicles were derailed, they were all run away on their own wheels. I could not find any special marks on the wheels of any of the vehicles. They had not any appearance of having struck against chairs.

#### *Evidence taken at Adjourned Inquiry, 11th May.*

*Driver John Henry Paige* states:—I have been for 26 years in the service of the Company, and have been a driver for 11 years. I came on duty on the 5th April at 7.15 a.m. to work until 7.15 p.m. I had come off duty on the 4th April at about 9.45 p.m. On the 5th April I was driver of the engine of the 8 a.m. down train from Tunbridge Wells to Brighton. My engine was a four-wheels-coupled tank-engine with one trailing pair of wheels, and it was running chimney first at the time of the accident. It was fitted with the Westinghouse automatic brake working blocks on all the wheels, and with a hand-brake working the same blocks. My brakes were in good order. The number of the engine which I was driving was 273. I am well acquainted with that engine. I have driven that engine for three years, and there is no fault with the engine whatever. We left Tunbridge Wells punctually at 8.0 a.m., and we arrived at Crowborough at 8.20 a.m., which was two minutes late. Nothing unusual had occurred to my train between Tunbridge Wells and Crowborough. I received the signal from the guard to leave Crowborough at 8.21 $\frac{1}{2}$ . I work on the near side of the engine. I am acquainted with the Burnt Oak overbridge, and I remember approaching that overbridge that morning. When we reached that overbridge steam was still turned on. I had first applied the brakes when about 100 or 125 yards on Crowborough side of the whistle board. I had made a good steady application of the brakes at that point. I had kept the automatic brake applied until just before reaching the overbridge, and then I had released the blocks, and I did not apply it again before passing under the overbridge. I should estimate the speed of my train at the time it reached the overbridge at about 25 miles per hour. That is about the usual speed at which we run past that point. Before reaching the bridge nothing unusual had occurred to my engine. Up to the time that I reached the overbridge I did not know of there being anything wrong with my engine. I was quite satisfied with my engine up to the time that it reached the overbridge. When passing under Burnt Oak bridge the engine dropped down very much on the near side which was my side, then she gave a

roll and I was on the verge of shutting off steam then, but she seemed to recover herself. She then seemed to me to be going along all right until the trailing wheels dropped off the metals. I then said to my mate, "We are running on the chairs. We are off the road." I immediately shut the regulator, and put the Westinghouse brake fully on. It might have been 50 or 75 yards past the overbridge where I shut off steam. After I had shut off steam and put the Westinghouse brake fully on, the engine gave a lurch and immediately threw me head first into the bushes. I remember nothing more, but when I got up I found that the engine was turned over. I was lying about two coaches away from the engine. My impression is that my four leading wheels left the rails just after passing through the overbridge, but it was not until afterwards that the trailing wheels left the rails. I do not think that any of the vehicles of the train were derailed before the engine. I think that the derailment originated in the first place with the engine. I was not aware that there was any work being carried on at the overbridge at the time. I do not think that my engine ran over any obstruction on the line at the overbridge. Up to the time of the accident the brakes had acted very well, and they acted well when I applied them before reaching the whistle board. I estimate that we were running at about 30 miles an hour before I applied the brake before reaching the whistle board. After releasing the brakes before reaching the overbridge I did not apply them again until the overbridge was passed. I think myself that the accident was caused through the permanent-way; the rains had made a lot of difference I think to the permanent-way, and being a very clayey soil, it caused the engine to dip very much on the near side, and therefore caused it to be derailed. I am well acquainted with the line through the overbridge. I have occasionally experienced trouble with the permanent-way at that point, more so in wet weather than in dry, and that is the reason why I always approach that spot with more caution than I do at any other point down the bank. I have never made any report of the condition of the line at that point. Before reaching the overbridge my engine had not been rolling about or pitching at all.

The engine is not in the habit of rolling. When I said that the four leading wheels were off the rails, what I really thought was that the two near side wheels were riding on the rails and the off side wheels were riding on the chairs.

*Signal-Porter Albert Bryder* states:—I have been five years in the service of the Company, three years as signalman. On the 5th April I was on duty at the Crowborough signal-box. I remember the 8.18 a.m. train leaving Crowborough for Buxted. It is recorded in my book as having left at 8.21, and as far as I know that entry is correct. We only book minutes at my box, not half-minutes. The signal-box at Crowborough is at the south end of the station, that is, the end nearest Buxted.

*Mr. Frank Saunders* states:—I am chief locomotive inspector to the Company, and am stationed at Battersea. I have held the appointment of chief inspector for six years. Since 1879 I have had experience of engines of the same type as engine No. 278. I have never had any experience of undue rolling or oscillation with that type of engine. I was myself riding on engine No. 278 about three months ago, and there was nothing whatever in the way of undue oscillation noticed with it. The engine was then in a fair state of repair. I have also ridden on the engine since the accident, but I did not notice any undue rolling on that occasion either. Since the accident I have ridden on the engine on three occasions at a speed of 55 miles an hour and once

at 60 miles an hour, and I did not find any undue oscillation. I tried the engine running in both directions with the same speeds. On none of these occasions did the engine appear to me to pitch at all. Supposing the train was travelling on the level at a speed of 25 miles an hour, the application of the brakes would bring it to a stand in about 30 yards. If the gradient was a falling one of 1 in 86, it would only make a very slight difference in the length in which the train was stopped. When the engine was running light it would have more oscillation than it would with a train attached to it. Even if the engine was off the line and the brakes were applied, I do not think that the train would push the engine. I have driven engines similar to No. 278 for several years and have sometimes had to drive them at a speed of 55 miles an hour, and have had no trouble in doing so.

*Assistant-Ganger Tidy*, recalled, states:—It was only under the six-foot end of the sleepers that the clay had been removed. No clay had been removed at all from under the other end of the sleepers. There was no new ballast put underneath the other end of the sleepers, though a little new top ballast might have been added to it. The rails were at the right level when we commenced work and we left them at the same level. The seven trains which ran over the line after the accident did not run over it at full speed. One of my men was out with a flag steadying them. The trains were all steadied over the line until it was packed up next morning.

#### *Evidence taken at Adjourned Inquiry, 19th May.*

*Mr. G. E. Herriott* states:—I am employed on the insurance staff of the Salvation Army and I live at 15, Cambrian Road, Tunbridge Wells. I was a passenger in the train which was derailed on the 5th April. I think that the vehicle in which I was travelling was the third vehicle of the train. I was travelling in a third-class carriage. I was travelling in a centre compartment of the carriage. The first time that I noticed anything wrong with the train was just after my carriage passed under the overbridge. The carriage then began to shake a good bit. I cannot say the distance that my carriage travelled before it left the road. I was in one of the carriages that was turned over. It was a few minutes before I was able to extricate myself from the carriage. I then went to assist other people to get out. After the accident I looked back towards the bridge. When I looked back I saw two men working near the bridge. I should say it was from 25 to 30 minutes before these two men left the place they were working at to come down to the scene of the accident. I should not be able to identify these men again. From seeing them working on the line, I took it that they were employed as platelayers. I had no conversation at all with these two men. I do not often travel between Crowborough and Buxted. I should say, in my opinion, that the speed of the train when it reached the overbridge did not exceed 25 miles an hour. Until the overbridge was reached I had noticed no irregularity in the running of my carriage. It appeared to me that the two men who were at work on the line after the accident were engaged in lifting the permanent way. I did not mention to anybody at the time that the two men were a long time in going to the assistance of the passengers. At the time we reached the overbridge we were not travelling as fast as we had previously

been doing. I had noticed that the driver had checked the speed. I should say it was half-way between the tunnel and the overhead bridge that the speed of the train was checked. I should say that the highest speed at which we had been travelling after leaving Crowborough was about 32 miles per hour. The two men were at work on the road on which my train had been running. It was not from looking at my watch that I judged that the men were 25 minutes before going to the assistance of the passengers, but I judged it was about that time. When I saw the men they were working with pick-axes and appeared to be packing the road. I did not see them lifting the road with a long lever. I used the term "lifting the road" meaning that the men were packing it up.

*Mr. John Bishop* states:—I am a farmer living at Ford Brook Farm. I remember the derailment of the train on the 5th April. I was at the time standing in a yard on the south side of the railway, at the position marked with a X on the map shewn to me. I went down to the scene of the accident as soon as I could get there. When I reached the scene of the accident, I saw two men at work under the overbridge. These men were packing on the same line as the train had run over. I should say that it was just about half an hour from the time that the train went over until the two men came to the assistance of the train. The men got there just before the other train had come up on the other line. I subsequently heard a man whose name I know is Tidy say, "This will be a warning to them about going so fast." He said also, that the line was all right. I have been accustomed to seeing trains run on that line for 6½ years. The train on that morning was going extra slow to what it

usually does. Just before the train got to the bridge I remarked to a man in the yard that the train was going slower than usual. When I got up to the train the two men were still working under the overbridge. The men were packing the line, one inside each metal. I could not see the train when it reached the overbridge, but I could see it just after it had passed the whistle board. I think it would have taken me three or four minutes to get from the place where I was standing up to the scene of the derailment. I do not know what the distance was. I know the two men who were packing, as they are neighbours of mine. I know all the platelayers, but I cannot say which were exactly the two who were at work under the overbridge. I was at the derailed train when I saw them. I should imagine I was nearly 150 yards from the men when I saw them at work. At that distance I could see that they were packing.

*Platelayer Frank Hart*, recalled, states :—Immediately after the accident occurred I walked down the line towards the train and about half-way I met ganger Tidy and he told me to go to the hut and get a red flag and go towards Buxted to protect the up train. I went and fetched my flag and then met Tidy again and he told me I need not go because the guard had gone. Before going down to the train after the accident I had done nothing to the road after the 8 o'clock train had run over it. Parsons did not either do any work to the line after the 8 o'clock train had passed over it. Immediately after the accident Parsons went back with flags in the Crowborough direction. After Tidy told me that the guard was protecting the up road, I came back to the overbridge and got some bars in order to get the up road clear of the accident. I am acquainted with a farmer called Mr. Bishop. I did not notice Mr. Bishop arrive at the scene of the accident.

*Platelayer Alfred Parsons*, recalled, states :—Immediately after the accident happened I went straight away to Crowborough to protect the road and get assistance. Nobody told me to go. I went on my own. I did not see what platelayer Hart did as soon as the accident happened. After the 8.0 a.m. train had passed us I did nothing further to the permanent-way under the overbridge. I am

not aware that platelayer Hart did anything to it. I arrived at the station-master's office, Crowborough, at between quarter and ten minutes to nine. I am acquainted with a farmer called Bishop. I did not see him until 11 o'clock that day. There was nobody else at the overbridge at the time of the accident except Hart and myself. There are four men in our gang, the ganger, assistant-ganger, and two platelayers. After Hart and I left the overbridge there could not have been anyone else there. I do not consider that it can be a correct statement to say that there were two men working at the overbridge for half-an-hour after the accident.

*Assistant-Ganger Thomas Tidy*, recalled, states :—At the time that the 8.0 a.m. train arrived I had two platelayers, Hart and Parsons, working under the overbridge. Immediately after the accident I walked towards the overbridge and Hart walked towards me. I met Hart. I told Hart that he was to go and get his flags and go up the up road on account of the up train. When I met Hart it was immediately after the accident. There was in my opinion no time for Hart to have done any work on the line before I met him. Before I met Hart, Parsons waved the flags to me, signalling that he was going off in the Crowborough direction to protect the line. Parsons went straight away after the accident occurred, and there was no time for him to have done any work on the line before he went away. After I had told Hart to go and fetch his flags, I myself went back to the accident. It might have been five minutes or possibly seven or eight minutes later that I went back to the overbridge. When I went back to the overbridge I did not do any work on the line. At the time I got back to the overbridge nobody was doing work on the line at that point, and there was nobody there to do it. I know by sight a farmer called Mr. Bishop. I saw him about two coaches' length away from the engine. I should say it was between ten minutes and a quarter of an hour after the accident occurred that I saw Mr. Bishop. I did not see him arrive, but I saw him on the spot. When platelayer Hart came back with his flags I told him he need not go and protect the up road. Hart then went back to the overbridge with me and brought away some bars.

### Conclusion.

From the above evidence, and from the marks on the line described above, it appears certain that, just after the train passed under the overbridge, one, or possibly two, pairs of wheels were derailed, and that after the train had then run a distance of about 70 yards a further derailment took place, resulting in the line being broken up to an extent which led to the derailment of the whole train.

As regards the question as to which vehicle it was which was first derailed, there are six witnesses who can give evidence on that point, viz., the driver, fireman, and guard of the train, and three permanent-way employes of the Company who were at work near the overbridge at the time the accident took place. All these witnesses concur in stating that in the first instance it was only the engine which was derailed; the driver and fireman are of opinion that it was both pairs of its leading wheels which were derailed, whilst the permanent-way men think that it was only one pair which was off the line in the first instance. The wheels of the engine and of all the vehicles of the train were examined after the accident; the leading pair of engine wheels was found to be damaged to an extent which rendered them  $\frac{1}{4}$  inch out of truth, but the two other pairs of wheels were found to be correct to gauge, as also were those of all the other vehicles of the train. It appears certain, therefore, that it was the engine which was first derailed, and it seems probable that for the first 70 yards it was only its leading pair of wheels which was off the line.

Driver Paige's evidence is to the following effect: That he applied his continuous brake when he was from 275 to 300 yards from the overbridge, and he estimates that at that time his speed was about 30 miles an hour; that he kept the brakes applied till just before reaching the overbridge, and he estimates his speed when passing under it at 25 miles an hour; that when passing under the bridge the engine dropped down on the near side and gave a roll, and that he was consequently on the point of shutting off steam; that the engine, however, seemed to recover itself and to be running all right until about 50 or 75 yards from the overbridge, when the trailing wheels left the line; that he then shut off steam and applied the brakes fully, but that the engine gave a lurch and threw him off into the bushes.

Fireman Savage confirms the driver's evidence as to the speed of the train and the application of the brakes; the first he knew of the derailment was that the engine began to roll, and this occurred just after they had passed under the overbridge; he states that that engine habitually rolled when rounding a curve, so at first he thought nothing of it, but immediately afterwards his mate said to him: "We are riding on the chairs." He then assisted his driver in making every endeavour to stop the train, but before they could do so the engine left the line altogether and was turned over.

Further evidence as to the speed of the train at the time of its derailment is as follows:—Guard Bradley concurs with the driver and fireman in estimating it at 25 miles an hour. Ganger Tidy, who was standing about 50 yards from the overbridge, can form no estimate of its speed, but platelayer Hart, who was standing under the overbridge at the time, drew platelayer Parsons' attention to the speed at which the train was coming, and said: "She will be off the road." Parsons states that the train was running at a higher speed than that at which trains usually run at that point, and that it seemed to him to be jumping about a bit. One witness, who was a passenger in the train, estimates its speed at the time of the derailment at 25 miles an hour, whilst another witness—a farmer, who saw the train approaching the overbridge—states that it was not running as fast as trains usually do run at that point.

The train had left Crowborough at 8.21½ a.m., which was 1½ minutes late, and guard Bradley states that the derailment occurred at 8.27 a.m.; so, according to his timing, the train had run from Crowborough to the point of derailment—a distance of 2 miles 9½ chains—in 5½ minutes, giving an average speed of just over 23 miles an hour. This is a very moderate speed, and is in accordance with the evidence of the driver, fireman and guard.

The engine did not come to rest until it had run 176 yards beyond the spot where it was first partially derailed, and this would certainly point to a higher speed than 25 miles an hour. It appears, however, that the driver did not realise that the engine was derailed until it had run about 70 yards beyond that spot, and it was not till then that he set to work to turn off steam and to apply the brakes; under these circumstances, a speed of 25 miles an hour does not seem inconsistent with the facts.

In spite, therefore, of the views expressed by the two platelayers, I consider that the evidence points to the estimate of 25 miles an hour being a fairly correct estimate of the speed at which the train was running.

The engine was a four-wheels-coupled tank-engine, with one pair of trailing wheels; its total length was 31 feet 7½ inches, and its wheel-base was 15 feet. It is a class of engine which is not designed for very fast running, but for the speed at which it appears to have been running on this occasion it is quite suitable. The only defects which were subsequently found in it appeared undoubtedly to have been the results of the accident.

This derailment of the engine undoubtedly occurred when it was only a few feet past the Burnt Oak overbridge, and it must be noted that immediately previous to the occurrence there had been some work in progress on the line at that spot. Permanent-way Inspector Walls, when walking along the line a few days previous to the accident, had noticed that the line under the overbridge was "a bit washy," and he had accordingly instructed ganger Tidy to take out the clay from underneath the sleepers, and to substitute for it some hard core and ballast. In accordance with these instructions, ganger Tidy and platelayers Hart and Parsons had been at work at this spot both on the day previous to the accident and on the morning on which it occurred. There were in all eleven sleepers under the bridge which had to be dealt with by them, and the

work at eight of these had been duly completed on the 4th April, leaving the remaining three to be done on the morning of the 5th. Work on these three remaining sleepers had accordingly been started early that morning. Assistant-ganger Tidy, who was in charge of the work, states that it was only under the inner rail of the curve that new ballast was being laid, and that the work of placing the new ballast under the portions of the three sleepers immediately underneath that rail had been entirely completed before either of the two trains which preceded the 8 a.m. train had run over the line. The work, however, of packing up the line in the four-footway between the rails was still in progress right up to the time of the arrival of the 8 a.m. train, and the packing was not actually completed until the morning of the day after the accident. Ganger Tidy and his platelayers all, however, assert that at the time of the derailment the line was in a thoroughly fit condition for trains to run over it. Nothing unusual had occurred to either of the first two trains, and driver Payne, who was in charge of the engine of the second one, states that he noticed nothing wrong with the line when his engine passed over it. Two witnesses, one of whom was travelling in the train and the other at work in the adjoining fields, state that two platelayers were still at work packing up the line under the overbridge after the accident had occurred, but both the platelayers fully account for their movements immediately after the derailment, and I think that the two witnesses must be mistaken. The condition of the line under the overbridge was carefully examined after the accident; it was found to be generally in good condition, but it was noted that for a short distance both rails were slightly low. The evidence of the driver and fireman points to the road under the overbridge having slightly given way when the engine passed over it, and this occurred at almost the very spot at which the men were at work; the work, too, was not actually completed at the time the train ran over it. In spite, therefore, of the opinions expressed by the ganger and platelayers, that the line was at that time in a thoroughly fit condition, it is difficult to avoid the conclusion that this derailment, which fortunately had not more serious results, was connected with this work. I am of opinion, therefore, that it must be attributed to some weakness in the line, which was due to the work which was being carried out and which was not fully completed at the time.

I have, etc.,

P. G. VON DONOP,

*Lt.-Col., R.E.*

The Assistant Secretary,

Railway Department,

Board of Trade.

## APPENDIX.

## DAMAGE TO ROLLING-STOCK AND PERMANENT-WAY.

*Rolling-Stock.*

*Engine, No. 273.*—Smoke-box door smashed in, handles bent and hand-rail broken off; chimney broken off and destroyed; copper exhaust pipes (smoke-box to tank) bent and broken; hand-rails and blower-rods bent and broken; right-hand tank sheet torn and bent back; dome casing destroyed; back bunker destroyed; cab-roof stove in and angle-iron frame bent, all cab windows broken; leading buffer beam bent; outside platform angle-iron foot buckled and angle-iron pulled down whole length of engine; right-hand side; right-hand leading corner and left-hand trailing corner of platform torn off; both steps bent inwards; leading guard irons, sand pipes and cocks torn off; brakework bent and twisted and frame brake-hanger studs partially pulled off; right-hand cylinder loosened; frames slightly set in at leading horns; leading wheels sprung about  $\frac{1}{4}$  inch; Westinghouse main reservoir badly dented, dislodged from its position and clips bent; driving spring hanger bolts bent both sides; both outside slide-bars broken.

*Bogie third brake, No. 398.*—Three corner pillars, one intermediate pillar, two standing pillars, two door-pillars, one door-panel and bottom rail, 40 ft. end-panel,  $3\frac{1}{2}$  ft. side-panel,  $3\frac{1}{2}$  ft. waist-panel, 6 ft. upright waist-panel, 25 ft. radius-moulding, 40 ft. moulding, 7 ft. moulding, 8 ft. lining-board, 8 ft. bottom side, 28 ft. side-cornice, two end-cornices, one cant-rail, one end-sweep, two buffer shoes and cotters, Westinghouse brake main pipe and end standard, one bolster radius-block, ten check chain-shackles, one axle-box, one horn-plate, eight roof boards, twelve cant-rail facia,  $1\frac{1}{2}$  ft. waist-panel, four roof boards, six end lining boards, one iron hoop stick, two hoop sticks (wood), one double quarter light top rail, one single quarter light top rail, one door light and frame, five quarter lights, 70 ft. step-board, three step-irons, two bottom step-irons, two short step-boards and one buffer-casting broken.

One headstock, truss-bar and pull-rod, bogie truck headstock and two sole-plates, spring plank, three spring links, ten step-irons, two drawbars and three buffers bent.

*Bogie third brake, No. 548.*—Ten roof-boards, four hoop-sticks (wood), one cant-rail, 32 ft. cornice, three corner pillars, one standing pillars, one door, two single-light rails, one double-light rail, one double-waist rail, two single-waist rails, twelve lining boards,  $9\frac{1}{2}$  ft. side-panel, 56 ft. end-panel, 96 ft. moulding, 22 ft. bottom-side moulding,  $17\frac{1}{2}$  ft. bottom-side, two bottom step-irons, Westinghouse stand-pipe, 1 inch cock and hose-pipe, three arm-rests, one hat-rack, four brackets, one view frame, three view glasses, one mirror, one door-handle, six

quarter-lights, one buffer casting, one radius-block, one step-iron, one seat-rail and lining-board, one end-cornice, one end-sweep, one end-frame, two end-frame battens, three sets outside light moulding, twelve floor-boards, 60 ft. step-board, one bottom step-board, two end-bars, two lining boards, 12 ft. inside facia, one door-bonnet and three pairs butts broken.

Eight check-chain shackles, one swing-plank, one safety-bracket, three buffers and six step-irons bent. 8 ft. lino damaged, roof-canvas torn.

All wheels derailed.

*Bogie Composite No. 459.*—One standing pillar, three corner-pillars, two end battens, end-panel, one end-bar, lining boards for two ends, two ascending steps, one view frame, five view glasses, 4 ft. side cornice, two end cornices, one end-sweep, 110 ft. moulding, one door light and frame, seat rail, four commode handles, 20 ft. step-board, three No. 5 axle-boxes, three side-springs, one buckle, three buffer castings, Westinghouse main pipe, one truss-bar, sixteen check-chain shackles and built up steel frame bogie broken.

Two bogie sole-plates, eight step-irons, one draw-bar, two couplings, four buffers, one bogie under-frame, steel headstock, two headstocks, one truss-bar, two pull-rods, four spring-links, one pivot-pin, Horn-plate of bogie-truck, four side and cross straps and one side stay bent.

Roof canvas torn.

*Bogie Composite, No. 274.*—48 feet end panel, one end cornice, 96 ft. moulding, one end-frame, 18 ft. roof-board, one end-sweep, one end-bar, one seat rail and batten, one lining board, four floor boards, one view-glass, one buffer-casting, one Westinghouse standard, 1 inch cock and hosepipe broken.

Two buffer-rods bent.

*Six-wheeled Brake Van, No. 33.*—32 ft. end-panel, three end-frame battens, 36 ft. lining-boards, 40 ft. 2 inch moulding, 7 ft. partition-board, one end cornice, two corner pillars, one cant-rail, two side-cornices, 6 ft. bottom-side, 20 ft. floor-board, two floor battens, two headstocks, one cross-bearer, two longitudinals, 64 ft. step-boards, one buffer-casting, one ascending-step, one drawbar-plate, one main-steam-pipe,  $1\frac{1}{2}$  in. cock and hosepipe and one No. 3 axle-box broken.

Two ascending-steps, two Westinghouse end-standards, one angle-iron, two buffer-rods, six axle-guards and two scroll-irons bent.

*Permanent-Way.*

174 chairs broken, 88 sleepers broken, 13 sleepers damaged, 12 84-lb. rails bent.