

arrived at the Junction points. He then released the brake, and allowed the train to travel freely until opposite the Yard signal-box. Here he re-applied the brake, and had thereby reduced the speed to about five miles an hour as it entered the platform road. The brake-pressure—about 10 lbs.—was kept applied until the engine was half way along the platform, and was then increased with the object of stopping the train. The increased air pressure did not have the usual stopping effect, and Hutchings then opened his brake-valve to its fullest extent. He also applied the steam sand, two or three engine lengths from the stops. But the first effect of emission of moisture from the sand-pipes was to make the engine-wheels “pick up,” and the collision resulted.

Hutchings had not expected to experience any difficulty in stopping the train at the usual place, and the brake had its usual retarding effect until the pressure was increased to bring the train to a final stop. He considers that at this place in the platform road the rail surface was possibly bad, due to engines standing for considerable periods of time on the rails, or that the wheels or wheel-blocks had picked up grease or moisture off the rails in the yard.

I cannot say that I am impressed with the explanation offered, nor do I consider that the figures given by Hutchings are likely to be even approximately accurate estimates of his speed. The platform rails are sheltered by the roof, and therefore were not affected by any slight drizzle of rain which may have fallen. There had been no train into or out of No. 2 Bay road since 8.30 p.m. the evening previous, and it is possible that the rails may have had on their surface some moisture condensed from the atmosphere. It is also possible that at the north end near the buffer stops, the co-efficient of friction of the railhead may sometimes be lower than at other places. But there was nothing in the conditions of atmosphere or temperature on this morning to indicate any special difficulty. Drivers must be aware that the co-efficient of friction of the rail surface is variable, and also must be aware that with steam sanders there is a liability of moisture to collect at the bottom of the sandbox. It is clearly their duty in approaching a terminal road to be careful always to have something considerable in hand, and to have blown out the moisture and brought their sanding gear into working order before the last moment.

I attribute the slight collision to an error of judgment in both these respects on the part of Hutchings.

I have, &c.,
J. W. PRINGLE, Major.

The Assistant Secretary,
Railway Department, Board of Trade.

Printed copies of the above Report were sent to the Company on the 24th June.

SOUTH EASTERN AND CHATHAM RAILWAY.

Board of Trade (Railway Department),
8, Richmond Terrace, Whitehall, S.W.,
8th July, 1912.

SIR,

I HAVE the honour to report, for the information of the Board of Trade, in compliance with the Order of the 22nd June, the result of my inquiry into the cause of the derailment of part of a passenger train, which occurred about 10.50 a.m. on the 19th June, between Whitstable and Faversham on the South Eastern and Chatham Railway.

The 10 a.m. up (express) train from Ramsgate Harbour to Victoria was travelling on a straight and level piece of track, when the rear brake-van left the rails, and shortly afterwards turned on its side. The driver, noticing an unusual drag upon the engine, stopped the train with the continuous brake. No other vehicles left the rails. There were a large number of passengers travelling, but three only complained of having been shaken or bruised. The rear guard was violently thrown down in the overturned van, but fortunately escaped any serious injury.

The train was drawn by an express passenger engine (2-4-0 type) and six-wheeled tender, and comprised the following eleven vehicles :—

No.	14,	8-wheeled bogie brake-van.
No.	892,	do. do. composite coach.
No.	881,	do. do. tri-composite coach.
No.	866,	do. do. 3rd class do.
No.	883,	do. do. tri-composite do.
No.	862,	do. do. 3rd class do.
No.	2,374,	do. do. composite do.
No.	882,	do. do. tri-composite do.
No.	893,	do. do. composite do.
No.	861,	do. do. 3rd class do.
No.	594,	6-wheeled brake-van.

The engine (with tender) weighed 89 tons, 14 cwts., and the total weight behind her, exclusive of passengers, baggage, &c., was 282 tons, 18 cwts. The brake-van weighed $12\frac{3}{4}$ tons, and the average tare of the bogie stock was about 27 tons.

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

After the collision it was found that coaches, Nos. 2,374 and 882, and Nos. 893 and 861 were buffer-locked.

The engine and tender and first six vehicles were uninjured. A list of damage to the last five vehicles is given in the Appendix. The permanent way was thrown out of line and damaged for a distance of about 600 yards, but no rails were broken or twisted. A large number of chairs were broken, and some sleepers required to be replaced.

Description.

This derailment took place on the Chatham Section of the Company's system between Faversham and Whitstable. There are two lines for up and down traffic, which have a general east and west direction. The train travelled on the up line, the southern of the pair of roads.

Graveney siding signal-box is situated 3 miles east of Faversham, and $3\frac{1}{2}$ miles west of Whitstable Stations. The alignment of the railway for two miles east of this signal-box is straight. The rails, for three-quarters of a mile before the place where derailment occurred, are level. Preceding this stretch of level there is a falling gradient with an inclination of 1 in 101.5 for a quarter of a mile. The formation is practically on ground level, the rail level being about 2 ft. above the ground.

Measured from Graveney siding signal-box, the distances to the undermentioned places, &c., are approximately as follows :—

Up distant signal...	...	...	...	...	890 yards east
Position of overturned van at rest	...	...	...	...	982 "
First marks of derailment	...	...	...	...	1,537 "

The permanent way of the up line was laid in 1893. The rails are in 30 feet lengths, and weighed (when new) 83 lbs. per yard. Their present weight is about 80 lbs. The fishplates weigh about 24 lbs. per pair, and have four $\frac{3}{8}$ inch bolts. The rails rest on cast iron chairs weighing 44 lbs. apiece, which are secured to the sleepers by three spikes and three treenails. Wooden keys are used to hold the rails in the chairs. There are 12 creosoted sleepers, all of the usual dimensions, to each rail length. Gravel (Bickley) mixed with ashes is used for ballast, with a proportion of Dungeness beach shingle.

Evidence.

George Francis Young, signalman, states; I have been in the service 22 years, a signalman 13 years, and at Whitstable Town since October last. I came on duty at 5.30 a.m. on Wednesday, June 19th last. Herne Bay offered the 10 a.m. up Ramsgate train to me at 10.28. I accepted it at the same time. I got "In section" for the train at 10.38, and it passed my box at 10.43. On Tuesday the 18th, it was "In section" 10.40, passed 10.44. On the 15th the times were "In section" 10.42, passed 10.46. I am satisfied, in my own mind, that on this morning the train was running somewhat slower than usual, the usual booked time being four minutes. I looked out

of the window as the train passed, and saw it pass. I saw nothing unusual in the movement of the train, except that it was travelling, perhaps, a little slower. It is about four miles between Herne Bay and Whitstable. I offered the train to Graveney siding at 10.38. It was accepted at once. My booked time for sending "In section" was 10.43. I remember I looked at the clock after sending the "In section" signal. It was barely 10.43. I was called up on the telephone by the Graveney signalman at 10.48. He told me the train had not passed him, and he asked me to confirm the time of my "In section" signal, so I told him it was 10.43. He then said "Wait a

minute"; went to look out of his window, and returned and said that he believed the train was off the road. He told me that he would fetch his mate, and send him to make enquiry. It was a bright sunny morning—no rain. I remember it was very warm in the morning. My time to book off is 3.35 p.m.

John William Compton, signalman, Graveney sidings, states: I have been in the service 37 years, and have been a signalman the whole of the time. I have been at Graveney seven years. I came on duty on Wednesday, June 19th, at 6 a.m., and booked off at 4 p.m. The 10 a.m. Ramsgate to Victoria train was offered to me that morning at 10.39, and I received the "In section" signal from Whitstable at 10.43. The usual time is four minutes for the train to pass my box after the "In section" has been received. At 10.48 I was in the box and looked up at the clock and realized it was time the train had gone by, so I looked out in the direction of Whitstable, and noticed it had come to a stand about half-a-mile away. By the aid of some field glasses I was able to see that some portion of the train was off the road, so I sent down relief signalman Cowdroy, who lodges with me and was off duty, with instructions to find out what was the matter. He was in the garden near by at the time. He came back and told me the rear brake was lying on its side. The fireman shortly after came and reported the mishap to me. After I had sent my mate to find out what was the matter, I asked Whitstable on the telephone if he noticed anything wrong with the train in passing, and said it had come to a stand near my up "Distant" signal. He replied he did not see anything wrong with it. The fireman told me that the down road was clear. I did not "Block back" for the train. The train was still "In section" and the road was actually blocked at the time. I know there is a rule for sending the "Obstruction danger" signal, but I forgot about it at the time—I was so busy. I gave the particulars to the signalman at Whitstable that the train was derailed. It was a clear morning. I cannot remember whether it was particularly hot. There was no rain. I should judge that the usual speed of this train past my box is from 50 to 55 miles an hour.

Warrender Clements, station master, Whitstable Town, states: I was in the signal-box at Whitstable on the morning of the 19th when the 10 a.m. up Ramsgate express passed. It was running, I think, in the ordinary way. The usual speed of this train passing Whitstable Station is, I think, about 45 miles an hour. There is a speed restriction to that figure through the station. There was no unusual movement in the train, that I noticed, and no unusual oscillation. I am quite certain also, that there was no buffer-locking at that time. I should have noticed it if there had been. It was a bright sunny morning about 10 o'clock. It was very warm. It struck me as being a much warmer morning than it had been recently.

Frederick George Capon, station master, Faversham, states: I remember Wednesday the 19th instant. It was a very bright sunny morning from 7.0 onwards. It was a hot burning sun. I went down to Graveney Siding box soon after 11.0 o'clock, and reached there 11.22. The sun struck me as being very hot. It was so hot that I changed my coat for a thinner one. I had the train uncoupled behind the sixth vehicle from the engine, and sent the engine and six vehicles on as far as Graveney. I took a carriage examiner down with me, and there was nothing wrong with any of these vehicles. I put the brake van I came

down in from Faversham on to the rear of these six vehicles, and sent the train on to Faversham. The train was thoroughly examined at Faversham Station, on arrival. I had transferred the passengers from the four rear coaches into the front six vehicles before they moved from the site of the accident, and additional carriages were attached at Faversham. The train was crowded—several hundred people in it. After being examined, and the additional coaches attached, the train was sent to Victoria.

John Prior Graves, engine driver, states: I have been in the service about 35 years, and have been driver for 21 years. I am stationed at Margate West. I signed off duty on the 18th June at 7 p.m., and came on duty again at Margate West at 10.8 a.m. on the 19th. In the ordinary course of events I should expect to finish work about 8.30 p.m. on the 19th. I was working the 10.0 a.m. express from Ramsgate on the 19th. My engine was No. 493, a four wheels coupled express with front bogie and six-wheeled tender. It was fitted with the vacuum brake, working blocks on the four coupled wheels and the six wheels of the tender; also a hand brake on the tender. We left Westgate to time with ten bogies and a six-wheeled van. We are due to leave Westgate 10.25. We passed Whitstable at 10.43 by my watch. We are due to run past Faversham at 10.50. I shut off steam in order to reduce speed running through Whitstable, where there is a speed restriction of 45 miles an hour. I had no difficulty in maintaining 20 inches of vacuum. There was nothing unusual that I noticed in the movement of the engine or carriages between Westgate and Whitstable. Just after passing through the station, I put on steam again. All signals were "clear." There is a small piece of level, and then the gradient rises; and at the top of the bank which is half a mile to three quarters of a mile west of Whitstable Town, I think the speed of the train was still about 45 miles an hour. I think by the time we reached the stretch of level and straight road, which is about two miles from Whitstable Town, the speed of the train would have been increased to about 55 miles an hour. I did not increase the speed on the stretch of level road in front of us, but still kept at about 55 miles an hour. For this distance, until we had run three miles out of Whitstable, there was no unusual movement in the engine or the train, to show that anything was wrong. The first thing that I noticed was a heavy drag on the train from the rear, I cannot say actually whereabouts on the line I was when I noticed this drag, but I immediately shut off steam and destroyed ten inches of vacuum. I was driving from the right of the footplate. Immediately after making this brake application I looked back, on the right side, and the fireman looked out at the same time on the left. He shouted out "whoa" and I destroyed the remainder of the vacuum. I cannot say how far we ran after making the first application of the brake, but the brake, I know, acted extremely well, and I do not think half a minute could have passed. When I looked back myself I could see nothing wrong. It was the fireman, who looked out on the left hand side, calling out "whoa" that made me make the emergency application of the brake. There was no movement that I noticed in the train; no throwing of the engine from side to side more than is noticeable on an ordinary occasion. This particular stretch of straight road is not a place where I have noticed any excessive movement or throw on the footplate, and on the particular morning there was nothing more than usual. Neither was the tender swinging about any more than usual.

As soon as we came to a stand I got off the foot-plate and went to see if the down road was clear. I went right back to the rear of the train and found it was clear. I noticed the brake van at the rear of the train, lying on its left side. I noticed all the screw couplings in the train were intact. There was no movement of the needle in the vacuum gauge except when I was actually opening the valve myself. I was watching the road in front of me when we were running along the straight, and if it had been out of line, I should have noticed it. If there was any "out of line" in the rails, it was so small that I could neither notice it or feel it as we ran over it. I was looking out for Graveney "distant" signal, and as the road is on the straight, I could not have helped observing whether there was any out of line in the rails. The first thing that I noticed of anything being wrong, was this "drag" that I have spoken of from the rear of the train. It was not the same sort of stopping effect as that due to the brake application, and I am perfectly certain that the brake was not applied when I noticed the drag. We generally lose about two minutes between Westgate and Herne Bay. I believe I lost this time on the morning in question. We generally regain it between Herne Bay and Faversham. I think our speed as we passed over the place where the accident took place would be between 50 and 60 miles an hour. That is the usual speed. The train appeared to be in line when I looked back after making my first application of the brake. I have worked over this portion of the line for about 14 years, but have never had any occasion to complain of any undue oscillation over this section of the line. I examined the engine very carefully while the fireman was going to the signal-box, and could find nothing missing from it, and there were no marks on it. It was a bright sunny morning—hotter than it had been for some time. I noticed a relaying gang, with a flagman, who were working a mile or thereabouts, behind where the accident occurred. There were no men working on the up road as I passed.

Victor Albert Ovenden, fireman, states: I have been in the service between 9 and 10 years, and am a passed driver. I signed off duty on the 18th June at 7 p.m. and was working on the 19th with driver Graves. My hours of duty were from 10.8 a.m. until 9.30 p.m. The driver reduced speed through Whitstable, in the ordinary way. We were running at between 50 and 60 miles an hour just before the accident occurred, and I was firing, when I felt a drag on the engine. I looked up, and noticed the driver applying the brake. I looked back over the left hand side and saw the rear brake van off the road, leaning over on its side. I called out "Whoa" and we stopped almost immediately. My mate told me to stop on the footplate while he went back. When he came back he told me to go to Graveney signal-box. He told me that the down line was clear, and to send for assistance. It was a very hot sunny morning. I was busy firing when we got on to the straight road two miles east of Graveney, and did not look at the road in front of me. I cannot say, therefore, anything about the line of the rails. There was no unusual movement of any description until I noticed this drag upon the back of the train.

William Milford, guard, states: I have been in the service as a guard for 45 years and am thoroughly acquainted with the line between London and Ramsgate Harbour. I work over the Faversham and Ramsgate Harbour section, many times throughout the year. I came on duty

on Wednesday the 19th at 4.30 a.m. and worked the 5.55 a.m. Holborn to Ramsgate Harbour train. I returned to London as head guard on the 10 a.m. Ramsgate to Victoria train. I should ordinarily book off at 1 p.m. I was riding in the front brake van next the engine. The train was made up as follows:—

			No.
8-wheeled bogie brake-van	...		14
Do. composite	...		892
Do. tri-composite	...		881
Do. third	...		866
Do. tri-composite	...		883
Do. third	...		862
Do. composite	...		2374
Do. tri-composite	...		882
Do. composite	...		893
Do. third	...		861
6-wheeled brake-van	...		594

All these, except the last, which was a six-wheeled vehicle, were eight-wheeled bogie coaching stock. We left Westgate right time and passed Herne Bay two minutes late, two minutes having been lost in running. We passed Herne Bay 10.39. I did not book the time we passed Whitstable. All went well until we reached Graveney up "distant" signal when the train was brought suddenly to a stand. I then looked at my watch and found the time was 10.45. I looked out of the window, as I wondered why the train had stopped. The signals were "clear." The driver pointed behind and I looked behind and saw that the rear van was on its side. I noticed nothing unusual in the way the train was moving, before we came to a stand. I got out of the van, and went to the rear of the train, and found my mate had got out of his van. I told him to go back and protect the rear of the train, and then went forward and asked the driver to send his fireman to Graveney and advise Faversham and order the break-down gang. There were about 200 passengers in the train. Many of these had got out, but I could not find that anyone was injured, and after I had assured myself that the down line was clear, I went to see that the passengers stood clear of that road, in case there was a train approaching. We generally lose two minutes travelling between Westgate and Herne Bay, and sometimes a minute is recovered running between Herne Bay and Faversham. On examining the train, I found the brake-pipe was disconnected between the rear van and the coach in front, and found the four coaches in front of the brake-van were buffer-locked. I got the idea that these carriages might have been off the road, because they were buffer-locked and the buffer castings were broken in some cases. There were no marks on the wheels to show they had been derailed. I have not noticed there is more oscillation on this track approaching Graveney siding than there is at other stretches of straight line on the railway. It was a very hot morning. The sun was shining brightly. I noticed that the road behind the derailed van was slowed in a serpentine way from side to side. I noticed there was a groove in the ballast outside the edge of the sleepers.

Robert Saffrey, guard, states: I have been in the service 25 years, and a guard for 20 years. I have been working over the Faversham and Ramsgate Section of the line the last 17 or 18 years, and I work over it daily between Margate and London. I came on duty on the 19th June at 10 a.m., and would, ordinarily, come off duty at 7.35 p.m. I came off duty about the same time the day previous. I was rear guard of the 10 a.m. Ramsgate to London train on the 19th instant, and rode in the rear van. I did not book the

times, but I noticed that we passed Herne Bay 10.39 by my watch. The train travelled in the usual way, and was travelling about the same speed as usual after passing Whitstable, and nothing seemed to be amiss until after we had passed the nuder bridge (known as Seasalter). About half a mile beyond this bridge as I was sitting in the observatory on the off side of my van, looking through the window, I saw one of the carriages in front bulge out of line of the rest of the train. I should say it was the second or third from my van. Immediately afterwards the ballast flew in all directions. The same instant, almost, I knew that the van was off the road. I was pitched across the van. The vacuum brake valve was situated about a foot on the near side of the centre of the van, and I had no time to open the valve before I was thrown across from the off to the near side. I do not think that the van could have travelled many yards before leaning over to the left hand or before it actually fell over in that direction. As soon as I could recover myself I got up on my feet and grasped the brake pipe which was then in a position almost over my head, and I kept in that position until the train came to a stand. The brake pipe is actually in the centre of the coach, and the gauge is on the left side of the brake pipe. I noticed that the whole of the vacuum was destroyed before the train stopped. I climbed out of the top of the van, through the door. By that time the passengers were out on the line. Guard Milford came up, and I arranged with him to go back and protect the train, but I found this had already been done by a platelayer. On finding that it was not necessary to do this, I returned to the train. When I saw the second or third carriage in front of me come out of line with the rest of the train, my first conclusion was that it was derailed. I do not think that there was more (possibly less) than a second of time between the moment I observed the carriage in front moving out of line and my being pitched across to the near side of the van.

Nicholas Burgess, waggon examiner, Faversham, states: I have about 11 years' service with the Company. I heard of this accident about 11 o'clock and went down to the scene with the breakdown gang, getting there about mid-day. There were four bogie coaches and a six-wheeled brake van, the remainder of the carriages having gone away with the engine. The first coach nearest Faversham was bogie compo No. 2374. This was buffer-locked with bogie No. 882. The third bogie was No. 893. There was no buffer-locking between Nos. 882 and 893. No. 893 was buffer-locked with No. 861 behind it. The last vehicle, six-wheeled brake van No. 594, was lying on its side. The four vehicles in front, were standing on the rails. The vacuum hose-pipe between the van and No. 861 was disconnected. It was torn apart. I carefully examined all the wheels and the underneath parts of these four coaches, and found no marks of any description pointing to derailment. There were indications of the coaches having been on a very sharp curve, as the footboards attached to the bogie frames had been in contact with the footboards attached to the sole plate. Pieces of wood were chipped at the corner of some of these, where they had come in contact. The two leading buffer castings of No. 882 were broken. The "off" trailing buffer casting of No. 893 was broken and the buffer bent inwards. The "off" leading buffer casting of No. 861 was also broken, and the drawbar of this bogie was broken 10 inches from inside the headstock. It was not pulled out owing to the cotter, or safety key.

There were four broken axle boxes on the van—three on the near side and one on the off side. I saw a considerable flaw in the broken drawbar at the leading end of No. 861. The result of this breakage would be to allow the drawbar to pull out about 2 inches. It was prevented from further movement by the drawbar cotter coming against the headstock plate. I do not think there would be any possibility of buffer locking taking place owing to this lengthening out of the drawbar and the increase of space between the buffer faces. There was nothing in the condition of the axles, wheels, springs, boxes, or any other part of these four coaches, which, in my opinion, would bring about an accident of this description. I examined the wheels very carefully and could find no sort of indication on the flanges, or any trace to show that they had been off the rails. I gauged the wheels of the coaches and found them correct to gauge.

Thomas Dowe, ganger, states: I have been ganger 16 years, and have 28 years' service with the Company altogether. I am in charge of two miles of permanent way—both roads—lying between 54½ and 56½ mile posts. I have three men in my gang. I examined the up road between Whitstable and Graveney about 7.15 on the morning of the 19th, and found everything in order. The road is all straight throughout, and I noticed nothing out of line. When the accident occurred, I was working on the down line about a quarter of a mile on the Whitstable side of where the first marks were found. I stopped to look at the 10 a.m. up Ramsgate train as it passed. I did not notice it was running any faster than usual. I did not notice that there was any undue oscillation either in the engine or the rear brake, as it passed. It was a very hot morning. I noticed it especially about 8 o'clock when we sat down to breakfast. After the train passed I went on with my work, until I heard a shout from the flagman. The flagman was then standing about 50 yards from where the train came to a stand. I looked up and saw a great cloud of dust, and when that had cleared away I saw that the rear brake-van was on its side. I have had no trouble with this road since about three years ago when there was some buckling of the rails which, I suppose, was caused by the heat. This was in May. There has been a certain amount of "creeping" since then but we have not had to open the joints to increase the expansion spaces. The up road was laid in 1893. The joints were "squared" then. The six-foot rail has "crept" faster than the near-side rail. I should say that the joints of the six-foot rail are now about three to four inches in advance of those of the near-side rail. The ballast is rather short. The roads keep sagging a bit owing to the soft bottom. The same rails were re-laid after the accident. We cut 4½ inches off a pair of the rails as the expansion spaces were small. I showed the Inspector last summer that the expansion spaces were insufficient and he said that he would have the rails pulled back in the winter, but it was not done.

Charles Hewitt, extra ganger, attached to the Kent Coast Branch, states: I am employed on extra work between Ramsgate Harbour and Faversham. I have eight men in the gang. I have about 17 years' service with the Company. On the 19th June, I was working with my men on the down road between Graveney and Whitstable. We were in possession of the road for renewing. I was looking towards Whitstable when the 10 a.m. up express from Ramsgate to Victoria was approaching and stepped to the near side of the down road. I stopped to watch the train pass. I

was about a quarter of a mile east of where the first marks were found after the derailment. I noticed nothing unusual about the speed the train was travelling as it passed me but the van was oscillating. It was not moving more than is usual with six-wheeled vehicles at the rear of a train. The engine did not appear to be rolling from side to side any more than usual. I had been employed on the down road on the Monday and Tuesday previous to the accident, and in the course of my work I had occasionally looked at the up road. The road looked in good line that morning. I noticed that the expansions were small but they were not jammed up. If the road had been out of line before the train passed over it I think I should have been certain to have noticed it. I had occasion to walk backwards and forwards over the up road several times that morning. After the accident, I went to examine the road. I found the first mark on a rail head, which looked as if a wheel flange had been over the rail. The mark had the appearance as if it extended over a length of rail covering two sleepers. About five sleepers in front of the first indication upon the rail head, marks began on the sleepers in the four-foot way. There were no chairs broken on these five sleepers. From the same mark on the rail-head which was close to a rail-joint, the road began to be slewed towards the six-foot way. There were about ten sleepers scored by the marks of wheel-flanges over them and these marks showed that the wheels were travelling from the six-foot to the near side of the permanent way. There were no chairs broken on any of these nine or ten sleepers. The marks of the near-side wheels were well outside the chairs. About 16 yards from the first mark upon the rail-head (about 20 sleepers) a deep cut commenced outside the ends of the sleepers on the near side, and this cut continued the whole of the way up to where the brake-van was lying. I think this cut shows that the brake-van was being dragged along or tilted over on its side nearly the whole of this distance. Opposite the point where the deep mark commenced it was found the road had been slewed into the six-foot to the extent of about 18 inches, and was out of line to that extent. There was no alteration in the relative position of the rails—the whole road—rails and sleepers together—were slewed out of line. Twenty yards ahead of this, the rails were

again in their right position in line, and from that point to where the van was found lying, nearly all the chairs under the near-side rail were broken, or displaced. The six-foot—or off side—rail from this point on to where the brake-van lay on its side, was in its right position in line, except at one or two points where it had been slightly forced out by the result of the brake-van being dragged against the opposite end of the sleepers. I counted the number of rails from the first mark to where the coach lay. The total distance was 570 yards—ten yards to a rail. In the neighbourhood of the first marks, there is a mixture of Dungeness shingle and Higham ballast. Further on towards where the van was lying, there is a considerable mixture of ashes with the ballast. There were no fastenings out of position in the chairs, and the rail fish plates and bolts were all intact over the first section of the road from the first mark to where the sleepers commenced to be broken under the near-side rail.

Alec Drury, flagman, attached to the regular gang of platelayers working between Whitstable and Faversham, states: I have been in the gang eight years, and do the flagman's duty in turn with the others. On the morning of the 19th I was flagging on the down road about a mile on the Whitstable side of Graveney Crossing, and the men were working on the Whitstable side of me, half-a-mile further on. I passed over from the up to the down side just before the 10 a.m. from Ramsgate Harbour approached, and watched the train as it went by. I noticed nothing whatever amiss with the train, and if the rear brake-van was oscillating a little, it was nothing more than is usual with such vehicles. I cannot say at what speed it was passing but it did not strike me as being unusual. After the train had passed I turned with my face towards Faversham to avoid the dust and smoke, and noticed the rear brake had left the road about 50 yards from me. I at once ran to advise my mates and called for help. The last I had previously seen of the van was in the upright position. After warning my mates and sending them to assist, I went back on the up road and placed detonators on the road to protect the train, remaining there until I was relieved. I was standing on the up road before the train passed, and should certainly have noticed if the rails had been out of line.

Conclusion.

There was no speed restriction on this level and straight section where derailment occurred. The actual speed of the train, as stated by driver Graves and his fireman (Ovenden) was about 55 miles an hour. Milford and Saffrey, the two guards, noticed nothing unusual in the way the train travelled. The attention of the platelayers, Dowle, Hewitt and Drury, who saw the train approach and pass them, a quarter of a mile before derailment took place, was not attracted either by its speed, or by any uncommon feature in its movement. The statements of the signalmen, and the timings recorded at the various signal-boxes passed, indicate that the journey was in no respects abnormal.

A heavy drag on the train from the rear was the first indication observed by driver Graves that anything was wrong. Steam was immediately shut off, and the continuous brake applied. The enginemen appear to have been thoroughly alert and to have acted with promptitude, for the train was brought to a standstill in a distance of about 560 yards from the first sign of derailment.

After the accident, the engine and first six coaches were uncoupled and sent forward to Graveney siding. Here they were examined and found to be in good order. This portion of the train was then despatched to Faversham, where it was again thoroughly examined with the same result, and eventually completed its journey to Victoria.

Examiner Burgess has described the condition of the last five vehicles. The first four were standing on the rails, with the buffers between the first and second, and third and fourth interlocked. These buffers are oval-shaped, 18 inches by 14 inches, except in one case where they are circular with a diameter of 16 inches. There were no marks on

the wheel-flanges or elsewhere, such as would be caused by derailment. The springs and axle-boxes were uninjured, and the wheels and axles true and to gauge. Scratches and splintering at the diagonally opposite corners of lengths of footboarding on all these four coaches, made it clear that the ends of the footboards, opposite and attached to the bogie frames, had been in contact with the adjoining ends of those attached to the sole plates. With the exception of one broken drawbar, the coupling attachments were intact. The last vehicle—brake-van—was lying on its near side, with four axle boxes broken, one only on the off side.

I examined these five vehicles before any work of repair had been carried out. There was nothing in their condition to suggest liability to derailment, or to cause distortion of a straight track in normal circumstances. The marks on the footboards described by Burgess were plainly visible, and indicated that the bogies of the four coaches had travelled round very sharp curves.* I could detect no signs that any of the vehicles had been derailed, except the brake van. I noticed a groove had been worn on the near side journal of the leading axle of the van, showing that there had been hard wear against a metal surface. A piece of the near side foot-board was found on the railway more than 300 yards from where the van came to rest.

From photographs taken by the Company, the van was found on its side with the left hand leading journal resting against the outer edge of the left hand rail. The body and tyre of its centre wheel lay across the rail head, and the tread of the rear hind wheel was pressed against the outer edge of the rail. The journal of the rear axle was buried in the ballast outside the sleepers. From the marks on the ballast, and the statement made by guard Saffrey, it is probable that the van was dragged approximately in this position for 500 yards.

Now as to the permanent way. The evidence of the engineman, and of the plate-layers, who were working in the immediate vicinity, is to the effect that the road was in good line prior to the accident. Moreover the fact that the engine, tender (wheel base, 13 feet), and first six coaches traversed the road safely and without damage, proves that the rails could not have been seriously out of line.

The condition of the road after derailment is described by ganger Hewitt. A slight abrasion on the head of the six-foot rail, evidently caused by a flange, was the first mark noted. On both sides of this mark (A) the track was slewed out of line. About 12 feet (five sleepers) in advance of (A) one or more flange marks were visible on the sleepers in the four-foot. These marks continued over 10 sleepers, with corresponding marks outside the left hand chairs. About 50 feet (20 sleepers) from (A) a deep score commenced in the ballast on the near side outside the ends of the sleepers. At this spot the road was slewed out of line 18 inches towards the six-foot-way, but was still in gauge. The score or trench, doubtless cut first by one or more wheels, and afterwards, when the van fell over to the left, by the left hand journal of the rear axle, extended along the edge of the sleepers to where the van was found lying. Many of the left hand chairs were broken, and the track pushed out of line on this length of road. None of the rails were bent or damaged, and there was no sideway movement of the chairs on the sleepers.

From my examination of the permanent way at the scene of the derailment, I can understand that it has been troublesome to maintain. The soft nature of the formation, which is practically ground level, has caused sagging of the roads, and necessitated lifting of the rails and sleepers. This has resulted in shortness of ballast round, and particularly at the ends of, the sleepers. The ballast, also, is not of good quality, either for resistance or drainage. The staggering of the joints, and irregular expansion spaces clearly point to "rail-creeping." Ganger Dowle, in fact, admits that deformation of the up road, caused by heat and insufficient expansion, took place three years ago.

I have no doubt that this derailment was brought about by a recurrence of very similar conditions. The morning of the 19th June was particularly close and the sun powerful. The expansion spaces were reported to be insufficient last summer, but no action was taken to increase them. It is probable that, with continued creeping, the rails over a considerable distance were closed up. The fact that it was found necessary, in replacing the road, to shorten a pair of rails by $4\frac{1}{2}$ inches is conclusive proof that the provision for rail expansion was insufficient.

It is unlikely that any noticeable horizontal deformation of the road had taken place before the train reached this spot. But the rails must have been in a high state of compression: possibly some vertical deformation or humping of the track had actually

* NOTE.—It has been found by experiment that the radius of curvature has to be $3\frac{1}{2}$ chains, before the corners of the footboards come opposite each other.

taken place. The movement or weight of the engine would be sufficient, especially with light and insufficient top ballast, to "spring" the track out of line. The deformation would be increased by the following vehicles. The irregularities in line, which the bogies of the last four coaches faithfully followed, at the cost of bufferlocking, were too great for the 6-wheeled brake van in rear, with a wheel-base of $19\frac{1}{2}$ feet, to negotiate, and derailment of the vehicle resulted.

It is to be regretted that the permanent way inspector referred to in Dowle's statement, did not, if his attention was drawn to the question of expansion, take action thereon. I am informed that the inspector left the Company's service, prior to this accident, on account of ill-health.

This case is a good illustration of the greater freedom from liability to derailment of bogie vehicles, when compared with six-wheeled vehicles. It strengthens also the contention that the best position for six-wheeled stock, when it is found necessary to marshal them with bogie stock in an express train, is at the end of the train.

I have, &c.,

J. W. PRINGLE,

Major.

The Assistant Secretary,
Railway Department, Board of Trade.

APPENDIX.

Damage to Rolling Stock.

Engine and tender.—Nil.

First and second bogie composite, No. 2374.—
One buffer rod slightly damaged; one door light broken.

Tri-composite bogie, No. 882.—Two buffer castings broken; one buffer bent.

First and second bogie composite, No. 893.—
One buffer casting broken; one buffer casting bolt broken.

Third class bogie, No. 861.—One buffer casting broken; one buffer bent; one draw-bar bent; one draw bar broken.

Six-wheel passenger brake-van, No. 594.—
Four axle boxes broken; four axle guards bent; one headstock broken; one sole and one bottom side rail broken; two stepboards broken; five stepboard irons bent and broken; brake hangers bent and brake frames bent; two intermediate longitudinals broken; two side lights of side observatory broken; three journals badly damaged; two bearing-spring suspension irons and one scroll iron bent; one shackle bolt broken; twelve retaining ring bolts broken; one axle-bearing broken; one axle-bearing missing; one draw-bar bent.

Printed copies of the above Report were sent to the Company on the 30th July.
