



MINISTRY OF TRANSPORT

RAILWAY ACCIDENTS

REPORT ON THE DERAILMENT

which occurred on

18th April 1952 at

BLEA MOOR

Between Dent and Ribbleshead in the

LONDON MIDLAND REGION

BRITISH RAILWAYS

LONDON : HER MAJESTY'S STATIONERY OFFICE

1952

(Reprinted 1953)

SIXPENCE NET

20th October, 1952.

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order of 21st April, 1952, the result of my Inquiry into the derailment of an express passenger train at about 1.23 p.m. on 18th April, 1952, at Blea Moor, between Dent and Ribbleshead, on the Midland Division main line between Carlisle and Leeds in the London Midland Region, British Railways.

The train concerned was the 9.15 a.m. Up Thames-Clyde Express from Glasgow to St. Pancras, and the derailment occurred as it was passing over the facing points at Blea Moor at about 55 m.p.h. A brake rod on the tender of the leading of the two engines hauling the train became detached and caught in the points, forcing open the closed switch rail.

The resulting damage was considerable. The second engine and the leading four coaches turned over on their sides and the next four coaches were derailed. The train carried nearly 200 passengers but, fortunately, there were no fatalities. Twenty nine passengers and five railway servants were injured, of whom 17 passengers were taken to hospitals at Skipton, Kendal, Leeds, and Lancaster, and were detained. The remainder were treated on the site or at hospitals, and allowed to go home.

There is no road near the site and the injured were taken forward by special train to Ribbleshead station. The arrangements made by the railway authorities for dealing with the casualties deserve the highest praise, as also does the response from the public for assistance. A doctor who was on holiday in the district arrived at the site of the accident at 2.0 p.m., having walked across the moor. Ten other doctors, and district nurses also attended at Blea Moor and Ribbleshead. The first ambulance was at Ribbleshead at 2.10 p.m., and it was followed within one and a half hours by 13 others from Settle, Lancaster, Hellifield, and Skipton. A number of local residents arrived in trade vans and private cars to render aid.

The work of clearing the lines, all of which were blocked, was started without delay, and three breakdown cranes were on the site by 5.30 p.m. Single line working on the Down line was introduced at 9.12 a.m. the following morning, and normal working over both the lines was restored by 4.40 p.m. that afternoon, after the damage to the permanent way, which was considerable, had been repaired.

*The weather was fine.*

#### DESCRIPTION

##### 2. *The site.*

The Midland Division main line between Carlisle and Leeds runs roughly North and South. In the Up direction it rises gradually for 48 miles from Carlisle to the 1167 feet summit at Aisgill, and for the last 8 miles the gradient is mainly 1 in 100. From Aisgill onwards the line undulates for about 10 miles, and Dent station lies almost in the centre of this section, at the south end of which is the 1½ mile long Blea Moor tunnel. The descent starts towards the southern end of the tunnel and continues, generally at a grade of 1 in 100, for about 15 miles through Blea Moor (¾ mile from the tunnel) and Ribbleshead (1 mile beyond Blea Moor) to Settle Junction. There is no station at Blea Moor and the name, which it is believed means "bleak moor", was given to a signal box which was constructed during the last war to control new Up and Down goods loops. The accident occurred at the facing points of the Up loop.

##### 3. *The train.*

The train consisted of ten coaches and it was drawn by two tender engines, an old class 4P 4-4-0 type compound, No. 41040, leading as the pilot engine and a class 7P 4-6-0 type, as the train engine. Including the engines the total weight of the train was 565 tons. All the coaches had steel underframes and, except for the rear brake, steel panelling on steel or timber body frames. The leading three coaches and the 8th and 9th coach were of the new British Railway standard "all steel" design and were built in 1951; they had a modern design of underframe, which was welded, and they were fitted with Buckeye automatic couplings, as also was the brake van. The remainder had shock absorbing buffers.

##### 4. *The accident.*

The leading engine remained upright and stopped on the main line about 160 yards beyond the points with only the four rear wheels of the tender off the track. The train engine turned over on its left side on the Up loop line just in rear of the leading engine. The front four coaches were thrown off their bogies on to their sides. The first three were more or less broadside to the lines in a W formation, and the third straddled all the four tracks; the next four coaches, and the leading bogie of the eighth coach, all of which were derailed, kept a fairly good line.

Damage to the train engine and its tender was mainly superficial though it was extensive, but the four leading coaches sustained heavy structural damage; there was no telescoping but many of the underframe members were twisted and bent and the bogies were torn away. The fifth and sixth vehicles were only slightly damaged and the remaining four were intact. The Buckeye coupling between the first and second vehicles was broken and the similar coupling between the second and third was forced open. The welded underframes stood up to the shock exceptionally well.

An examination of the track showed fresh marks on some of the sleepers of the Up line starting from a point about  $\frac{1}{4}$  mile on the Aisgill side of Blea Moor tunnel and continuing through the tunnel for  $2\frac{1}{4}$  miles to the Up facing points at Blea Moor. The marks were irregular but they were all between the centre of the sleepers and the right hand rail in the direction of travel. An examination of the engines revealed that the forward end of the right side adjustable brake pull rod on the tender of the leading engine had come adrift. The rod itself was badly bent and the rounded loose end was bruised. No other defects were found in the train, other than those caused by the derailment. It was therefore clear that the marks on the track had been caused by the unsecured front end of the brake rod striking and bouncing on it. This rod eventually struck the lock stretcher bar of the Up facing points at Blea Moor at a point about  $11\frac{1}{2}$  inches from the right hand rail. The stretcher was buckled to the extent of  $6\frac{1}{4}$  inches and was consequently shortened by  $1\frac{7}{8}$  inches. The lock on the points, and the detector were fractured and the left hand closed switch was pulled away from the stock rail by  $\frac{9}{16}$  inch. This resulted in the inevitable derailment of the train engine and the coaches which followed it over the points.

#### *The Brake gear.*

5. There are two adjustable brake pull rods on the tender of the pilot engine No. 41040 and they are each about 5 feet 8 inches long. The front ends are attached to the cranks on the brake shaft by case hardened round steel pins  $1\frac{3}{4}$  inches diameter and  $5\frac{1}{2}$  inches long, held in position by  $\frac{1}{2}$  inch diameter split pins. The general arrangements are shown in the sketch opposite page 3.
6. The round pin from the right hand adjustable rod and its split pin was missing from the engine. A similar type of round pin was subsequently found in the vicinity of the first mark on the sleepers and I assume it to be the missing pin ; no split pin was found. The round pin was undamaged ; it had slight wear marks made by the bushes in the fork of the brake shaft crank, and these marks extended halfway across the split pin hole.
7. The round pin from the left hand brake rod was removed for examination. It was not of standard size and again the wear on it extended well over the  $\frac{7}{16}$  inch diameter split pin hole. The split pin was only  $\frac{5}{16}$  inch diameter and it was kinked and partially sheared at the head and in the legs
8. As shown in the sketch, the forward end of the right hand fixed brake rod was fractured. The rod was flawed at the point of fracture but the flaw could not have been noticed in a normal inspection. This fracture was the result of the leading end of the adjustable rod striking the track, and it did not contribute to the accident in any way.

#### REPORT

9. The train left Carlisle on time at 12.1 p.m. and passed Aisgill box, at the summit, about 3 minutes before time. Its speed was then reduced to 15 m.p.h. over a permanent way restriction, but it had recovered a speed of about 45 m.p.h. as it entered Blea Moor tunnel. All the Blea Moor signals were clear, and the train was travelling at about 55 m.p.h. when the derailment occurred at the Up loop facing points.

None of the train staff, nor a locomotive firing instructor who was on the train engine, was aware that anything was amiss before the derailment. Members of a permanent way gang who were opening up the ballast in the Blea Moor tunnel, noticed that something on one of the engines was striking the ballast and throwing it up from the track. They could, however, do nothing to stop the train.

10. Pilot Engine No. 41040, belonged to Holbeck Shed, Leeds, in the North Eastern Region. On 18th April it worked the 3.0 a.m. passenger train from Leeds to Bradford, then a parcels train from Bradford to Carlisle, where it was attached to the Up Thames-Clyde Express to return to Leeds. It was prepared for the driver in the Kingmoor Shed, Carlisle, where its brakes had been booked for adjustment.

11. Fitter J. G. I. Cookson of that shed, adjusted the brakes on the engine and the tender. He said that on the tender he adjusted the blocks to the wheels with the barrel nuts only and then slackened them to  $\frac{3}{8}$  inch clearance. He did the work with the engine on a pit with the aid of a good lamp. He did not look at the split pins on the cranks of the brake shaft, but he was so close to them that he thought he would have noticed if one was missing.

12. The engine had run 41,000 miles since it came out from the Shops in November 1950, and it had undergone an "X" examination in Holbeck Shed on 17th April, the day before the accident. On passenger engines of this type such examinations are carried out every 12-16 days. The procedure is for the engine first to be carefully inspected by an examining fitter, who prepares an "Examination and Repair Card", referred to later as an "X" card. That card contains the headings of certain scheduled items of examination to be done, and the examining fitter adds other items of repair as he considers necessary as a result of his inspection. The various items of work are allocated to fitters by the foreman fitter. On completion, the engine is again thoroughly inspected by an examining fitter before it leaves the shed.

Details of the various schedule items for the different types of examination are given in the Railway Executive Instruction "Examination of Steam Locomotives", and one of the items to be included in an "X" examination is as follows :—

<i>Item No.</i>	<i>Parts to be examined</i>	<i>Procedure</i>	<i>Locomotives</i>
20X	Brake gear	Examine and adjust or reblock as required. Lubricate brake cylinder trunnions, brake shaft and hand brake screw.	all

The equivalent heading on the "X" card (item 19X) is "Brake Gear".

13. The "X" card for engine No. 41040 was prepared at about 4.30 p.m. on 16th April by Acting Examining Fitter H. Davidson. He said that he examined the engine on a pit with a flash lamp. He found nothing wrong with the brake gear, including the split pins which he tapped. He wrote against the item 19X, Brake Gear, the words "Clean, oil and leave free". That he said was generally done on every "X" card. He also made the additional entry "Engine and Tender brake blocks to change" against item 26X, the standard heading of which did not apply.

14. Item 19X was allocated to Fitter F. Westmoreland. He said, "I went round with the oil can and grease gun, oiled pins and shafts relating to the brake shafts. Grease gun for the grease type pins. I think that is all". When asked whether he examined the brake gear generally and any of the split pins in particular, he replied, "No, I am not an examiner, it is not my job". He added that he would report anything he saw wrong to the examining fitter, but on this occasion he noticed nothing.

15. The work on item 26X was done by Fitter J. Altoft. He stated that he "reblocked" the tender by slacking back the adjusting barrel nuts on the pull rods, and that it was not necessary to touch the round pins connecting that rod to the brake shaft. It was not part of his duty to examine the brake gear generally, but as usual he had a "good look round" and he saw nothing wrong.

16. All the work on the engine was finished at about 5.0 p.m. on 17th April. The final examination before the engine went into traffic to work the 3.0 a.m. train on the following day was made by Examining Fitter C. A. Rogers, at about 1.0 a.m. ; the engine was on a pit and he had an electric lamp. Rogers said that he knew that the engine had been under an "X" repair. He did not, however, have the repair card so he was unaware of any special items that had been booked, although he noticed that new brake blocks had been fitted. He examined the engine carefully and looked at all the split pins in the brake gear, and found them all intact.

17. Leading Fitter J. Jessop stated that in his opinion the examination of the brake gear in accordance with item 20X of the Railway Executive Instruction was the responsibility of the examining fitters who inspected the engine before and after the "X" repair, although he thought that the fitter allocated to item 19X (oiling and greasing the gear) should also check that it was in order. He said that the fitter examining an outgoing engine knew whether it had been under an "X" or other type of examination. He would not, however, know what special items of work had been carried out on it although he could obtain this information from the "X" card, to which he had access.

Mr. Jessop said that he signed the "X" card concerned at about 5 p.m. after the work had been completed, but he did not examine the engine. He said that between 90 and 100 engines were "homed" at Holbeck Shed and that approximately 7 were under "X" examination each day. He personally made a thorough check of the work done by the fitters on at least one engine a day. He had no system, however, of ensuring that he inspected every engine within a reasonable period.

Mr. Jessop was shown the round pin and the split pin taken from the left hand tender brake pull rod, and he said that it was not a good split pin and should have been changed. He said that it was hardly ever necessary to move the position of the round pin on the adjustable brake rod. He did not think that examining fitters were in the habit of neglecting this part of the brake gear, and he personally had never found a defective split pin nor a pin missing.

18. Foreman Fitter F. A. Bourne said that in his opinion it was the responsibility of the fitter who changed the brake blocks to notice and change defective split pins in the brake gearing. The examining fitters should also automatically look at the pins. He confirmed that it was very rarely necessary to adjust the position of the round pins. He had known split pins to shear but the wear should be noticed and the pin changed before that happened. He also considered that the pin from the other brake pull rod was "definitely not good". He spoke well of both the examining fitters and also of Westmoreland and Altoft, all of whom he said were experienced men.

19. Mr. E. Geeson, Shed Master at Holbeck, said that when Engine No. 41040 was in Shed on 17th April, the examination and work scheduled for every 7-9 weeks was done in addition to the items under the "X" examination. The additional items are allocated to fitters and are not entered on the "X" card ; the only one concerning the brake gear was the adjustment of the hand brake, and that was done. He went on to say that leading fitters do not have the time to check all the work done on engines after "X" or "7-9 week" examinations, but they are expected to make spot checks. They are required to make a careful inspection before and after an engine undergoes the more detailed examination given every 10-12,000 miles, but even then they would be expected to look mainly for signs of wear. These inspections, moreover, did not take the place of those done by examining fitters. Engine 41040 last had the "10-12,000 mile" scheduled attention on 6th February, 1952, since when it has run 5,000 miles.

Mr. Geeson said that it was the responsibility of examining fitters to check the brake gear before and after "X" examinations, and also during the daily examination all engines are given before working a passenger train. He would in this particular case have expected the fitter changing the brake blocks also to notice the split pin on the left hand brake rod, which he agreed was defective.

#### CONCLUSION

20. There is no doubt about the cause of this accident. The front end of a brake rod on the tender of the leading engine became detached and, after bouncing on the sleepers and ballast between the rails for a distance of over two miles, it struck the stretcher bar of the first facing points. The closed switch of the points was wrenched open and the derailment of the second engine and the following coaches was inevitable.

21. The brake rod came adrift because of bad maintenance of the engine. The round pin holding the rod to the brake shaft became displaced, and this can only have resulted from the securing split pin having dropped out of position. The split pin was not found and it may have come out many miles back. It is not possible, therefore, to say in what way it was defective. There can be no doubt however, that there was some defect, for a well fitting split pin with correctly splayed legs will not fall out of its own accord. The wear marks on the round pin concerned indicated that the split pin could not have been a good fit, and that its condition was like that of the equivalent pin on the other brake rod, which was far from good. It seems probable, therefore, that one leg of the missing pin sheared, and that the pin fell out because the other leg was straight or inadequately splayed. On the other hand both the legs may have sheared.

22. The split pins in the brake gear were easily accessible and their unsatisfactory condition should certainly have been noticed by the fitters who examined the engine before and after the "X" examination which the engine received just before the accident. I find myself unable to accept the contention of these men that the pins were all in order. The two fitters who worked on the brake gear, particularly the man who changed the brake blocks, might also have noticed the defects. It is not, however, fair to blame any one of these four fitters directly for the accident, for the pins must have been defective for some time.

I examined the brake gear on a number of other engines in Holbeck Shed. No split pins were found in a condition comparable with that taken from the left hand brake rod of the engine concerned, but I saw a few cases of pins which did not fit well and of pins with only one leg splayed. These were defects which should not have existed.

23. I can, therefore, attribute this accident only to the fact that insufficient attention had been paid over a considerable period to the examination of engine brake gear.

#### REMARKS

24. This serious accident, which was almost identical with one that occurred at Wood Green on the former L.N.E.R. in 1944, was the third case on British Railways attributable to a locomotive defect within a year. The other two were the derailment at Weedon in September 1951, with 15 fatalities, and the collision at Glasgow (Queen Street) in November 1951. The former was caused by a mistake on the part of an experienced fitter who mismanaged the task of transposing the bogie axles and it would most probably have been prevented by better supervision. In the Glasgow case a vacuum brake failure occurred as a result of a defect which had obtained for some time. In all three of these accidents the engines were in traffic in an unsafe condition, and in this particular case also the engine must have been in that condition for a considerable period.

25. If the safety of the travelling public is to be ensured, locomotives must be efficiently maintained and this requires the work of examination and repair to be conscientiously supervised. The fact that engines are used so much more intensively nowadays makes the question of close supervision specially important. The necessity for careful attention to detail needs no emphasis.

26. It was indeed fortunate that this accident was not accompanied by loss of life. The complete absence of telescoping in the leading coaches can probably be attributed to the Buckeye couplings with which they were fitted; these are now standard in the British Railway design of main line coach. Another feature of this coach is the greatly strengthened welded underframe, which in this accident withstood the very considerable shock exceptionally well.

I have the honour to be,

Sir,

Your obedient Servant,

D. McMULLEN,

Colonel.

The Secretary,  
Ministry of Transport.

#### Postscript.

Since concluding this Report a serious accident occurred on 25th October, 1952, near Crewkerne, between Yeovil and Axminster, on the Southern Region West of England main line. Details are given in the Appendix. The accident was also caused by part of the brake gear on the tender of the engine becoming detached. It was the result of an unsatisfactory feature in the design, but ineffective examination and an accumulation of dirt on the undergear may have contributed.

## APPENDIX

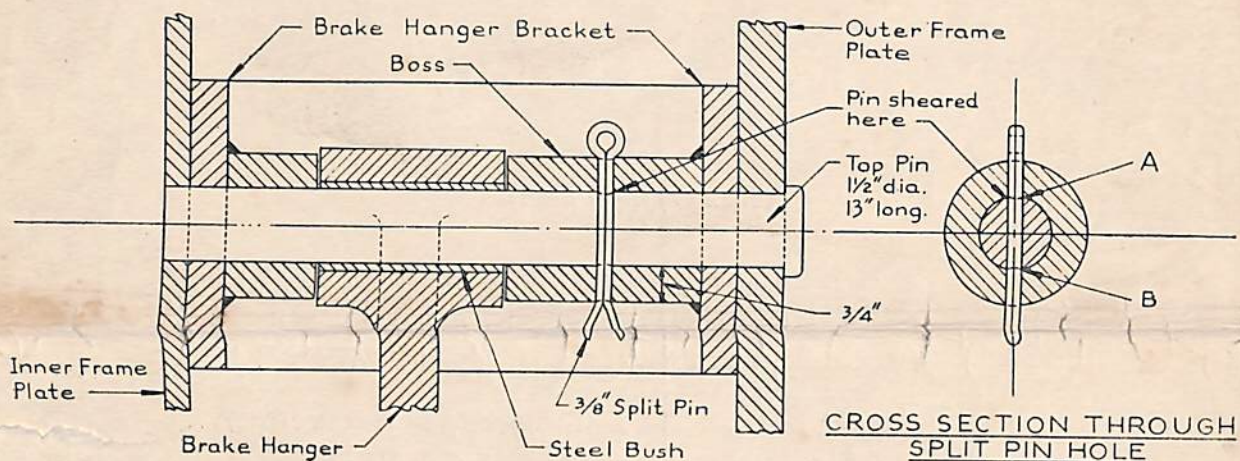
ACCIDENT TO 12.20 P.M. EXPRESS PASSENGER TRAIN FROM ILFRACOMBE TO WATERLOO,  
ON 25TH OCTOBER, 1952.

The train consisted of 11 coaches and it was hauled by a Merchant Navy class engine. When travelling between Crewkerne and Sutton Bingham at about 75 m.p.h. the brake hanger on the rear of the left hand trailing tender wheel became detached and fell on to the track. Marks on fish bolts and check rails showed that it travelled in that condition for nearly 3 miles.

The brake hanger then caught in the throat of the check rail of an occupation crossing. The check rail was 10 feet 8 inches long and weighed approximately  $2\frac{3}{4}$  cwt., and it was torn out of position. The rail was lifted and it travelled through the battery box and the floor of the leading coach on the train. Its subsequent trajectory was diagonal through three compartments and it emerged through the roof of the fourth, the trailing compartment of the coach. One child was seriously injured and seven other passengers received slight injuries or complained of shock.

The train was stopped at Sutton Bingham station at 3.44 p.m. from where a doctor and an ambulance were called. The ambulance arrived at 3.59 p.m. and the child was removed to hospital. After temporary repairs to the engine, the train left Sutton Bingham at 4.13 p.m. and proceeded to Yeovil where the damaged coach and the engine were detached.

The arrangements for supporting the brake hanger are shown in the sketch below:—



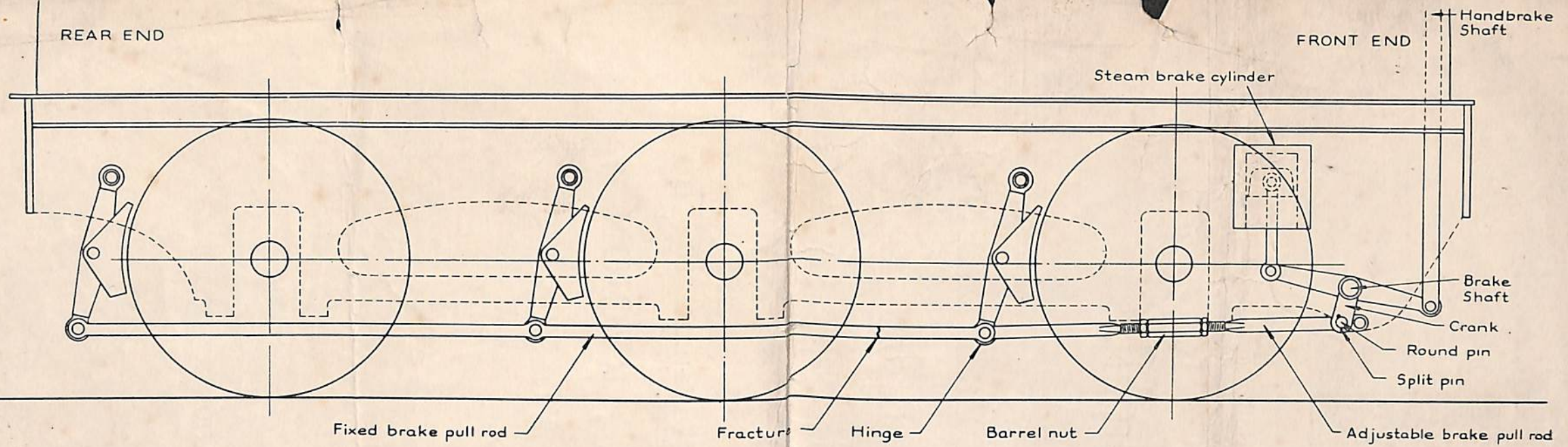
After the accident, only the upper portion of the split pin (above A) was in position, and the top pin was missing. It was subsequently found about  $1\frac{1}{2}$  miles beyond the first marks on the track. The legs of the split pin were not found and they may have fallen out many miles back.

The top pin was of case hardened steel and had a clearance, when new, of  $\frac{1}{64}$  inch in the brake hanger bracket and in the boss. The split pin was an easy fit in the holes. There was no means of lubricating the top pin and consequently friction with the brake hanger bush caused it to rotate slightly whenever a brake application was made, thus subjecting the split pin to shear.

An examination of the upper portion of the split pin concerned showed that this rotating movement caused one of its legs to be sheared through almost entirely, and the second leg partially, at A. The first leg then fractured, but the burring of the metal probably prevented it from falling out. The shearing then continued in the second leg at a different angle, but before it became extensive that leg also fractured. Presumably both the legs then dropped out and the vibration of the engine caused the top pin to work out of its position; when it cleared the brake hanger bush, the hanger fell. It was difficult to estimate the period of time between the fractures of the two legs of the split pin, but it may not have been great.

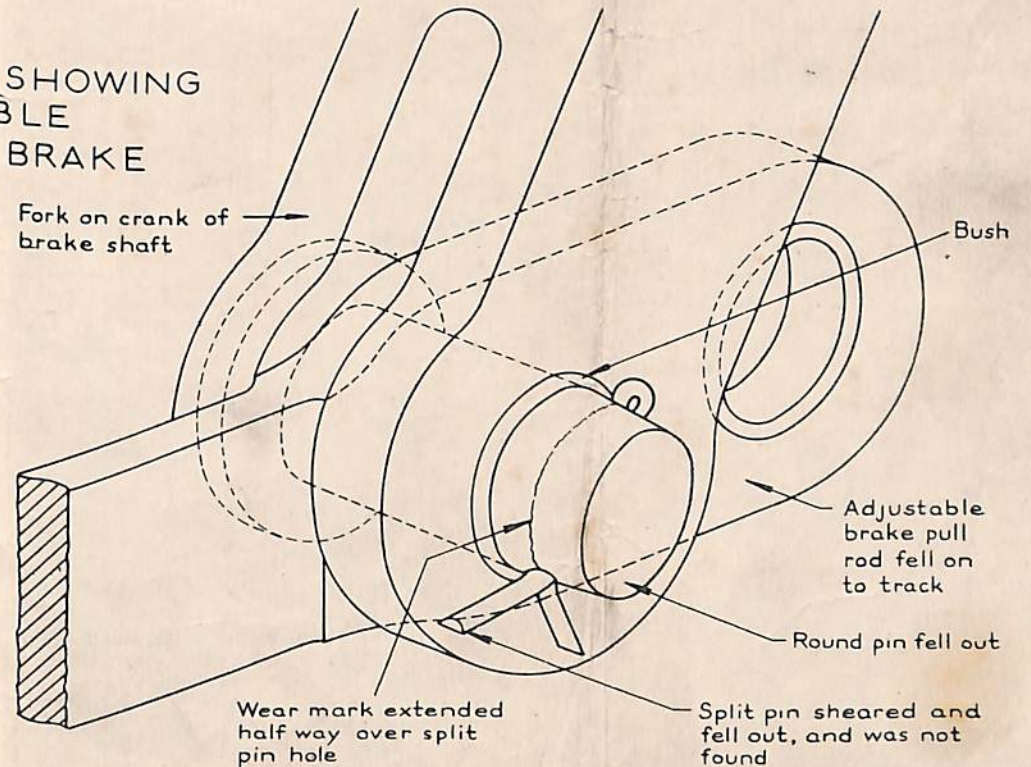
The split pins securing other top pins were examined and showed similar signs of shearing action at A and also, but to a lesser extent, at B.

It was not a satisfactory feature in the design of the Merchant Navy class engine that the split pins should be subjected to shear. This feature was noticed for the first time in December, 1951, after the class had been in service for over ten years, when a similar incident occurred near Woking, fortunately without any damage. As a result, a modification of the arrangements for supporting the brake hanger was proposed, and it was still under consideration. After the present accident, however, immediate steps were taken to remedy the defect. All the split pins concerned were examined, and renewed if necessary. It was also decided to fit a longer top pin and to secure it outside the frame plate by a split pin which could not be subjected to shear. The work on all the engines in traffic was completed on 5th November, 1952. Action is also in hand by the Headquarters of the Railway Executive to ascertain whether the same feature in design exists on other classes of engine and, if necessary, to modify it.



Note :- Adjustable and fixed brake pull rods duplicated on L.H. side of tender

ENLARGED SKETCH SHOWING FITTING OF ADJUSTABLE BRAKE PULL ROD TO BRAKE SHAFT



SKETCH SHOWING LAYOUT OF BRAKE GEAR ON THE TENDER OF CLASS 4P ENGINE No. 41040

The engine concerned in this accident had undergone an "X" examination in Salisbury locomotive shed five days before the accident. The fitters who inspected the engine on that occasion and the other fitters who examined it subsequently stated that all the split pins in the brake gear had been checked and were intact. No defect in the split pin which failed could have been noticed before the fracture of the first leg of the pin, and that may not have happened before the engine left the shed that morning. On the other hand, the possibility of one leg being broken at that time cannot be entirely ignored; if that was the case, the leg would, at least, have been loose.

Such a defect might not have been noticed because of the dirt that had accumulated under the tender, and similar conditions were found under the tender of another engine of the same class. Owing to a leakage of oil from the sump in which the chain operated valve gear works, dirt is said to accumulate more rapidly on the undergear of Merchant Navy class engines than on other classes. Instructions have already been issued by the Regional Officers that special attention is to be paid to the removal of the dirt so as to ensure that all the brake fittings can be examined effectively.

*Crown Copyright Reserved*

PUBLISHED BY HER MAJESTY'S STATIONERY OFFICE

To be purchased from

York House, Kingsway, LONDON, W.C.2      423 Oxford Street, LONDON, W.1

P.O. Box 569, LONDON, S.E.1

13a Castle Street, EDINBURGH, 2

1 St. Andrew's Crescent, CARDIFF

39 King Street, MANCHESTER, 2

Tower Lane, BRISTOL, 1

2 Edmund Street, BIRMINGHAM, 3

80 Chichester Street, BELFAST

or from any Bookseller

1952 (Reprinted 1953)

Price 6d. net