INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE MISSOURI PACIFIC RAILROAD AT BLAKE, KANS, ON JANUARY 14, 1926

APRIL 23, 1926

To the COMMISSION

On January 14, 1926, there was a derailment of a pasenger train on the Missouri Pacific Railroad at Blake, Kans, resulting in the death of two employees and the injury of three passengers and two employees

LOCATION AND METHOD OF OPERATION

This accident occurred on the Coffeyville district of the Southern Kansas Division, which extends between Osawatomie and Coffeyville, Kans, a distance of 134 6 miles, and is a single-track line over which trains are operated by time-table, train orders, and a manual block-signal system The point of accident was at the west passing-track switch at Blake, approaching this point from the west there are 1,233 feet of tangent and then a 1° curve to the right extending to the switch at which the derailment occurred, 3,083 feet distant From a point about 1 mile west of Blake the grade is descending for eastbound trains, varying from 0 75 to 0 27 per cent and is then practically level to the point of accident, 820 feet distant

The switch involved is a facing-point switch for eastbound trains and leads off to the north or left from the main track to a passing track The switch stand is located on the fireman's side of an eastbound train, it is of the "Standard" ground-throw type, from the mast of which at night is displayed a green light when the switch is lined for the main track and a red light when it is lined for the passing track

The weather was clear at the time of the accident, which occurred at 1 31 a m

DESCRIPTION

Eastbound passenger train No 116 consisted of one combination mail and baggage car, one baggage car, one coach, one chair car and two Pullman sleeping cars, in the order named, all of steel construction, hauled by engine 6436, and was in charge of Conductor Beemish and Engineman Reed It departed from Coffeyville at 1 07 a m, two minutes late, passed Deering, 9 3 miles from Blake and the last open office, at 1 17 a m, still two minutes late, and was derailed

at the west passing-track switch at Blake at 1 31 a m while traveling at a speed of 55 miles an hour, as indicated by the tape of the speed recorder with which the engine was equipped

The entire train was derailed with the exception of the rear truck of the last car The engine swerved to the left and came to rest on its left side at a point about 330 feet from the switch, north of and parallel with the passing track, and the tender cistern was torn from its frame and came to rest between the engine and the right-of-way fence, while the first car came to rest behind the engine at right angles to the passing track, the other derailed cars remained upright on the roadbed The employees killed were the engineman and fireman

SUMMARY OF EVIDENCE

Brakeman Koontz was riding in the rear car as his train approached Blake and said his first knowledge of anything wrong was when the car gave a severe lurch which threw him from his feet and upon attempting to rise was again thrown to the floor, he made no investigation but went back immediately to protect the rear of the train

Train Porter Flowers was riding in the coach with Conductor Beemish as their train approached Blake, and he said the first intimation he had of the impending accident was upon hearing a peculiar noise made by the trucks under the car, which was followed immediately by the shock of the derailment He was able to free himself of the wreckage and went to the telephone booth to notify the dispatcher of the accident, later he examined the switch and found it locked for the main track, with the switch light indication showing green for the main track

Engineman Reed and Fireman Woodward were killed as a result of the accident, while Conductor Beemish was so severely injured that his condition would not permit of an interview at the time of this investigation

Sheriff W D McCrabb reached the point of accident about 45 minutes after its occurrence, and he said he found the crank which works the switch with one arm broken, laying on the ground near the switch The switch points were lined for the passing track and the switch stand locked for the main track, while the switch light was burning and showing green for the main track Undersheriff Clubb and Chief of Police Rudeauff were present when Mr McCrabb made the examination and confirmed his statements

Missouri Pacific Special Officer Ziengenfuss arrived at the scene of the accident at about 2 50 a m and was met by Messrs McCrabb,

Clubb, and Rudeauff and the condition of the switch was called to his attention He said the rear truck of the rear Pullman sleeping car was about 6 inches from the switch points which were lined for the passing track and tight against the stock rail

Division Engineer Knecht arrived on the relief train and on examining the switch he found that the points were set for the passing track and fitted tightly against the stock rail, the entire turnout appeared to have been moved eastward about 3 inches He examined the switch stand and found the crank to have been broken, the crank lug over which the connecting rod fits was missing, but was later found and fitted to the broken crank The broken crank showed a fresh break to the extent of about three-fourths inch, while the balance of the fracture was either an old break or a crack, and it appeared as though it might have been a progressive break

Section Foreman Malgren inspected and operated the switch at about 9 o clock on the morning of January 13 He said he had applied a new connecting rod about a month previously as the other rod appeared old and somewhat worn

Master Mechanic Kilbury examined engine 6436 at the scene of the accident both before and after it had been derailed but found nothing about it which in his opinion would have caused or contributed to the cause of the accident

Careful examination of the engine and equipment was made and nothing was found which would have caused or contributed to the occurrence of the derailment The track for some distance preceding the point of accident was inspected but nothing was found to indicate any unusual condition, the track in this vicinity was laid new in June, 1925, and the switch involved was said to have been installed new at that time It was last used by the crew of westbound light engine 804, at about 4 30 p m January 13 Between that time and the time of the derailment the switch had been passed over by four freight trains, one eastbound and three westbound

A test was made to ascertain the extent to which the switch points would open when suddenly released, and it was found that they would spring open a distance of 1¼ inches or more

The evidence indicated that the accident was caused by cocked switch points, due to the breaking of one of the arms of the crank holding the end of the connecting rod in position, this allowed the connecting rod to fall to the ground and left the switch points free to move An investigation for the purpose of ascertaining the reason for the failure of this crank arm was conducted by Mr James E Howard, engineer physicist, whose report follows

REPORT OF THE ENGINEER-PHYSICIST

The derailment of eastbound passenger train No 116 at Blake, Kans, on January 14 1926, was apparently due to a broken lever arm of a switch-stand stem, whereby facing points of switch rails of a passing track were released and set for entrance to the passing track independent of and contrary to the indications of the switch-light beacon

It was shown by testimony taken at the investigation of this accident that rails were laid in this vicinity early in the month of June, 1925, and, furthermore, that the switch stand in question was put in at that time Instructions were in force that new switch stands should be put in when rails were renewed It was also stated that this switch stand 'was shipped with the rest of material as a new stand, shipped just as you see it" In the opinion of the roadmaster it was a new stand A new connecting rod was put in about a month prior to the accident, on account of the earlier rod being an old one and worn

Attention is directed to this description of the switch stand, since the appearance of the steel casting, of which the broken lever arm was a part, showed a very corroded condition, not expected to be displayed by a casting in service only seven months The new connecting rod, one month in service, showed no attack of corrosive action The examination of the lug casting suggests the possibility of error in having designated it as a new part of the stand

Figure 1 shows the appearance of the broken lever Its corroded condition is shown by the photograph The diameter of the lug, on the broken side, was 1 22 inches The opposite lug had a diameter of 1 44 inches A blue print of the switch stand calls for lugs having diameters of 1½ inches each The diameter of the eye of the new connecting rod was 1½ inches conforming to the dimensions on the drawing

Figure 2 shows the looseness of the fit of the connecting rod engaging its lug on the broken arm of the lever The connecting rod was a good mechanical fit on the opposite unused lug, for this class of work

Figure 3 shows the opposite faces of the broken lug lever The average dimensions of the lever at the place of fracture were 0 3 inch thick by 2 06 inches wide The drawing calls for a thickness of one-half inch

The middle of the width of the fractured surface displayed a progressive fracture It seemed to have had its origin at the upper face of the lever In its first stages the fracture separated the upper half of the thickness of the lever, as indicated by its fan-shaped outlines, with center of radiation at the upper side of the casting

The final stage separated the lower half of the thickness of the lever At an intermediate period there was probably an extension of the upper fracture toward one edge of the casting When the balance of the casting was finally broken, control of the switch rails was lost

The steel casting showed blowholes, but that is not an unusual circumstance in steel castings Blowholes prevail near the upper surfaces of open sand castings, and in the upper parts of two-part-flask molds, in the absence of sink heads or risers The occurrence of blowholes in steel castings is therefore hardly a matter for adverse criticism in view of their general prevalence, but their presence must be reckoned with in establishing safe dimensions in castings to meet working stresses

Although the fracture of this casting probably admitted of detection prior to complete rupture, or rather might have been discovered under minute examination, this member is not one which should require critical examination as a safeguard to insuring its integrity

The looseness of the fit of the connecting rod over the lug was a matter which should have attracted attention It must have been apparent when the new connecting rod was put in place one month prior to the accident, if indeed it was not in evidence when the stand was installed in June, 1925

SUMMARY

It was clearly demonstrated that the derailment of train No 116 was due to the fracture of the lever arm of the switch mechanism governing the rails of the passing track at Blake, Kans The fracture of this lever arm allowed the switch rails to shift their position at will and contrary to the indications of the switch light which at the time of the derailment was locked in "clear" for the main-line track The train was derailed upon taking the switch rails while traveling at a normal rate of speed for the main-line track

Examination of the lever arm of the switch-stand shaft showed a reduction in the thickness from one-half inch, called for on the blue print of the stand, to an average thickness of 0 3 inch Some, if not all, of this reduction was due to corrosion of the metal The fracture of the arm was progressive in its character

The lug over which the connection rod of the switch mechanism engaged was a quarter of an inch in diameter under size The opposite, unused lug, was substantially full size This discrepancy in size of the working lug should have been observed and a new full-dimension lever arm installed

This mechanism of the track structure is a vital one The fracture of the lever arm inevitably led to a derailment The daily use of the switch showed that it was functioning properly, but did not

reveal the element of weakness and the approach of rupture Details of a switch stand should possess adequate strength, obviating the need of critical inspection under ordinary circumstances If exposed to exceptional corroding influences such conditions should be taken into consideration and weakened parts renewed

Respectfully submitted

W P Borland, *Director*

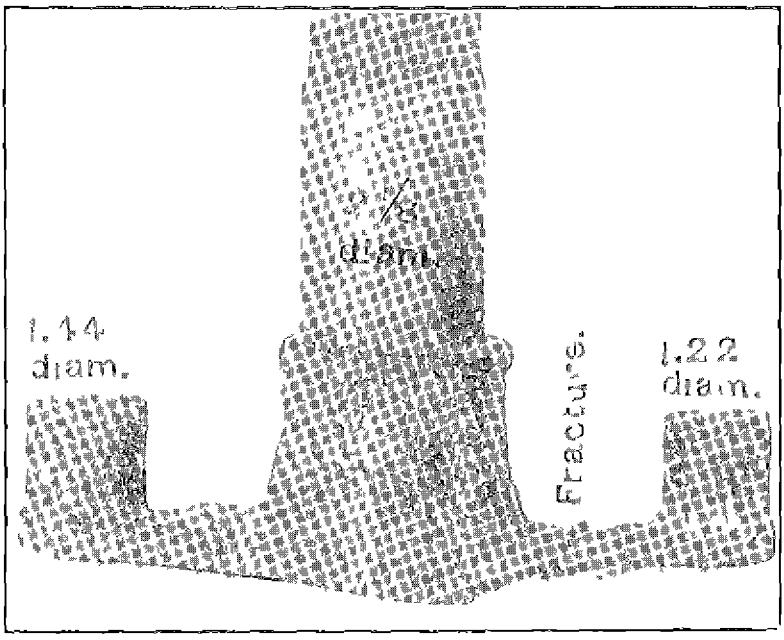

FIG. 1.—Photograph of fractured crank lever. Diameter of lug on broken side 1.22 inches; diameter of opposite lug, 1.44 inches.

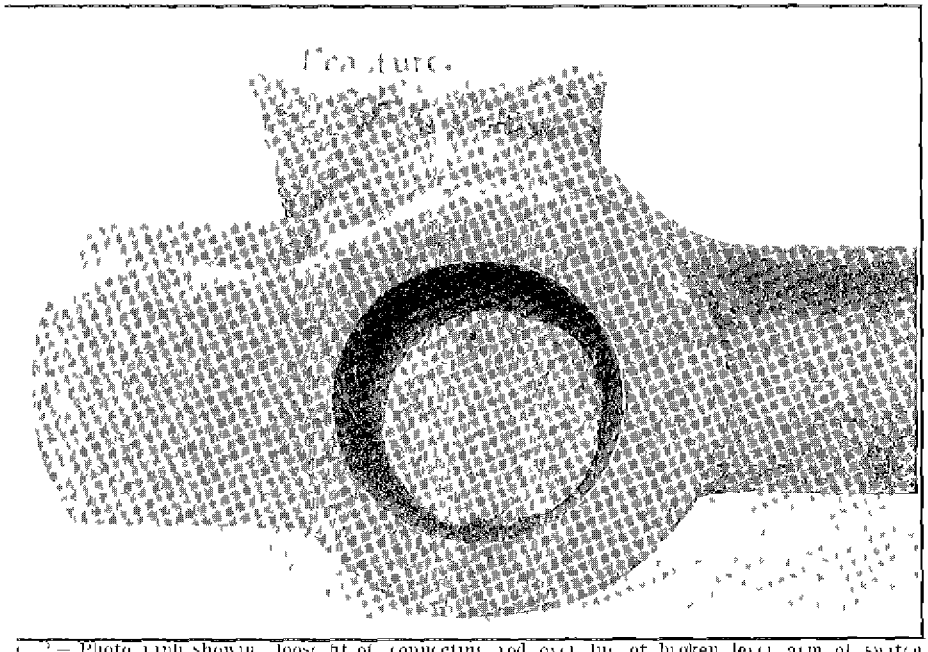

FIG. 2.—Photograph showing loose fit of connecting rod over lug of broken lever arm of switch stand stem.

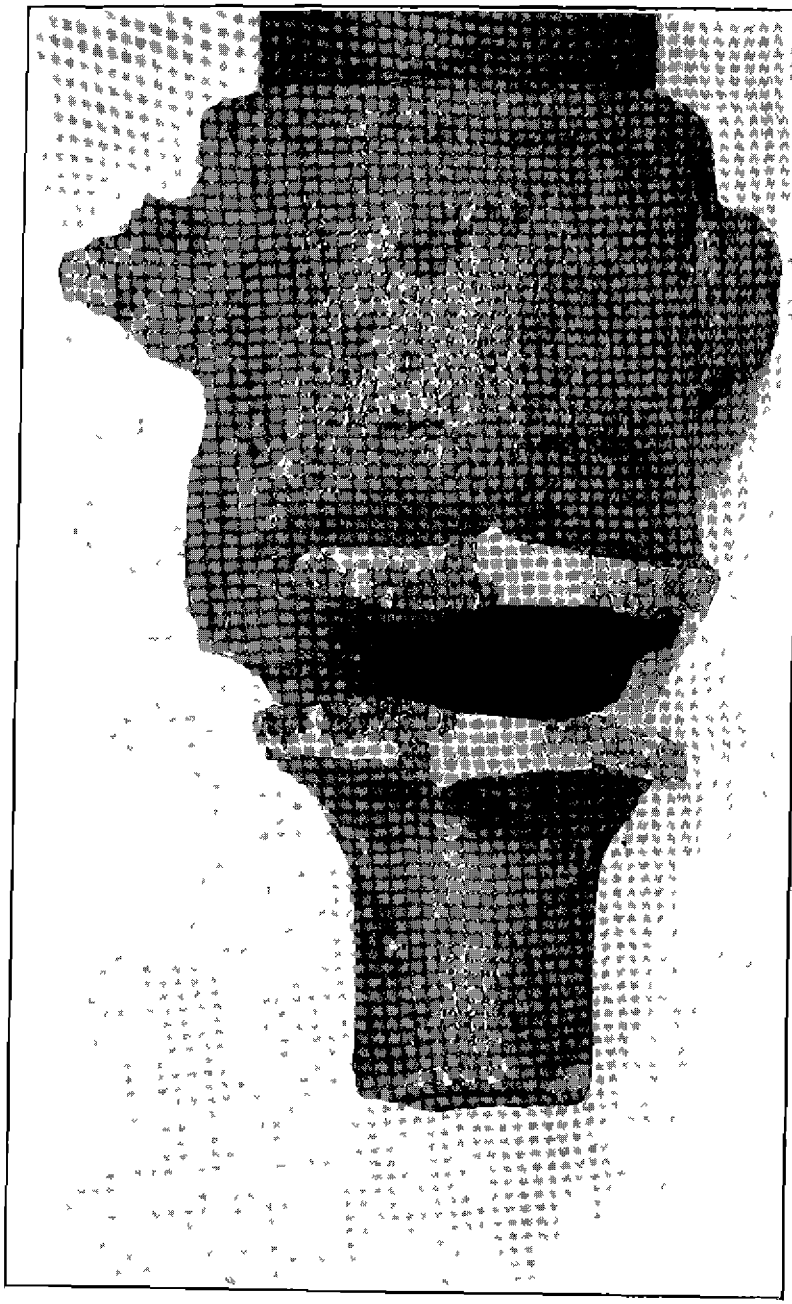

FIG 3.—Photograph of fractured surfaces of broken lever arm of switch stand stem. Origin of fracture indicated by a star on the cut

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