IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE MISSOURI, KANSAS & TEXAS RAILROAD NEAR LEWIS, MO., ON MARCH 17, 1920.

May 6, 1920.

On March 17, 1920, there was a derailment of a passenger train on the Missouri, Kansas & Texas Railroad near Lewis, Mo., which resulted in the death of 2 employees and injury to 3 employees and 1 passenger. After investigation of this accident, the Chief of the Bureau of Safety reports as follows

This accident occurred on the Sedalia Division of the Parsons District, a single-track line extending from Sedalia, Mo., to Parsons, Kans., a distance of 159.5 miles. Trains are operated by timetable and train orders, no block signal system being in use except for a distance of about 4 miles east of Parsons.

The accident occurred at a point about 1 mile east of Lewis, approaching which point from the east the track is straight for a considerable distance, followed by a 2-degree 12-minute curve to the left about 785 feet in length, the point of derailment being on this curve about 450 feet from its eastern end. The grade is 1.05 percent descending for westbound trains for a distance of about 2,500 feet and then 0.2 percent descending for about 400 feet to the point of accident. The superelevation of the outer rail on the curve is about 3 inches, this being the standard superelevation on this railroad for that curvature for a speed of 65 miles an hour. The track in this vicinity is laid with 85-pound rails, single-spiked, with about 20 ties to the rail, tieplated on curves. Practically all of the ties on curves are of white oak, while on tangent track 80 percent are of white oak and the balance of treated red oak and pine. The ballast consists of about 15 inches of limestone and chat. The condition of the track on the whole as to gauge, surface and alignment was good. The weather at the time of the accident was clear.

Westbound passenger train No. 5, known as the "Katy Flyer," was in charge of Conductor Demmitt and Enginemen Doyle and Murrell and consisted of engines 385 and 360, 3 baggage cars, 1 combination mail and baggage car, 1 coach, 1 chair car and 3 Pullman sleeping cars, in the order named. This train left Sedalia at 3.55 a.m., 25 minutes late, passed Bryson, 16.7 miles west of Sedalia, at 4.19 a.m. and at 4.35 a.m. was derailed at a point about one mile east of Lewis while traveling at a speed estimated to have been about 60 miles an hour.

Both engines turned over on their right sides, coming to rest clear of the track, separated from each other a distance of about 20 feet. The first two baggage cars came to rest on the outside of the curve at right angles to the track, close to the tender of engine 360, the first car being entirely clear of the track while one end of the second car was resting on the track; both cars were practically upright. The third and fourth cars

were also derailed on the outside of the curve, coming to rest in an upright position clear of the track and nearly parallel with it. With the exception of the forward trucks of the chair car, none of the other cars was derailed. The employees killed were the engineman of the leading engine and the fireman of the second engine.

The statements of the employees indicated that they did not notice any application of the air brakes until about the time the derailment occurred when they apparently were applied as a result of the derailment; that the derailment occurred without any warning or intimation of danger to the engine crews is apparent from the fact that neither engineman had shut off steam, the driving wheels of both engines continuing to revolve for several minutes after the derailment, while both brake valves were in running position, reverse levers near the center, end valves set for a short cut-off. Train No. 5 had traveled the distance of about 15 miles from Bryson to the point of accident in about 16 minutes, showing that the average speed of the train had been high and indicating that the estimates as to its speed at the time of the accident are approximately correct.

After derailment engine 385 came to rest with the engine truck 3 feet, 2 inches from the center line of the track, while the trailer truck was 11 feet 7 inches distant therefrom, the forward tender truck was 11 feet 7 inches and the rear of the tender 15 feet distant. This engine apparently had moved ahead approximately 5 feet after having turned on its side. The tender of engine 385 was separated from the head end of engine 360 by a distance of about 20 feet, the ground within this distance not showing signs of having been disturbed. The engine truck of engine 360 was 13 feet 9 inches from the center line of the track, and the trailer truck 17 feet distant; the forward end of the tender frame was 23 feet and the rear end 18 feet distant. Engine 360 apparently had moved ahead a distance of about 25 feet after overturning. The draft rigging and couplers between the two engines showed signs of having been twisted, as if the second engine had started to overturn while the first engine was upright, while in his report covering the accident the superintendent stated that there was a cut in the knuckle of the tender coupler of engine 385 three inches long and 5/8 inch deep, extending upward, while there were marks on the forward coupler of engine 360 corresponding with this mark and indicating that engine 360 had raised and tipped over the tender of engine 385. The position of the engines after derailment, together with the other facts referred to, indicates that engine 360 was the first of the two engines to be derailed.

The federal requirement as to the gauge of engine wheels is that it shall be maintained at not less than 53 inches nor more than 53-3/8 inches, while the lateral motion of driving wheels is restricted to 3/4 inch. Slight variations from these requirements were found, on each engine the gauge of the front driving wheels was 52-7/8 inches and of the back driving wheels, 52-31/32 inches; the lateral motion of the back driving wheels

of engine 385 was 27/32 inch. The truck wheels under these engines were also gauged and found to be within the prescribed limits. Some of the employees thought that engine 385 had always had excessive lateral motion. Examination of the work reports covering the preceding 30 days disclosed that the following reports on this particular feature had been made, February 25, "take up lateral in back driver box," March 7, "all drivers too much lateral," March 11, "engine truck has 1-1/8 inch lateral." All of these reports, however, were made by engine inspectors, not by enginemen who had been running the engine, and the engineman who was in charge of engine 385 coming into Sedalia on train No. 5 on the trip on which this accident occurred, as well as an engineman who had been in charge of the engine on the preceding day, stated that apparently there was nothing wrong with the engine and that it was in proper condition to operate. The fireman who was on the engine at the time of derailment said the engine had been riding rough and that he was afraid of it; he thought the first part of the train to be derailed was the left side of the engine truck of engine 385, and that it was due to engine 360 working steam too hard, taking the weight of the train from engine 385. Engine 360 was being doubleheaded on this trip for the purpose of getting it to the shops for conversion into an oil burner. The engineman who had operated it on the preceding day stated that he had not had any trouble with it and that it was in good condition.

Examination of the brake rigging of the two engines showed that the rigging of engine 385 was intact with the exception of the back driving wheel brake beam, which had been broken in about the center, probably as a result of the derailment. The brake rigging of engine 360 was very badly damaged, while some parts were missing. A broken brake shoe thought to have come from this engine was found at the point of derailment on the left side of the track, and gave rise to the theory that it had in some manner become detached and derailed the train. Examination of the track showed that there were marks on the outside of the running surfaces of both rails starting at a point about 1,500 feet east of the point of derailment, the mark on the south rail becoming very plain immediately east of the point of derailment, these marks had evidently been made by dragging equipment. The first rail to be displaced, however, was on the north side, the joint at the receiving end was intact, but at a point about 43 inches west of this point there was a mark on the running surface extending a distance of 16 inches to where it turned toward the gauge side, passing down the ball and striking the web, which was marked at a point 10 feet 4 inches from the receiving end. At this point the rail was badly twisted, the ball of the rail having been twisted outward on its base. The rail was not broken, but it was thought by the superintendent that the twisting was due to some object having gotten in between the wheel and the rail, it was at this point that the brake shoe was found, badly scarred and broken. The rail on the south side remained intact, and according to the superintendent there were no wheel marks on the ties east of the rail which was twisted.

Measurements of the gauge and superelevation of the track beginning at the first rail joint east of the point of derailment were made for a distance of 3,465 feet, these measurements being made every half rail length. Extending back from the point of derailment measurements covering the first 500 feet showed 10 points where the gauge was from 1/2 inch to 7/8 inch wide, the most noticeable variation in gauge began 214-1/2 feet back, measurements at five successive points showing the gauge to be wide as follows. 7/8 inch; 1/2 inch; 9/16 inch, and 7/8 inch. The superelevation at a point 424 feet east of the first joint was 3/4 inch higher than the elevation at a point half a rail length east thereof. The general condition of the ties and ballast was good, but the rail which was twisted was badly curve-worn, 24 percent of the metal of the head having been work away.

The board of inquiry composed of officials of the railroad, reached the conclusion that the derailment occurred about at the back driving wheels of engine 360, and that it was due to brake rigging coming down and portions of it lodging between the wheel and the rail. It was thought that a brake hanger came down, due to the breaking of the left intermediate brake hanger post, letting it fall against the side rod, or to the cotter key in the end of the post working out, the hanger working to the end of the post and the rocking of the engine frame causing the post to lower sufficiently for the hanger to extend over the end of the post far enough to be struck downward by the side rod, breaking off the post, the marks on the top end of the brake hanger and the inside of the side rod, together with the fact that the side rod was sprung were considered to support this conclusion. While the top and outside of the hanger appeared to have been struck by something and there were also marks on the bottom of the back section of the side rod, measurements taken subsequently show that the bottom portion of the side rod could not possibly have struck the top of the hanger post in its normal position, the latter being three inches higher than the bottom portion of the side rod when at its top quarter position. Abrasions on the bottom and inside of the side rod showed that it had struck something, however, while the rod was bent outward and upward about 1/8 inch. It is possible that it struck the hanger after the post had been broken but it could not have done so with the hanger in its normal position.

This accident was caused by dragging equipment, probably some portion of the brake rigging on the second engine of this train. The nature and cause of the breakage of this dragging equipment was not positively established.

All of the employees involved were experienced men, and none had been on duty in violation of any of the provisions of the hours of service law.