

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 3249
THE PENNSYLVANIA RAILROAD COMPANY
REPORT IN RE ACCIDENT
AT FORT WAYNE, IND., ON
APRIL 28, 1949

SUMMARY

Date: April 28, 1949
Railroad: Pennsylvania
Location: Fort Wayne, Ind.
Kind of accident: Derailment
Train involved: Passenger
Train number: 29
Engine numbers: Diesel-electric units
5852A and 5845A
Consist: 15 cars
Speed: 70 m. p. h.
Operation: Signal indications
Track: Double; tangent; level
Weather: Clear
Time: 6:23 a. m.
Casualties: 43 injured
Cause: Broken journal

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3249

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

THE PENNSYLVANIA RAILROAD COMPANY

June 16, 1949

Accident at Fort Wayne, Ind., on April 28, 1949, caused
by a broken journal.

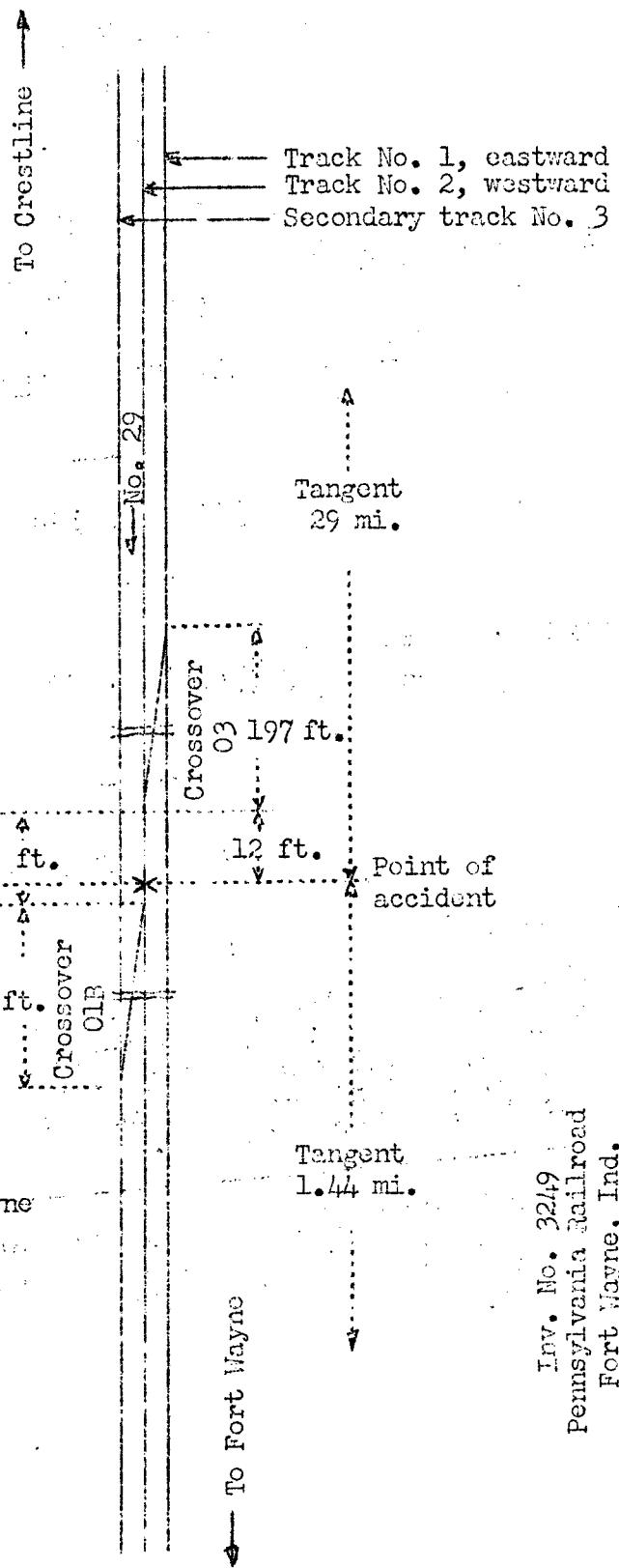
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

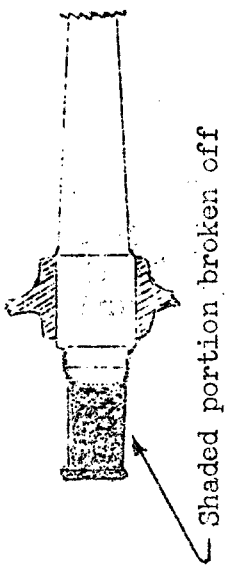
On April 28, 1949, there was a derailment of a passenger train on the Pennsylvania Railroad at Fort Wayne, Ind., which resulted in the injury of 21 passengers, 18 dining-car employees, 3 Pullman employees and 1 train-service employee.

¹
Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.

- o Division Post
1.7 mi.
- o Crestline, Ohio
29.3 mi.
- o Upper Sandusky, Ohio
97.0 mi.
- o Adams, Ind.
3.0 mi.
- X Point of accident
2.4 mi.
- o Fort Wayne, Ind.



Sketch showing broken journal



Inv. No. 3249
 Pennsylvania Railroad
 Fort Wayne, Ind.
 April 28, 1949

Location of Accident and Method of Operation

This accident occurred on that part of the Fort Wayne Division extending between Division Post, near Crestline, Ohio, and Fort Wayne, Ind., 133.4 miles, a double-track line in the vicinity of the point of accident, over which trains moving with the current of traffic are operated by signal indications. From south to north the main tracks are designated as No. 1, eastward; and No. 2, westward. A secondary track, designated as No. 3 and used for the movement of freight trains through the classification yards, parallels track No. 2 on the north. Trailing-point crossover O3 connects tracks Nos. 1 and 2, and facing-point crossover O1B connects track No. 2 and secondary track No. 3. Each of these crossovers is 197 feet in length. The west switch of crossover O3 is 2.4 miles east of the station at Fort Wayne. The east switch of crossover O1B is 15 feet west of the west switch of crossover O3. The accident occurred on track No. 2 at a point 12 feet west of the west switch of crossover O3. From the east the main tracks are tangent about 29 miles to the point of accident and 1.44 miles westward. The grade is level.

This carrier's operating rules read in part as follows:

76a. Engine and train crews as frequently as opportunity permits must observe engines and cars in their train, moving and standing, to detect any conditions that might interfere with the safe movement of trains.

77. * * *

Train and engine crews on moving trains will be on the lookout for signals when passing other trains and while passing stations, highway crossings where watchmen are on duty and points where trackmen and other employes are working and when practicable exchange hand signals with them.

This carrier's safety rules read in part as follows:

1507. Maintain lookout in the direction engine or car is moving, to avoid coming in contact with structures or obstructions alongside of or over track, or with engine, car or train on adjacent track. When vision is obscured, or not certain of location, keep into clear.

1527. Leaning beyond line of moving passenger car to operate steam heat valves located on the outside of platform, is prohibited.

Timetable special instructions prescribe the maximum authorized speed for passenger trains in the vicinity of the point of accident as 75 miles per hour.

Description of Accident

No. 29, a west-bound first-class passenger train, consisted of Diesel-electric units 5852A and 5845A, coupled back-to-back in multiple-unit control, one baggage-mail car, six sleeping cars, one kitchen-dormitory car and one dining car coupled together as a unit, and six sleeping cars, in the order named. The first car was of conventional carbon-steel construction, and the remainder of the cars were of lightweight high-tensile steel construction. This train passed Adams, the last open office, 5.4 miles east of Fort Wayne, at 6:19 a. m., 6 minutes ahead of scheduled time, and, while it was moving on track No. 2 at a speed of 70 miles per hour the rear truck of the eighth car, and the tenth to fifteenth cars, inclusive, became derailed. The first mark of derailment was 12 feet west of the west switch of crossover 03 and 3 feet east of the east switch of crossover 01B.

A separation occurred between the eleventh and twelfth cars when metallic steam-heat connectors struck the rotary-operated coupler-release mechanism during the derailment. All of the cars, except the first car and the rear of the last car, were equipped with tightlock couplers. The Diesel-electric units and the first eleven cars remained coupled and stopped with the front end of the first unit 2,422 feet west of the point of accident. The twelfth to fifteenth cars, inclusive, remained coupled. The front end of the twelfth car stopped 805 feet east of the rear end of the eleventh car and 529 feet west of the point of derailment. The twelfth to fifteenth cars, inclusive, stopped between track No. 2 and secondary track No. 3. They leaned towards the north at angles varying between 5 and 50 degrees from upright. The eighth to the fifteenth cars, inclusive, sustained considerable damage below the floorline. Crossover 01B, a portion of secondary track No. 3 and 500 feet of track No. 2 were destroyed.

The weather was clear at the time of the accident, which occurred about 6:23 a. m.

The flagman was injured.

The eighth car, Pennsylvania 4603, a dormitory-kitchen car of lightweight high-tensile steel construction, was built in January, 1949, and was placed in service January 26, 1949. It is 85 feet long between the pulling faces of the couplers, and consists of a kitchen compartment, a steward's compartment, and a compartment containing berths for the dining-car crew. Its lightweight is 156,680 pounds, divided into 77,080 pounds at the kitchen end, and 79,600 pounds at the dormitory end. The car is provided with two 4-wheel trucks. The wheelbase of each truck is 8.5 feet long, and the truck centers are spaced 59.5 feet apart. The truck sideframes and pedestals are cast integrally, and the bottoms of the pedestals are secured by bolted tie-bars. These trucks are provided with single bolsters arranged with anchors. The equalizers are of the bottom type. They extend between the journal boxes on each side of each truck, are curved upward at each end, and are seated upon the tops of the journal boxes. The spring arrangement consists of an assembly of two helical springs seated upon each equalizer bar near each end, and a quadruple assembly of helical springs and one elliptical spring on each side of each truck at the bolster location. Each wheel has two brake shoes.

The journal involved was equipped with a double roller-type bearing. This bearing consisted of cylindrical inner and outer races. The inner races were pressed upon the axle journal, and were of double-cone shape to control lateral movement. The outer races were pressed into the journal boxes, and were arranged not to revolve. The journal-box housing was sealed by a gasket and a cover plate against the leakage of oil, and also against the entrance of water or other foreign matter. The journal-bearing assembly was lubricated by oil which circulated from the bottom of the journal box.

Discussion

As No. 29 was approaching Fort Wayne the speed was 75 miles per hour, as indicated by the tape of the speed-recording device, in territory where the maximum authorized speed was 75 miles per hour. The enginemen were in the control compartment of the first unit, and the members of the train crew were in various locations throughout the cars of the train. When the engine was about 2 miles east of crossover O3, the engineer closed the throttle to idling position. When the engine was about 2,000 feet east of the crossover, he made a service application of the brakes in preparing to stop at the station at Fort Wayne. The train moved westward a short distance after this application was made, and the speed had been reduced to 70 miles per hour when the brakes became applied in emergency as a result of the derailment.

Examination after the accident disclosed that the left front journal of the rear truck of the eighth car was broken, and as a result the front end of the left equalizer bar had dropped and had been in contact with the track structure. The equalizer bar and the left front pedestal tie-bar were considerably marked. Examination of the track disclosed a light scraping mark on the north side of the north rail of crossover O3 at a point 10.4 feet east of the west frog and 1.5 feet south of the south rail of track No. 2. The heel block and the point of the frog were battered. At a point 52 feet westward, scraping marks appeared on the south stock rail of the turnout at the west end of crossover O3, and the switch-point heel-block was battered. At a point 111 feet west of the first mark and 12 feet west of the west switch of crossover O3, a wheel mark appeared on the top surface of a tie at a point 5 inches inside the south rail of track No. 2. From this point westward flange marks on the tops of the ties extended diagonally northward and westward. These marks indicated that a derailed wheel had been in contact with the south rail of the east turnout of crossover O1B.

Examination of the failed journal disclosed that it had been overheated, then had become broken. The break in the journal occurred within the inner race of the inside set of the double-type roller bearing at a point 1-1/2 inches outward from the journal fillet. The portion of the journal remaining attached to the axle was ground into an oval shape stub, and it extended about 3-1/2 inches outward from the hub of the left wheel. The broken-off portion of the journal remained in the journal-box housing and was fused to the inner races. Both pieces of the journal and all parts of the bearing assembly were badly discolored by overheating. The inner assembly of the bearing was practically destroyed. The separator cages were badly broken, and the roller elements were deformed. Except for one broken separator prong, the outer assembly was intact. The rear enclosure of the journal housing was broken as a result of the breaking of the journal. All of the oil in this bearing had been burned. However, a sufficient amount of oil was found in all the other journal-bearing assemblies of this car.

The wheels on the axle involved were multiple-wear wrought-steel BR-type wheels, manufactured during 1947 and applied to car P.R.R. 4603 on March 9, 1949. The flange height and thickness conformed to good contour. The tread wear was negligible. Tests after the accident indicated that

the eccentricity of the right wheel was 0.005 inch, and, although proper test of the left wheel could not be made because of the broken journal, its eccentricity was computed to be 0.011 inch. The axle involved was manufactured during 1948, heat No. 54V065, serial No. 2601, and was normalized and tempered at the carrier's Juniata Shop on March 23, 1948. The journals were 6 inches by 11 inches. The records of the carrier indicated that the inner race of the failed bearing was pressed on the journal under a pressure of 20 tons, which conformed to the requirements of a range between 10 and 20 tons, inclusive. An additional requirement is that the diameter of the axle journal must be equal to the inside diameter of the inner race plus 0.002 to 0.004 inch.

According to the report of the engineer of tests of the Pennsylvania Railroad, the axle involved conformed to the requirements for a completely normalized and tempered medium-high carbon-steel axle. The carbon content was 0.575 percent, or 0.025 percent over the maximum for grade C car axles. All other requirements were as specified by the carrier. There was no record of magnetic-particle testing of the axle prior to the derailment, but such tests after the accident disclosed no fractures of the remaining portion of the axle. In conclusion, the report stated that the immediate cause of the failure was overheating as a result of the inner race of the inside roller assembly becoming free and rotating on the journal. Apparently the inner race was loosened as a result of failure of one of the separator cages, which permitted roller elements to lock the bearing. At the time of the accident the bearing assembly had an accumulation of 99,147 miles, and had last been supplied with oil on April 16, 1949. The journal-bearing assembly on the right journal of this axle was in good condition. A sampling inspection of 20 sets of double-type roller bearings which had been in service from 6 to 12 months disclosed that all were in good condition. The mileage of these journal bearings ranged between 73,232 and 132,650 miles.

The investigation disclosed that car P.R.R. 4603 had moved in through passenger service between New York and Chicago since it was placed in service. This car had been assembled in the train of No. 29 at Sunnyside Yard, N. Y., during the afternoon of April 27, 1949, after it had been inspected and serviced. No. 29 departed from New York, N. Y., 759.7 miles east of Fort Wayne, about 5 p. m., and had stopped at several points where the cars were inspected. The last inspection point was at Crestline, Ohio, 129.3 miles east of the point of accident. This inspection was made

between 4:23 a. m. and 4:27 a. m. on the date of the accident, and consisted of an air-brake test and general visual inspection of equipment. At this time there was no indication of any defective condition of the journal involved. Because of the construction of roller-bearing assemblies proper visual inspection can be made only when the housings are removed. Operators at open offices located 83.6, 60.2 and 5.3 miles east of Fort Wayne, observed the passage of No. 29, but they saw no defective condition of the train.

Under the rules, the members of train and engine crews are required to inspect their trains at frequent intervals, and they must exchange signals with crossing watchmen, with operators at open offices, and with members of crews of trains on adjacent tracks. No. 29 stopped momentarily at Upper Sandusky, Ohio, 102.4 miles east of Fort Wayne, but there was not sufficient time to inspect the train at that point. Between Upper Sandusky and Fort Wayne there are only two curves where trainmen and enginemen can inspect their trains. The safety rules of this carrier require train and engine employees to maintain a lookout in the direction of movement. The trainmaster said that while a train is moving no member of the train or engine crew may lean beyond the outside line of any unit of the train. Members of the crew said they inspected their train at all available locations, they exchanged signals with operators and with the crews of passing trains, and there was no indication of any defective condition until the derailment occurred. Considering the construction of modern streamline cars, with the skirting below the floor line, it is difficult to detect defective conditions of journals while a passenger train is moving at high speed. The total elapsed time for No. 29 between Crestline and the point of accident, a distance of 129.3 miles, was 1 hour 56 minutes, and the average speed was 66.88 miles per hour.

Since January 11, 1949, the Commission has investigated three accidents, including the instant case, in which roller-bearings have failed. In each of these cases, there was no means to indicate a defective or overheated condition of such bearings to members of the crew. Since October, 1943, this carrier has been experimenting, by road-service test, with several devices intended to give warning when journals become overheated. So far, the carrier has not adopted any such device for general use.

Cause

It is found that this accident was caused by a broken journal.

Dated at Washington, D. C., this sixteenth day of June, 1949.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.