

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2672
THE PENNSYLVANIA RAILROAD COMPANY
REPORT IN RE ACCIDENT
AT SOUTH FORK, PA., ON
FEBRUARY 10, 1943

SUMMARY

Railroad: Pennsylvania
Date: February 10, 1943
Location: South Fork, Pa.
Kind of accident: Derailment
Train involved: Freight
Train number: Extra 5719 West
Engine number: 3719
Consist: 42 cars, caboose
Estimated speed: 20-25 m. p. h.
Operation: Automatic block and
cab-signal system
Track: Four tracks; 4°00' curve to
right; 0.49 percent descend-
ing grade westward
Weather: Cloudy
Time: 9:30 a. m.
Casualties: 1 killed
Cause: Accident caused by tire of
driving wheel becoming dis-
placed from its wheel-center

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2672

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

THE PENNSYLVANIA RAILROAD COMPANY

April 3, 1943.

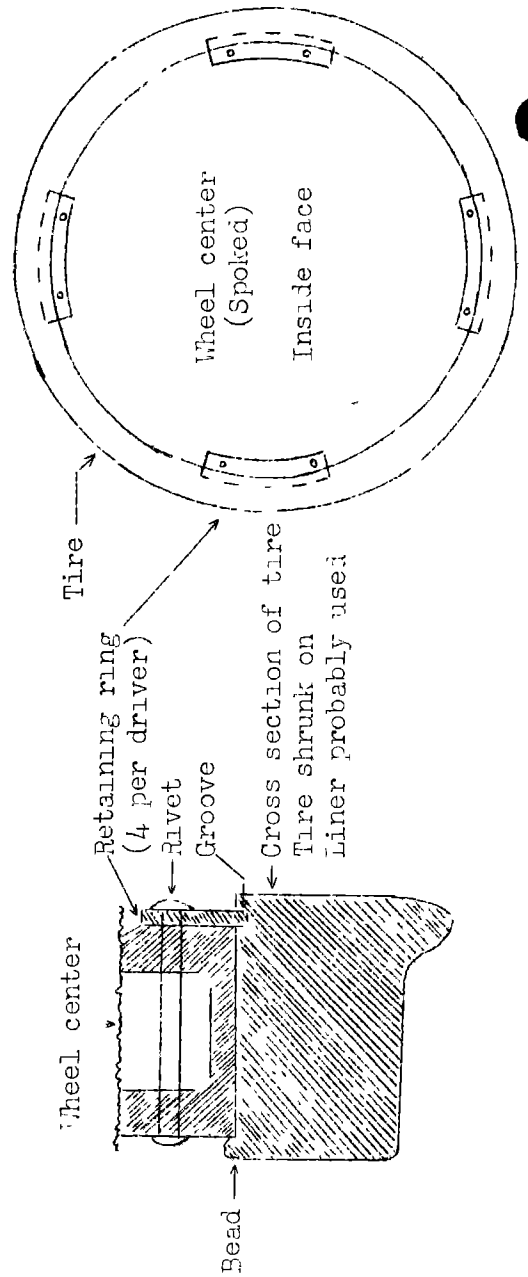
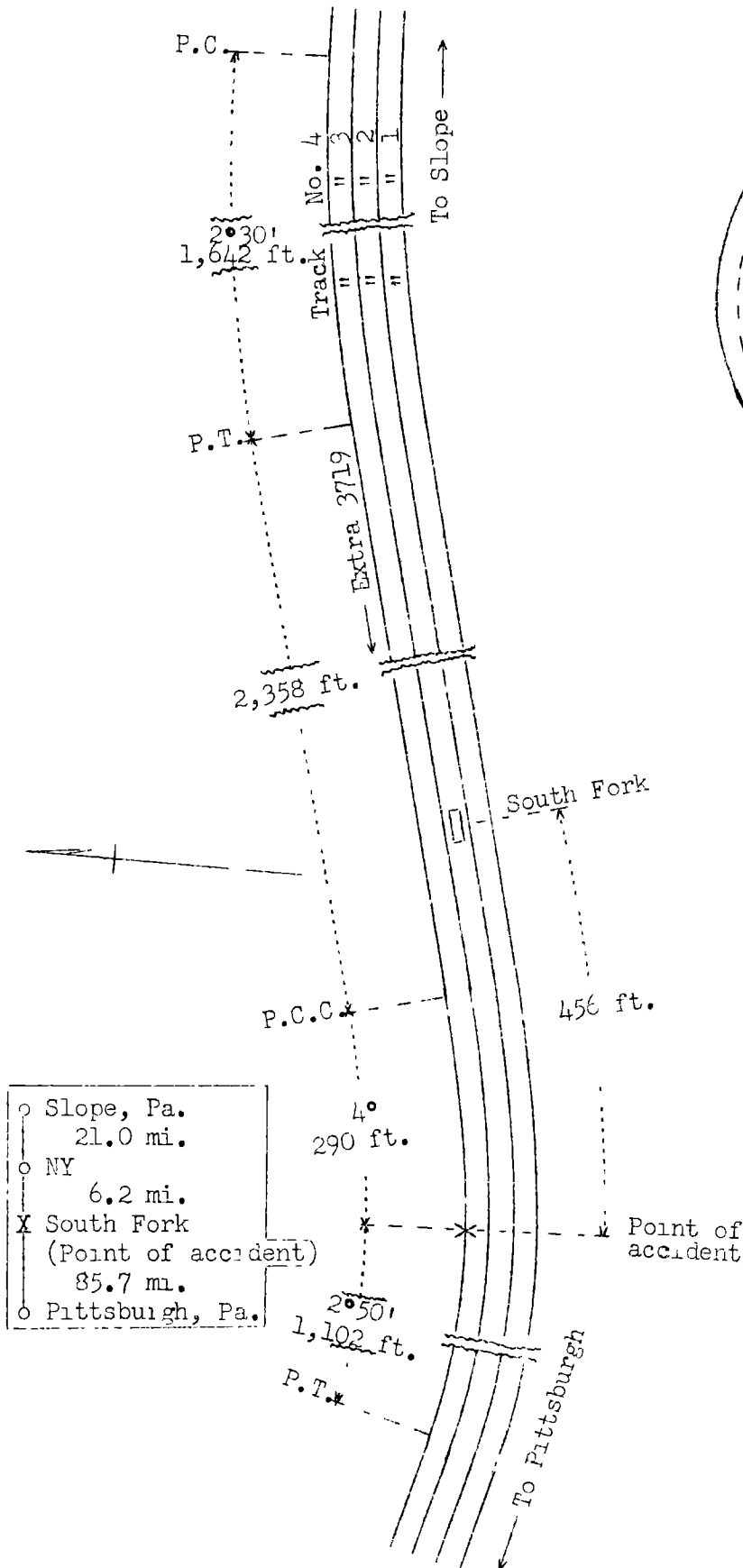
Accident at South Fork, Pa., on February 10, 1943, caused
by tire of driving wheel becoming displaced from its
wheel-center.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On February 10, 1943, there was a derailment of a
freight train on the Pennsylvania Railroad at South Fork,
Pa., which resulted in the death of one employee.

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



Inv-2672
Pennsylvania Railroad
South Fork, Pa.
February 10, 1942

Location of Accident and Method of Operation

This accident occurred on that part of the Pittsburgh Division which extends between Slope and Pittsburgh, Pa., 112.9 miles. In the immediate vicinity of the point of accident this is a 4-track line over which trains moving with the current of traffic are operated by an automatic block and cab-signal system, the indications of which supersede timetable superiority. The main tracks from south to north are No. 1, eastward freight, No. 2, eastward passenger, No. 3, westward passenger, and No. 4, westward freight. The accident occurred on track No. 4 at a point 456 feet west of the station at South Fork. Approaching from the east there are, in succession, a 2°30' curve to the left 1,642 feet in length, a tangent 2,358 feet, and a compound curve to the right 1,392 feet in length, the curvature of which varies between 2°50' and 4°. The accident occurred on the latter-mentioned curve 290 feet from its eastern end where the curvature is about 4°. Throughout a distance of 16.3 miles immediately east of South Fork, the grade for west-bound trains is generally descending and varies between 0.26 and 1.44 percent. At the point of accident the grade is 0.49 percent descending westward.

On track No. 4, the track structure consists of 131-pound rail, 39 feet in length, laid in July, 1942, on an average of 22 hardwood ties to the rail length; it is fully tieplated, provided with 6-hole angle bars, has 4 spikes per tieplate on the high rail and 3 spikes per tieplate on the low rail of each curve. There are 8 rail anchors per rail length. The track is ballasted with crushed rock to a depth of 24 inches. At the point of derailment the gage was 4 feet 3-7/8 inches and the superelevation was 5 inches.

Brake and train air signal instructions read in part as follows:

* * *

25. * * *

When making a release while drifting engine brakes should be held applied until the train brakes are released.

* * *

In the vicinity of the point of accident, the maximum authorized speed on track No. 4 for freight trains is 45 miles per hour.

Description of Accident

Extra 3719, a west-bound freight train, consisted of engine 3719, 39 loaded and 3 empty cars and a caboose. After a terminal air-brake test was made, this train departed from Slope, 27.2 miles east of South Fork, at 7:55 a. m., according to the dispatcher's record of movement of trains, passed NY, 6.2 miles east of South Fork and the last open office, at 9:19 a. m., and while moving at an estimated speed of 20 to 25 miles per hour the No. 1 pair of driving wheels became derailed to the left at a point 456 feet west of the station at South Fork.

There was no indication of defective track or dragging equipment. The first mark of derailment was an angle-bar bolt sheared off inside the low rail. Engine 3719 continued in line with the track until it encountered the frog of a trailing-point switch 991 feet west of the first mark of derailment, and then the general derailment occurred. Throughout this distance nearly all the angle-bar bolts inside the low rail were sheared off and the rail anchors were damaged. East of the frog there was no mark outside the high rail. The engine was derailed to the left, stopped practically in line with the track, and leaned to the south at an angle of 10 degrees, with the front end 1,254 feet west of the first mark of derailment. The cab was demolished, numerous steam pipes were broken in the cab and the engine was otherwise badly damaged. The tender was derailed to the left, and stopped on its left side at the rear of the engine and at right angles to it. The first 17 cars were derailed and stopped in various positions across the 4 main tracks. Of these cars, 3 were destroyed. The eighteenth and thirty-third cars were damaged.

It was cloudy at the time of the accident, which occurred about 9:30 a. m.

The employee killed was the fireman.

Track Data

After the accident, inspection of the track throughout a distance of 155 feet immediately east of the first mark of derailment disclosed that the greatest variation in gage between two stations 15.5 feet apart was 1/32 inch, and the greatest variation in superelevation between two adjacent stations was 1/8 inch.

Mechanical Data

After the accident, an inspection of engine 3719 disclosed that the left No. 1 driving wheel tire was off its wheel-center, the left front section of the side rod was broken, and the

intermediate and the back sections were bent. The right No. 3 driving-wheel tire disclosed indications of looseness on the wheel-center.

Engine 3719 is of the 2-10-0 type. The Nos. 1 and 5 pairs of driving-wheel tires are flanged, and the Nos. 2, 3 and 4 driving wheels have plain tires. In working order, the total weight of engine 3719 is 386,100 pounds distributed as follows: Engine truck, 33,600 pounds; No. 1 driving wheels, 71,500 pounds; No. 2 driving wheels, 67,000 pounds; No. 3 driving wheels, 72,600 pounds; No. 4 driving wheels, 68,200 pounds; No. 5 driving wheels, 72,600 pounds. The diameters of the engine-truck wheels and driving wheels are, respectively, 33 inches and 30-17/32 inches. The tender is rectangular in shape, equipped with two four-wheel trucks, and has a capacity of 10,300 gallons of water and 37,400 pounds of coal.

The tire involved was 3-1/2 inches wide and 2-15/16 inches thick, had a flange 1-1/4 inches high, and the inside diameters at four points were 54.875 inches, 54.890 inches, 54.870 inches and 54.835 inches. The average inside diameter was 54.875 inches. The diameters of the wheel-center at four points were 54.785 inches, 54.755 inches, 54.755 inches and 54.820 inches. The average diameter of the wheel-center was 54.779 inches. The retaining-ring groove was 15/32 inch deep and 15/32 inch wide. The outer wall of the retaining groove was 1/4 inch thick. The tire in question was applied to the wheel-center by shrinkage, and, for additional security, the tire was provided with an overlapping projection about 1/4 by 1/4 inch, which fitted outside the wheel-center. Inside the wheel-center, four segments 2-1/4 inches wide, 13 inches long, and 3/8 inch thick were riveted to the wheel-center with two 11/16-inch rivets. The segments extended into the retaining groove of the tire about 7/16 inch. Records indicate that the tire was mounted on the wheel-center August 5, 1942, at Pitcairn, Pa. After the accident, the outer wall of the retainer-groove was found broken off throughout its entire circumference and the face of the wheel-center was scored and grooved throughout its entire circumference; however, the inner face of the tire was smooth. These conditions indicated the use of shims between the tire and the wheel-center, but no shim was found after the accident.

Engine 3719 received Class 3 repairs at Juniata Shop, Pa., July 6, 1941, annual repairs at Olean, N. Y., June 6, 1942, and the last monthly repairs at Pitcairn, January 12, 1943.

Discussion

Extra 3719 West was moving on a 4° curve to the right, which had a superelevation of 5 inches, when the right No. 1 driving wheel dropped inside the low rail. The gage was 4 feet 8-7/8 inches. The speed was 20 to 25 miles per hour in territory where the maximum authorized speed for freight trains is 45 miles per hour. There was no indication of defective track.

According to the statement of the engineer, as his train was approaching the point where the accident occurred, the speed was about 20 or 25 miles per hour and there was no unusual condition of the engine to indicate anything being wrong. When the engine reached a point about 450 feet west of the station at South Fork, there was considerable pounding at the front of the engine on the right side. The engineer made a service application of the brakes, then, realizing that the engine was derailed, he moved the brake valve to emergency position.

The investigation disclosed that the left No. 1 driving-wheel tire was off its wheel-center. Marks on the track indicated that the right No. 1 driving wheel had dropped inside the low rail at a point 456 feet west of the station and had continued in line with the track a distance of 991 feet until it encountered the wing of a switch frog where the general derailment occurred. Throughout the distance of 991 feet there was no mark outside the high rail. Since the fireman was killed in the accident, it could not be determined when he first became aware that the left No. 1 driving wheel was defective.

The assistant master mechanic said that he examined the tires of engine 3719 about 2 hours 15 minutes after the occurrence of the accident and at that time the tires of engine 3719 were warm. The left No. 1 tire was considerably warmer than the other tires and was too hot to be touched; however, in his opinion, the left No. 1 tire was heated to a higher degree as a result of the tire revolving on the wheel-center before it slipped free. The right No. 3 tire disclosed indications of looseness. The driving-wheel brake shoes were warm and indicated excessive heat but they had not been red hot. An enginehouse foreman, who examined the tires about the same time, said the left No. 1 driving-wheel brake shoe did not indicate that the tire had been subjected to abnormal heat as a result of braking. A car foreman said that he observed the driving-wheel brake shoes and they bore indications of having been heated as a result of braking but not excessively, and that the left No. 1 tire had been heated to a higher degree than the others. The engineer said that while his train was traversing the descending grade a distance of 16 miles he had applied and released the train brakes on six occasions. Each brake application was made by a 6 to 10-pound brake-pipe

reduction. During the time the train brakes were applied, the engine and tender brakes were held released; however, he applied the engine and tender brakes with a brake-cylinder pressure of 20 to 30 pounds while the train brakes were releasing. The braking instructions of this railroad require that when a train is drifting the engine and tender brakes should be held applied while the train brakes are releasing. The engineer said that, after the accident, he placed his hand on the left No. 1 tire and, although it was warm, it was not heated to a degree uncomfortable to the touch. The front brakeman said he observed no smell of overheated metal.

Locomotive inspection reports from December 1, 1942, to February 10, 1943, inclusive, disclose that no exception was taken to the condition of the left No. 1 tire during that period; however, on January 5, 1943, the railroad's inspector at East Altoona, Pa., reported the left No. 2 and the right No. 3 tires as being loose, but were reported by the foreman as being tight. Examination after the accident disclosed the left No. 1 tire to be 2-13/16 inches thick and its average inside diameter to be 0.096 inch greater than the average diameter of the wheel-center and required a shrinkage allowance of this amount. The variation between the greatest inside diameter of the tire and the smallest diameter of the wheel-center was 0.135 inch. The tire was out-of-round 0.025 inch and the wheel-center 0.065 inch. No liner was found after the accident, but the condition of the inside surface of the tire indicated the use of one. If a liner of constant thickness to compensate for the average greater diameter of the tire was used, a portion of the liner would not provide sufficient shrinkage allowance where the least variations existed but would provide too much allowance where the greatest variations existed.

There was no indication that brake-shoe metal had flowed as a result of excessive heat, nor was there any metal built up on the tire. The investigation developed that the excessive heat retained by the left No. 1 tire was a result of it having revolved about its wheel-center. The wall of the retaining groove was broken away almost its entire circumference. There was no slid-flat spot on the tire. Of 12 work reports signed by engineers during the 10-day period immediately preceding the accident, 8 bore notations that engine 3719 was riding roughly. Apparently, a combination of rough riding, braking on a descending grade and the fit of the tire on the wheel-center caused the tire to become displaced.

Cause

It is found that this accident was caused by a tire of a driving wheel becoming displaced from its wheel-center.

Dated at Washington, D. C., this third day of April, 1943.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.