INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 2852

THE PENNSYLVANIA RAILROAD COMPANY

REPORT IN RE ACCIDENT

AT PLYMOUTH, IND., ON

DECEMBER 21, 1944

SUMMARY

Railroad:	Pennsylvania	
Date:	December 21, 1944	
Location:	Plymouth, Ind.	
Kind of accident:	Rear-end collision	
Trains involved:	Baggage-express	: Engine
Train numbers:	Passenger Extra 6857 West	: Extra 6991 West
Engine numbers:	6857	: 6991
Consist:	13 cars	
Estimated speed:	10 m. p. h.	: 35 m. p. h.
Operation:	Signal indications	
Track:	Double; tangent; 0.38 percent ascending grade westward	
Weather:	Clear	
Time:	10:51 p. m.	
Casualties:	1 killed; 6 injured	
Cause:	Failure of the air-brake system of engine 6991	
Recommendation:	That the Pennsylvania Railroad Company provide additional means for operating power-reverse gear on their locomotives for use in case of failure of air pressure	

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2852

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

THE PENNSYLVANIA RAILROAD COMPANY

February 15, 1945.

Accident at Plymouth, Ind., on December 21, 1944, caused by failure of the air-brake system of engine 6991.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On December 21, 1944, there was a rear-end collision between a baggage-express train and an engine on the Pennsylvania Railroad at Plymouth, Ind., which resulted in the death of one employee, and the injury of six employees.

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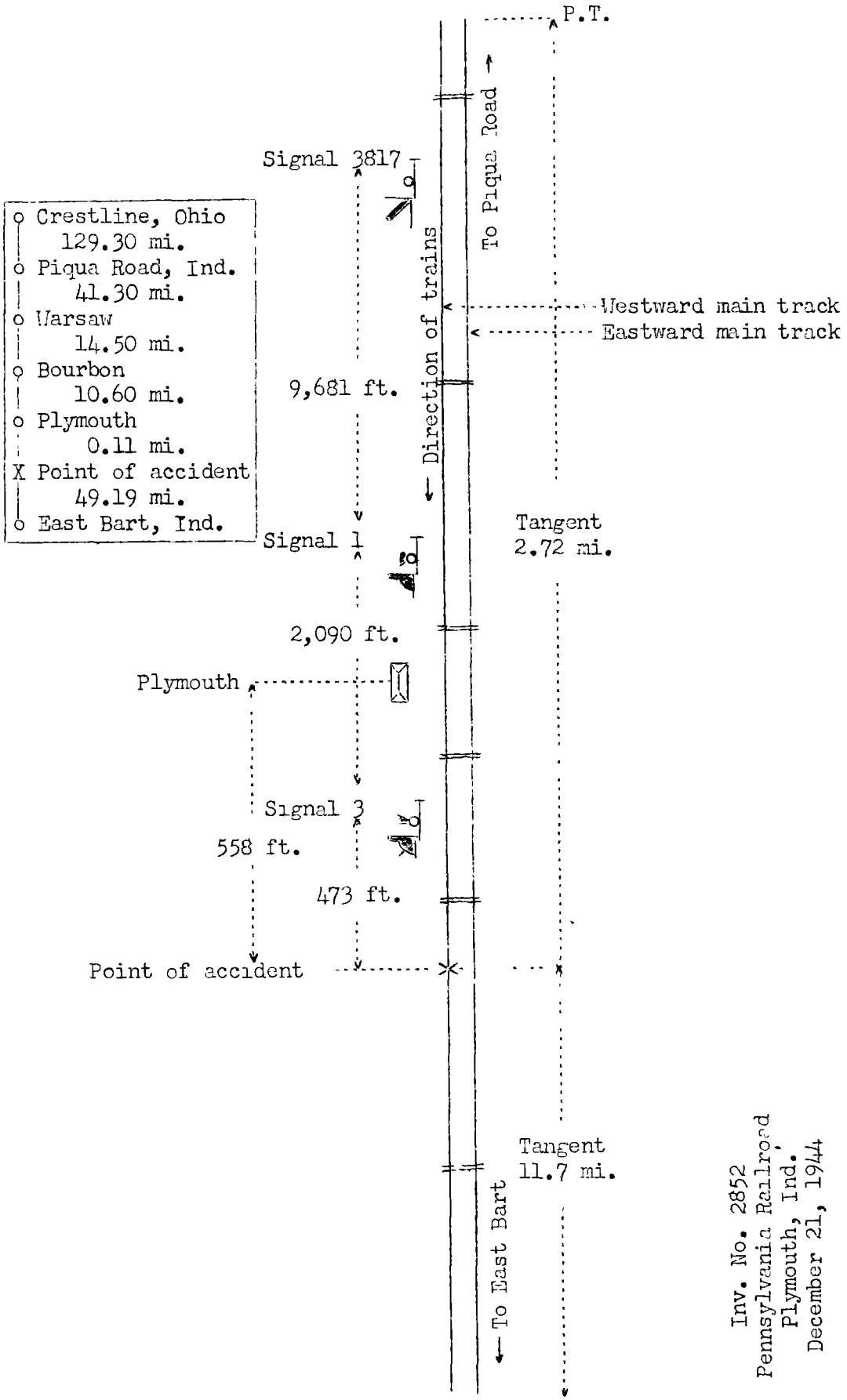
[1]Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Inv. No. 2852
Pennsylvania Railroad
Plymouth, Ind.
December 21, 1944

Location of Accident and Method of Operation

This accident occurred on that part of the Fort Wayne Division extending westward from Crestline, Ohio, to East Bart, Ind., 245 miles. This was a double-track line over which trains moving with the current of traffic were operated by signal indications. The accident occurred within interlocking limits on the westward main track at a point 558 feet west of the station at Plymouth, which was 195.7 miles west of Crestline. The main tracks were tangent throughout a distance of 2.72 miles east of the point of accident and 11.7 miles westward. The grade for west-bound trains was, successively, 0.38 percent descending 2.58 miles, level 1,358 feet and 0.38 percent ascending 278 feet to the point of accident and some distance westward.

Automatic signal 3817 and interlocking home signals 1 and 3, which governed west-bound movements on the westward main track, were located, respectively, 12,244 feet, 2,563 feet, and 473 feet east of the point of accident. These signals were of the position-light type, and were continuously lighted. The involved aspects and corresponding indications and names of these signals were as follows:

Signal	Aspect	Indication	Name
3817	Three white lights in diagonal position to the right.	Proceed prepared to stop at next signal. Train exceeding medium speed must at once reduce to that speed.	Approach.
1 and 3	Three white lights in horizontal position.	Stop.	Stop-signal

DEFINITIONS

* * *

Speeds

Medium Speed--Not exceeding one-half the speed authorized for passenger trains but not exceeding 30 miles per hour.

* * *

Operating rules read in part as follows:

99. When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes, and when necessary, in addition, displaying lighted fusees.

* * *

When a train is moving under circumstances in which it may be overtaken by another train, the flagman must take such action as may be necessary to insure full protection. By night, or by day when the view is obscured, lighted fusees must be thrown off at proper intervals.

* * *

501a. Interlocking home signals governing the use of routes leading to a block will in addition govern the use of the block in direction for which traffic has been established for a train to the next block signal.

605. Interlocking signals govern the use of the routes of an interlocking, and as to movements within home signal limits that are protected by home and distant signals, * * * engine and train crews are relieved from observing Rule 99 * * *.

663. A train or engine must stop clear of an interlocking signal indicating "stop." A train or engine must not pass a Stop-Signal except when authorized * * *.

Brake and Train Air Signal Instructions read in part as follows:

Enginehouse Foremen and Enginemen

21. * * *

It must be known before each trip that the brakes on locomotive and tender are in safe and suitable condition for service; that the air compressor or compressors are in condition to provide an ample supply of compressed air for the service in which the locomotive is to operate, that the devices for regulating all pressures are properly performing their functions, that the brake valves work properly in all positions, and that the water has been drained from the air brake system.

The maximum authorized speed for the following train was 40 miles per hour.

Description of Accident

Passenger Extra 6857 West, a west-bound baggage-express train, consisted of engine 6857, one baggage-express car, three express cars, one baggage-express car, one passenger-express car, two milk cars, two baggage-horse cars, one express car, one baggage-express car and one coach, in the order named. All cars were of steel construction. This train passed Warsaw, 25.1 miles east of Plymouth, at 10:13 p. m. and stopped at Plymouth at 10:45 p. m. About 6 minutes later, after this train had moved about 450 feet westward and had attained a speed of about 10 miles per hour, the rear end was struck by Extra 6991 West.

Extra 6991 West, a west-bound engine, passed Warsaw at 10:23 p. m., passed signal 3817, which displayed approach, passed signals 1 and 3, which displayed stop, and while moving at an estimated speed of 35 miles per hour it struck Passenger Extra 6857 West 473 feet west of signal 3.

The tender of the engine and the first, second, tenth, eleventh, twelfth and thirteenth cars of Passenger Extra 6857 were damaged. The front end of engine 6991 was considerably damaged.

The weather was clear at the time of the accident, which occurred at 10:51 p. m.

The flagman of Extra 6991 was killed. The engineer, the conductor, the front brakeman and the flagman of Passenger Extra 6857, and the engineer and the fireman of Extra 6991 were injured.

Engine 6991 was provided with No. 6-ET air-brake equipment, 1 cross-compound air compressor and two main reservoirs which had a capacity of 53,600 cubic inches. The regulating devices were adjusted to supply a brake-pipe pressure of 70 pounds, and a brake-cylinder pressure of 45 pounds by using the independent brake valve. The duplex compressor governor maintained main-reservoir pressures between 100 pounds and 130 pounds. The power-reverse mechanism was operated by main-reservoir pressure only. The compressor was provided with two air strainers, one at each inlet valve. These strainers were cylindrical in shape, and at their inner ends were reduced to the size of the inlet passages. The cylindrical portion normally was filled with curled hair held in place at the outer end by wire netting, and

at the inner end by a perforated brass disk. The last annual inspection and repair of engine 6991 were completed on December 8, 1944, and the last enginehouse inspection prior to the accident was made at Crestline about 8 a. m., December 21, 1944.

Discussion

Under the rules of this carrier governing operation in automatic block-signal territory, an approach indication requires that the speed of a train must be so controlled that the train can be stopped short of the next signal. An interlocking signal displaying stop must not be passed by a train unless proper authority from the signalman has been received. Flagging protection against following movements within interlocking limits was not required. All the surviving employees concerned so understood.

Passenger Extra 6857 West stopped within interlocking limits on the westward main track at Plymouth at 10:45 p. m. About 6 minutes later, after this train had started and had moved westward about 450 feet, the rear end was struck by Extra 6991 West 2,563 feet and 473 feet, respectively, west of signals 1 and 3, which displayed stop.

The members of the train crew of Passenger Extra 6857 were in the rear car. The first they knew of anything being wrong was when they saw the following train pass a lighted fusee, which the flagman had placed on the westward main track about 180 feet to the rear of his train when it was standing in the vicinity of the station. The collision occurred immediately afterward.

As Extra 6991 West was approaching signal 3817, located 9,681 feet east of interlocking home signal 1, the speed was about 40 miles per hour. This train consisted of the engine only, and the crew consisted of an engineer, a fireman and a flagman. The enginemen were maintaining a lookout ahead, and the flagman was in the brakeman's booth on the tender of the engine. The air brakes had functioned properly at all points where previously used en route. Signal 3817 displayed approach and the enginemen called the indication. The approach indication required the speed to be not in excess of 30 miles per hour and to be so controlled that the train could be stopped short of the next signal. When the engine was in the vicinity of signal 3817, the engineer placed the throttle lever in closed position and moved the independent brake valve to application position, but no application of the air brakes was obtained. Then he made unsuccessful attempts to place the reverse lever in position for the engine to move in backward motion and to apply the air brakes in emergency. The power-reverse mechanism

could not be operated by any means other than air pressure. Soon afterward the enginemen observed that the gauges did not indicate any main-reservoir, brake-cylinder, equalizing-reservoir or brake-pipe pressures, and as there was nothing they could do to stop the engine or control its speed these employees and the flagman jumped off the engine before it passed signal 1. As a result of the inoperative condition of the air-brake system, the engine proceeded unattended, and was moving at a speed of about 35 miles per hour when the collision occurred.

The engineer of engine 6991 said that when he took charge of this engine at Piqua Road, 66.4 miles east of Plymouth, he tested the air-brake system and it functioned properly. He attempted to open the drain cock of the front main reservoir, but it would not fully open because ice had formed in the valve. He applied burning waste in an unsuccessful attempt to thaw the ice, and he thought he had then closed the drain cock. The temperature was 11 degrees above zero at Plymouth at 10 p. m.; however, the performance of the air-brake system as described by the engineer did not indicate that ice prevented the proper functioning of the air-brake system. After the accident, an inspection of engine 6991 disclosed that the throttle was in closed position, the automatic brake valve was in emergency position, the independent brake valve was in application position, and the reverse lever was in position for short cut-off in forward motion. The air compressor was dismantled and examination disclosed that the brass disk at the inner end of the top strainer was broken and hair had entered the air cylinders and the valves, and the reversing-valve rod of the steam portion was bent so that the end button engaged the bore of the high-pressure piston rod. The shop foreman, who supervised the dismantling and tests of the compressor, said that the fouling of the valves by the hair resulted in the failure of the compressor.

Before engine 6991 departed from Crestline, the main-reservoir leakage was well within the prescribed limits. The engineer said that the last time the brakes were applied was at Bourbon, 10.6 miles east of Plymouth, and at that point the air-brake system functioned properly. The compressor probably failed after the engine passed Bourbon. The normal leakage of the main reservoirs and their related piping would not have fully depleted the pressure after the compressor failed and before engine 6991 reached Plymouth, but apparently the main-reservoir drain cock had not been fully closed at Piqua Road, and when it became free of ice there was considerable increase in the leakage, which quickly depleted the pressure after the compressor failed, and resulted in the failure of the air-brake system. On engine 6991 no provision had been made for operation of the power-reverse mechanism in case of emergency involving loss of air pressure. If a steam-line connection to the power-reverse mechanism also had been provided, the engineer would

have been able to place the valve gear in position for backward motion, and he could then have reduced speed as required by the signal indications and stopped in time to avert this accident.

Cause

It is found that this accident was caused by failure of the air-brake system of engine 6991.

Recommendation

It is recommended that the Pennsylvania Railroad Company provide additional means for operating power-reverse gear on their locomotives for use in case of failure of air pressure.

Dated at Washington, D. C., this thirteenth day of February, 1945.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.