INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 2499

THE PENNSYLVANIA RAILROAD COMPANY

REPORT IN RE ACCIDENT

AT GRAND TRUNK, IND., ON

MAY 5, 1941

SUMMARY

Railroad:	Pennsylvania
Date:	May 5, 1941
Location:	Grand Trunk, Ind.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	44
Engine numbers:	5392-5364
Consist:	15 cars
Speed:	6-12 m. p. h.
Operation	Interlocking
Track:	Double; tangent; 0.38 percent descending grade eastward
Weather:	Clear
Time:	12:11 a. m.
Casualties:	1 injured
Cause:	Accident caused by failure properly to control speed of train in compliance with interlocking signal indications

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2499

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

THE PENNSYLVANIA RAILROAD COMPANY

June 16, 1941

Accident at Grand Trunk, Ind., on May 5, 1941, caused by failure properly to control speed of train in compliance with interlocking signal indications

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REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On May 5, 1941, there was a derailment of a passenger train on the Pennsylvania Railroad at Grand Trunk, Ind., which resulted in the injury of one employee. This accident was investigated in conjunction with representatives of the Public Service Commission of Indiana.

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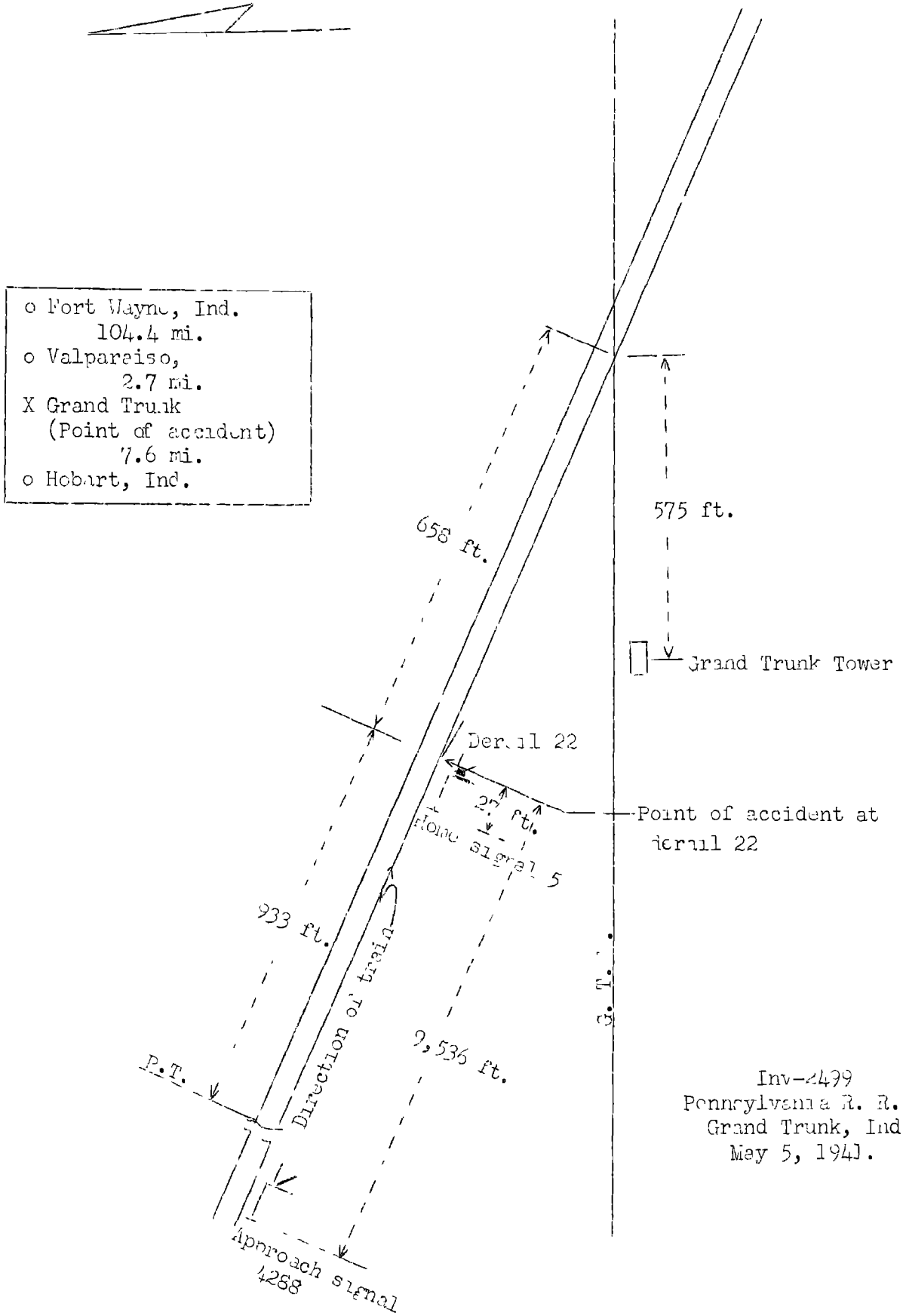
[1] Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Inv-4499
Pennsylvania R. R.
Grand Trunk, Ind.
May 5, 1941.

Location and Method of Operation

This accident occurred on that part of the Fort Wayne Division which extends between Hobart and Fort Wayne, Ind., a distance of 114.7 miles. In the vicinity of the point of accident this is a double-track line over which trains moving with the current of traffic are operated by an automatic block-signal system, the indications of which supersede time-table superiority. At Grand Trunk a single-track line of the Grand Trunk Western Railroad, hereinafter referred to as the G. T. W., crosses the tracks of the Pennsylvania Railroad at an angle of 23°26'. This crossing is protected by an interlocking which is controlled from Grand Trunk tower, located south of the G. T. W. track and 575 feet west of the crossing. The interlocking is maintained and operated by the G. T. W. The accident occurred within interlocking limits on the eastward main track at a split switch-point derail located 658 feet west of the crossing. As the point of accident is approached from the west there are, in succession, a tangent more than 3 miles in length, a 0°40' curve to the right 1,500 feet, and a tangent 933 feet to the point of accident and some distance beyond. The grade for east-bound trains is, successively, 0.50 percent ascending a distance of 6,500 feet and 0.38 percent descending 1,275 feet to the point of accident.

The interlocking machine is of the electro-mechanical type. The mechanical portion consists of 31 working levers in a 32-lever frame, and the electrical portion consists of 4 working levers in a 16-lever frame. The mechanical levers operate 3 switches, 8 derails, 11 facing-point locks, and 15 signals. The electric levers are used for controlling 4 facing-point lock levers which lock 1 switch and 4 derails, including derail 22 at which the accident occurred. Approach locking is used on the Pennsylvania, and time locking is used on the G. T. W. Electric switch locking is provided throughout the interlocking. The time release for the Pennsylvania eastward home signal is set for 3 minutes 48 seconds.

Approach signal 4288 and home signal 5, governing eastward movements on the eastward main track of the Pennsylvania, are mounted on masts south of the right rail located at points, respectively, 9,536 feet and 27 feet west of derail 22. Signal 4288 is of the automatic, 1-unit, 3-indication, position-light type, continuously lighted; its normal indication is approach. Signal 5 is of the semi-automatic, 1-unit, 4-indication, position-light type, continuously lighted; its normal indication is stop. The involved aspects, indications and names of these signals are as follows:

Signal number	Aspect	Indication	Name
4288	45 degrees	A train exceeding one-half its maximum authorized speed here must at once reduce to not exceeding that speed. Approach next signal prepared to stop.	Approach-Signal
5	Horizontal	Stop	Stop-Signal

An audible approach-indicator, located in Grand Trunk tower, gives information of the approach of a Pennsylvania train on the eastward main track from a point 19,175 feet west of home signal 5, and in conjunction with the audible indicator an approach-indicator is lighted.

Rules of the operating department read in whole or in part as follows:

> 27. * * *
>
> When light failures in a Position-light signal do not prevent correct reading of the signal, it will not be regarded as imperfectly displayed signal.
>
> 34. Immediately upon seeing a Fixed-signal affecting the movement of their train, the engineman and fireman must, and when practicable the trainmen will, call its indication by name to each other.

Special time-table instructions read as follows:

> D1102. Rule 34- In calling signals, the name as it appears in the Book of Rules shall be used omitting the word "Signal," except Rule 275.

The maximum authorized speed for passenger trains is 80 miles per hour.

The weather was clear at the time of the accident, which occurred at 12:11 a. m.

Description

No. 44, an east-bound first-class passenger train, with Conductor Eme and Enginemen Bandt and Carrier in charge, consisted of engines 5392 and 5334, both of the 4-6-2 type, one baggage car, one baggage-express car, one passenger-baggage car, one dining car, two coaches, one passenger-baggage car, one coach, one dining car, two Pullman sleeping cars, one buffet car and three Pullman sleeping cars, in the order named; all cars were of steel construction. This train departed from Chicago, 40.9 miles west of Grand Trunk, at 11:20 p.m., according to the train sheet, on time, passed Liverpool, 10.7 miles west of Grand Trunk, the last open office, at 12:03 a. m., on time, passed signal 4288 at a speed estimated as about 70 miles per hour, passed signal 5, which was displaying stop, and, while moving at a speed estimated as between 6 and 12 miles per hour, was derailed at derail 22.

Both engines and the front truck of the first car were derailed to the right and stopped upright on the ties. The first engine stopped with the front end about 188 feet beyond the derail.

The employee injured was the engineman of the second engine.

Summary of Evidence

Engineman Bandt, of the first engine, stated that at Chicago a terminal air-brake test was made, a running test was made after the train left that point, and the brakes functioned properly en route. Brake-pipe pressure of 110 pounds and main-reservoir pressure of 130 pounds were being maintained. The weather was clear and there was no smoke trailing from the engine or any condition of the engine that either obscured his view or distracted his attention. As his train was approaching the point where the accident occurred he was maintaining a lookout ahead, and the speed was about 70 miles per hour. He said that signal 4283 was displaying proceed for his train, that all lights were lighted, and that both he and the fireman called its indication. This signal continued to display proceed until his engine passed it. At a point about 3,620 feet west of the home signal he could see across the angle between the G. T. W. and the Pennsylvania that an east-bound G. T. W. train was closely approaching the crossing. At this point he was unable to see the home signal and waited a few seconds to ascertain the exact movement of the G. T. W. train; then, becoming alarmed, he made a 15-pound brake-pipe reduction. Soon after the brake-pipe exhaust ceased he observed that the home signal displayed stop and he immediately moved the brake valve to emergency

position, but the distance was insufficient for stopping the train short of the home signal. The speed was reduced to 10 or 12 miles per hour when the engine entered the derail. He said that he could see the home signal at a distance of about 35 car lengths.

Fireman Wells, of the first engine, stated that as his train was approaching the point where the accident occurred the speed was about 70 miles per hour, the weather was clear, and there was no condition of the engine that obscured the view ahead. When his train was at a point about 3/4 mile west of signal 4288, he observed that it displayed proceed. He called its indication to the engineman who replied, "Clear." Since the engine was hand-fired and as the fireman was occupied in tending the fire until after the engine passed the signal, he did not keep it under further observation. Before the home signal could be seen from the left side of the cab, he observed the engineman making a service brake-pipe reduction. The fireman crossed to the right gangway to see the signal. At this time the engineman moved the brake valve to emergency position and the fireman could see that the home signal displayed stop.

Engineman Carrier, of the second engine, stated that the brakes functioned properly en route. When his train was about 1/4 mile west of signal 4288 the speed was about 70 miles per hour. The signal displayed proceed, all lights were lighted, and he called its indication to his fireman. Brake-pipe pressure of 110 pounds was indicated by the gauge of his engine and the double-heading cock was closed. The weather was clear and there was no smoke or any condition of the engine that obscured his view ahead. Because the right injector required attention his lookout ahead was distracted momentarily; however, just before the first engine passed signal 4288 he observed that it still displayed proceed. Before he could see the home signal he observed that a service brake-pipe reduction was made, which was followed immediately by an emergency application of the brakes. He closed the throttle and opened the sander valve. At this time he observed that the home signal displayed stop. When his train was at a point about 4,750 feet west of the home signal he saw an east-bound G. T. W. train 30 or 40 car lengths west of the crossing; however, he thought that it was stopped. He estimated that the speed of his train was 10 miles per hour when his engine entered the derail. The accident occurred about 12:11 a. m.

Fireman Crosby, of the second engine, stated that because smoke trailed down on the left side of the engine he was unable to see signal indications en route. His engine was equipped with a mechanical stoker. He did not see signal 4288; however,

when his train was a short distance west of the home signal he observed that it displayed stop. He did not remember whether his engineman called the indication of signal 4288.

Conductor Eme stated that he talked with Engineman Bandt before No. 44 left Chicago and he appeared to be in normal condition. His train was on time when it was approaching Grand Trunk and the speed was about 70 miles per hour. The first he knew of anything being wrong was when he felt an emergency application of the brakes and the train stopped abruptly. He did not notice whether a service application preceded the emergency application. He thought the speed had been reduced to 6 or 8 miles per hour when the engines became derailed. The weather was clear at the time of the accident, which occurred about 12:11 a. m. After the occurrence of the accident he observed that the home signal displayed stop. After 14 cars had been pulled back to Hobart, 7.6 miles west of Grand Trunk, a relief engine was coupled to the front end, an air-brake test was made, and the brakes functioned properly.

Front Brakeman Alford stated that when his train was approaching Grand Trunk the first knowledge he had of anything being wrong was an unusually heavy application of the brakes. He said that it was not unusual for No. 44 to be stopped at Grand Trunk because of conflicting movements on the G. T. W.

The statement of Flagman Romary added nothing of importance.

Engineman Rook, of G. T. W. No. 6, which cleared the interlocking at Grand Trunk at 12:11 a. m., stated that as his train was approaching the G. T. W. approach signal, located 6,623 feet west of the Pennsylvania tracks, it displayed a yellow aspect until his train reached a point about 3/4 mile west of it, then changed to green. As soon as his engine passed the approach signal he observed that the home signal, located 1,633 feet west of the crossing, displayed a green aspect. The speed was 45 or 50 miles per hour when his train was moving over the crossing.

Fireman Page, of G. T. W. No. 6, corroborated the statement of Engineman Rook as to the signal indications displayed for his train.

Leverman Blum, of the G. T. W. at Grand Trunk, stated that he had been assigned as leverman at that point since September, 1940, and during this time no difficulty had been experienced with the interlocking. Neither train is scheduled

at Grand Trunk, but based on scheduled running time G. T. W. No. 6 is due at the crossing at 12:11 a. m. and Pennsylvania No. 44 is due there at 12:12 a. m. He lined the route for an east-bound G. T. W. freight train which passed the tower at 11:56 p. m. Since G. T. W. No. 6 was reported as being on time he did not change the route. About 12:09 a. m. the approach-indicator light indicated that No. 6 had entered the approach circuit and the leverman cleared the eastward home signal on the G. T. W. Several seconds later the approach-indicator bell indicated that No. 44 had entered the approach circuit on the Pennsylvania. No. 6 cleared the crossing at 12:11 a. m., as indicated by the leaving-indicator bell, and he restored the levers governing the G. T. W. route to normal position; this procedure ordinarily requires 9 seconds. He then started to line the route for No. 44. At that time the indicator displayed red and he observed fire flying from the brake shoes of No. 44. The accident occurred at 12:11:09 a. m. He said that after a train has entered the approach circuit the route cannot be changed except by operating the time release. The time release intervals are 2 minutes for the G. T. W. and 3 minutes 48 seconds for the Pennsylvania.

Signal Maintainer Holst, of the G. T. W., stated that he arrived at the scene 6 or 7 minutes after the accident occurred. He inspected the interlocking machine in the tower and found all levers in normal position. All derails on both lines were set for the derailing position. The derail involved was in good condition. Home signal 5 displayed stop, but he did not observe signal 4288. About 1-1/2 hours later he examined lever 5 and found it locked and there was no evidence of tampering with the lock. His last inspection of the interlocking was on May 2, when he inspected and oiled the derails.

Assistant Signal Supervisor Burns, of the G. T. W., stated that he arrived at the scene of accident about 12:50 a. m. As all levers of the interlocking machine were in normal position, no route was lined on either railroad. Home signal 5 displayed stop and signal 4288 displayed stop-and-proceed. He has supervision over that part of the interlocking which controls movements on the G. T. W. According to his records, he last inspected the interlocking on February 10 and 17, 1941, and on both occasions the interlocking functioned as intended.

Signal Maintainer Warner, of the Pennsylvania, stated that he arrived at Grand Trunk about 12:45 a. m. and found all levers in the tower in normal position, home signal 5 displaying stop, and signal 4288 displaying stop-and-proceed. These

signals are under his supervision and he has never experienced any difficulty with them. Later he disconnected the control relay at signal 4288 so that it would display its most restrictive indication.

Inspector of Telegraph and Signals Marquardt, of the Pennsylvania, stated that he arrived at the scene of accident at 3:25 a. m. and inspected signal 4288. The lowest light of the approach indication of this signal was not illuminated because of a broken filament; however, the signal was displaying stop-and-proceed and home signal 5 was displaying stop. He examined the machine levers and all were in normal position. Tests of the mechanical locking, signal indication and approach locking disclosed them to be functioning as intended.

Supervisor of Telegraph and Signals McFarland stated that he arrived at the scene of accident at 3:35 a. m., and placed signal 4288 and the home signal under observation during a period of 56 hours. After the engines had been rerailed a detailed check of the interlocking was made. These tests included a check of mechanical locking, approach locking, all relays, local control wires and lighting circuits; all wiring was tested with a megger. These tests disclosed that all apparatus met the railroad's requirements and all apparatus functioned properly. The time release for the eastward main track required 3 minutes 52 seconds to run its cycle. He said that the crew of FW-26, an east-bound freight train which passed Grand Trunk at 10:35 p. m., reported the lowest light of the approach position of signal 4288 unlighted.

Foreman of Telegraph and Signals McMaken, of the Pennsylvania, stated that he was present when the interlocking and involved signals at Grand Trunk were tested and found conditions to be as previously described. If signal 4288 displayed proceed for No. 44 the leverman could not line the route for the G. T. W. After a train has entered the approach circuit the route and the derail cannot be changed without operating the time release which is adjusted for 3 minutes 48 seconds, but the operator can place the home signal at stop. If the route was lined for the eastward Pennsylvania track and the home signal was displaying proceed, the route could not be changed for a G. T. W. train during the time No. 44 was moving between signal 4288 and the home signal. He said that if signal 4288 displayed proceed for No. 44 it was a false indication; however, tests made after the occurrence of the accident disclosed no evidence of any cross or ground. Had a cross between the approach and the proceed lighting circuits existed, both indications would have been displayed simultaneously. In his opinion signal 4288 displayed approach for No. 44.

Observations of the Commission's Inspectors

On May 9, 1941, the Commission's inspectors participated in tests of the interlocking apparatus and signals involved in the accident. These tests included a check of the mechanical locking, indication locking and approaching locking. All line wires between signal 4288 and the home signal were inspected. All insulators were in place but in various places the insulation was missing from the wires; however, no short circuit existed. The apparatus involved met the requirements of the Pennsylvania Railroad and the Commission's Rules, Standards, and Instructions, and the insulation resistance of all wires in the circuits involved was above the limits prescribed by the Commission's Rules, Standards, and Instructions. There was nothing found that might have caused signal 4288 to function abnormally. Signal 4288 was under observation from 3:35 a. m., May 5, until 11:35 a. m., May 7. During that period it operated properly and no improper indication was displayed. It was disclosed that if signal 4288 should falsely display proceed, the lever controlling the home signal could not be latched in normal position and the mechanical locking could not be released; therefore, the route could not be changed from the Pennsylvania to the G. T. W.

On May 9, from the cab of an east-bound engine of the type involved, the Commission's inspectors observed that approach signal 4288 could be seen from either side a distance of 5,102 feet; however, the signal was lost to view from the left side when the engine was 382 feet west of it. The home signal could be first seen from the right side of the cab at a distance of 2,045 feet and from the left side a distance of 1,455 feet.

On May 12 a series of braking tests were conducted at the scene of the accident to determine the distance necessary for stopping a train of equipment similar to No. 44 on the day of the accident. The test train consisted of 2 engines of the type involved and 15 passenger cars of the types that comprised No. 44. All cars were equipped with UC brake equipment. The first test was made by simulating as closely as possible the performance of Engineman Bandt on the night of the accident. At a point 6,024 feet east of signal 4288, which was designated by the engineman involved as the point where he had started to apply the brakes, the speed was 70 or 71 miles per hour. A 15-pound brake-pipe reduction was made, the brake-pipe exhaust ceased after 11 seconds and then a 9-second interval elapsed, during which time the train moved a distance of 1,440 feet. When the home signal was first sighted at a distance of 2,045 feet an emergency application was made. The

total stopping distance was 4,139 feet. The front end of the first engine stopped 354 feet beyond derail 22. On the second test the speed was 72 miles per hour and a 22-pound brake-pipe reduction was made 2,045 feet west of the home signal. The brake-pipe exhaust ceased after 12 seconds and the train stopped in 5,131 feet, or 3,086 feet beyond derail 22. The total time required to make the stop was 1 minute 11 seconds. On the third test the speed was 70 miles per hour and an emergency application was made 2,045 feet west of the home signal. The train stopped in a distance of 2,243 feet, or 198 feet beyond derail 22. The elapsed time was 36 seconds.

Discussion

According to the evidence, No. 44 passed signal 4288 at a speed estimated as 70 to 72 miles per hour, passed the home signal, which was displaying stop, and, while moving at a speed of 6 to 12 miles per hour, became derailed at the derail, 27 feet beyond the home signal. The route was lined for a G.T.W. passenger train that had just cleared the interlocking.

According to both enginemen of No. 44, signal 4288 displayed proceed for their train and all lights in the aspect were illuminated. The engineman of the first engine said that he kept the signal under constant observation throughout a distance of about 5,100 feet. The engineman of the second engine said he observed the indication first at a distance of 1/4 mile, then his attention was distracted momentarily but he again saw the indication before the first engine passed it. The fireman of the first engine said he observed signal 4288 at a distance of 3/4 mile, called its indication as clear and was answered by the engineman; however, as the fireman was engaged in tending the fire until his engine was some distance east of the signal, he did not observe it again. The fireman of the second engine did not see the signal. The weather was clear and there was no condition existing on either engine that obscured the view ahead, except smoke trailing to the left side. When the train was about 3,485 feet west of the home signal, the engineman of the first engine saw an east-bound G. T. W. train closely approaching the interlocking and made a 15-pound brake-pipe reduction, then at a point 2,045 feet west of the home signal he observed that this signal was displaying stop and moved the brake valve to emergency position; however, the distance was not sufficient to stop short of the derail. According to members of the train crew, they felt only one brake application, which seemed to be an emergency application. Tests conducted after the occurrence of the accident disclosed that a train similar to No. 44 could be stopped from a speed of 70 miles per hour by an emergency application of the brakes

in a distance of 2,243 feet. The front end of the first engine stopped 165 feet east of the home signal, a distance of 2,210 feet beyond the point where the emergency application was made.

According to the statement of the leverman, he lined the route for an east-bound G. T. W. freight train which passed Grand Trunk about 11:56 p. m. After this train departed he restored the signals to normal but the route remained lined for movement on the G. T. W., as he expected No. 6, an east-bound G. T. W. passenger train, to be the next train to move through the interlocking. When No. 6 entered its approach circuit the leverman placed the eastward G. T. W. home signal at proceed and a few seconds later No. 44 entered its approach circuit. The interlocking was so arranged that when the route was lined for movement on the G. T. W., signal 4288 displayed approach, the home signal displayed stop and the derail was open. Since the approach circuit for No. 44 extended 19,175 feet west of the home signal, since operation of the time release required 3 minutes 52 seconds, and since the speed of No. 44 was 70 miles per hour a distance of 17,130 feet and from 70 to 10 miles per hour throughout 2,045 feet, probably No. 44 would traverse the 19,175 feet between the west end of the approach circuit and the home signal in about 3 minutes 39 seconds, or less than the time-release interval; therefore, during a period of 3 minutes 52 seconds immediately preceding the time of the accident, the route could not have been lined for No. 44 and then lined for the G. T. W. In addition, the interlocking was so arranged that when the leverman attempted to line the route for the G. T. W. freight train, if signal 4288 remained at proceed he would be unable to line the route for the G. T. W. Tests conducted after the accident occurred disclosed that the interlocking was functioning as intended except that the lowest light of the approach aspect of signal 4288 was extinguished; however, according to the rules, this aspect could be accepted by a crew. Previously, the interlocking had functioned properly.

There was no condition disclosed that could cause signal 4288 to display proceed and at the same time permit the route to be lined for the G. T. W., and it therefore appears probable that the three employees on the engines, who stated they saw signal 4288, misread the two-light aspect, which was considerably shorter than the normal three-light aspect, as proceed instead of as approach. The fireman of the first engine was tending the fire from a point 3/4 mile west of signal 4288 to a point east of this signal, and it is possible that light from the fire-box interfered with the proper reading of the aspect. If the stoker-fired engine had been the first engine instead of the second one, this arrangement would have given the fire-

man of that engine the opportunity to maintain an uninterrupted observation of the signal involved.

Cause

It is found that this accident was caused by failure properly to control the speed of the train in compliance with interlocking signal indications.

Dated at Washington, D. C., this sixteenth day of June, 1941.

By the Commission, Commissioner Patterson.

W. P. BARTEL,

(SEAL) Secretary.