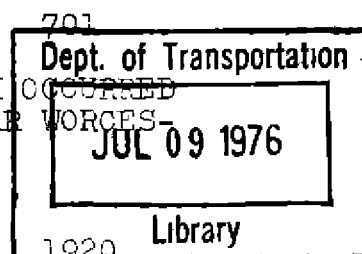


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IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED
ON THE BOSTON AND ALBANY RAILROAD NEAR WORCES-
TER, MASS., ON JUNE 15, 1920.



August 3, 1920.

On June 15, 1920, there was a rear-end collision between two passenger trains on the Boston & Albany Railroad near Worcester, Mass., which resulted in the injury of 42 passengers, 8 employees, and 4 other persons. This accident was investigated in conjunction with representatives of the Massachusetts Public Utilities Commission, and as a result of this investigation the Chief of the Bureau of Safety reports as follows:

This accident occurred on the Boston Division, which in the vicinity of the point of accident is a double-track line over which trains are operated by time-table, train orders, and an automatic block-signal system. The block signals are normal-clear, two position, lower quadrant home and distant semaphores, night indications are red and yellow, green and yellow, and double green, for stop, caution and proceed, respectively. The signals involved are an interlocking signal at tower 26, this being a three-position upper quadrant signal located about 1 mile east of the station, automatic signal 42.12 located 6094 feet east of the home signal, and automatic signal 41.12, located 5,521 feet east of signal 42.12. The accident occurred 90 feet east of signal 41.12.

Approaching the point of accident from the west there is a curve of $1^{\circ} 30'$ to the left 2,500 feet in length, a 910-foot curve to the right varying from $1^{\circ} 47'$ to 2° , a tangent 865 feet long, and a 1-degree curve to the right, the accident occurring on this curve about 175 feet east of its western end. The grade for more than 1 mile varies from .56 per cent to .90 per cent descending for eastbound trains.

The view of signal 41.12 is restricted to a distance of about 1250 feet while the rear end of a train at the point of accident could be seen from a distance of about 1210 feet. It was raining at the time of the accident, but not sufficiently to obscure signals.

Eastbound passenger train No. 18, en route from Albany, N. Y., to Boston, Mass., consisted of engine 562, 1 baggage car, 1 smoking car, 1 coach, 1 parlor car, 2 Pullman sleeping cars, 1 dining car, and 1 coach, in the order named, and was in charge of Conductor Plant and Engineman Calkins. This train left Worcester at 8.11 p.m., 46 minutes late. Soon after it passed Hamilton Street Bridge, located about $2\frac{1}{2}$ miles east of the station and about 3,000 feet west of the point of accident, the two baggagemen heard something

dragging under the baggage car and signaled the engineman to stop the train; one of the baggagemen also went into the adjoining car and opened the conductor's valve. The train came to a stop at about 8.18 p.m., and a pinch bar was found wound around the front journal of the forward truck of the baggage car. The engineman, who had gotten off to find out what the trouble was, got back on the engine and whistled out a flag; the flagman had already started back, and had reached a point about 300 feet from the rear of his train when he was passed by train No. 114, which collided with train No. 18 at about 8.21 p.m.

Eastbound train No. 114, consisting of engine 508, 3 coaches and 1 combination smoking and baggage car, in charge of Conductor Barker and Engineman Card, was en route from Worcester to Boston. This train left Worcester at 8.13 p.m., 3 minutes late, due to waiting for train No. 18 to clear the block. The signal at tower 26 was in the stop position, train No. 114 coming almost to a stop before the signal changed to caution. Signal 42.12 was displaying a caution indication, after having made a service application of the brakes the engineman read the indication of signal 41.12 as clear and released the brakes. About half a minute later he saw the rear of train No. 18, and immediately made an emergency application of the brakes and reversed the engine, locking the driving wheels. The speed of train No. 114 at the time of the accident was about 20 miles an hour.

Train No. 18 was moved forward a distance of about 35 feet, slight damage being sustained by the engine tender, and the trucks of all of the cars, while the dining car and rear coach were considerably damaged, as well as the engine of train No. 114.

The statements of the crew of train No. 18 indicated that their train was running about 40 or 45 miles per hour when the brakes were applied, the train stopped in a distance estimated to be about 15 car lengths, and the engineman got off to ascertain the nature of the trouble; he then returned to his engine and sounded the whistle signal for the flagman to go back and protect the train. In the meantime Flagman Kearns, who was riding in the rear car, had started for the rear end when he felt the brakes applied and, according to his statement, had reached the rear end when the train had stopped. He at once opened the trap door and started back to flag, taking with him red and white lanterns, fuses, and torpedoes, and he said he went back as fast as he could as he knew that train No. 114 was following his train. He looked at signal 41.12 as he passed it and said it was in the stop position. He put down one torpedo just west of the signal and was from 25 to 50 feet west of the signal when he heard his engineman sound the whistle for him to go back. When he was about 75 feet beyond the torpedo he saw the reflection of a headlight and as it approached the engineman of train No. 114 sounded the whistle in answer to the stop signals.

which he was giving with a lighted fusee. Flagman Kearns said he could see the sparks flying from the wheels due to the brakes being applied; he estimated its speed when passing him as between 25 and 30 miles an hour. He was about 15 or 20 feet west of the rear end of train No. 114 when it came to a stop after the accident.

Engine Inspector Kneeland, who was riding on the rear end of train No. 18, verified the flagman's statement that he put a torpedo on the rail just west of the rear end of the train, and he thought the flagman had gotten back a distance of about 150 yards before he was passed by train No. 114. Inspector Kneeland heard the engineman answer the flagman's stop signals. He thought the accident was due to the rails being wet.

The statements of the employees of train No. 18 as to how long their train had stopped before the accident occurred varied from 2 to 4 minutes. With the exception of the flagman, Baggage-master Murphey was the only other member of this crew who noticed the position of signal 41.12 and he said it was in the stop position after the accident.

According to Engineman Card, of train No. 114, the home signal at Tower 26 was in the stop position as his train approached, and he brought his train practically to a stop when the signal changed to caution. When signal 42.12 was reached he found it displaying a caution indication; he made an application of the air brakes. Engineman Card said that when signal 41.12 came in sight it was displaying a clear indication, both lights being green, and that he then released the air brakes. Shortly afterwards he saw the markers on the rear end of train No. 18, made an emergency application of the air brakes and reversed the engine; he did not remember anything which occurred after that. Engineman Card was positive that signal 41.12 was displaying a clear indication, and stated he did not see a flagman or fusee, or acknowledge the stop signals of a flagman. He thought about half a minute elapsed between the time of releasing the brakes and the time of the emergency application, and thought that the brake pipe probably had not been recharged. The fireman had been working on the fire after passing Tower 26 and was not positive whether he saw signal 42.12; he did not see signal 41.12.

Conductor Barker, of train No. 114, did not notice any application of the air brakes after passing Tower 26 until Engineman Card acknowledged the stop signals of a flagman and applied the brakes just before the accident occurred. After the accident he looked west and saw a burning fusee, but did not notice the position of signal 42.12. Flagman Seguin said there was an emergency application of the brakes followed closely by the shock of the col-

lision and that when he started back to protect his train he first looked ahead and saw signal 41.12 in the stop position. Flagman Sequin also saw a burning fusee about a car-length west of his train.

A switchman who was a passenger on train No. 114 heard Engineman Card acknowledge the stop signals of a flagman and felt an emergency application of the brakes, while an engineman who was also a passenger on train No. 114 felt an emergency application of the brakes and noticed the train passing a lighted fusee. Another employee who was nearby at the time of the accident heard Engineman Card acknowledge the flagman's stop signals, and after the accident saw signal 41.12 in the stop position, as did a trainmaster who reached the scene of the accident shortly afterwards.

Signal Maintainer Clifford arrived at signal 41.12 at 9.45 p.m. and at that time the signal was in the stop position with the home, track, and distant relays open. He reached signal 42.12 at 10.15 p.m. and found the distant signal in the caution position and the distant relay open. Assistant Supervisor Fitzgerald arrived at signal 41.12 at about midnight and tests made at that time showed that the circuits were free from foreign current. The relay and signal boxes of signals 41.12 and 42.12 were then sealed and on June 16 the seals were removed and thorough inspection and tests made of the signal apparatus. On June 22 further tests were made, but none of the inspections and tests disclosed anything which could have led to the display of a false indication at signal 41.12.

A terminal test of the air brakes of train No. 114 had been made at Worcester, at which time the brakes were found to be in proper working order, while on the trip from Boston to Worcester as train No. 113, with the same equipment, no difficulty with the air brakes had been experienced. Tests made after the accident showed the air-brake equipment to be in proper working order; the engine brakes could not be tested on account of damage sustained in the accident.

Evidence was introduced at the investigation which indicated that the bar picked up by train No. 18 had been dropped upon the track from an overhead bridge by some boys.

This accident was caused by the failure of Engineman Card of train No. 114 properly to observe and obey automatic block signal indications and a flagman's stop signals.

The investigation disclosed that signal 42.12 was displaying a caution indication, which under the rules requires a train to "approach next signal prepared to stop". Engineman Card saw this signal and read its indication properly; but he did not apply the brakes for the purpose of

checking the speed of his train until he had gone a considerable distance beyond the caution signal and was approaching the next signal, the evidence indicating that his train was then running at comparatively high speed. The evidence is conclusive that signal 41.12 was displaying a stop indication, and no reasonable explanation can be advanced to account for the error of Engineman Card in accepting this indication as a clear signal. The fact was established that at the time train No. 114 approached signal 41.12, Flagman Kearns of train No. 18 was between that signal and the approaching train, giving stop signals with a lighted fusee; and although Engineman Card did not remember seeing the flagman's signals, he acknowledged them. The engineman's range of vision of the flagman's fusee, the block signal, and the rear end of the preceding train, was approximately the same but the speed of his train was so high that he was unable to stop in the space available. Tests of the brakes on train No. 114 both prior to and subsequent to the accident disclosed that they were in proper operating condition, and while Engineman Card thought he did not obtain the full effect of the brakes on account of having released them but a short time before he made the emergency application, the statements of the crew and other employees riding on that train indicated that proper emergency action of the brakes was obtained. That the speed of this train was high is further evidenced by the fact that Flagman Kearns stated it was running so fast when it passed him that it would have been impossible for him to have gotten on the train, and by the comparatively heavy damage sustained by the steel equipment in train No. 18 as a result of the impact. Had train No. 114 been under proper control, as required by the caution signal and rule 703, when approaching signal 41.12, or had Engineman Card properly observed and obeyed the stop indication of this signal, this accident could have been averted.

In a previous report upon a similar accident, it was pointed out that "the rules permit the distant signal indication to be observed with less exactness than is the home signal indication", as the interpretation of this indication "approach next signal prepared to stop" does not necessarily require any definite action on the part of the engineman at the time he received that indication. In discussing this subject in the annual report of this Bureau for the year 1916, the following statement was made:

"There is no good reason why the indication of the distant signal should not convey as positive and definite an order to the engineman as does the indication of the home signal. The home signal at danger means STOP, this is a positive order; it requires an engineman to act immediately, whereas, under present standard rules, the distant signal at caution merely indicates to an engineman that he must approach the next signal with caution or prepared to

stop; it does not require him to take any positive action at the point of indication but leaves the question of speed entirely to his own judgment. It is extremely desirable, in the interest of safety, that the standard indication for distant signal at caution should be changed so that it will mean "reduce speed, and approach next signal with caution or prepared to stop."

Had such an interpretation of the distant signal indication been in effect on this railroad, this accident would probably have been prevented.

Rule 99 reads in part as follows:

"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 fuses must be thrown off at proper intervals "

Flagman Kearns failed to throw off a fuse when the brakes on his train were applied approaching the point where the accident occurred.

This accident again directs attention to the need of an automatic train-control device which will operate to control a train in case the engineer for any reason fails to observe or heed the stop indication of an automatic block signal.

Engineman Card was employed as a fireman in 1905 and promoted to engineer in 1910. He was reduced to fireman in March, 1914, on account of a depression of business and again promoted to engineer in November, 1915; his record was good. Flagman Kearns was employed as a yardman in 1907 and promoted to trainman in 1909; his record was clear. At the time of the accident Engineman Card had been on duty about 5 hours, after about 17 hours off duty. Flagman Kearns had been on duty about 6 hours, after about 9 hours off duty.