

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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INVESTIGATION NO. 3080  
THE PENNSYLVANIA RAILROAD COMPANY  
REPORT IN RE ACCIDENT  
NEAR GALLITZIN, PA., ON  
FEBRUARY 28, 1947

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SUMMARY

Railroad: Pennsylvania

Date: February 28, 1947

Location: Gallitzin, Pa.

Kind of accident: Derailment

Train involved: Passenger

Train number: 3

Engine numbers: 1428-5525

Consist: 13 cars

Estimated speed: Front portion of train, standing : Rear car, in excess of 60 m. p. h.

Operation: Signal indications

Track: Four; 9°15' curve; 1.73 percent descending grade eastward

Weather: Clear

Time: About 4:08 a. m.

Casualties: 1 killed; 13 injured

Cause: Passenger-train car becoming separated from train and moving out of control on grade, as result of defective coupler, defective air-brake equipment, and defective hand brake

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3080

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

THE PENNSYLVANIA RAILROAD COMPANY

April 14, 1947.

Accident near Gallitzin, Pa., on February 28, 1947, caused by a passenger-train car becoming separated from the train and moving out of control on a grade, as a result of a defective coupler, defective air-brake equipment, and a defective hand brake.

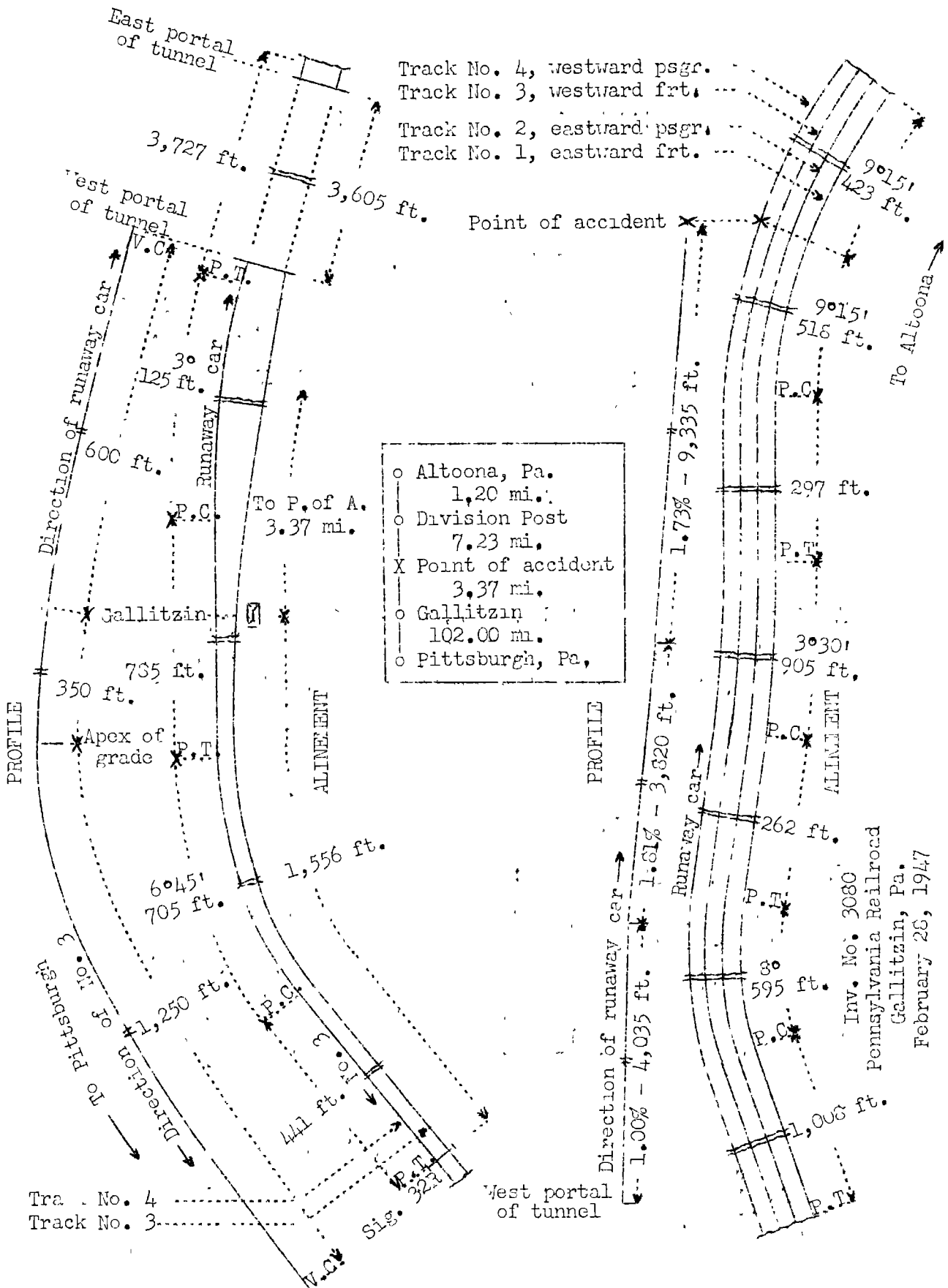
REPORT OF THE COMMISSION<sup>1</sup>

PATTERSON, Commissioner:

On February 28, 1947, there was a derailment of a passenger-train car moving out of control on a grade on the Pennsylvania Railroad near Gallitzin, Pa., which resulted in the death of 1 Pullman porter, and the injury of 12 passengers and 1 train-service employee. This accident was investigated in conjunction with a representative of the Pennsylvania Public Utility Commission.

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



Location of Accident and Method of Operation

This accident occurred on that part of the Pittsburgh Division extending between Division Post, near Altoona, and Pittsburgh, Pa., 112.6 miles, a four-track line in the vicinity of the point of accident. The main tracks from south to north are designated as No. 1, eastward freight; No. 2, eastward passenger; No. 3, westward freight; and No. 4, westward passenger. Trains moving with the current of traffic on tracks Nos. 1, 2 and 4 and in either direction on track No. 3 are operated by automatic block-signal and cab-signal indications. The derailment occurred on track No. 4 at a point 2.43 miles west of Altoona and 3.37 miles east of the station at Gallitzin. From the west on track No. 4 beginning at home signal 32R, located 1,556 feet west of the station at Gallitzin, there are, in succession, a tangent 441 feet in length, a  $6^{\circ}45'$  curve to the right 705 feet, a tangent 735 feet, a  $3^{\circ}$  curve to the right 125 feet, and a tangent 3,727 feet to the east portal of a tunnel, which is 3,605 feet long, then there are numerous sharp curves and short tangents. From the west, in the immediate vicinity of the point of derailment, there are, in succession, a tangent 1,008 feet in length, an  $8^{\circ}$  curve to the right 595 feet, a tangent 262 feet, a  $3^{\circ}50'$  curve to the left 905 feet, a tangent 297 feet, and a  $9^{\circ}15'$  curve to the right 518 feet to the point of derailment and 423 feet eastward. The west end and the apex of a vertical curve are, respectively, 1,600 and 350 feet west of the station at Gallitzin, and 2,200 and 950 feet west of the west portal of the tunnel. From the west portal of the tunnel eastward the grade varies between 1.00 percent and 1.81 percent descending throughout a distance of 3.26 miles to the point of derailment, where it is 1.73 percent.

Throughout a distance of 518 feet immediately west and 60 feet immediately east of the point of derailment the tracks on the curve involved are laid on a fill. In the immediate vicinity of the point of derailment a rock wall slopes upward at an angle of about 30 degrees and faces track No. 4 at an angle of about 45 degrees. At a point 60 feet east of the point of derailment a hillside cut, which is practically perpendicular, parallels track No. 4 on the north. The wall of the cut is about 15 feet distant from the centerline of the track. On the curve involved the structure of track No. 4 consists of 130-pound rail, rolled in 1930, cropped to 35 feet in length, and relaid in 1946, on an average of 21 treated hardwood ties to the rail length. It is fully tieplated with double-shoulder tieplates, spiked with 5 spikes per tieplate, provided with 6-hole angle bars and an average of 8 rail anchors

per rail length. It is ballasted with crushed stone to a depth of 30 inches. The specified curvature was 9°15', and the specified superelevation was 3-1/2 inches. At the point of derailment the curvature was 9°07', the superelevation was 2-7/8 inches, and the gage was 4 feet 8-5/8 inches.

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

11. Where inspectors are employed to make a general inspection of cars upon arrival at a terminal they must make a visual inspection of \* \* \* hand brakes, \* \* \* and make necessary repairs \* \* \*

15-b. (Passenger Trains)--\* \* \*

\* \* \*

A car having the hand brakes inoperative must never be the rear car of a train.

\* \* \*

### Inspection at Terminals

44. Duties of Inspectors and Repairmen--All car inspectors and repairmen whose duty it is to inspect and make light repairs to trucks and draft arrangements must also be required to give the same attention to hand brake defects, \* \* \*

\* \* \*

45. Brake Cylinders, Triple Valves, U-12, D-22, \* \* \*--Inspector must see that these parts are cleaned, lubricated, and tested not less frequently than indicated below:

#### Passenger Equipment

\* \* \*

U-12 and D-22 Valves, Brake Cylinders, Slack Adjusters, Relay, Quick Service and Safety Valves .....15 months

\* \* \*

52. Inspection and Repairs of Hand Brake Connections--All parts and connections of the hand brake should be carefully examined and any necessary changes and repairs made.

The maximum authorized speed for passenger trains moving on track No. 4 is 40 miles per hour on tangent track and 30 miles per hour on the curve involved.

#### Description of Accident

No. 3, a west-bound first-class passenger train, consisted of engine 5525, one baggage car, one sleeping car, three coaches, two sleeping cars, one dining car and five sleeping cars, in the order named. The ninth and thirteenth cars were of lightweight, high-tensile-steel construction, and the remainder of the cars were of conventional all-steel construction. At Altoona, where engine 1428 was coupled ahead of engine 5525 to assist this train to Gallitzin, a terminal air-brake test was made. No. 3 departed from Altoona at 3:13 a. m., and because of inadequate steam pressure, it stalled about one mile east of Gallitzin. After a delay of about 16 minutes the train was started and it proceeded to Gallitzin, where it stopped at 3:54 a. m. on track No. 4, with the front of the train about 50 feet east of signal J2R and the rear about 160 feet west of the west portal of the tunnel. Soon afterward engine 1428 was detached, and a road air-brake test was made. Then, when an attempt was made to start the train, the thirteenth, or rear, car became detached from the train. This car moved eastward out of control to a point 3.37 miles east of Gallitzin, where it was derailed.

The car overturned to the north and slid eastward on its left side, then struck the rock wall and was diverted upward and southward toward track No. 4. The car stopped practically upright, with its front truck on track No. 4 at a point 138 feet east of the point of derailment and its rear end about 15 feet north of track No. 4. The left side of the car was crushed inward, the left side sheets were scraped and torn, and the left side of the roof was crushed inward about two-thirds its length.

The flagman was injured.

The weather was clear at the time of the accident, which occurred about 4:08 a. m.

The thirteenth car of No. 3, Pullman Cascade Mirage, a sleeping car of lightweight-steel construction, was built in 1940, and placed in service August 5, 1940. It is 84 feet 6 inches long between the pulling faces of the couplers, and contains 5 bedrooms and 10 roomettes. The A end, which was coupled to the twelfth car, is of non-vestibule design, but the

B end is equipped with a vestibule. Its lightweight is 127,500 pounds. The car is provided with two 4-wheel trucks spaced 59.5 feet between the truck centers, and has clasp brakes on all wheels. The journals are equipped with roller bearings.

The hand-brake equipment is of the horizontal-lever ratchet type provided with a hand-clasp latch, mounted on a staff through the buffer beam at the B end and near the left diaphragm post. A 20-tooth bottom ratchet 3-13/16 inches in diameter is secured on the brake staff at the platform level. A cast-steel pawl, slightly angular in shape, one end of which has a long and a short tailpiece for the insertion of a person's foot and the other end a tooth to engage the notches of the ratchet wheel, is provided with a 1-inch cast-steel trunnion. The pawl is secured to the trunnion by a 3/4-inch bolt and a washer. A bracket plate provides a rigid metallic connection between the brake shaft and the pivot of the pawl. A set of gears, the ratio of which is 5 to 1, is mounted at the lower end of the brake shaft. The hand-brake arrangement applies braking force on the two wheels at the left side of the B-end truck, and the calculated braking force is 39 percent of the lightweight of the car. The dynamometer reading of this force was 7,000 pounds. To apply the hand brake a person clasps the latch, pulls the horizontal lever about 90 degrees toward the A end, inserts the tooth of the pawl in the bottom ratchet, then pushes the lever about 90 degrees to obtain another purchase on the top ratchet for another pull. If the pawl fails to engage the bottom ratchet no braking force can be obtained.

The air-brake equipment of this car consists of a D-22-AR control valve, a combined auxiliary, emergency, and displacement reservoir, two 16-inch by 72-inch supply reservoirs, a 12-inch by 10-inch brake-cylinder mounted on each side of each truck, two conductor's emergency valves, an F-6 relay valve, related piping, and armored-type air hose at each end of the car. The four brake cylinders of this type of brake system are connected to common supply reservoirs. After a brake application excessive leakage from one cylinder will deplete the supply reservoirs and pressure in all four brake cylinders within a short period. Repeated application and release of the train-brake system within a short period will deplete all reservoir pressures. The lightweight braking ratios are as follows: 90 to 100 percent with 36-pound brake-cylinder pressure, and 150 percent with 60-pound brake-cylinder pressure. According to the rules of the Pennsylvania Railroad the brake-cylinder piston is required to be adjusted for travel of 5 inches. D-22 control valves are required to be cleaned at intervals not in excess of 15 months. The air-brake system on this car was last cleaned June 7, 1945, at St. Louis, Missouri,



The twelfth car, a conventional-type standard all-steel Pullman, and the thirteenth car were provided with swivel-shank A.A.R. Type T tight-lock couplers at each end. These couplers have tight contours in the coupler heads and knuckles, wings on each side of the coupler head, and interlocking pins and funnels on the wings. When connected the couplers form a solid beam, horizontally and vertically, to prevent lateral or vertical movement between coupler faces. These couplers are provided with rotary-operated coupler-release rigging, which is connected below the coupler to the operating mechanism of the coupler. This mechanism consists of the lock, lift toggle, knuckle thrower, rotary lock-lifter and trunnion, and a primary and a secondary anti-creep feature. When all parts are in closed position and all parts are in operating condition these couplers will not open unless the uncoupling lever is raised. The lift toggle is provided with a 3/8-inch tell-tale hole so that it can readily be observed if the lock is in closed position. The rear coupler of the twelfth car was cast in June, 1943, and the last shop inspection was made at Sunnyside Yard, N. Y., on December 20, 1946. The twelfth and thirteenth cars were assembled in the train of No. 3 at Sunnyside Yard, N. Y., about 7 p. m., February 27, and the equipment of this train was inspected at Harrisburg and Altoona, Pa., respectively, 142.6 and 11.8 miles east of Gallitzin.

#### Discussion

Because of inadequate steam pressure, No. 3 stalled at a point about 0.9 mile east of Gallitzin. The train was held on the grade by use of the independent brake valve for a period of about 14 minutes while steam pressure was being increased, then the engineer of the first engine made a 15-pound brake-pipe reduction to hold the train while closing the slack. After a period of about 2 minutes the train proceeded, and it stopped on track No. 4 at the apex of the grade at Gallitzin about 3:54 a. m. When the train stopped the forward part was on the descending portion of the grade and the rear part was on the ascending portion of the grade. The rear end was 160 feet west of the west portal of the tunnel. The stop at Gallitzin was made after the engineer of the first engine made a 12-pound brake-pipe reduction, which was not released until after the first engine was detached. The engineer of the second engine encountered difficulty in placing the double-heading cock on his engine in open position. About 2 minutes elapsed before he released the train brakes, after which he recharged the brake pipe and then a full-service brake-pipe reduction was made to test the brakes. Then the brakes were released. About 4:03 a. m., when the engineer attempted to start the train it was necessary to reverse the engine to close the slack. Then, when a forward movement was started,

the brakes became applied in emergency. Immediately afterward, it was discovered that the rear car had become separated from the twelfth car and was moving eastward on the descending grade. At this time the enginemen were on the engine, the conductor and the front brakeman were in the ninth car and the flagman was on the rear end of the thirteenth car. When the flagman observed that the thirteenth car had become detached from the train and was moving eastward on the descending grade he attempted to stop the movement of the car by the use of the hand brake which was on the east end, but could not force the pawl into position to engage the ratchet. This defective condition of the hand brake prevented application of braking force at the brake shoes. The car moved out of control a distance of 3.37 miles to the point where it entered the 9°15' curve to the right, and the car overturned to the north at a point 581 feet east of the west end of the curve. At this point the curvature was 9°07', the superelevation was 2-7/8 inches, and the gage was 4 feet 8-5/8 inches. The overturning speed for this car on the curve was estimated as about 62 miles per hour.

The investigation disclosed that the top portion of the rotary lock-lifter of the rear coupler of the twelfth car was broken at the rotor, 1-5/8 inches below the point where it rested upon the trunnion. Discoloration of the metal of the rotary lock-lifter indicated that the break had existed during a considerable period. It apparently had broken as a result of a severe blow on the gusset section, which was somewhat flattened. An improvised split-key had been inserted in the tell-tale hole of the lift-toggle and, because of the light construction of this key, it had been drawn into the lock-block cavity. After the accident the knuckle of the coupler at the west end of the thirteenth car was found in open position, as a result of bent skirting of the car having forced the uncoupling lever to raised position during the derailment. The couplers of both cars were gaged for height, contours and gathering arms, and the measurements were within the required specifications. The anti-creep features of both couplers were in good condition. The lock of the coupler of the thirteenth car could not be raised by the hammer-and-bar method of test. The lock of the rear coupler of the twelfth car could be raised by this test, because of the broken lock-lift lever.

Tests of the air-brake system of the thirteenth car disclosed that the packing-cup of the left rear brake-cylinder piston was ruptured. This condition permitted brake-cylinder pressure to escape through the breather port and, as a result the brake would release in about 3-1/2 minutes after a 20-pound brake-pipe reduction was made. The brake would release from an

emergency application after an interval of 2 minutes 20 seconds. The piston travel of each brake cylinder was as follows: B end, left side, 6 inches; B end, right side, 3-1/2 inches; A end left side, 3-1/2 inches; and A end, right side, 4-1/2 inches. During a test simulating the repeated application and release of the air-brake system, such as occurred in the vicinity of Gallitzin, this action depleted the pressure in the reservoir system of this car to the extent that the brake released from an emergency application after an interval of 38 seconds. The brake-cylinder-piston packing cup was of the Buna-S rubber, 12-inch, snap-on type. The packing cup had become disconnected from the piston and was lying at the back end of the cylinder. About 60 percent of the outer rim of the cup had ruptured and was detached from the central body. Under the rules of this carrier, cars equipped with D-22 type control valves are required to be cleaned at intervals not exceeding 15 months. The air-brake equipment of the car in question was last cleaned and oiled 20 months 21 days prior to the day of the accident. The components of the material of the packing cup were such that rupture could have occurred at any time after it was placed in service. The actual time when the rupture occurred is not known.

Because of the broken lock-lift lever, which nullified the anti-creep feature, the slack closures made during the attempt to start the train at Gallitzin resulted in the knuckle lock at the rear of the twelfth car becoming opened, and the thirteenth car became separated from the twelfth car. When the separation occurred, the brake-pipe hose parted and the air-brakes became applied at an emergency rate of application. Under normal condition, the brake of the thirteenth car would have remained applied throughout a considerable period of time. However, because of excessive leakage of air at the left rear brake cylinder and the repeated application and release of the train-brake system in the vicinity of Gallitzin, the reservoir pressure became depleted to the extent that the brake held a few seconds only.

Examination of the hand-brake equipment of the thirteenth car of No. 3 disclosed that the long tailpiece of the pawl was broken adjacent to the trunnion. Discoloration of the metal of the pawl indicated that the break had existed during a considerable period of time. It appeared to have been broken as a result of its having been struck a severe blow by some metallic object. In addition, the trunnion was corroded to such an extent that the pawl could not be moved by striking it with a hammer. This condition caused the hand-brake to be inoperative. The hand-brake system was arranged to provide a braking ratio of 39 percent of the light-weight of the car. If the hand brake had been in operative condition, this accident would not have occurred.

During a period of several days immediately prior to the day of the accident the cars involved had moved in trains through several terminals where shop facilities are maintained. The equipment of No. 3 was last inspected by members of the mechanical force at Altoona about 50 minutes prior to the time the accident occurred, but no defective condition was observed.

Under the Safety Appliance law, all passenger-train cars are required to be equipped with efficient hand brakes. The movement of the thirteenth car without an efficient hand brake was in violation of the Safety Appliance law. In addition, the Safety Appliance law requires all cars used in moving interstate traffic to be equipped with couplers which can be uncoupled without the necessity of men going between the ends of the cars. The coupler at the rear end of the twelfth car could not be uncoupled by the use of the uncoupling lever, and the condition of this coupler was in violation of the Safety Appliance law.

Cause

It is found that this accident was caused by a passenger-train car becoming separated from the train and moving out of control on a grade, as a result of a defective coupler, defective air-brake equipment, and a defective hand brake.

Dated at Washington, D. C., this fourteenth day of April, 1947.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,  
Secretary.