

INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 2465

THE SOUTHERN RAILWAY COMPANY

REPORT IN RE ACCIDENT

AT ELLENWOOD, GA., ON

DECEMBER 10, 1940

SUMMARY

Railroad: Southern
Date: December 10, 1940
Location: Ellenwood, Ga.
Kind of accident: Derailment
Train involved: Passenger
Train number: 1
Engine number: 1460
Consist: 11 cars
Speed: 40-50 m. p. h.
Operation: Timetable, train orders and
automatic block-signal and
automatic train-stop system
Track: Single; tangent; 1 percent
descending grade southward
Weather: Clear
Time: 11:40 a. m.
Casualties: 46 injured
Cause: Accident caused by damaged switch
frog, as a result of being struck
by defective equalizer-bar of
passenger-car truck

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2465

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

THE SOUTHERN RAILWAY COMPANY

January 23, 1941

Accident at Ellenwood, Ga., on December 10, 1940, caused
by damaged switch frog, as a result of being struck
by defective equalizer-bar of a passenger-car truck.

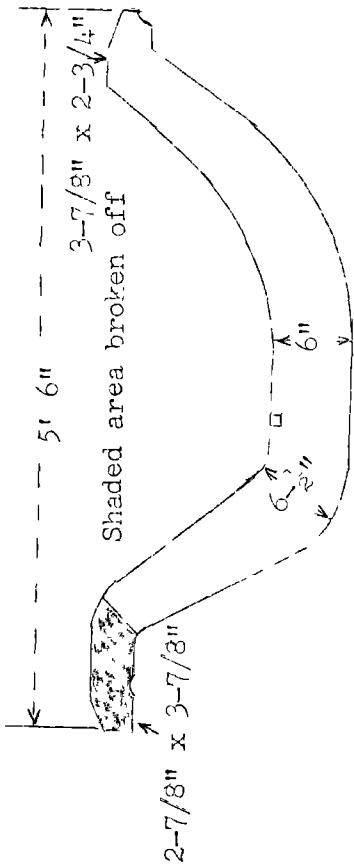
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

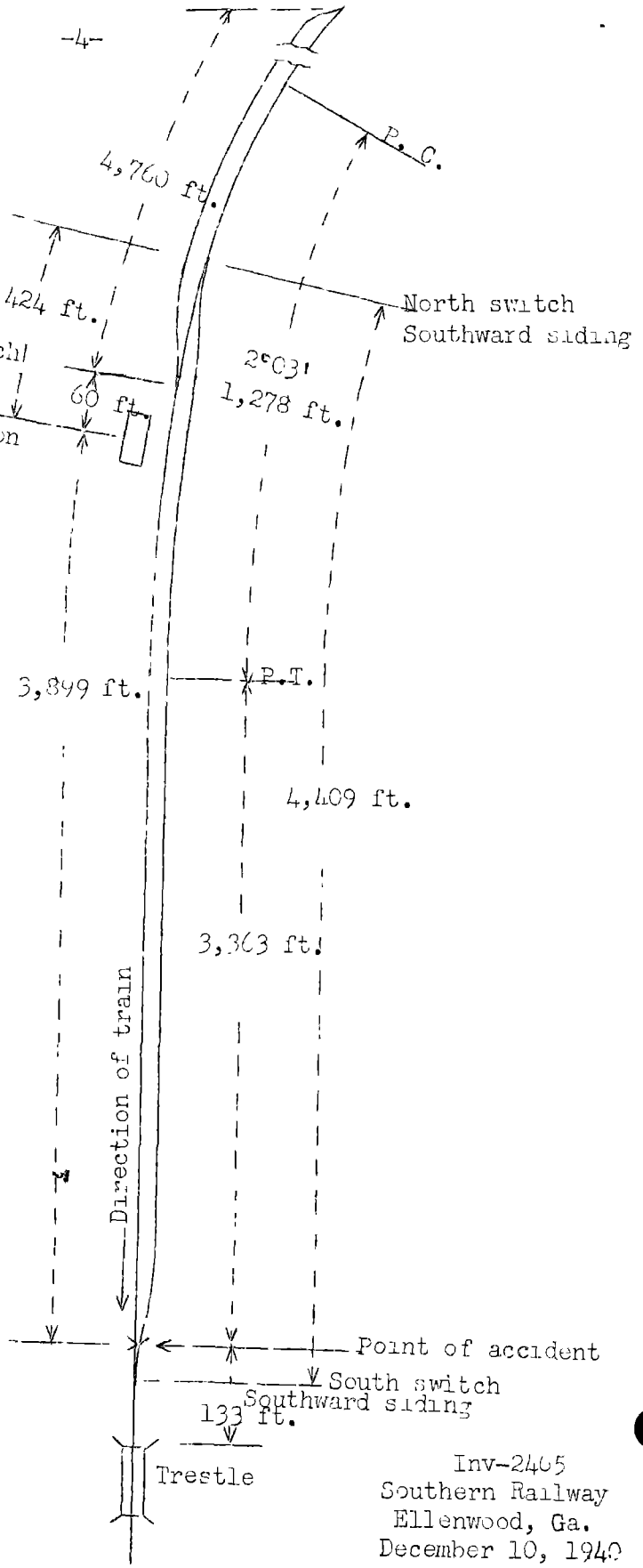
On December 10, 1940, there was a derailment of a passenger train on the Southern Railway at Ellenwood, Ga., which resulted in the injury of 33 passengers, 2 Pullman porters, 5 railway employees, 2 dining-car employees, 3 private-car employees, and 1 train-service employee.

¹Under 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.

- o Atlanta, Ga. 6.2 mi.
- o Constitution 6.7 mi.
- o Ellenwood
- x Point of accident 74.9 mi.
- o Macon, Ga.



Freight Iron Equalizer



Inv-2465
 Southern Railway
 Ellenwood, Ga.
 December 10, 1940

Location and Method of Operation

This accident occurred on that part of the Atlanta Division which extends between Atlanta and Macon, Ga., a distance of 87.8 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders and an automatic block-signal and automatic train-stop system. At Ellenwood there are two sidings; the northward siding is 4,760 feet in length and parallels the main track on the west; the southward siding is 4,409 feet in length and parallels the main track on the east. The south switch of the northward siding and the north switch of the southward siding are located, respectively, 60 feet and 424 feet north of the station. These sidings lap a distance of 364 feet and the entrance switches are at the lap. The leaving ends of these sidings are equipped with spring switches. The derailment occurred on the main track at the south end of the southward siding at the frog of the spring switch located approximately 3,899 feet south of the station. The frog involved is a No. 10, 100-pound frog, of the spring-type, having a 6-foot plate and a 30-inch cast-steel riser. As the point of accident is approached from the north there is a 2°03' curve to the left 1,278 feet in length, which is followed by a tangent 3,363 feet in length to the point of accident and approximately 1/2 mile beyond. The grade for south-bound trains is 1 percent descending 3,575 feet to the point of accident.

The track structure consists of 100-pound rail, 39 feet in length, laid on an average of 23 treated pine and cypress ties to the rail length; it is single-spiked on tangents and double-spiked on curves, fully tieplated with from 3 to 5 anti-creeper to the rail length, ballasted with crushed rock to a depth of 8 or 10 inches, and is well maintained.

The north end of a trestle 215 feet in length is located 133 feet south of the point of derailment. This trestle is a 25-panel, pile-bent, ballast-deck structure, the greater portion of which varies between 16 feet 7 inches and 21 feet 9 inches in height.

According to the timetable, the minimum running time for first-class trains between Constitution and Ellenwood, a distance of 6.7 miles, is 8 minutes, or an average of 50.02 miles per hour.

The weather was clear at the time of the accident, which occurred about 11:40 a. m.

Description

No. 1, a first-class south-bound passenger train, with Conductor Dodge and Engineman Garmon in charge, consisted of engine 1460, of the 4-6-2 type, one mail car, one baggage car, two coaches, one dining car, three Pullman sleeping cars, one Pullman observation car and two business cars, in the order named; all cars were of steel construction. This train departed from Atlanta, 12.9 miles north of Ellenwood, at 11:15 a. m., according to the train sheet, 5 minutes late, passed Constitution, 6.7 miles north of Ellenwood and the last open telegraph office, at 11:29 a. m., 6 minutes late, and, while moving at a speed estimated to have been between 40 and 50 miles per hour, was derailed at the frog of the south switch of the southward siding at Ellenwood.

The engine and the first four cars, remaining coupled, stopped with the rear end of the fourth car 1,189 feet south of the point of derailment. The front coupler of the fifth car was broken; this car stopped upright, to the west of the track and 150 feet to the rear of the fourth car; only the front pair of wheels of the front truck remained on the rails. The sixth, seventh and eighth cars were derailed to the west of the track, stopped in line with it, and leaned at an angle of about 50 degrees. The ninth car was derailed and stopped on its left side east of the track 217 feet to the rear of the eighth car; the front end was on the track and the rear end was 19 feet from the center-line of the track. The tenth car, remaining coupled to the ninth car, was derailed and stopped on its left side down the embankment and parallel to the trestle. The eleventh car was derailed to the east of the track and stopped on its left side with its rear end in the creek bed. The rear six cars were badly damaged. The track was damaged throughout a distance of 1,019 feet south of the point of derailment.

Summary of Evidence

Engineman Garmon stated that at Atlanta 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. When his train approached the point where the accident occurred the speed was between 40 and 45 miles per hour. About 1 mile north of Ellenwood station he looked back along the train and there was no indication of defective equipment. The first intimation of anything being wrong was the air brakes becoming applied when the engine was about 6 car lengths south of the south switch at Ellenwood. He looked back and saw cars overturning. After the accident occurred he examined his train and found a broken equalizer-bar on the front truck of the fifth

car. There was no defective equipment ahead of this car. The accident occurred about 11:42 a. m.

Fireman Turner corroborated in substance the statement of the engineman. Approximately 3 miles north of Ellenwood the fireman looked back along the train and did not see any indication of defective equipment.

Conductor Lodge stated that when his train was approaching the point where the accident occurred he was in the fourth car and the speed was about 40 or 45 miles per hour. Shortly before the accident occurred a dining-car employee met him at the rear of the car and informed him there was something wrong with the dining car. The conductor opened the coach door, and heard a noise which sounded as though the dining-car trucks were derailed. He immediately opened the conductor's valve and the air brakes became applied. He thought the train was near the south switch of the southward siding at this time. Prior to the derailment there was nothing unusual in the motion of the train which would indicate any difficulty. After the accident occurred he found a broken equalizer-bar on the left side of the front truck of the dining car. Inspection of the track north of the point of accident revealed marks which indicated that the equalizer-bar had been dragging some distance.

Dining-Car Steward Saunders stated that when his train was near the station at Ellenwood the speed was about 45 or 50 miles per hour. He heard something striking the bottom of the dining car; he started toward the rear of the car, and as he proceeded through the car he realized it was derailed. He opened the conductor's valve, which was located at the rear of the car.

The statement of Baggage-master Johnson added nothing of importance.

Flagman Moore stated that after the accident occurred he proceeded back to provide flag protection and observed marks on the ties a distance of about 1 mile north of the point of derailment.

Roadmaster Gates arrived at the scene of accident about 1 p. m. and inspected the track throughout a distance of 6.67 miles north of the point where the accident occurred. At a point about 6.67 miles north of the point of derailment, a truck spring was found lying on the east side of the roadbed, and the track-circuit-cable connections had been struck 10.2 inches outside the gage side of the east rail; from this point southward there were light marks intermittently on the ends of the ties. At Conley, 4.15 miles north of the point of derailment, there were marks on the house-track-switch turnout rail

and the hold-down straps of the frog were bent. Between Conley and the north switch of the southward siding at Ellenwood, marks were found occasionally on ties about 12 inches outside the gage side of the east rail. The outside of the left stock-rail of the north switch of the southward siding was marked at a point 49.5 feet south of the switch point and there was a light mark diagonally across the head of the rail. A hold-down strap of the frog was torn loose from the base plate. Between the north and the south switches of the southward siding some of the ties were marked outside the east rail; these marks varied between 8 and 18 inches outside the gage side of the rail. Marks at a road crossing located 541 feet south of the north switch clearly indicated dragging equipment. The frog at the south end of the southward siding was badly broken. The siding point-rail was broken at a point 6 feet from its end. The heel riser was missing and was found later about 150 feet south of the frog and east of the main track. All bolts connecting two rails of the frog were broken. The hold-downs and the rail-stops were torn loose from the base plate. The north end of the base plate showed indications of having received a severe blow. The wing rail was broken at a point 7 inches north of the theoretical point; the break extended through the head of the rail to the center of the web. Examination of the heel riser indicated that it had received a severe blow on its north end, and abrasions on the bottom at the pointed end indicated that it had been in contact with metal. The heel riser is of cast steel, pointed at one end, 5 inches wide at the other end, and is 30 inches long. It was his opinion that the heel riser was forced through the throat of the frog, which process caused the bolts to be sheared and the wing rail to open beyond the limits of the stops and hold-downs. This resulted in all following wheels becoming derailed near the toe of the frog. The first mark of derailment was about 24 inches south of the theoretical point of the frog on the gage side of the head of the rail, and was followed by flange marks on the rail and on the switch ties immediately south of the mark on the head of the rail. The main track was destroyed throughout a distance of about 1,000 feet south of the frog; the east rail was off the roadbed and the west rail was out of alignment. On the east side of the front truck of the fifth car in the train a broken equalizer-bar was found. It was his opinion that the broken equalizer-bar caused the various marks described and struck the heel riser in the frog involved with sufficient force to destroy the frog.

Master Mechanic Stubbs stated that he arrived at the scene of accident about 12:45 p. m., and found a broken truck equalizer-bar on the front truck of the fifth car; the fracture was at the back edge of the journal box of the first wheel on the left or east side. The equalizer-bar had dropped and was in contact with the inside of the rail; however, there were indications that prior to derailment it had been in contact with objects outside the east rail. The break, which was about 20 percent old defect, indicated

that it had started on the outside lower edge. Since it was between the jaws of the car pedestal, the defect could not have been found during ordinary inspection.

Car Inspector Childress, of the Atlanta Terminal Company, stated that at Atlanta he inspected the cars of No. 1 and found nothing defective. Usually he inspects about half the train, but he was unable to say whether his inspection included the dining car involved.

Car Inspector Smith, of the Atlanta Terminal Company, stated that he inspected the east side of the rear four Pullman cars and met Car Inspector Childress at the rear end of the dining car.

Engineer of Tests Bryant stated that his examination of the broken equalizer-bar disclosed a progressive fracture which had originated near one corner of that part of the bar which was suspended on the first journal-box. At the time of the failure the fracture had progressed until it covered about one-third of the cross-sectional area of the equalizer-bar. In the face of the fracture there were openings which resulted from the piling of the muck bar in the rolling of the bloom from which the equalizer was forged. He said that it is not unusual to have openings of this kind in a wrought-iron member broken in this manner. The vertical direction of the openings indicated that the direction of piling of the iron was proper with respect to the plane of stress in the equalizer-bar. During his examination a slot 7/8 inch by 4 inches was cut in the bar near the broken end; the piece removed from the slot was used for test purposes. The results of the tests together with the railroad's specification No. 80-A for wrought iron to be used in forging equalizer-bars were as follows:

	<u>Test Piece</u>	<u>Spec. 80-A</u>
Yield point, lb. per sq. in.....	25,840	0.5 ten. str.
Tensile strength, lb. per sq. in...	46,675	45,000 min.
Elongation in 4 in., percent.....	25.7	22 min.
Reduction of area, percent.....	34.2	30 min.

Note.- The metal of the involved equalizer-bar is in accordance with required specifications. The result of the fracture of the test piece disclosed that it was fibrous, which is normal for wrought iron.

Analysis of drillings taken from one end of the test piece disclosed that the metal of the equalizer-bar contained 0.03 percent of manganese, which is well within the specification limit of 0.07 percent.

The broken end of the equalizer-bar was missing; however, there was no evidence of welded metal at the fracture, nor was there any evidence of overheating or other damage which might have been caused by improper welding. He said that because of damage sustained by the equalizer-bar any nick from which the progressive fracture might have started was obliterated; however, undoubtedly there was a nick or sharp corner which could have developed from wear on the tension side of the equalizer-bar and provided sufficient stress to originate the progressive fracture.

According to data furnished by the railroad, the dining car involved, No. 3865, was placed in service in July, 1940, after receiving Class 1 repairs at the Chattanooga Shop. The report shows that all truck equalizer-bars were removed, inspected for cracks, and annealed. The truck involved was a Commonwealth, six-wheel, drop-equalizer, passenger-car truck; it was provided with four equalizer-bars 5 feet 6 inches in length, on which were mounted coil and elliptical truck springs.

Observations of the Commission's Inspectors

The Commission's inspectors examined the track north of the point of accident and found conditions to be as described by the roadmaster. Examination of the defective equalizer-bar involved disclosed that the end which was suspended from the left front journal-box was broken off. About 20 percent of the cross-sectional area of the fracture was discolored and worn smooth; the indications were that a partial fracture had existed prior to the occurrence of the accident. The end where the fracture occurred was hidden by the truck pedestal from ordinary visual inspection.

Discussion

According to the evidence, No. 1 was proceeding at a speed of 40 or 50 miles per hour when the attention of the conductor, who was then in the fourth car, was directed to a noise under the fifth car that sounded as if a truck was derailed. The conductor opened the conductor's valve but too late to avert the accident as the derailment had occurred already. Soon after the derailment occurred the left front equalizer-bar of the front truck of the fifth car was found to be broken. The truck spring that had been seated on this bar was found at a point 6.67 miles north of the point of accident; from this point to the point of derailment marks appeared on turnouts and intermittently on ties outside the east rail. The frog at the south switch of the southward siding at Ellenwood was demolished and the first mark of derailment appeared 24 inches south of the point of the frog. Apparently the equalizer-bar failed in the vicinity where the spring was found and was then dragged to the frog,

which it struck and damaged sufficiently to cause the derailment of the wheels following. The engineman and the fireman looked back along the train at points 1 and 3 miles, respectively, north of Ellenwood but did not observe any indication of equipment dragging. The car involved was last inspected at a point 12.9 miles north of Ellenwood but no defective condition of the equalizer-bar was observed; however, when the bar was in normal position the end that became defective was hidden from view by the pedestal. During July, 1940, this car received Class 1 repairs, at which time the equalizer-bars were inspected and annealed.

Examination of the equalizer-bar subsequent to the accident disclosed at the point of failure a progressive fracture which covered about one-third of the cross-sectional area of the bar. Test of the metal disclosed that it met the railroad's specifications for wrought iron. There was no indication of welding or overheating. Beyond the expression of an opinion that there must have been a nick or a sharp corner from which the progressive fracture originated and developed, there was no evidence introduced bearing upon the cause of the progressive fracture.

Cause

It is found that this accident was caused by a damaged switch frog, as a result of being struck by a defective equalizer-bar of a passenger-car truck.

Dated at Washington, D. C., this twenty-third day of January, 1941.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.