

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT NO. 3416

THE NEW YORK CENTRAL RAILROAD COMPANY

IN RE ACCIDENT

NEAR MUNCIE, IND., ON

JUNE 10, 1951

SUMMARY

Date: June 10, 1951

Railroad: New York Central

Location: Near Muncie, Ind.

Kind of accident: Derailment

Train involved: Passenger

Train number: 41

Engine number: Diesel-electric units 4008
and 4112

Consist: 13 cars

Speed: 62 m. p. h.

Operation: Timetable, train orders and
automatic block-signal system

Track: Double; tangent; level

Weather: Clear

Time: 6:28 a. m.

Casualties: 73 injured

Cause: Broken wheel on Diesel-electric
unit

Recommendation: That this carrier promptly arrange
to have wheels on Diesel-electric
locomotive units cleaned and care-
fully inspected at maintenance
terminals at the end of each trip,
and that locomotive units also
receive inspection of running gear
at all points where air brake tests
are required to be made.

INTERSTATE COMMERCE COMMISSION

REPORT NO. 3416

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION
REPORTS UNDER THE LOCOMOTIVE INSPECTION ACT
OF FEBRUARY 17, 1911, AS AMENDED,
AND THE ACCIDENT REPORTS ACT OF
MAY 6, 1910.

NEW YORK CENTRAL RAILROAD

September 27, 1951

Accident (derailment) near Muncie, Ind., on June 10, 1951,
caused by failure of a driving wheel on a Diesel-electric
locomotive unit.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On June 10, 1951, about 6:28 a.m., near Muncie, Ind., a driving wheel on New York Central Railroad Diesel-electric locomotive unit 4112 broke while the locomotive was hauling a passenger train at a recorded speed of 62 miles per hour, resulting in derailment of the trailing unit and the first 11 cars of the train. Fourteen employees and 59 passengers were injured.

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

DESCRIPTION OF ACCIDENT

New York Central Railroad Diesel-electric locomotive units 4008 and 4112, coupled in multiple-unit control, hauling westbound passenger train No. 41, en route to St. Louis, Mo., departed from Harmon, N. Y., at 3:00 p.m. on June 9, 1951, and proceeded without any known unusual incident to a point about 3 miles west of the station at Muncie, Ind., a distance of approximately 520 miles from Harmon, where, about 6:28 a.m. on June 10, a broken wheel on trailing B-unit, No. 4112, caused derailment of this unit and the first 11 cars of the train.

The train, which consisted of the 2 Diesel-electric locomotive units and 13 cars, departed from Muncie station at 6:22 a.m. It had attained a tape-recorded speed of 62 miles per hour when the right rear wheel of the leading truck of the second unit, road number 4112, which was coupled for reverse movement with "P" end at the rear, broke at a point approximately 3.3 miles west of Muncie station. Examination after the accident occurred disclosed that there were a series of evenly spaced indentations on the north rail throughout a distance of 1,450 feet to the point of derailment. At the point of derailment there were marks on the track structure indicating that one pair of wheels had become derailed to the north. The general derailment occurred at a trailing-point siding turn-out 1,204 feet west of the point of derailment.

The westward main track in the vicinity of this derailment was laid with 127-pound Dudley rail, rolled in 1929, medium manganese, 39 feet in length, and laid in 1929, with 36-inch 6-hole toeless angle bars, 24 treated oak ties per rail, fully tieplated with single-shoulder and double-shoulder tieplates, with the double-shoulder plates under the joints, 2 spikes per single-shoulder plate and 4 spikes per double-shoulder plate, 3 anchors per rail, on stone ballast having a depth of 12 inches below the ties.

The track was tangent from Muncie depot to point of derailment. From Muncie depot westward there was a descending grade for 1200 feet of 0.328 percent, then a ascending grade for 1500 feet of 0.21 percent, level grade for 1800 feet, an ascending grade of 0.45 percent for 1700 feet, an ascending grade of 0.17 percent for 1000 feet, a level grade for 3700 feet, a descending grade of 0.4 percent for 1500 feet, a level grade for 800 feet, an ascending grade of 0.1 percent for 3000 feet, a level grade for 1000 feet, a descending grade of 0.2 percent for 2300 feet, and a level grade for 520 feet to the point of derailment.

Unit #112 was derailed to the right and in addition to the damaged wheels had a broken right rear brake cylinder on the leading truck, damaged brake rigging, sand pipes, traction motor casings and related wiring, and fuel tanks under the car body which had rubbed on the rails during the derailment. The cars of the train, from front to rear, came to rest as follows: Mail car derailed to right and leaning to right at an angle of approximately 30 degrees, dormitory car and first coach were derailed to right and leaning to right, second coach was derailed to the right and lying on its side, three Pullman cars were derailed and tilted, two dining cars and Pullman car were derailed and upright, and the front truck of the last coach was derailed. The last two Pullman cars remained on the rails and were not damaged. Most of the passengers injured and a trainman who was injured were in the first two coaches.

DESCRIPTION OF LOCOMOTIVE UNIT INVOLVED

New York Central Diesel-electric unit #112, type A1A-A1A, was built by the Electro-Motive Division of General Motors Corporation at La Grange, Ill., in February 1948. The two 14-cylinder V-type 2-cycle 1000-horsepower Diesel engines were direct connected to two main generators. The unit was a "B" type designed to be used as a trailing or intermediate unit. The six-wheel equalizer trucks had type D17-B 600-volt traction motors driving the two outside pairs of wheels of each truck. The wheels had specified new diameter of 36 inches. The weight of the unit was 313,000 pounds; gear ratio 55:22, and maximum designed speed was 98 miles per hour. The unit was equipped with type 24-RL brake equipment.

DESCRIPTION OF PARTS INVOLVED

The wheel which failed was a Class C MW wrought steel wheel, 36 inches in diameter and having a rim thickness in excess of $2\frac{1}{2}$ inches when new. Data, 9 49 C 9523 C, was not stenciled on the rim of the wheel. Stencil marks indicated that the wheel had been manufactured at Carnegie (Pittsburgh plant). The stenciled characters were $\frac{5}{8}$ inch high and approximately $\frac{3}{32}$ inch deep. The wheel was new, according to the stamping, in September 1949 and was placed in service under New York Central Railroad Diesel-electric locomotive unit 4000 on May 17, 1950. It was removed and rim thickness turned down to $2\frac{1}{2}$ inches on August 1, 1950 and was placed under N.Y.C. unit 4003 on August 19, 1950. It was removed

and rim thickness turned down to 1-3/4 inches on April 22, 1951 and placed under N.Y.C. unit 4112 on April 25, 1951 and remained in position B4 until it failed. The rim thickness was 1 1/2 inches at the time of failure, the tread wear was 1/8 inch, and flange was 1 inch thick.

Mate wheel was marked: 9-49 C 9587 C. Axle was marked: 10-49, 12-49, 5-50, 972766, DEM, 26551, NAT, P3125, CIS, KND 6-22-49, 601C, 10-48.

The wheel assembly was equipped with Hyatt roller bearings which appeared to be in good condition after the accident.

EXAMINATION OF PARTS INVOLVED

When the locomotive was examined subsequent to the accident, a section of the rim, approximately 12 1/2 inches in length, had not been found. Three separate sections of rim, measuring 13 inches, 19 1/2 inches and 11 1/2 inches, were found and examined. Approximately 49 1/2 inches of rim remained on the wheel.

Sketch A, attached hereto, shows manner in which failure occurred. Four pieces were broken from the rim of the wheel with inner fracture of each originating in the plate just below the rim. The plate fracture was an arc 44 inches in length and the length of plate edges of the pieces were 7 1/4, 10 1/2, 16 1/4 and 10 inches, respectively. Minimum plate thickness at fracture was 1 inch. Tread of wheel was free from defects except small skid burns and numerous very small thermal cracks which had maximum length of 1/4 inch and did not appear to have contributed to the failure.

Sketch B shows outline of the piece of the wheel that was not recovered. Character of fracture was determined by adjoining parts that were available for examination. Fracture at the plate was irregular with surface showing old progressive fracture with lines of progression battered smooth. Fracture surface at one end showed very recent progressive fracture extending to within about 1/4 inch of surface of tread. Fracture surface at other end showed progressive fracture extending toward the tread to within 3/4 inch of the surface, a band of new break area about 1/2 inch wide, and progressive fracture about 1/4 inch wide to the tread of the wheel.

Sketch C shows details of portion of the wheel which measured 13 inches on tread and 10 1/2 inches at plate. Frac-

ture surface at plate was irregular and showed old progressive fracture with lines of progression battered smooth. Fracture surface at one end showed progressive fracture extending to within about $3/4$ inch of the tread, a band of new break about $1/2$ inch wide, and then progressive fracture area about $1/4$ inch wide extending to the tread of the wheel. Other end of this portion showed all new break with no indication of progressive fracture.

Sketch D shows portion of the wheel which measured $19\frac{1}{2}$ inches on tread and $16\frac{1}{4}$ inches at the plate. Fracture at the plate was relatively smooth and showed an old progressive fracture originating on the inside surface of the plate in a surface irregularity, the nature of which was not determined by visual examination. The regularity of fracture through the plate at this location indicated that this could have been the primary failure. Fracture surface at one end showed all new break except a small progressive fracture area about $1/4$ inch x $1/4$ inch extending upward from the plate at the outer edge. Fracture surface at other end showed about $5/8$ inch progressive fracture area extending toward the tread and remainder a new break.

Sketch E shows portion of the wheel which measured $11\frac{1}{2}$ inches on tread and 10 inches at the plate. Fracture surface at the plate was irregular with an old progressive fracture area about 4 inches long and $2-5/8$ inches wide at one end which appeared to have originated at a 1 inch long lap, fold, or scar in the metal on the inside surface of the plate. Remainder of fracture in the plate showed old progressive fracture with lines of progression battered smooth. Fracture surface at one end showed progressive fracture area extending about $5/8$ inch toward the tread with remainder a new break. Other end of this portion showed all new break with inside area battered.

INSPECTION AND REPAIR REPORTS

Locomotive unit 4112 had made 1,019,660 miles since new and had not received general repairs. It received annual inspection February 5, 1951, at Harmon, N. Y. The last monthly inspection report was made May 25, 1951, at Harmon, N. Y.

The last daily inspection and repair report furnished by the railroad company was dated June 7, 1951, at 7:50 a.m., at Harmon, N. Y.

Daily inspection and repair reports for a period of 30 days prior to the accident from St. Louis, Mo., and Harmon, N. Y., were examined and no defects were found reported that had any bearing on accident. Thirty-four daily inspection reports from Harmon, N. Y., covering period prior to the accident were examined during the investigation. The time of inspection was entered on only 1 report and 17 reports did not carry the approving signature of a foreman..

METALLURGICAL REPORT

The laboratory analysis shows the steel in this Class "C" Carnegie wheel had chemical composition and Brinell hardness entirely within the requirements of Association of American Railroads Specification M-107-48.

SUMMARY OF EVIDENCE

Testimony indicated that engine and train crews had no warning of impending trouble prior to the accident. The engineer and fireman were seated in their usual and proper positions in the cab of the leading unit. Members of the train crew were in various and normal locations throughout the train.

The engineer stated that he assumed charge of the locomotive at Bellefontaine, Ohio, 80.8 miles east of Muncie; that the incoming engineer told him no difficulty had been experienced with the units; that he ran non-stop from Bellefontaine to Muncie; during the trip he did very little braking and that the locomotive units functioned normally and properly. At time of accident the train brake applied in emergency apparently as a result of separation of the train, and without action on his part. He further stated that, after the derailment occurred, he immediately lapped the automatic brake valve, then he inspected the units and shut down the Diesel engines of the derailed unit. After the train stopped he handed a red flag to the front brakeman, who protected against eastbound trains.

The fireman corroborated testimony of the engineer and stated that after the derailment and upon instructions from the engineer he shut down the train heating boilers.

The head brakeman stated that he and the assistant conductor were seated on opposite sides of the aisle at the rear

of the first coach. When the train was about 15 telegraph poles from the west end of Hart siding he heard some object striking the car underbody. He arose, pulled the emergency air brake cord, and followed the assistant conductor toward the car door. When the train stopped he alighted, proceeded to the head end where he obtained a red flag, and continued west on the track where he stopped approaching train No. 446.

Testimony of two car inspectors who examined train 41 at Bellefontaine prior to the accident and which was corroborated by the general car foreman was to the effect that the purpose of their inspection was the testing of air brakes on the entire train and inspection of journal boxes and wheels under the cars; that they checked to see that brakes set on the locomotive units but did not examine locomotive journal boxes or locomotive parts other than make a passing observation.

Report of the superintendent stated that no inspection was made of Diesel units at either Cleveland or Bellefontaine by mechanical department employees.

The investigation indicated that it is the carrier's practice to run Diesel-electric locomotives assigned to train 41 from Harmon, N. Y., to St. Louis, Mo., with train inspections at intermediate points similar to that made at Bellefontaine. After a 1½-hour layover and unit inspection at St. Louis the locomotives are dispatched on train 24 to Harmon. It thus appears that car wheels, journals and boxes, and brakes receive inspections at intermediate points between Harmon and St. Louis but inspections, other than a casual observation of brake operation by car inspectors, are not made of the locomotive units from time of departure to arrival at the final destination.

The superintendent of equipment stated that axles of Diesel-electric locomotive wheels are magnaflux tested when the wheels are turned and that the wheels are visually examined for flaws or other defects both before and after the turning operation. Inspection of wheels under locomotives is done in routine manner with no special provision for inspection of the inner face of the wheels.

DISCUSSION

The plate failure in the wheel which caused the derailment occurred after a service life of 1 year and 23 days

during which time the tread had been turned twice. Testimony during the investigation indicated that wheels are visually inspected before and after turning but receive merely routine inspections while in service. Testimony further developed that car inspectors made inspections of wheels, journals, boxes, and air brakes on cars but gave little attention to the locomotive units aside from observing that brakes applied when brake test was made.

Driving wheels under Diesel-electric locomotives are subject to very severe service. Operating speeds are high; peripheral speeds of the smaller diameter wheels are much higher than obtain in the larger driving wheels used under steam locomotives and in addition the wheels are subject to heavy starting and driving stresses. A driving wheel axle under a Diesel-electric unit carries approximately half the weight of the traction motor through the support bearings. This heavy unsprung weight adds to the complex system of stresses in the wheel assemblage. Because driving wheels under Diesel electric locomotive units are subject to complex stresses, the observation and inspection of Diesel wheels should be thorough and exact. Failure of the subject wheel which was responsible for the accident resulted from a progressive crack which probably did not develop within a short time interval. Evidence presented during the investigation indicated that the method of inspection of Diesel-electric locomotive units followed by the railroad was not such that progressive cracks in Diesel driving wheels would be readily discovered.

CAUSE OF ACCIDENT

It is found that this accident was caused by failure of a driving wheel under a Diesel-electric locomotive unit, resulting from progressive fracture in the plate section.

RECOMMENDATION

It is recommended that this carrier promptly arrange to have wheels on Diesel-electric locomotive units cleaned and carefully inspected at maintenance terminals at the end of each trip, and that locomotive units also receive inspection of running gear at all points where air brake tests are required to be made.

Dated at Washington, D. C., this 27th day
of September, 1951.

By the Commission, Commissioner Patterson.

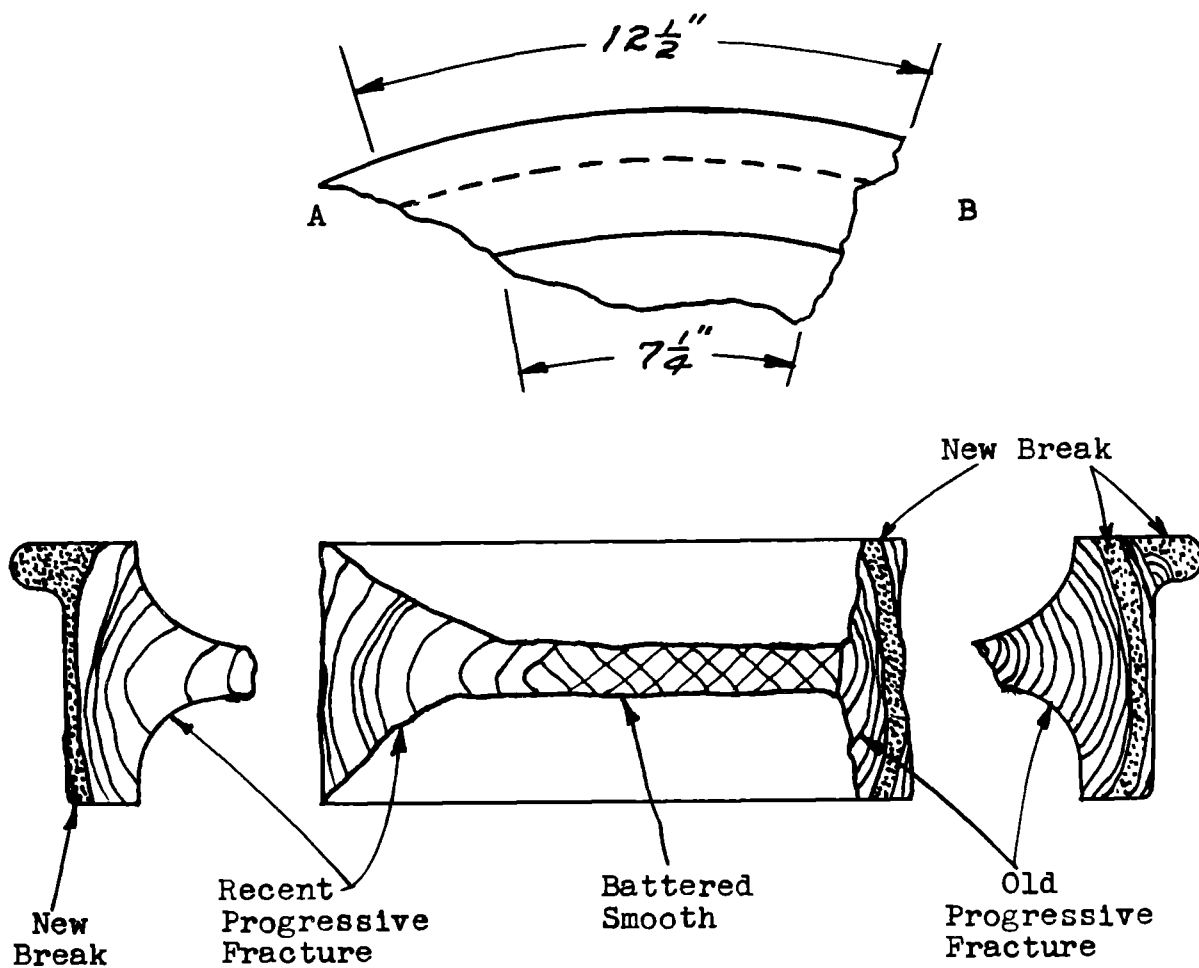
SEAL

W. P. BARTEL,
Secretary.

Sketch B - Broken 36" MW Wrot Steel Wheel from Location B4,
DPB 4112, which Caused Derailment in Train 41 at Hart, Indiana,
June 10, 1951.

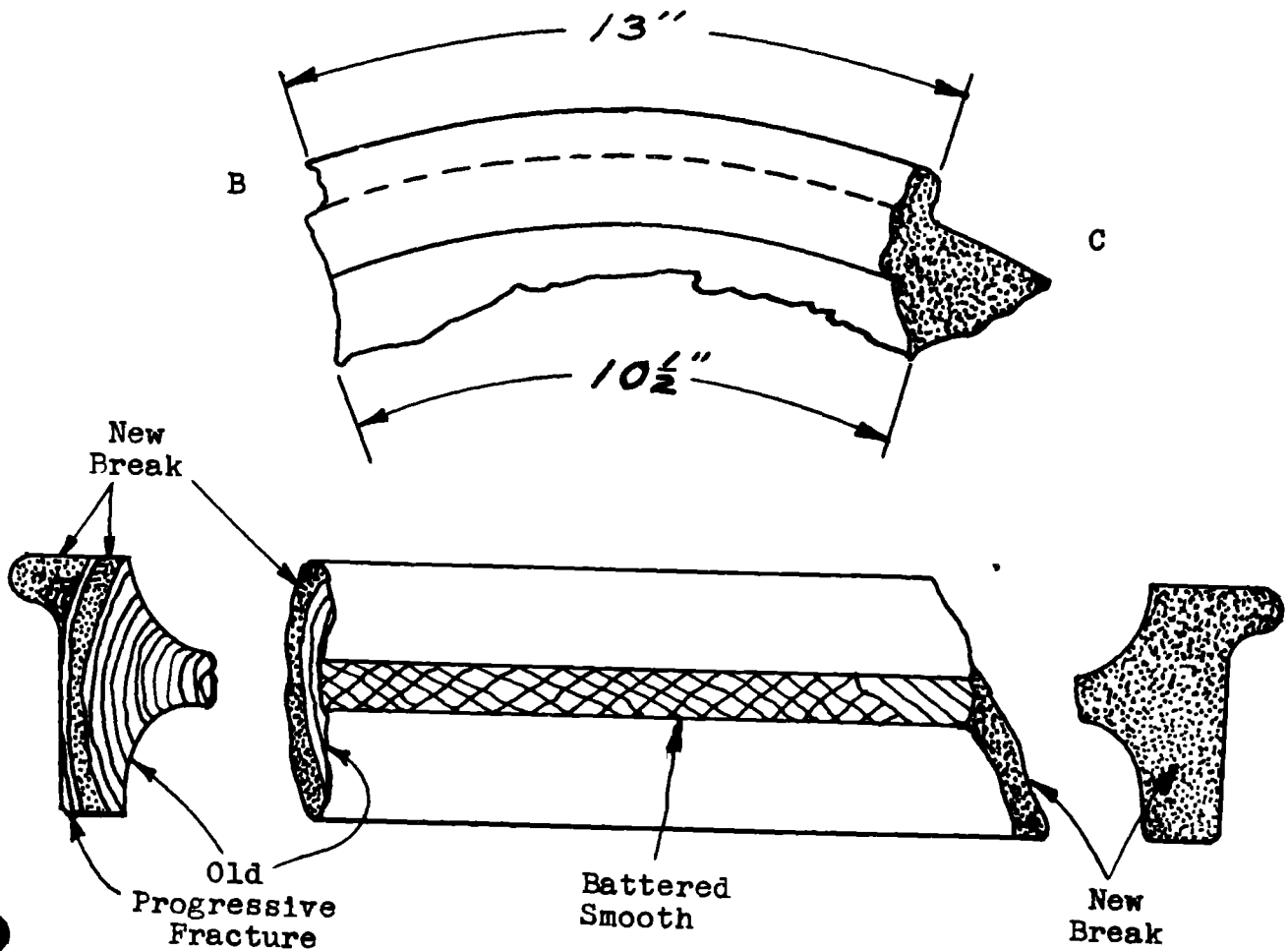
Examined at Hart, Indiana, June 10, 1951.

Material - Heat Treated Wrot Steel



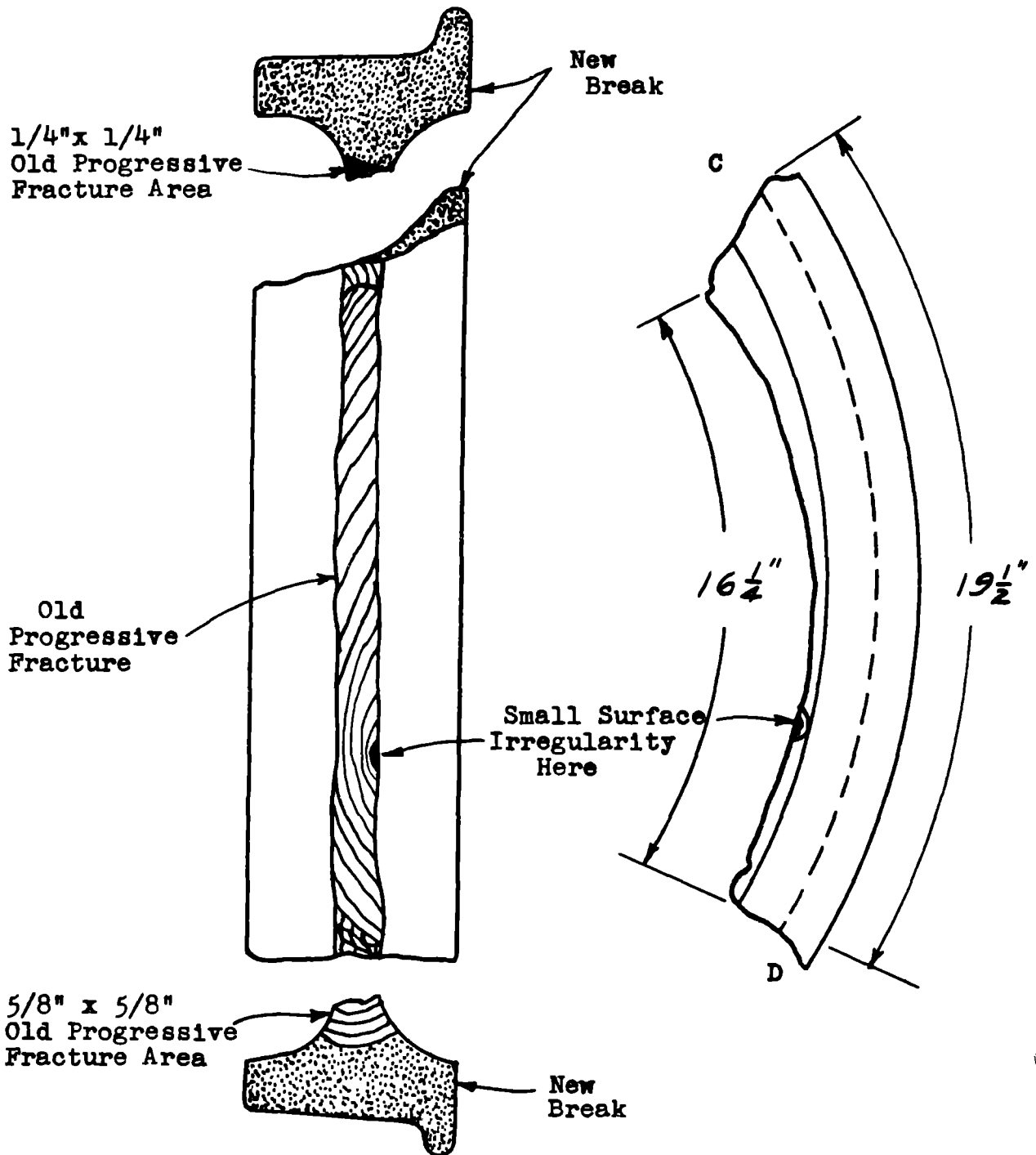
Sketch B

Sketch C - Broken 36" MW Wrot Steel Wheel from Location B4,
DPB 4112, which Caused Derailment in Train 41 at Hart, Indiana,
June 10, 1951.
Examined at Hart, Indiana, June 10, 1951.
Material - Heat Treated Wrot Steel



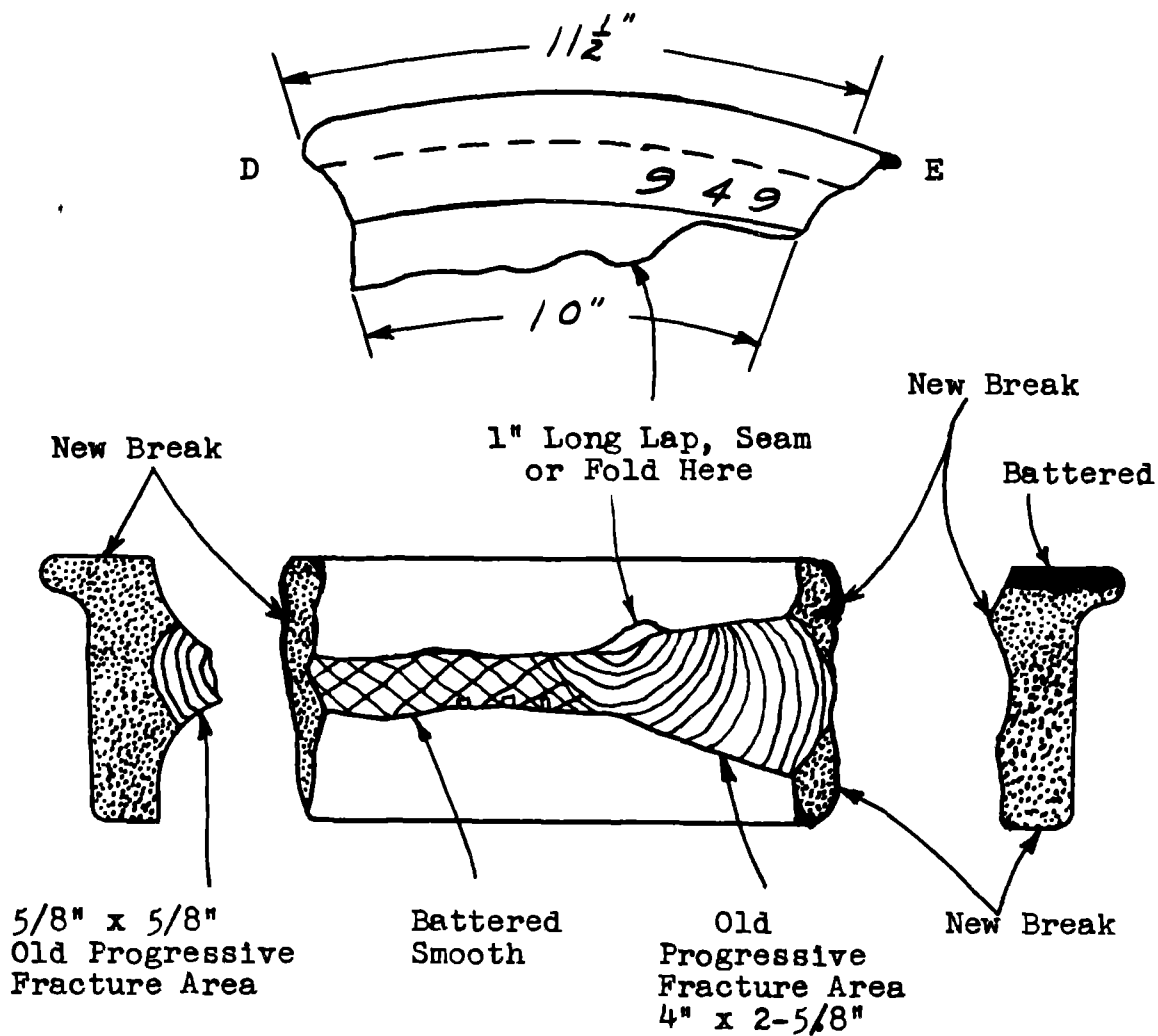
Sketch C

Sketch D - Broken 36" MW Wrot Steel Wheel from Location B4,
DPB 4112, which Caused Derailment in Train 41 at Hart, Indiana,
June 10, 1951, Examined at Hart, Indiana, June 10, 1951.
Material - Heat Treated Wrot Steel



Sketch D

Sketch E - Broken 36" MW Wrot Steel Wheel from Location B4, DPB 4112, which Caused Derailment in Train 41 at Hart, Indiana, June 10, 1951. Examined at Hart, Indiana, June 10, 1951. Material - Heat Treated Wrot Steel



Sketch E