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INTERSTATE COMMERCE COMMISSION

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FORTY-FIFTH ANNUAL REPORT

OF THE

DIRECTOR OF LOCOMOTIVE INSPECTION

TO THE

INTERSTATE COMMERCE COMMISSION

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FISCAL YEAR ENDED  
JUNE 30, 1956



UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1956

For sale by the Superintendent of Documents, U. S. Government Printing Office  
Washington 25, D. C. - Price 15 cents

**ANNUAL REPORT OF THE  
DIRECTOR OF LOCOMOTIVE INSPECTION**

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AUGUST 31, 1956.

*To the Interstate Commerce Commission:*

In compliance with section 7 of the act of February 17, 1911, as amended, the Forty-Fifth Annual Report of the Director of Locomotive Inspection, covering the work of the fiscal year ended June 30, 1956, is respectfully submitted.

Summaries are given, by railroads, of all accidents which resulted in serious injury or death to one or more persons, due to the failure of parts and appurtenances of locomotives, as reported and investigated under section 8 of the Locomotive Inspection Act. Accidents which occurred as a result of failure of parts and appurtenances of locomotives, which resulted in damage to property or equipment but not serious injury or death, are not included in this report. For additional information concerning railroad accidents, see Accident Bulletin, prepared by the Bureau of Transport Economics and Statistics.

Tables contained in the report show the results of inspection of locomotives, the number of accidents and resultant casualties caused by failure of some part or appurtenance of individual locomotives, and the parts and appurtenances which caused accidents and casualties. The tabulated inspection data cover the number of locomotives for which reports were filed, the number inspected, the number and percentage found defective, the number for which written notices for repairs were issued in accordance with section 6 of the act and the total number of defects found and reported. Tables are included to show, by railroads, all locomotive defects found by district inspectors. Data for preceding years are given where possible for comparative purposes.

Results of locomotive inspections made by district inspectors in performance of duties prescribed under section 6 of the act are shown in table I. The decrease in the number of locomotives for which reports were filed which has occurred from 1950 to 1955 resulted, in the major part, from replacement of steam locomotives by locomotives other than steam most of which were of the Diesel-electric type. The increase in the fiscal year covered by this report resulted from

extension of our jurisdiction on April 1, 1956, to cover multiple operated electric locomotive units.

During this and the preceding 3 years the number of locomotive units inspected per inspector remained approximately constant. However, because funds appropriated for travel were not sufficient to permit district inspectors to properly travel throughout their respective districts for the purpose of discharging duties assigned to them under the law, they were unable to visit outlying terminals with the same frequency as in former years. Consequently a nonuniform pattern of enforcement prevailed during this period. The appropriation for fiscal year 1957 provides for additional travel funds which will permit coverage of neglected inspection points and make possible greater uniformity of enforcement by district inspectors.

The increase in the number of locomotives found defective, the number of defects found, the percentage of inspected found defective and in the number ordered out of service is a reflection of the deterioration resulting from increasing age of the now predominating Diesel power.

TABLE I.—*Reports and inspections—Steam locomotives, locomotive units other than steam and multiple operated electric locomotive units*

	Year ended June 30—					
	1956 <sup>1</sup>	1955	1954	1953	1952	1951
Number of locomotives for which reports were filed.....	38,062	36,992	39,270	41,172	43,206	45,915
Number inspected.....	97,348	98,025	103,337	104,069	110,483	115,061
Number found defective.....	11,107	9,913	9,994	10,154	12,321	12,370
Percentage of inspected found defective.....	11.4	10.1	9.7	9.8	11.2	10.8
Number ordered out of service.....	644	223	257	281	505	614
Number of defects found.....	35,560	29,968	29,403	30,143	41,351	46,592

<sup>1</sup> Includes multiple operated electric locomotive units subsequent to March 31, 1956.

The Rules and Instructions for Inspection and Testing of Multiple Operated Electric Locomotive Units Designed to Carry Freight and/or Passenger Traffic became effective April 1, 1956. During the period from April 1 to June 30, 1956, there were reported 2,782 units of which 285 were inspected and 11 or 3.9 percent of those inspected were found defective.

#### INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF LOCOMOTIVES

All accidents reported under requirements of the law and rules were carefully investigated and appropriate action taken to prevent recurrence so far as possible. Copies of published reports of accident

investigations were distributed to interested parties, and all district inspectors were advised of details and causes of unusual accidents to better assist them in their educational contacts with railroad personnel. The dissemination of pertinent information concerning fundamental causes of locomotive accidents and resultant casualties has been an important adjunct to basic enforcement activities. Such public information combined with the active enforcement of the requirements has been effective in promotion of locomotive safety and has resulted in a decreasing accident trend. Special conferences are held with groups of district inspectors at which uniformity of enforcement procedures are stressed and methods of improvement in promotion of locomotive safety thoroughly discussed. These meetings are implemented by distribution of current activities bulletins, covering accident investigations, which are forwarded monthly to the district inspectors.

#### ACCIDENTS

Seventy-three accidents occurred in connection with all types of locomotives and resulted in 4 deaths and 79 injuries. Compared with the preceding year there was an increase of 1 death, a decrease of 10 accidents, and a decrease of 63 injuries.

The chart on page 4 shows the relation between the percentage of defective locomotives, the number of accidents and casualties resulting from defective parts and appurtenances and illustrates the effect of operating locomotives in defective condition.

Tables II, III, and IV which follow show details of accidents which occurred in the past year and are prepared to show their distribution among personnel and responsible parts and appurtenances. If advantage is taken of information contained in these tables, proper inspections and repairs made, and equipment maintained in compliance with the standards of condition established by the requirements of the law and rules many accidents may be prevented.

Tables V and VI show details of defective parts and appurtenances of steam locomotives and locomotives other than steam reported, inspected, found defective and ordered out of service. If the distribution of reported defective parts shown by the tables is considered, those parts which may be expected to require most maintenance will be indicated and inspection and repair programs may be set up on the emphasized basis.

Detailed results of inspections of steam locomotives and locomotive units other than steam are shown in tables VII and VIII, respectively.

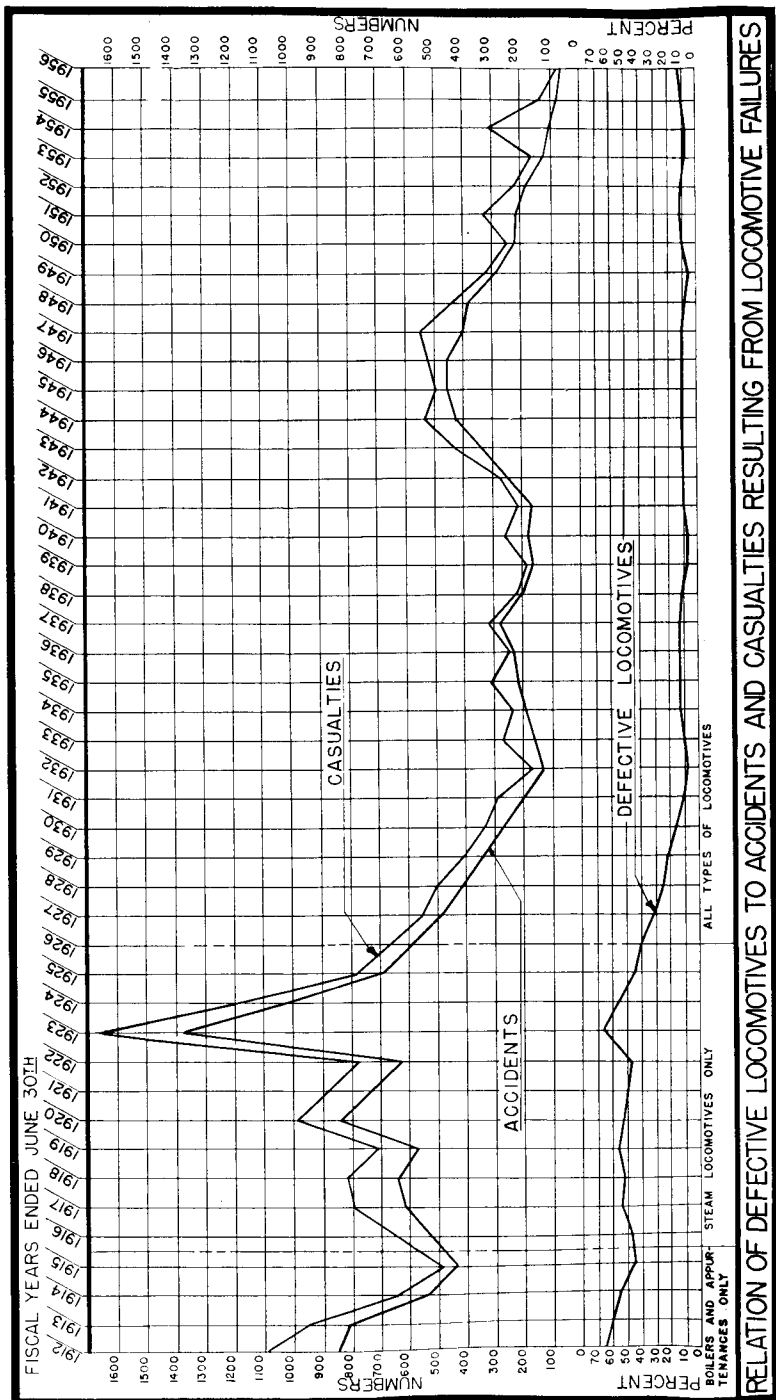


TABLE II.—Accidents and casualties caused by failure of some part or appurtenance of steam locomotives and locomotive units other than steam

	Year ended June 30—					
	1956 <sup>1</sup>	1955	1954	1953	1952	1951
Number of accidents.....	73	83	105	134	196	221
Percent increase or decrease from previous year.....	12.0	21.0	21.6	31.6	11.3	20.5
Number of persons killed.....	4	3	3	12	4	16
Percent increase or decrease from previous year.....	<sup>2</sup> 33.3	-----	75.0	<sup>2</sup> 200.0	75.0	<sup>2</sup> 60.0
Number of persons injured.....	79	142	302	150	203	299
Percent increase or decrease from previous year.....	44.4	53.0	<sup>2</sup> 101.3	26.1	32.1	<sup>2</sup> 27.8

<sup>1</sup> No accidents involving multiple operated electric locomotive units were reported in 1956.

<sup>2</sup> Increase.

TABLE III.—Number of casualties classified according to occupation—steam locomotives and locomotive units other than steam

	Year ended June 30—									
	1956		1955		1954		1953		1952	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....	1	19	1	26	1	37	4	37	1	51
Firemen.....	2	38	1	34	3	39	4	57	2	76
Brakemen.....	1	10	-----	10	-----	11	3	20	1	31
Conductors.....	-----	8	-----	4	-----	8	-----	8	-----	7
Switchmen.....	-----	-----	-----	4	-----	3	-----	4	-----	10
Maintenance employees.....	-----	2	1	4	2	12	-----	8	-----	24
Other employees.....	-----	2	-----	18	-----	2	-----	2	-----	2
Nonemployees.....	-----	-----	-----	42	-----	194	1	14	-----	2
Total.....	4	79	3	142	3	302	12	150	4	203

LOCOMOTIVE ACCIDENTS

Twenty-two accidents occurred on Diesel-electric locomotives because of defective condition of floors, steps and passageways. Twenty of these accidents were caused by accumulation of oil upon walking surfaces. In 11 of the 20 accidents oil accumulations had been reported from 4 to 29 times during the month preceding the accident. Continued reporting of the same defective condition indicates that necessary corrective repairs to eliminate the cause responsible for the dangerous condition were not made and indicates a laxity in observance of basic safety essentials. Because each oil hazard is a potential source of a disabling accident, district inspectors have been instructed to give close attention to this type of defect particularly on railroads where this condition is prevalent.

Three accidents resulted from defective cab seats in the fiscal year. This is a reduction of 5 in the number of such accidents compared with the preceding year and apparently is a reflection of the surveillance exercised by the district inspectors.

TABLE IV.—Accidents and casualties resulting from failure of steam locomotives, tenders, locomotives other than steam and their appurtenances

Part or appurtenance which caused accident	Year ended June 30, 1956		
	Accidents	Killed	Injured
Air compressors.....	1		1
Axles, axle journals, and journal boxes.....	1		3
Boiler:			
Blow-off cocks.....	1		1
Explosions.....	2	4	2
Fuel explosions in firebox.....	1		1
Staybolts.....	1		1
Steam valves, piping and blowers.....	3		3
Brakes and brake rigging.....	5		5
Cab:			
Doors or windows.....	3		3
Seats.....	3		3
Couplers, draft and drawgear.....	1		1
Electrical equipment:			
Insulation, short circuits or electrical flashes.....	3		3
Fans and shutters.....	1		1
Fires due to liquid fuel or debris.....	3		4
Floors, steps and passageways.....	24		24
Handholds.....	1		1
Internal-combustion engines and turbines:			
Crankcase or air-box explosions.....	7		8
Exhaust and cooling systems.....	2		2
Fuel injectors and connections.....	2		2
Machinery—steam locomotive:			
Crossheads and guides.....	1		1
Lubricators, glasses and connections.....	1		2
Valve and reversing gear.....	1		1
Unguarded moving parts.....	3		3
Miscellaneous.....	2		3
Total.....	73	4	79

Seven crankcase explosions resulted in injury to 9 persons. Primary cause of these explosions was overheating of bearings, 4 of which were due to clogged or defective lubrication system, 1 due to bearing rotating causing stoppage of oil passages, and 2 were caused by defective pistons. Three accidents resulted from employees coming in contact with unguarded moving parts.

EXPLOSIONS AND OTHER BOILER ACCIDENTS

Two boiler explosions occurred in the fiscal year; both were caused by overheating of the crown sheet due to low water. Four persons were killed and two were injured in these accidents.

One of the explosions occurred on a locomotive in freight-train service and the other on a switching locomotive. On the locomotive used in freight service, the color of the overheated sheets showed a line of demarcation which indicated that the water had been approximately 9 inches below the highest point of the crown sheet. The train was stationary at the time of the explosion. The switching locomotive was ordered for yard service and it was being prepared for service when the crown sheet failed. The entire crown sheet and top portion of the back flue sheet and door sheet had been overheated. The overheated area as shown by the color of the sheets

TABLE V.—Number of steam locomotives reported, inspected, found defective, and ordered out of service

Parts defective, inoperative or missing, or in violation of the rules	Year ended June 30—					
	1956	1955	1954	1953	1952	1951
1 Air compressors.....	239	229	304	351	671	897
2 Arch tubes.....	1	5	4	5	12	17
3 Ashpans and mechanism.....	13	17	24	36	59	64
4 Axles.....	2	3	3		1	4
5 Blow-off cocks.....	91	105	121	185	299	262
6 Boiler checks.....	70	84	158	182	356	477
7 Boiler shell.....	31	43	79	94	174	226
8 Brake equipment.....	565	636	835	1,038	1,955	2,453
9 Cabs, cab windows, and curtains.....	187	241	298	354	694	1,173
10 Cab aprons and decks.....	113	100	133	179	295	395
11 Cab cards.....	23	19	27	40	53	83
12 Coupling and uncoupling devices.....	17	11	22	30	42	54
13 Crossheads, guides, pistons, and piston rods.....	223	256	398	478	1,035	1,363
14 Crown bolts.....	10	7	20	27	38	52
15 Cylinders, saddles, and steam chests.....	251	387	364	455	908	1,437
16 Cylinder cocks and rigging.....	116	130	132	136	328	474
17 Domes and dome caps.....	23	20	20	45	85	131
18 Draft gear.....	107	133	150	168	313	441
19 Draw gear.....	57	69	79	108	189	297
20 Driving boxes, shoes, wedges, pedestals, and braces.....	250	226	258	345	681	1,145
21 Firebox sheets.....	25	20	37	55	141	203
22 Flues.....	19	27	32	49	121	184
23 Frames, tail pieces, and braces, locomotive.....	78	100	151	225	368	486
24 Frames, tender.....	10	11	14	10	26	47
25 Gages and gage fittings, air.....	40	42	47	61	136	173
26 Gages and gage fittings, steam.....	68	61	89	112	228	325
27 Gage cocks.....	113	116	120	211	337	495
28 Grate shakers and fire doors.....	54	107	90	121	282	339
29 Handholds.....	112	110	146	196	353	420
30 Injectors, inoperative.....	3	35	33	18	34	60
31 Injectors and connections.....	379	406	674	843	1,615	2,190
32 Inspections and tests not made as required.....	37	26	24	53	68	121
33 Lateral motion.....	48	65	98	137	274	465
34 Lights, cab and classification.....	18	35	39	26	44	118
35 Lights, headlight.....	32	34	56	42	100	108
36 Lubricators and shields.....	38	47	63	81	160	222
37 Mud rings.....	36	33	65	78	149	153
38 Packing nuts.....	253	233	240	294	552	638
39 Packing, piston rod and valve stem.....	106	122	154	220	494	765
40 Pilots and pilot beams.....	34	39	52	48	102	124
41 Plugs and studs.....	15	16	22	50	91	117
42 Reversing gear.....	108	151	170	216	429	631
43 Rods, main and side, crankpins, and collars.....	214	221	315	459	990	1,511
44 Safety valves.....	17	22	15	19	39	45
45 Sanders.....	123	155	277	324	552	806
46 Springs and spring rigging.....	505	551	834	1,322	2,424	3,340
47 Squirt hose.....	26	27	39	41	69	90
48 Staybolts.....	69	55	108	144	254	280
49 Staybolts, broken.....	30	27	55	125	159	282
50 Steam pipes.....	57	58	87	161	232	342
51 Steam valves.....	21	33	69	68	146	181
52 Steps.....	147	157	255	321	561	805
53 Tanks and tank valves.....	217	269	340	466	980	1,304
54 Telltale holes.....	9	6	13	6	15	33
55 Throttle and throttle rigging.....	133	179	228	327	608	927
56 Trucks, engine and trailing.....	96	153	171	263	427	700
57 Trucks, tender.....	123	129	152	219	474	710
58 Valve motion.....	105	114	174	195	437	673
59 Washout plugs.....	83	73	79	138	266	325
60 Stokers.....	68	58	55	133	253	306
61 Water glasses, fittings, and shields.....	193	218	282	357	651	858
62 Wheels.....	70	94	107	151	340	536
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....	166	194	263	339	569	774
Number of defects.....	6,487	7,350	9,763	12,980	24,738	34,657
Locomotives reported.....	5,875	8,892	12,135	15,798	20,490	26,595
Locomotives inspected.....	8,794	12,128	19,999	28,899	45,220	62,113
Locomotives defective.....	1,499	1,784	2,599	3,583	6,234	7,995
Percentage of inspected found defective.....	17.0	14.7	13.0	12.4	13.8	12.9
Locomotives ordered out of service.....	152	96	117	163	370	508

TABLE VI.—Number of locomotive units other than steam reported, inspected, found defective, and ordered out of service

Parts defective, inoperative or missing, or in violation of the rules		Year ended June 30—					
		1956	1955	1954	1953	1952	1951
1	Air compressors.....	443	419	326	210	206	146
2	Axles, truck and driving.....	26	7	4	7	3	2
4	Batteries.....	97	83	82	40	39	85
5	Boilers.....	275	203	175	103	69	43
6	Brake equipment.....	3,259	2,790	2,126	1,698	1,450	1,166
8	Cabs and cab windows.....	1,600	1,073	858	679	813	672
9	Cab cards.....	183	150	135	128	139	100
10	Cab floors, aprons, and deck plates.....	1,933	1,677	1,703	1,589	1,694	1,281
11	Clutches.....	4	2	5	9	5	4
12	Controllers, relays, circuit breakers, magnet valves and switch groups.....	775	802	454	424	222	166
13	Coupling and uncoupling devices.....	166	204	139	95	76	35
14	Current collecting apparatus.....	17	15	12	6	5	9
16	Draft gear.....	360	336	291	218	202	141
17	Draw gear.....	146	140	55	42	28	46
18	Driving boxes, shoes, and wedges.....	291	249	154	128	98	38
20	Frames or frame braces.....	30	14	32	22	33	27
22	Fuel system.....	2,555	1,833	1,951	1,853	1,751	1,082
23	Gages or fittings, air.....	278	226	136	138	110	70
24	Gages or fittings, steam.....	60	48	56	44	11	14
25	Gears and pinions.....	20	27	12	13	26	9
26	Handholds.....	258	219	230	121	127	97
28	Inspections and tests not made as required.....	748	183	185	175	159	143
29	Insulation and safety devices.....	282	188	105	77	102	64
30	Internal-combustion engine defects, parts and appurtenances.....	6,356	5,035	4,848	4,564	4,768	3,270
32	Jack shafts.....	2	2	1	1	1	5
33	Jumpers and cable connectors.....	553	214	178	156	191	190
35	Lateral motion, wheels.....	14	39	5	7	8	11
36	Lights, cab and classification.....	352	198	232	109	49	23
37	Lights, headlight.....	38	33	28	42	22	16
39	Meters, volt and ampere.....	58	43	40	27	41	14
40	Motors and generators.....	1,122	880	813	655	674	314
42	Pilots and pilot beams.....	78	71	71	46	53	36
43	Plugs and studs.....	1	22	11	6	15	3
44	Quills.....	26	7	11	6	15	26
46	Rods, main, side, and drive shafts.....	4	7	11	6	15	2
48	Sanders.....	2,307	1,492	1,200	1,224	1,202	902
49	Springs and spring rigging, driving and truck.....	363	306	241	178	153	108
51	Staybolts, broken or defective.....	1	22	11	6	15	1
53	Steam pipes.....	190	177	154	119	89	24
54	Staps, footboards, et cetera.....	1,005	737	622	505	480	377
55	Switches, hand-operated, and fuses.....	48	38	34	17	18	15
56	Transformers, resistors, and rheostats.....	9	3	6	3	2	9
57	Trucks.....	1,007	1,054	503	439	390	234
59	Water tanks.....	49	31	34	31	47	33
60	Water glasses, fittings, and shields.....	14	16	11	14	38	11
61	Warning signal appliances.....	182	152	121	122	117	83
62	Wheels.....	252	282	257	212	230	215
63	Miscellaneous.....	1,220	898	1,005	864	638	574
Number of defects.....		29,054	22,618	19,640	17,163	16,613	11,935
Locomotive units reported.....		29,405	28,100	27,135	25,374	22,716	19,320
Locomotive units inspected.....		88,269	85,897	83,338	75,170	65,263	52,948
Locomotive units defective.....		9,597	8,129	7,395	6,571	6,087	4,375
Percentage of inspected found defective.....		10.9	9.5	8.9	8.7	9.3	8.3
Locomotive units ordered out of service.....		492	127	140	118	135	106

indicated that the water level had been about 16 inches below the highest point of the crown sheet.

Six boiler and appurtenance accidents other than explosions resulted in injury to 6 persons.

## SPECIFICATIONS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 51 specification cards and 570 alteration reports were filed, checked, and analyzed. These reports are necessary in order to determine whether or not the boilers represented were so constructed or repaired as to render safe and proper service and whether the stresses were within the allowed limits. Corrective measures were taken with respect to discrepancies found.

Under rules 328 and 329 of the Rules and Instructions for Inspection and Testing of Locomotives Other Than Steam, and under rule 449 for Multiple Operated Electric Locomotive Units, 3,588 specifications (including 1,829 M. U. specifications) and 1,452 alteration reports were filed for locomotive units and 335 specifications and 392 alteration reports were filed for boilers mounted on locomotive units other than steam. These were analyzed and corrective measures were taken with respect to discrepancies found.

## EXTENSION OF TIME FOR REMOVAL OF FLUES

Five hundred and nine applications were filed for extension of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 43 of these cases the condition of the locomotives or other circumstances were such that extensions could not properly be granted. Six were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Twenty-five applications were canceled for various reasons. Four hundred and thirty-five applications were granted for the full period requested, 48 of which were granted after defects disclosed by our investigations were required to be repaired.

## SUITS FOR PENALTIES

During the year 6 cases involving 117 counts for alleged violations of the Locomotive Inspection Act and rules formulated thereunder were transmitted to United States attorneys for prosecution under section 9 of the act.

One case involving confession of judgment on 51 counts was decided for the United States. Five cases were pending at the end of the year. Brief summary of the cases follows:

United States *v.* New York Central Railroad Company, northern district of Ohio, involved 102 counts for failure to file reports of monthly inspections with United States inspector within 10 days after inspection as required by the rules. Judgment on 51 counts for \$5,100; 51 counts dismissed.

United States *v.* New York Central Railroad Company, western district of New York, involved one count for use of locomotive while defective and in violation of rule 229 (d). Pending.

United States *v.* The Northwestern Pacific Railroad Company, northern district of California, involved 11 counts for permitting locomotive belonging to the Pacific Lumber Company to be used on its line of railroad when flues had not been removed and boiler cleaned and examined within the period of time specified in rule 10. Pending.

United States *v.* Chicago and North Western Railway Company, northern district of Illinois, involved one count for use of a locomotive having defective injector in violation of rule 43. Pending.

United States *v.* Union Pacific Railroad Company, district of Oregon, involved one count for use of locomotive while defective and in violation of rules 229 (d) and 318. Pending.

United States *v.* The Pennsylvania Railroad Company, middle district of Pennsylvania, involved one count for use of locomotive while defective and in violation of rules 101 and 102. Pending.

#### APPEALS

No formal appeal from the decision of a district inspector was filed by any carrier during the fiscal year.

#### BETTERMENT OF SERVICE

In order to keep district inspectors thoroughly informed and familiar with advancement and improvements on locomotives other than steam and multiple operated electric locomotive units, and to establish uniform enforcement standards in each and every district, they are assembled in groups at convenient locations for conferences and discussions with officials of the Bureau.

At these conferences such items as new locomotive designs, inspection problems arising in the various districts, matters concerning policies, and uniform inspection and enforcement procedure under the Locomotive Inspection Act are thoroughly discussed.

JOHN A. HALL.

*Director of Locomotive Inspection.*

#### ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES, TENDERS, LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1956, BY ROADS

[A double star (\*\*) indicates accidents not properly reported, as required by rules 55, 162, and 335. Complete investigations therefore, could not be made, inasmuch as the Bureau was not apprised of the accidents in sufficient time after they occurred to permit them to be properly investigated.]

##### ATCHISON, TOPEKA & SANTA FE RAILWAY:

August 20, 1955, unit 31, Lugo, Calif. Open circuit [in jumper cable prevented normal functioning of reverser; one injured.

August 27, 1955, unit 136-A, near Saginaw, Tex. Air blower box flange cap screws loose; oil on engineroom floor; one injured.

September 15, 1955, unit 215-C, Winslow, Ariz. Oil on engineroom floor; one injured.

\*\*November 22, 1955, unit 2342, Los Angeles, Calif. Cab window stuck in partially opened position; one injured.

Four accidents; four injured.

##### CHESAPEAKE & OHIO RAILWAY:

\*\*July 25, 1955, locomotive 2723, Quinimont, W. Va. Defective restraining latch on power reverse gear permitted undesired movement of control wheel; one injured.

One accident; one injured.

##### CHICAGO & NORTH WESTERN RAILWAY:

November 18, 1955, locomotive 587, West Chicago, Ill. Crown sheet failure due to low water; one killed, one injured.

March 10, 1956, unit 5021-A, Bellevue, Wis. Adjusting trunk dowel latch was worn permitting cab seat to drop; one injured.

June 29, 1956, unit 5017-B, between Knapp and Hudson, Wis. Crankcase explosion resulted from an overheated bearing; water leaking at lower liner seal; lower tangs #2 main bearing sheared off which permitted bearing to rotate 90 degrees, shutting off oil lubrication; "#2 engine used 6' of water in 3 hours" was reported June 22, "No. 2 engine using water" was reported June 23 and 24; one injured.

Three accidents; one killed; three injured.

##### CHICAGO, BURLINGTON & QUINCY RAILROAD:

November 19, 1955, unit 114-A, Eola, Ill. Crankcase explosion caused by overheated crankshaft bearings; filter elements coated with heavy sludge; lubricating oil pressure regulating and relief valve was prevented from seating due to particles of flaked carbon lodged between it and the body seat; one injured.

One accident; one injured.

##### CHICAGO, ROCK ISLAND & PACIFIC RAILROAD:

October 9, 1955, unit 93-B, Clarksville, Iowa. Crankcase explosion resulted from an overheated bearing; one injector was defective and did not properly atomize the fuel oil; exhaust valves of 5 cylinders were leaking freely and permitted unburned fuel oil to pass into crankcase; one injured.

One accident; one injured.

##### ERIE RAILROAD:

December 20, 1955, unit 738-C, Cuba, N. Y. Crankcase explosion; surface of main part of left No. 2 piston very rough; cap, compression rings, upper oil ring, and top oil ring on skirt missing; two injured.

One accident; two injured.

##### GRAND TRUNK WESTERN RAILWAY:

October 22, 1955, unit 9008, Blue Island, Ill. Crankcase explosion caused by a defective and overheated piston; piston had a large hole in its crown and liner was excessively scored; one injured.

November 3, 1955, locomotive 6313, Fenton, Mich. Axle broke at the fillet between journal and wheel seat, resulting in derailment of freight train; old fracture in left main driver axle covered approximately 67 percent of cross-sectional area; three injured.

Two accidents; four injured.

## LOUISVILLE &amp; NASHVILLE RAILROAD:

November 22, 1955, unit 817, Magella, Ala. Crankcase explosion resulted from an overheated bearing; one or more defective lower liner seals; engine lubricating oil with high percentage water contamination; one injured.  
One accident; one injured.

## MAINE CENTRAL RAILROAD:

\*\*February 25, 1956, unit 16, Lewiston, Maine. Cab threshold plate was not properly roughened; one injured.  
One accident; one injured.

## MISSOURI PACIFIC RAILROAD:

July 29, 1955, unit 7003-B, 1 mile south of Thrall, Tex. Flash occurred in high voltage cabinet when series contactor closed due to defective coil in reverser magnet valve; one injured.  
One accident; one injured.

## NEW YORK CENTRAL RAILROAD:

July 13, 1955, unit 1042, Erie, Pa. Lost cotter key permitted castle nut on train control receiver cable plug to work off resulting in undesired train control action and brake application; one injured.

\*\*October 13, 1955, unit (Crucible Steel Company of America Railway) 40, Geddes, N. Y. Employee's hand was caught in unguarded radiator fan when attempting to stop racing engine. Emergency stop failed to function; one injured.

December 4, 1955, unit 4208, Lyons, N. Y. Oil on engineroom floor; leak at both ends of hose in lubricating oil delivery line between pump and filter; engineroom floor to be cleaned and/or oil leaks were reported 20 times since November 11; one injured.

\*\*February 1, 1956, unit 8242, Cayuga, N. Y. Tubular metal supports of cab seat back rest broke; supports were weakened by bolt holes provided for attachment of back rest cushion; one injured.

\*\*February 4, 1956, unit 8618, Selkirk, N. Y. Defective joint between turbo-charger and exhaust stack permitted escape of exhaust gas; one injured.

March 12, 1956, unit 1067, Kirkville, N. Y. Lubricating oil strainer was clogged; engine shut down because of low oil pressure; undesired automatic train control brake application resulted from low voltage when attempt was made to start engine; two injured.

April 1, 1956, unit 4057, Staatsburg, N. Y. Fire in heating boiler and battery compartments of unit caused by outfire relay on heating boiler improperly set and kickoff spring missing from fuel spray head. Excessive heat in exhaust stack damaged insulation on battery cables causing short circuit. Defective condition of heating boiler reported on March 6, 7, 9, 10, 11, and 27; two injured.  
Seven accidents; nine injured.

## NEW YORK, CHICAGO &amp; ST. LOUIS RAILROAD:

October 22, 1955, locomotive 804, Toledo, Ohio. Flexible staybolt cap and sleeve blew out of throat sheet; bolt broken and weld securing the sleeve failed; one injured.  
One accident; one injured.

## NEW YORK, NEW HAVEN &amp; HARTFORD RAILROAD:

July 16, 1955, unit 0463, Brewster, N. Y. Oil on engineroom floor; clean oil off engineroom floor and/or oil leaks were reported 22 times since June 16 (before accident), 3 times (after accident); one injured.

July 20, 1955, unit 634, Cedar Hill, Conn. Employee slipped on sand that had been applied to front platform to absorb oil; leaking oil was reported July 6 (two times) and July 20 (two times), "clean decks" and "clean oil off engine and floor" was reported July 6, "clean engineroom cat walks" was reported July 13, "clean up cat walk" was reported July 17, "clean oil from walk" and "oil on floor in front end compartment" was reported July 20; one injured.

August 29, 1955, unit 0704, Westerly, R. I. Leaking turbocharger drip pan gaskets deposited oil on engineroom floor; clean engineroom floor and/or oil leaks were reported 27 times since August 2; one injured.

September 15, 1955, unit 799, Springfield, Mass. Oil on engineroom floor; engineroom floor to be cleaned and/or oil leaks in engine room were reported 25 times since August 16; one injured.

October 31, 1955, unit 0923, Boston, Mass. Defective fuel filter assembly permitted oil to leak to deck, runningboard and steps; clean up engineroom and/or oil leaking were reported October 15, 18, 19, 22, 26 and 31; one injured.

December 17, 1955, unit 0504, Needham, Mass. Threads on valve body at bonnet fit of steam heat valve badly worn and eroded; one injured.

December 29, 1955, unit 0703, Silver Spring, Providence, R. I. Oil on engineroom floor; leak at air compressor shaft oil seal of No. 1 engine; clean engineroom floor and/or No. 1 engine oil seal leaks were reported 17 times since December 4 (before accident), 1 time (after accident); one injured.

\*\*February 22, 1956, unit 0400, Woodlawn, R. I. Oil on engineroom floor; clean engineroom floor and/or oil leaks were reported 29 times (before accident) 3 times (since accident), since February 2; one injured.

April 21, 1956, unit 0619, Cedar Hill, Conn. Oil on right front step; oil cooling radiators leaking; "Oil all over walkway and front end" and "Oil on front catwalk" reported April 21 (day of accident); one injured.

June 26, 1956, unit 796, New London, Conn. Oil on engineroom floor; clean oil off engineroom floor and/or oil leaks were reported 23 times since June 3; one injured.

Ten accidents; ten injured.

## NORFOLK &amp; WESTERN RAILWAY:

December 12, 1955, locomotive 2153, near Wytheville, Va. Crown sheet failure due to low water; three killed, one injured.

One accident; three killed; one injured.

## NORTHERN PACIFIC RAILWAY:

December 4, 1955, locomotive 2673, Forsyth, Mont. Separation occurred in stoker steam line at union nut connection of shut-off valve; threads in nut were badly deteriorated; one injured.

March 19, 1956, locomotive 1576, Northtown Yard, Minn. Employee fell when investigating turbo-generator power failure; cinder accumulation on access steps; one injured.

Two accidents; two injured.

## NORTHWESTERN PACIFIC RAILROAD:

\*\*October 17, 1955, unit (S. P.) 4617, Arcata, Calif. Employee slipped on wet platform; drinking water container drain pipe plugged; one injured.

One accident; one injured.

## PENNSYLVANIA RAILROAD:

July 10, 1955, locomotive 4486, East Altoona, Pa. Overflow valve body disconnected from injector due to threads being in a worn condition; one injured.

\*\*October 5, 1955, unit 9131, Philadelphia, Pa. Fuel oil leak between injection pump and delivery pipe due to defective gasket; one injured.

\*\*November 1, 1955, locomotive 6715, Vineyard, Pa. Crosshead wrist pin became disengaged because of a disconnected valve motion union link; one injured.

\*\*November 11, 1955, unit 4872, Washington, D. C. Employee burned by backfire from steam heating boiler firebox. Fuel oil valve out of position, improper size connecting bolt in control arm, improper atomization pressure; one injured.

\*\*November 15, 1955, unit 8817, Conway, Pa. Broken automatic coupler lock lifter; one injured.

December 2, 1955, locomotive 6907, Harrisburg, Pa. Undesired application of air brakes caused by broken snap ring on differential piston in air compressor; one injured.

December 28, 1955, unit 2022-B, Crestline, Ohio. Leaking oil at fuel injection pump ignited by short circuit; oil leaks reported 12 times since November 28; wires in electrical supply line deteriorated and conduit corroded; one injured.

January 11, 1956, unit 9576-A, Hudson, Ohio. Oil on engineroom floor; scored and worn fuel oil delivery pipe fitting prevented tight fit with seat in fuel



injection pump delivery valve holder; "Clean up unit. Oil on floor." was reported on January 9, and "9576-A has fuel oil leak. Engineroom covered with oil. Check all pipes." was reported on January 10; one injured.

\*\*February 23, 1956, unit 5614, Washington, D. C. Employee's hand contacted unguarded heater fan; protective screen missing; one injured.

\*\*March 6, 1956, unit 5758-A, Chicago, Ill. Cab window stuck in open position; defective adjusting mechanism became disconnected and struck employee's hand; one injured.

March 7, 1956, unit 9616-B, near Halfway, Md. Flash occurred in high voltage cabinet; defective magnet valve prevented proper operation of reverser; one injured.

April 21, 1956, unit 9622-A, Hubbard, N. Y. Employee slipped on oil on floor of unit; Eddy Current Clutch not properly protected; clean oil off floors and/or oil leaking were reported April 2, 4, 5, and 13 (before accident), April 23 (after accident); one injured.

\*\*May 7, 1956, unit 7853, New York, N. Y. Cut-out cock handle and body showed evidence of excessive striking; valve was difficult to operate; one injured.

\*\*May 12, 1956, unit 4820, Washington, D. C. Undesired application of automatic brakes resulted in severe slack action; broken low voltage contactor in axle speed governor control circuit; one injured.

May 14, 1956, unit 8456, Toledo, Ohio. Fumes emitted by overcharged and overheated storage batteries; two contact fingers and contact bar of voltage regulator partially burned and pitted; two injured.

May 23, 1956, unit 9455-A, Jacks Run, Pa. Undesired application of air brakes caused by worn fulcrum pin in safety control foot pedal; one injured.

Sixteen accidents; seventeen injured.

#### SEABOARD AIR LINE RAILROAD:

\*\*July 18, 1955, unit 1601, Wildwood, Fla. Improper application of the jumper cable conduit fouled the hand brake chain; one injured.

November 25, 1955, unit 1747, Raleigh, N. C. Crankcase explosion caused by overheated main crankshaft bearings; low oil pressure and high oil pump suction shut down switch of engine governor inoperative; No. 8 fuel injector leaked at seal ring; one injured.

Two accidents; two injured.

#### SOUTHERN RAILWAY:

September 20, 1955, unit 4186, Lowland, Tenn. Oil on floor of passageway of engineroom; one injured.

One accident; one injured.

#### SOUTHERN PACIFIC—LINES WEST:

\*\*July 11, 1955, unit 1426, Alameda, Calif. Defective gasket between turbo-charger and exhaust stack permitted gas to enter cab of unit; one injured.

July 12, 1955, locomotive 4456, Los Banos, Calif. Blow-off cock stuck open; one injured.

\*\*August 21, 1955, unit 8060, Yuma, Ariz. Oil on engineroom floor; clean engineroom floor and/or oil leaking reported August 2, 9, 16, 17, and 18; one injured.

August 26, 1955, locomotive 3659, Los Banos, Calif. Oil on top and front of tender fuel oil tank; one injured.

October 1, 1955, locomotive 4161, Rucker, Calif. Defective carrier bolt assembly permitted indicator box to slip from supporting bracket; one injured.

October 2, 1955, locomotive 4303, Planehaven, Calif. Employee burned by flash from open firebox door; heavy accumulation of sand in smokebox, lower flues plugged with sand; one injured.

\*\*December 10, 1955, unit 1354, Oakland, Calif. Oil on cab step; one injured.

\*\*January 19, 1956, unit 1507, Marysville, Calif. Oil on running board; one injured.

\*\*February 29, 1956, locomotive 2752, West Oakland, Calif. Valve yoke and steam valve assembly blew out of injector body while being tested; threads in injector body too large for proper fit. Boiler checks leaking and/or injector leaks were reported 16 times since February 6; one injured.

March 1, 1956, locomotive 4447, Goshen Junction, Calif. Broken hinges on cab door allowed door to fall and strike employee's leg; one injured.

\*\*March 20, 1956, unit 5206, Alvarado, Calif. Automatic radiator shutter control inoperative because of dry and rusted condition of shutters; manual control lever adjustment latch rusted and inoperative; hood door blew shut on employee's wrist while attempt was being made to adjust radiator shutters; one injured.

\*\*March 27, 1956, unit 6431, Yuma, Ariz. Frame of train number container distorted; employee slipped on unroughened floor while attempting to remove train numbers from container; one injured.

May 15, 1956, unit 6279, Roseville, Calif. Employee's hand contacted unguarded heater fan; opening into heater was not completely protected; one injured.

June 27, 1956, unit 6235, Beowawe, Nev. Oil on engineroom floor; oil on floor and/or oil leaking were reported 11 times since June 16; one injured.

Fourteen accidents; fourteen injured.

#### UNION PACIFIC RAILROAD:

November 17, 1955, unit 936-B, between Arlington and The Dalles, Oreg. Heating boiler frozen and inoperative. Accumulation of snow and ice on passageway in unit which entered by door blocked open to permit use of hose to thaw boiler; one injured.

One accident; one injured.

#### WABASH RAILROAD:

June 1, 1956, unit 355, Danville, Ill. Locking pin assembly was missing permitting back rest to fall from cab seat; one injured.

One accident; one injured.

NOTE.—No accidents involving multiple operated electric locomotive units were reported in 1956.

TABLE VII.—Number of steam locomotives inspected, found defective,

Parts defective, inoperative or missing, or in violation of the rules	Aitchison, Topeka & Santa Fe	Baltimore & Ohio	Boston & Maine	Canadian National	Canadian Pacific	Central Vermont	Chesapeake & Ohio
1 Air compressors		8		7	3	1	9
2 Arch tubes							
3 Ashpans and mechanism					1	1	
4 Axles							
5 Blow-off cocks		1		2			
6 Boiler checks		5		3		1	
7 Boiler shell							
8 Brake equipment		20		19	3	1	4
9 Cabs, cab windows, and curtains		3		8	3	4	
10 Cab aprons and decks		7		6	1	1	
11 Cab cards			1	1	4		1
12 Coupling and uncoupling devices		2		1		1	
13 Crossheads, guides, pistons, and piston rods		8		1	1		
14 Crown bolts					1		
15 Cylinders, saddles, and steam chests	2	9		2	1		8
16 Cylinder cocks and rigging	3			2			
17 Domes and dome caps		2					
18 Draft gear		3		6	1	1	
19 Draw gear		3		1	1		
20 Driving boxes, shoes, wedges, pedestals, and braces		5		4	1	1	1
21 Firebox sheets		1			2		
22 Flues		2					1
23 Frames, tail pieces, and braces, locomotive		8		3			1
24 Frames, tender				1			
25 Gages and gage fittings, air		1		1	5		
26 Gages and gage fittings, steam		6		4	2	1	
27 Gage cocks		10	1	5		1	
28 Grate shakers and fire doors		1				1	
29 Handholds		7		5	1		
30 Injectors, inoperative							
31 Injectors and connections	1	12		13	9		3
32 Inspections and tests not made as required	1			1		1	
33 Lateral motion					5		
34 Lights, cab and classification		1				1	
35 Lights, headlight		1					
36 Lubricators and shields					1		
37 Mud rings		5					
38 Packing nuts		14		2	3	1	
39 Packing, piston rod and valve stem		1		1			1
40 Pilots and pilot beams				2	2		
41 Plugs and studs		1		1			
42 Reversing gear	3	2	1	1			
43 Rods, main and side, crankpins, and collars		5		5	2		4
44 Safety valves							
45 Sanders		4		1			2
46 Springs and spring rigging		35		14	10	11	2
47 Squirt hose				1			
48 Staybolts		7		2	2		1
49 Staybolts, broken		2					
50 Steam pipes					2	1	
51 Steam valves						1	
52 Steps		5		9	12		
53 Tanks and tank valves		10		4	1	3	1
54 Telltale holes		2					
55 Throttle and throttle rigging		8		7	2	2	1
56 Trucks, engine and trailing		10		2	2		
57 Trucks, tender		11		9	4	1	2
58 Valve motion		8					
59 Washout plugs	3	11		2	2		
60 Stokers		3		2			
61 Water glasses, fittings, and shields		24	1	2	2	2	1
62 Wheels		6		1	1		
63 Miscellaneous—Signal appliances, badge plates, brakes (hand)		4		3	1	2	
Number of defects	13	304	4	169	92	44	43
Locomotives reported	116	505	15	143	80	30	130
Locomotives inspected	39	973	6	83	32	73	165
Locomotives defective	5	113	2	32	19	14	7
Percentage of inspected found defective	12.8	11.6	33.3	38.6	59.4	19.2	4.2
Locomotives ordered out of service		5		2	4	1	1

<sup>1</sup> Aitchison, Topeka & Santa Fe.

and ordered from service, at cetera—by carriers

Chicago & North Western	Chicago, Burlington & Quincy	Chicago, St. Paul, Minneapolis & Omaha	Colorado & Southern	Denver & Rio Grande Western	Duluth, Missabe & Iron Range	Fort Worth & Denver	Grand Trunk Western	Great Northern	Gulf, Colorado & Santa Fe	Illinois Central	Lake Superior & Ishpeming	Louisville & Nashville
22	1	15	1		3	5	9	7		1	1	1
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330	23	147	18	29	61	29	135	134		319	9	65
248	137	68	34	50	140	30	119	185	(1)	469	19	52
341	117	127	156	87	87	39	148	231		852	11	65
73	7	30	5	6	10	5	32	28		66	2	19
21.4	6.0	23.6	3.2	6.9	11.5	12.8	21.6	12.1		7.7	18.2	29.2
4	1	1				1	5	1		6		3



TABLE VIII.—Number of locomotive units other than steam inspected.

Parts defective, inoperative or missing, or in violation of the rules	Akron, Canton & Youngstown	Albion & Southern	Alton & Southern	Ann Arbor	Apalachicola Northern	Atchison, Topeka & Santa Fe	Atlanta & St. Andrews Bay	Atlanta & West Point	Atlantic Coast Line	Baltimore & Ohio	Bangor & Aroostook
1 Air compressors					12				2	1	
2 Axles, truck and driving					1				1		
3 Batteries					6				1	1	
4 Boilers					28				1	3	4
5 Brake equipment			1		84			3	24	59	5
6 Cabs and cab windows		3		2	45			1	8	46	1
7 Cab cards				1	7			2			
8 Cab floors, aprons and deck plates				1	144			1	9	45	
9 Clutches											
10 Controllers, relays, circuit breakers, magnet valves and switch groups				1	11				11	10	1
11 Coupling and uncoupling devices					9					2	
12 Current collecting apparatus											
13 Draft gear		1			7				6	2	
14 Draw gear					2						
15 Driving boxes, shoes and wedges					5					37	
16 Frames or frame braces					2					6	
17 Fuel system				1	144			1	19	23	3
18 Gages or fittings, air				4	14					3	2
19 Gages or fittings, steam					3						
20 Gears and pinions					3				2	1	
21 Handholds					3					1	
22 Inspections and tests not made as required				1	19				9	10	1
23 Insulation and safety devices					14				3	9	
24 Internal-combustion engine defects, parts and appurtenances				1	284	3		2	57	81	2
25 Jack shafts											
26 Jumpers and cable connectors				2	22				4	7	
27 Lateral motion, wheels									1		
28 Lights, cab and classification					17				2	10	
29 Lights, headlight					4				2		
30 Meters, volt and ampere					5			1	2	1	
31 Motors and generators					73				4	33	1
32 Pilots and pilot beams					2						
33 Plugs and studs											
34 Quills											
35 Rods, main, side, and drive shafts											
36 Sanders				1	97			4	42	22	15
37 Springs and spring rigging, driving and truck					2				8	9	2
38 Staybolts, broken or defective											
39 Steam pipes					6			1	4	2	
40 Steps, footboards, et cetera		1			41				6	12	3
41 Switches, hand-operated, and fuses										1	
42 Transformers, resistors and rheostats											
43 Trucks					10			4	5	12	5
44 Water tanks											
45 Water glasses, fittings and shields											
46 Warning signal appliances					12				1	6	
47 Wheels				1	7				1	4	
48 Miscellaneous		1			26			1	9	24	2
Number of defects	6	1	18	1,166	3	21	243	484	47		
Locomotive units reported	16	17	18	24	11	1,740	14	28	564	987	42
Locomotive units inspected	11	29	37	43	24	7,291	28	77	1,733	2,892	41
Locomotive units defective	3	1	7	579	2	6	123	244	11		
Percentage of inspected found defective	10.3	2.7	16.3	7.9	7.1	7.8	7.1	8.4	26.8		
Locomotive units ordered out of service				3			5	11			

found defective, and ordered from service, et cetera—by carriers

	Belt Railway of Chicago	Bessemer & Lake Erie	Birmingham Southern	Boston & Maine	Butte, Anaconda & Pacific	Camas Prairie	Canadian National	Canadian Pacific	Canton	Carolina & Northwestern	Central of Georgia	Central Railroad of New Jersey	Charleston & Western Carolina	Chesapeake & Ohio	Chicago & Eastern Illinois	Chicago & Illinois Midland	Chicago & North Western	Chicago & Western Indiana	Chicago, Burlington & Quincy	Chicago Great Western	Chicago, Milwaukee, St. Paul & Pacific	
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