

INTERSTATE COMMERCE COMMISSION

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NINETEENTH ANNUAL REPORT

OF THE

CHIEF INSPECTOR  
BUREAU OF LOCOMOTIVE INSPECTION

TO THE

INTERSTATE COMMERCE COMMISSION

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FISCAL YEAR ENDED  
JUNE 30, 1930



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## ANNUAL REPORT OF THE CHIEF INSPECTOR, BUREAU OF LOCOMOTIVE INSPECTION

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OCTOBER 1, 1930.

*To the Interstate Commerce Commission:*

In compliance with section 7 of the act of February 17, 1911, as amended, the Nineteenth Annual Report of the Chief Inspector, covering the work of the bureau during the fiscal year ended June 30, 1930, is respectfully submitted.

Summaries are given, by railroads, of all accidents, showing the number of persons killed and injured due to the failure of parts and appurtenances of locomotives, as reported and investigated under section 8 of the locomotive inspection law, and those reported to the Bureau of Statistics under the accident report act of May, 1910, and not reported to this bureau in accordance with the requirements.

The tables showing the number of accidents, the number of persons killed, and number injured as a result of the failure of parts and appurtenances of locomotives have been arranged to permit comparison with previous years as far as consistent. These tables also show the number of locomotives inspected, the number and percentage of those inspected and found defective, the number for which written notices for repairs were issued in accordance with section 6 of the law, and the total defects found and reported. The data contained therein cover all defects on all parts and appurtenances of locomotives found and reported by our inspectors, arranged by railroads.

Summaries and tables show separately accidents and other data in connection with steam locomotives and tenders and their appurtenances and accidents and other data in connection with locomotives other than steam.

## REPORT OF CHIEF INSPECTOR OF LOCOMOTIVES

TABLE I.—Reports and inspections—Steam locomotives

	Year ended June 30—					
	1930	1929	1928	1927	1926	1925
Number of locomotives for which reports were filed.....	61,947	63,562	65,940	67,835	69,173	70,361
Number inspected.....	100,794	96,465	100,415	97,227	90,475	72,279
Number found defective.....	16,300	20,185	24,051	28,995	36,354	32,989
Percentage inspected found defective.....	16	21	24	31	40	46
Number ordered out of service.....	1,200	1,490	1,725	2,539	3,281	3,637
Total number of defects found.....	60,292	77,268	85,530	112,008	136,973	129,239

TABLE II.—Accidents and casualties caused by failure of some part of the steam locomotive, including boiler or tender

	Year ended June 30—					
	1930	1929	1928	1927	1926	1925
Number of accidents.....	295	358	419	488	574	690
Per cent increase or decrease from previous year.....	17.1	15	14.1	14.9	16.8	31.3
Number of persons killed.....	13	19	30	28	22	20
Per cent increase or decrease from previous year.....	31.6	36.6	17.1	127.3	110	69.7
Number of persons injured.....	320	390	463	517	660	764
Per cent increase or decrease from previous year.....	17.9	15.8	10.4	21.6	13.6	33.9

<sup>1</sup> Increase.

TABLE III.—Accidents and casualties caused by failure of some part or appurtenance of the steam locomotive boiler <sup>1</sup>

	Year ended June 30—							
	1930	1929	1928	1927	1926	1925	1915	1912
Number of accidents.....	105	119	150	185	247	274	424	856
Number of persons killed.....	12	14	26	20	18	13	13	91
Number of persons injured.....	113	133	174	205	287	315	467	1,005

<sup>1</sup> The original act applied only to the locomotive boiler.

TABLE IV.—Derailments and casualties caused by defects in or failure of some part of the steam locomotive or tender

	Year ended June 30—				
	1930	1929	1928	1927	1926
Number of derailments <sup>1</sup> .....	8	9	14	15	23
Number of persons killed.....			1	1	2
Number of persons injured.....	14	25	27	23	49

<sup>1</sup> Only derailments reported by carriers as being caused by defect in or failure of parts of the locomotive or tender were investigated or counted.

## REPORT OF CHIEF INSPECTOR OF LOCOMOTIVES

TABLE V.—Number of casualties classified according to occupation—Steam locomotive accidents

	Year ended June 30—									
	1930		1929		1928		1927		1926	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....	4	100	7	128	8	151	8	181	5	210
Firemen.....	4	123	7	128	11	161	9	179	6	230
Brakemen.....	4	32	1	45	4	54	4	51	3	77
Conductors.....		10		24		16		25		28
Switchmen.....		10		11		15		13		19
Roundhouse and shop employees:										
Boiler makers.....		1		5	3	5		11		5
Machinists.....		3		2	2	4	1	5		5
Foremen.....		1		1		1		1		3
Inspectors.....		3		1		1				
Watchmen.....		2		3	1	2	2	4	1	5
Boiler washers.....		2		1			1	2		2
Hostlers.....		3		5		10	1	7		9
Other roundhouse and shop employees.....	1	8	1	3		8		10	1	15
Other employees.....		6	2	10		12	1	9	3	10
Nonemployees.....		16		23	1	23		19	1	42
Total.....	13	320	19	390	30	463	28	517	22	660

TABLE VI.—Reports and inspections—Locomotives other than steam

	Year ended June 30—			
	1930	1929	1928	1927
Number of locomotive units for which reports were filed.....	1,135	1,071	1,034	951
Number inspected.....	1,306	1,099	1,119	604
Number found defective.....	120	131	169	174
Percentage inspected found defective.....	9	12	15	29
Number ordered out of service.....	6	4	9	9
Total number of defects found.....	289	329	411	423

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

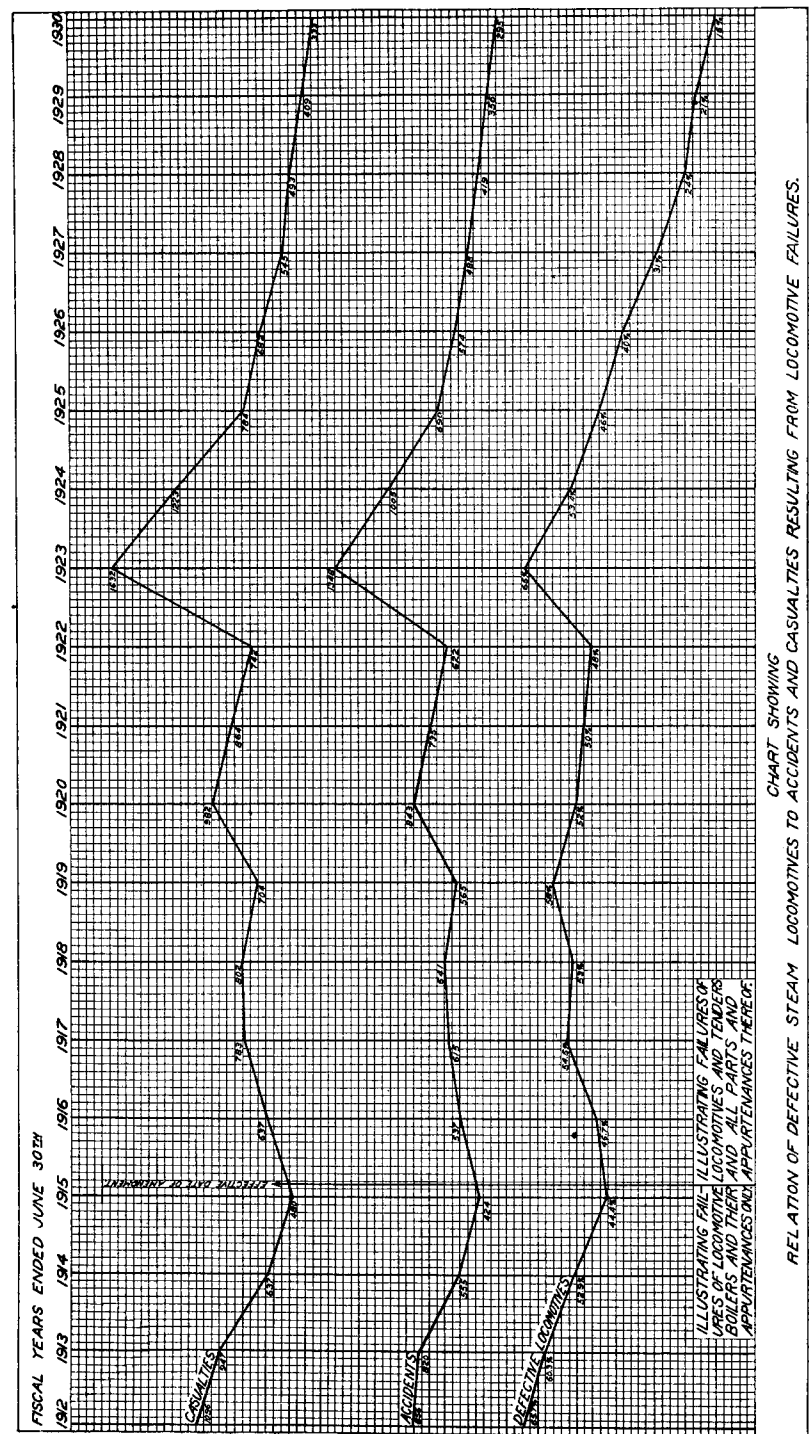
	Year ended June 30—			
	1930	1929	1928	1927
Number of accidents.....	3	1	4	5
Number of persons killed.....			1	1
Number of persons injured.....	3	1	3	5

TABLE VIII.—Number of casualties classified according to occupation—Locomotives other than steam

	Year ended June 30—							
	1930		1929		1928		1927	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:								
Engineers.....		2				2		1
Firemen.....		1		1				2
Roundhouse and shop employees:								
Inspectors.....								1
Other roundhouse and shop employees.....					1	1		1
Total.....		3		1		3		5

TABLE IX.—Accidents and casualties resulting from failures of steam locomotives and tenders and their appurtenances

Part or appurtenance which caused accident	Year ended June 30--														
	1930			1929			1928			1927			1926		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Air reservoirs.....															5
Aprons.....															11
Arch tubes.....															
Ash-pan blowers.....	3	1													12
Axles.....	4		9	7	8	5	7	10	7	10	9	7	10		10
Blow-off cocks.....	4		5	1				1							8
Boiler checks.....	5														
Boiler explosions:															
A. Shell explosions.....															
B. Crown sheet; low water; no contributory causes found.....	6	7	5	11	11	12	15	16	25	14	14	14	22	11	33
C. Crown sheet; low water; contributory causes or defects found.....	5	4	8	6	2	8	7	4	12	5	3	12	15	6	30
D. Fire box; defective stay bolts, crown stays, or sheets.....	1		1	1		3									
Brakes and brake rigging.....	21		23	16		17	14		14	25	1	26	13		21
Couplers.....	9	1	13	5		6	13	1	14	15		16	15		19
Crank pins, collars, etc.....	3		5	2		2	8		8	3		4	8		10
Crossheads and guides.....	4		5	3		10	3		3	7		7	5		7
Cylinder cocks and rigging.....	1		1	1		1	6		6	3		3	3		
Cylinder heads and steam chests.....	1		1	1		1	1		1	4		4	9		11
Dome caps.....	2		2	4		4	1		1	1		1	1		1
Draft appliances.....	1		1	3		3	1		2	2		2	1		2
Draw gear.....	1		1	6		6	2		2	5		6	2		2
Fire doors, levers, etc.....	8		8	4		4	8		8	6		6	11		11
Flues.....	10		14	7		7	17		21	23		26	26		31
Flue pockets.....	7		7	7		7	11		11	10		10	9		8
Footboards.....															
Gauge cocks.....	3		3	5		5	1		1	1		1	3		3
Grease cups.....															
Grate shakers.....	18		18	16		16	25		25	29		29	38		38
Handholds.....	5		5	10		10	12		12	12		12	14		14
Headlights and brackets.....	2		2	2		2	1		2	6		6	1		2
Injectors and connections (not including injector steam pipes).....	4		4	6		6	7		7	12		12	19		22
Injector steam pipes.....	2		2	2		2	3		3	4		4	5		9
Lubricators and connections.....	1		1	5		5	8		8	7		7	8		11
Lubricator glasses.....															
Patch bolts.....															
Pistons and piston rods.....															
Plugs, arch tube and washout.....	2		3	2		2	1		2	1		1	1		3
Plugs in fire-box sheets.....															
Reversing gear.....	14		14	23		23	35		35	30		30	37		37
Rivets.....															
Rods, main and side.....	11		15	14		17	11		13	16		18	20		24
Safety valves.....															
Sanders.....	2		2	3		3	2		2	5		5			
Side bearings.....															
Springs and spring rigging.....	4		4	10		10	10		11	14		18	16		16
Squirt hose.....	20		20	23		23	32		33	33		33	51		51
Stay bolts.....	1		1	4		4	5		5	2		4	8		4
Steam piping and blowers.....	5		5	4		4	6		6	6		6	4		7
Steam valves.....	6		6												
Studs.....															
Superheater tubes.....	5		7	1		1	1		1	2		2	7		10
Throttle glands.....															
Throttle leaking.....	3		3	2		2	1		3	6		6	12		12
Throttle rigging.....	2		2	4		4	3		4	4		4	7		23
Trucks, leading, trailing or tender.....	5		5	14		16	8		9	22		23	13		13
Valve gear, eccentrics, and rods.....	15		15	18		18	13		13	10		11	12		12
Water glasses.....	1		1	1		1	1		1	2		2	3		3
Water glass fittings.....	1		1	1		1	5		5	5		6	6		7
Wheels.....	3		4	8		16	5		13	5		6	6		7
Miscellaneous.....	63		64	71		69	84		84	69		68	81		82
Total.....	295	13	320	356	19	390	419	30	463	488	28	517	574	22	660



## REPORT OF CHIEF INSPECTOR OF LOCOMOTIVES

TABLE X.—Accidents and casualties resulting from failures of locomotives other than steam, and their appurtenances

Part or appurtenance which caused accident	Year ended June 30—											
	1930			1929			1928			1927		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Circuit breakers.....							1		1	1		1
Insulation.....	1		1				1	1				
Pantographs.....							2		2			
Third-rail shoes.....										1		1
Transformers.....						1				2		2
Miscellaneous.....	2		2	1								
Total.....	3		3	1		1	4	1	3	5		5

TABLE XI.—Number of steam locomotives reported, inspected, found defective, and ordered from service

Parts defective, inoperative or missing, or in violation of rules	Year ended June 30—					
	1930	1929	1928	1927	1926	1925
1. Air compressors.....	873	1,202	1,282	1,679	2,151	1,574
2. Arch tubes.....	87	104	103	127	204	198
3. Ash pans and mechanism.....	76	132	133	192	211	216
4. Axles.....	12	20	7	13	8	14
5. Blow-off cocks.....	325	442	469	650	780	825
6. Boiler checks.....	521	761	914	1,043	1,200	991
7. Boiler shell.....	579	841	954	1,422	1,888	1,597
8. Brake equipment.....	2,706	3,894	5,214	6,572	7,062	6,497
9. Cabs, cab windows, and curtains.....	3,066	2,140	1,670	2,055	2,666	2,541
10. Cab aprons and decks.....	710	1,005	852	1,086	1,307	1,165
11. Cab cards.....	226	305	375	575	696	665
12. Coupling and uncoupling devices.....	122	154	179	289	394	447
13. Crossheads, guides, pistons, and piston rods.....	1,421	1,887	2,088	2,602	3,018	2,823
14. Crown bolts.....	95	129	164	235	334	447
15. Cylinders, saddles, and steam chests.....	2,311	3,210	3,264	4,526	5,080	4,352
16. Cylinder cocks and rigging.....	848	967	1,007	1,634	1,904	1,801
17. Domes and dome caps.....	154	227	281	388	463	371
18. Draft gear.....	950	1,310	1,453	2,037	2,634	2,283
19. Driving boxes, shoes, wedges, pedestals, and braces.....	1,003	1,367	1,650	2,210	3,140	3,273
20. Fire-box sheets.....	471	657	730	796	1,129	1,152
21. Flues.....	254	334	464	465	556	524
22. Frames, tailpieces, and braces, locomotive.....	1,271	1,377	1,354	1,682	1,973	2,036
23. Frames, tender.....	1,777	297	256	264	373	391
24. Gauges and gauge fittings, air.....	290	309	461	721	886	694
25. Gauges and gauge fittings, steam.....	553	678	969	1,425	2,038	1,809
26. Gauge cocks.....	783	1,114	1,413	2,024	3,068	3,081
27. Grate shakers and fire doors.....	767	295	377	613	720	832
28. Handholds.....	865	1,125	1,373	2,285	3,100	2,831
29. Injectors, inoperative.....	103	86	93	84	78	70
30. Injectors and connections.....	3,275	4,484	5,563	7,188	8,303	8,064
31. Inspections and tests not made as required.....	7,456	9,246	6,623	8,889	10,646	10,436
32. Lateral motion.....	372	618	699	673	758	659
33. Lights, cab and classification.....	119	121	118	107	106	86
34. Lights, headlights.....	373	488	571	835	946	928
35. Lubricators and shields.....	312	423	500	746	883	704
36. Mud rings.....	445	636	822	1,073	1,458	1,584
37. Packing nuts.....	828	991	1,265	1,851	2,772	2,761
38. Packing, piston rod and valve stem.....	1,429	1,708	1,904	2,214	2,489	2,411
39. Pilot and pilot beams.....	272	371	386	507	638	832
40. Plugs and studs.....	348	482	619	740	1,087	849
41. Reversing gear.....	579	788	967	1,247	1,539	1,274
42. Rods, main and side, crank pins, and collars.....	2,488	3,465	4,152	5,137	5,683	4,813
43. Safety valves.....	116	170	172	212	270	234
44. Sanders.....	804	1,008	1,031	1,268	1,769	2,004
45. Springs and spring rigging.....	3,311	4,557	4,939	5,956	6,826	5,532
46. Squirr hose.....	313	387	478	644	826	1,008
47. Stay bolts.....	395	542	590	631	905	741
48. Stay bolts, broken.....	1,098	1,197	1,867	2,373	3,582	3,745
49. Steam pipes.....	730	925	1,020	1,308	1,587	1,590
50. Steam valves.....	399	471	708	774	962	869

## REPORT OF CHIEF INSPECTOR OF LOCOMOTIVES

TABLE XI.—Number of steam locomotives reported, inspected, found defective, and ordered from service—Continued

Parts defective, inoperative or missing, or in violation of rules	Year ended June 30—					
	1930	1929	1928	1927	1926	1925
52. Steps.....	1,021	1,394	1,817	2,440	3,227	2,867
53. Tanks and tank valves.....	1,426	1,717	1,941	2,747	3,430	3,352
54. Telltale holes.....	183	174	241	377	487	451
55. Throttle and throttle rigging.....	1,175	1,554	1,889	2,233	2,618	2,403
56. Trucks, engine and trailing.....	1,141	1,605	1,914	2,363	2,860	2,966
57. Trucks, tender.....	1,531	2,144	2,610	4,114	4,929	5,372
58. Valve motion.....	827	1,067	1,262	1,568	1,576	1,250
59. Washout plugs.....	1,283	1,871	2,211	2,786	3,649	3,588
60. Train control equipment.....	48	60	112			
61. Water glasses, fittings, and shields.....	1,501	1,816	2,115	2,973	3,621	3,713
62. Wheels.....	1,025	1,325	1,609	2,119	2,243	2,148
63. Miscellaneous—Signal appliances, badge plates, brakes (hand).....	691	1,101	1,273	1,511	1,746	1,529
Total number of defects.....	60,292	77,268	85,530	112,008	136,973	129,239
Locomotives reported.....	61,947	63,562	65,940	67,835	69,173	70,361
Locomotives inspected.....	100,794	96,465	100,415	97,227	90,475	72,279
Locomotives defective.....	16,300	20,185	24,051	29,995	36,354	32,989
Percentage of inspected found defective.....	16	21	24	31	40	46
Locomotives ordered out of service.....	1,200	1,490	1,725	2,539	3,281	3,637

TABLE XII.—Number of locomotives other than steam reported, inspected, found defective, and ordered from service

Parts defective, inoperative or missing, or in violation of rules	Year ended June 30—			
	1930	1929	1928	1927
Air compressors.....	5	6	5	2
Axles.....		1		
Batteries.....				1
Boiler.....	2		1	
Brake equipment.....	40	44	32	13
Cabs or cab windows.....	14	39	32	72
Cab floors, aprons, or deck plates.....	2	3	1	
Controllers, relays, circuit breakers, and switch groups.....		1	1	
Current collecting apparatus.....	7	10	1	20
Draft gear.....	17	36	41	9
Draw gear.....	1			6
Driving boxes, shoes, wedges, pedestals, or pedestal braces.....	1	16	17	8
Frames, tailpieces, or braces.....	3		1	1
Fuel tank, its piping and valves.....	15	1	6	8
Gauges and gauge fittings, air.....	5	3	3	1
Gears and pinions.....	3	4	1	
High tension equipment not properly guarded against accidental contact.....	7	5	29	11
Inspections or tests not made as required.....	45	40	84	79
Internal combustion engine defects, including parts and appliances.....	2		11	
Insulation.....	1			1
Jack shafts.....	4	5	5	1
Lateral motion, wheels.....	3	3	2	18
Lights, cab or classification.....	7	17	10	5
Lights, headlights.....	3	5	9	1
Meters, volt and ampere.....				1
Motors or generators.....	23	11	10	5
Pilots or pilot beams.....	4	1	3	1
Plugs or studs (boiler, other than fusible plugs).....			1	
Rods, motor, main or side, drive shafts.....	1		2	38
Sanders.....	8	8	12	
Springs or spring rigging, driving or truck.....	21	24	10	18
Switches, hand-operated, and fuses.....	2		6	6
Transformers, resistors, and rheostats.....	2	1	1	2
Trucks.....	11	14	10	56
Water glass, fittings, or shields.....			1	2
Wheels.....	5	6	17	17
Whistles, bells, or train signal system.....	1	1	1	
Miscellaneous.....	26	20	45	20
Total defects.....	289	329	411	423
Locomotive units reported.....	1,135	1,071	1,034	951
Locomotive units inspected.....	1,306	1,099	1,119	604
Locomotive units defective.....	120	131	169	174
Percentage inspected found defective.....	9	12	15	29
Locomotive units ordered out of service.....	6	4	9	9

INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF  
LOCOMOTIVES

All accidents reported to the bureau as required by the law and rules were carefully investigated and appropriate action taken to prevent recurrences as far as possible. Copies of accident investigation reports were furnished to parties interested when requested, and otherwise used in our effort to bring about a diminution in the number of such accidents.

The percentage of locomotives inspected by our inspectors found to be defective, the number of accidents, the number of persons killed, and the number of persons injured shown in the eighteenth annual report was the lowest heretofore recorded, however, a still further improvement was made in the condition of locomotives in the year just closed and the benefits derived therefrom are clearly reflected in the reduced number of accidents and casualties.

During the year 16 per cent of the locomotives inspected were found with defects or errors in inspection that should have been corrected before being put into use as compared with 21 per cent for the previous year. A summary of all accidents and casualties to persons occurring in connection with steam locomotives compared with the previous year shows a decrease of 17.1 per cent in the number of accidents, a decrease of 31.6 per cent in the number of persons killed, and a decrease of 17.9 per cent in the number injured during the year.

The decrease in accidents and casualties brought about by decrease in defective locomotives, and the converse, are illustrated graphically by the chart on page 5.

Table IX shows the various parts and appurtenances of steam locomotives and tenders which through failure have caused serious and fatal accidents. If the information contained in this table is taken advantage of and proper inspections and repairs made in accordance with the requirements of the law and rules many accidents will be avoided.

Detailed results of our inspections of steam locomotives of each carrier are shown in Table XIII, and a comparison of condition of locomotives over a period of years is shown in Table XV. It will be noted from Table XV that some of the carriers are maintaining their locomotives in condition approaching perfection while others are delinquent in this respect, and that the average percentage of locomotives on all railroads found defective has steadily decreased over a period of years reaching the low point of 16 per cent for the year ended June 30, 1930. Improved standards of maintenance reflected by the reduced percentage of defective locomotives have brought about the greatest degree of safety of locomotive operation ever attained.

## BOILER EXPLOSIONS OR CROWN-SHEET FAILURES

Boiler explosions caused by crown-sheet failures continue to be the most prolific source of fatal accidents; 84.6 per cent of the fatalities during the year were attributable to this cause as compared with 68 per cent in the previous year. However, there was a decrease of 35.3 per cent in the number of such accidents, a decrease of 15.3 per cent in the number of persons killed, and a decrease of 35 per cent in the number of persons injured as compared with the previous year.

The increasing size of locomotive boilers and the high pressures carried therein tend to increase the violence of explosions and cause increase in the fatalities per accident and increase in the seriousness of injury to those who are exposed and survive. The necessity for the use of the safest and strongest practicable firebox construction, including the use of reliable boiler feeding and water level indicating devices, are indicated by plates 1 to 16, inclusive, to which special attention is directed. In order that the number of this class of accidents and the effects thereof might be minimized, these questions have been referred to in my former annual reports.

## EXTENSION OF TIME FOR REMOVAL OF FLUES

Two hundred and eighty-two applications were filed for extensions of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 12 of these cases the condition of the locomotives was such that extensions could not properly be granted. Nineteen were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Forty-four extensions were granted after defects disclosed by our investigations had been repaired. Twenty-seven applications were canceled for various reasons. One hundred and eighty applications were granted for the full periods requested.

## SPECIFICATION CARDS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 1,242 specification cards and 7,500 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 numerous discrepancies found.

Under rules 328 and 329 of the Rules and Instructions for Inspection and Testing of Locomotives Other Than Steam, 70 specifications and 123 alteration reports were filed for locomotive units and 23 specifications and 6 alteration reports were filed for boilers mounted on locomotives other than steam. These were checked and analyzed and corrective measures taken with respect to discrepancies found.

## SUITS FOR PENALTIES

Eleven suits for penalties, involving 241 counts for alleged violations of the Locomotive Inspection Law and Rules, were pending in the various district courts at the beginning of the year. Information of violations was lodged with the proper United States attorneys in three cases, involving 39 counts. Judgments in favor of the Government were obtained in 11 cases, involving 236 counts; 107 counts were dismissed by stipulation or agreement and penalties imposed on 129 counts in the sum of \$12,900. Three cases, involving 44 counts, were pending in the district courts at the end of the year. The following is a brief summary of the cases:

## CASES PENDING AT THE BEGINNING OF THE YEAR AND DISPOSED OF DURING THE YEAR

*U. S. v. Erie Railroad Company*, western district of New York, involved 45 counts for use of locomotives while defective and in violation of rules. Judgment on 38 counts for \$3,800; 7 counts dismissed.

*U. S. v. Erie Railroad Company*, northern district of Ohio, involved 6 counts for use of locomotives while defective and in violation of rules. Judgment on 5 counts for \$500; 1 count dismissed.

*U. S. v. Erie Railroad Company*, southern district of New York, involved 12 counts for use of locomotives while defective and in violation of rules. Judgment on 9 counts for \$900; 3 counts dismissed.

*U. S. v. Lake Superior & Ishpeming Railroad Company*, western district of Michigan, involved 15 counts for permitting the use of locomotives while defective and in violation of rules. Judgment on 8 counts for \$800; 7 counts dismissed.

*U. S. v. Minneapolis, St. Paul & Sault Ste. Marie Railway Company*, district of Minnesota, involved 30 counts for violations of cab-curtain order. Judgment on 2 counts for \$200; 28 counts dismissed.

*U. S. v. The New York, Chicago & St. Louis Railroad Company*, northern district of Indiana, involved 53 counts for use of locomotives while defective and in violation of rule 157. Judgment on 20 counts for \$2,000; 33 counts dismissed.

*U. S. v. Pittsburg & Shawmut Railroad Company*, western district of Pennsylvania, involved 4 counts for use of locomotives while defective and in violation of rules 122 and 123. Judgment on 4 counts for \$400.

*U. S. v. Pittsburgh & West Virginia Railway Company*, western district of Pennsylvania, involved 20 counts for use of locomotives while defective and in violation of rules. Judgment on 20 counts for \$2,000.

*U. S. v. Tennessee Railroad Company*, eastern district of Tennessee, involved 10 counts for use of locomotives while in defective condition

and in violation of rules. Judgment on 7 counts for \$700; 3 counts dismissed.

*U. S. v. Western Maryland Railway Company*, district of Maryland, involved 16 counts for use of locomotives while defective, in violation of rules, and for failure to preserve intact parts affected by accident. Judgment on 8 counts for \$800; 8 counts dismissed.

## CASES INSTITUTED AND DISPOSED OF DURING THE YEAR

*U. S. v. Chicago, St. Paul, Minneapolis & Omaha Railway Company*, district of Minnesota, involved 25 counts for use of locomotive while in violation of rules 104 and 116 (f). Judgment on 8 counts for \$800; 17 counts dismissed.

## CASES PENDING AT THE CLOSE OF THE YEAR

*U. S. v. Chicago, Indianapolis & Louisville Railway Company*, northern district of Indiana, involves 10 counts for use of locomotive while in violation of cab-curtain order.

*U. S. v. Chicago, Springfield & St. Louis Railway Company*, southern district of Illinois, involves 30 counts for use of locomotives while defective and in violation of rules.

*U. S. v. The Pennsylvania Railroad Company*, northern district of Indiana, involves 4 counts for use of locomotives while defective and in violation of fire-door order.

## AMENDMENTS TO RULES FOR INSPECTION AND TESTING OF STEAM LOCOMOTIVES AND TENDERS

The part of the commission's order dated February 21, 1929, promulgating rule 118, applying to equipment of new locomotives with mechanically operated fire doors, together with the provision applicable to maintenance of fire doors became fully effective on April 1, 1929, and the part of the order applying to equipment of existing locomotives with mechanically operated fire doors when receiving classified repairs became fully effective on July 1, 1929. The terms of the order are being generally complied with, however some of the mechanically operated fire doors that were at first applied as a result of the order contained inherent defects that precluded proper operation; these are now being replaced by fire doors that are apparently satisfactory.

## APPEALS

No formal appeal by any carrier was taken from the decisions of any inspector during the year.

A. G. PACK, *Chief Inspector.*

### ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES AND TENDERS AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1930, BY ROADS

[A star (\*) indicates accidents taken from records of the Bureau of Statistics of the Interstate Commerce Commission. A double star (\*\*) indicates accidents not properly reported, as required by rules 55 and 162. A complete investigation, 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:

July 9, 1929, locomotive 1472, Chicago, Ill. Left sander air pipe leaking at union near sand dome; 1 injured.

\*August 14, 1929, locomotive 1640, Coconino, Ariz. Rear coupler on locomotive failed, resulting in sudden stop of passenger train; old defect in coupler shank covering approximately 40 per cent of cross-sectional area; 5 injured.

\*\*November 10, 1929, locomotive 3222, Dodge City, Kans. Broken driving-wheel tire came off and locked wheel, causing emergency stop. Locomotive had been continued in use for 79 miles after break in tire was found and reported; 1 injured.

\*\*June 10, 1930, locomotive 2122, Chicago, Ill. Packing nut on blower pipe worked loose; 1 injured.

Four accidents; 8 injured.

#### ATLANTA, BIRMINGHAM & COAST RAILROAD:

June 20, 1930, locomotive 54, LaGrange, Ga. Injector delivery pipe failed at front collar while repairs were being made to stop leak; collar cracked and defective; stop cock of boiler check would not seat properly on account of accumulation of scale on the seat and valve; 1 injured.

One accident; 1 injured.

#### ATLANTIC COAST LINE RAILROAD:

\*\*July 26, 1929, locomotive 1636, South Rocky Mount, N. C. Extension handle to main steam valve to lubricator disconnected; 1 injured.

\*\*August 13, 1929, locomotive 1708, Richmond, Va. Hot water discharged out of coal-pusher lubricator when filling plug was removed; coal-pusher throttle leaking; 1 injured.

March 31, 1930, locomotive 1044, Winona, S. C. Crown sheet failure, caused by overheating due to low water; 2 injured.

\*\*May 8, 1930, locomotive 1514, near Lodge, Ga. Main rod strap failed, causing derailment of two locomotives and seven cars of passenger train moving about 60 miles per hour; strap broke at back end, due to fissure in the forging; 2 injured.

Four accidents; 6 injured.

#### BALTIMORE & OHIO RAILROAD:

August 28, 1929, locomotive 2517, Adamstown, Md. Injector warning valve inoperative. Engineer injured while leaning out cab window endeavoring to determine whether injector was working; 1 injured.

August 29, 1929, locomotive 2940, Parkersburg, W. Va. Grate connecting rod broke, causing fireman's hand to be caught between grate shaker lever and cab; connecting rod had been burned and reduced in diameter due to overheating; 1 injured.

October 11, 1929, locomotive 5217, Washington, D. C. Small step on pilot broke, due to old flaw, causing inspector to fall into inspection pit; 1 injured.

October 11, 1929, locomotive 2896, Fort Ritner, Ind. Bolt used as a stop for ash-pan slide lost out, or was sheared off, permitting slide to overtravel; 1 injured.

November 28, 1929, locomotive 1149, Bridgeport, Ohio. Knuckle dropped out of front coupler on locomotive; 1 injured.

December 8, 1929, locomotive 613, Pittsburgh, Pa. Caps missing from ends of water pipe for washing ashes off front ash-pan slope, permitting hot cinders to be blown into fireman's face when he opened ash-pan blow-off cock; ends of water pipes burned off due to overheating above ash-pan wings where there was little clearance; 1 injured.

April 15, 1930, locomotive 369, Baltimore, Md. Shaker bar slipped off lever, causing fireman to lose his balance and trip on edge of cab apron and fall out of

gangway; engine low on left side causing apron to stand away from tender deck 2 inches on right side and front edge of apron to be raised  $\frac{3}{4}$  inch above cab floor; 1 injured.

April 20, 1930, locomotive 6220, Laughlin Junction, Pa. Displaced bearing bar caused grates to interfere while being shaken; 1 injured.

June 3, 1930, locomotive 2741, Lore City, Ohio. Handhold above cab windows broke, due to old fracture in bend at front connection covering approximately 65 per cent of cross-sectional area; 1 injured.

Nine accidents; 9 injured.

#### BELT RAILWAY OF CHICAGO:

October 23, 1929, locomotive 130, Chicago, Ill. Front coupler on locomotive slipped by coupler on car, causing emergency application of brakes; coupler on locomotive was  $1\frac{1}{2}$  inches below the minimum prescribed standard height; 2 injured.

December 15, 1929, locomotive 90, Clearing, Ill. Grate shaker lever became disconnected from rods, due to connecting pin losing out; 1 injured.

Two accidents; 3 injured.

#### BOSTON & ALBANY RAILROAD:

\*July 29, 1929, locomotive 1431, Worcester, Mass. Blower-valve handle disconnected; 1 injured.

December 5, 1929, locomotive 594, near Springfield, Mass. Brakes went into emergency causing sudden stop; brake equipment reported defective on November 29 and December 4 and 5; 1 injured.

\*\*April 16, 1930, locomotive 1408, West Springfield, Mass. Shaker bar slipped off lever, due to improper fit; shaker bar defective and levers worn; 1 injured.

\*\*June 22, 1930, locomotive 1423, near Worcester, Mass. Conveyor pawl shifter of right stoker would not stay in neutral position; pawl spring missing and idling pin stuck; 1 injured.

Four accidents; 4 injured.

#### BOSTON & MAINE RAILROAD:

September 1, 1929, locomotive 3009, near North Adams, Mass. Flue broke off at front flue sheet; flue had been excessively rolled and reduced to approximately  $\frac{1}{16}$  inch in thickness in an endeavor to stop leakage; 1 injured.

November 15, 1929, locomotive 3029, Mechanicville, N. Y. Washout cap in bottom of boiler barrel blew out; threads in cap badly worn; upper threads on flanged pad filled with dirt and hard scale and lower threads badly worn; cap reduced to  $\frac{1}{16}$  inch in depth by application of two sheet iron liners and a copper-asbestos gasket; cap could be slipped on pad for  $\frac{3}{8}$  inch, or  $4\frac{1}{2}$  threads, without being turned; 1 injured.

January 3, 1930, locomotive 1421, Marlboro, Mass. Steam-valve bonnet turned out of air compressor throttle valve; threads on valve stem distorted; pump throttle reported on December 21, 23, 25, 26, and January 1; 1 injured.

May 18, 1930, locomotive 651, East Cambridge, Mass. Fire hose blew off coupling, due to not being securely attached; 1 injured.

June 5, 1930, locomotive 2659, Rummey, N. H. Water-glass steam-pipe fitting broke flush with body of valve; fitting of poor material; 1 injured.

June 9, 1930, locomotive 2406, Malden, Mass. Grease cup plug thrown from cup at back end of eccentric rod; 1 injured.

June 16, 1930, locomotive 3022, Lincoln, Mass. Employee's hand injured on sharp end of a piece of wire attached to whistle wire to form an extension; 1 injured.

Seven accidents; 7 injured.

#### BUFFALO, ROCHESTER & PITTSBURGH RAILWAY:

January 31, 1930, locomotive 752, Johnsonburg, Pa. Tube broke off at defective safe end weld; 2 injured.

One accident; 2 injured.

#### CENTRAL OF GEORGIA RAILWAY:

\*July 27, 1929, locomotive 57, Savannah, Ga. Employee struck knee on bolt protruding from footboard hanger; bolt too long; 1 injured.

One accident; 1 injured.

#### CENTRAL RAILROAD OF NEW JERSEY:

July 22, 1929, locomotive 771, Manasquan, N. J. Bonnet blew out of drifting valve supply valve, due to threads in bonnet spanner nut being badly worn; 1 injured.



\*\* September 14, 1929, locomotive 859, Dunellen, N. J. Bull ring in cylinder broke, causing cylinder head to be knocked off. A piece of the broken bull ring or packing struck a laborer who was working near the track; 1 injured.

December 8, 1929, locomotive 43, Tremley, N. J. Insufficient clearance between reverse lever slide and brake pipe; 1 injured.

\*\* December 18, 1929, locomotive 37, Newark, N. J. Front footboard caught on rail, due to front driving spring being missing, and bent back under locomotive, throwing employee to the ground; apparently locomotive had been in service with spring missing for some time; 1 injured.

April 14, 1930, locomotive 227, Bayonne, N. J. Metal shelf attached to back wall of cab became disconnected and fell, striking employee's foot; shelf not properly secured in place; 1 injured.

April 24, 1930, locomotive 929, Glen Onoko, Pa. Wrist pin failed flush with crosshead due to old fractures covering approximately 80 per cent of cross-sectional area; 2 injured.

April 28, 1930, locomotive 660, Wilkes-Barre, Pa. Insufficient clearance between tender deck and grate-shaking lever fulcrum and dump-grate lock casting; 1 injured.

May 10, 1930, locomotive 774, West Easton, Pa. Injector steam pipe collar failed; collar not properly brazed to steam pipe; injector overflow pipe clamp loose at frame connection permitting pipe to work and vibrate injector; injector anchor bracket loose on boiler stud. Excessive vibration of injector had been reported seven times prior to accident; 1 injured.

Eight accidents; 9 injured.

#### CHESAPEAKE & OHIO RAILWAY:

\*\* August 8, 1929, locomotive 1204, Henry, Ind. Scalded when attempt was made to clean strainer in supply line to feed water pump; 1 injured.

One accident; 1 injured.

#### CHICAGO & ALTON RAILROAD:

November 4, 1929, locomotive 53, Kansas City, Mo. Blow-off cock operating lever became disconnected from valve stem account of the grip nut securing operating lever working off valve stem; threads on valve stem in poor condition and nut a poor fit on stem; 1 injured.

April 8, 1930, locomotive 625, Higbee, Mo. Boiler check drain valve leaking; 1 injured.

Two accidents; 2 injured.

#### CHICAGO & NORTH WESTERN RAILWAY:

July 27, 1929, locomotive 2314, Ironwood, Mich. Tender brake pipe angle-cock handle safety stop was broken permitting angle cock to slip by center and fail to shut air off completely when tender was being uncoupled, causing air hose to swing around and strike employee; 1 injured.

\* August 1, 1929, locomotive 1069, Newald, Wis. Water glass burst; 1 injured.

August 22, 1929, locomotive 2556, near Dalton, Wis. Washout plug blew out of front flue sheet while train was going 25 miles per hour; plug not properly tightened when applied. Excessive openings around fire door permitted cab to be so quickly filled with hot water and steam that crew were forced to leave the cab before closing throttle or applying the brakes and train ran uncontrolled for 1½ miles before coming to a stop; 2 injured.

\*\* August 29, 1929, locomotive 1603, near Waunakee, Wis. Main rod broke, due to old fracture covering approximately 80 per cent of cross-sectional area; 4 injured.

October 2, 1929, locomotive 94, Ringwood, Ill. Bell clapper broke at eye and fell out, striking fireman on the head; clapper was worn at point of failure to less than one-half of its original thickness and metal was crystallized; 1 injured.

November 6, 1929, locomotive 683, Eland, Wis. Water from leaky tender tank permitted ice to accumulate on tender sill steps; a crack, approximately 3 inches long, in sheet between tender water leg and rear wall of tank box; tank reported leaking on November 4 and 6 (previous to accident) and two times on November 7; 1 injured.

\*\* November 10, 1929, locomotive 2202, near South Milwaukee, Wis. Insufficient clearance between reverse lever latch and foot rest on front end of quadrant account of stop pin missing from quadrant; 1 injured.

March 7, 1930, locomotive 2100, Cedar Rapids, Iowa. Driving brake hanger post broke off at frame connection; 1 injured.

Eight accidents; 12 injured.

#### CHICAGO, BURLINGTON & QUINCY RAILROAD:

\*\* July 20, 1929, locomotive 6139, Mooresville, Mo. Insufficient clearance between friction clutch secondary handle of stoker and blower valve handle; 1 injured.

July 22, 1929, locomotive 4989, Plymouth, Ill. Main driving axle broke just inside of driving wheel bearing, due to old fracture covering approximately 65 per cent of cross-sectional area; 1 injured.

September 12, 1929, locomotive 7011, Fairmont, Nebr. Manhole cover gave way account of hinge being broken, causing employee to fall into tank; 1 injured.

September 13, 1929, locomotive 2835, Villisca, Iowa. Steam heat throttle valve bonnet blew out due to improper repairs having been made to throttle valve bonnet joint. (Bonnet had been built up by fusion welding, but the bronze deposit did not fuse properly, leaving an unattached shell which broke and permitted bonnet to blow out); 1 injured.

September 23, 1929, locomotive 5020, Wymore, Nebr. Water glass burst, breaking a piece out of shield, injured while closing water-glass cocks; 1 injured.

September 26, 1929, locomotive 5005, Napier, Mo. Insufficient clearance between cab windshield and top tender step; 1 injured.

\*\* January 26, 1930, locomotive 2849, East Dubuque, Ill. Boiler check stuck open; 1 injured.

February 2, 1930, locomotive 655, near Mystic, S. Dak. Main rod strap broke due to old fracture at back end of top strap covering more than four-fifths of cross-sectional area; 1 injured.

Eight accidents; 8 injured.

#### CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

July 2, 1929, locomotive 2769, Milwaukee, Wis. Right eccentric arm improperly located on main crank pin, preventing reverse lever from operating properly; 1 injured.

January 9, 1930, locomotive 8128, near Red Wing, Minn. Crown sheet failure caused by overheating, due to low water; left tank valve was found disconnected and in closed position; left injector reported as not supplying the boiler on December 25, 26, 27, 28, January 1, 3, and 4; 3 injured.

January 31, 1930, locomotive 2702, near Beloit Junction, Wis. Main rod broke due to old fracture; 1 injured.

February 27, 1930, locomotive 2763, near Northfield, Minn. Main driving axle broke due to old flaw extending over more than five-eighths of cross-sectional area; 1 injured.

Four accidents; 6 injured.

#### CHICAGO RIVER & INDIANA RAILROAD:

February 27, 1930, locomotive 360, Chicago, Ill. Water glass burst; cut by flying glass; left glass of water-glass shield was found lying on cab deck, it apparently having not been replaced after boiler washout; 1 injured.

One accident; 1 injured.

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

July 21, 1929, locomotive 1965, Barnett, Mo. Left front cab door fell off, due to being insecurely fastened; "Put left front cab door in place on hinges" was reported at end of previous trip; 1 injured.

September 8, 1929, locomotive 855, Little Rock, Ark. Chain extending from interior of cab to damper at rear of boot on oil-burning locomotive dropped down through deck, due to ring handle being missing (locomotive was moved while fireman was making repairs); 1 injured.

\*\* November 17, 1929, locomotive 2303, Manly, Iowa. Reflex type water glass burst; 1 injured.

March 27, 1930, locomotive 1909, Bucklin, Kans. Fusion-welded transverse seam in door sheet above fire door failed for entire width of door sheet; 1 injured.

\*\* May 9, 1930, locomotive 2019, Kansas City, Kans. Brake-beam hanger became disengaged from bracket; hanger bracket reported loose on May 3, 6, 8, 9, 16, 17, 18, and 19; 1 injured.

\*\* May 20, 1930, locomotive 1778, Calvin, Okla. Welding which secured grease cup to main rod was cracked, making a small hole from which hot grease spurted out when plug was being screwed down; 1 injured.

June 10, 1930, locomotive 1497, Oskaloosa, Iowa. Boiler tube failed at safe end weld; overheated in welding; 1 injured.

Seven accidents; 7 injured.

## CLEVELAND, CINCINNATI, CHICAGO &amp; ST. LOUIS RAILWAY:

October 19, 1929, locomotive 6073, near Johnson, Ind. Insufficient clearance between reverse lever and feed-water pipe; 1 injured.

March 4, 1930, locomotive 7463, Gallion, Ohio. Uncoupling-lever bracket broke, due to old fracture through 80 per cent of cross-sectional area; 1 injured. Two accidents; 2 injured.

## DELAWARE &amp; HUDSON RAILROAD CORPORATION:

August 24, 1929, locomotive 1012, Dickson, Pa. Flue failed at front flue sheet, due to having been excessively worked; 1 injured.

\*\*April 29, 1930, locomotive 608, South Junction, N. Y. Crank became disconnected from bell yoke, due to pin shearing off; 1 injured. Two accidents; 2 injured.

## DELAWARE, LACKAWANNA &amp; WESTERN RAILROAD:

July 28, 1929, locomotive 161, Secaucus, N. J. Fire hose burst; 1 injured.

January 11, 1930, locomotive 1024, Harrison, N. J. Tube failed at prosser groove adjacent to back flue sheet; tube had been excessively worked and reduced to approximately  $\frac{1}{2}$  inch in thickness at point of failure; 1 injured. Two accidents; 2 injured.

## DENVER &amp; RIO GRANDE WESTERN RAILROAD:

\*August 6, 1929, locomotive 942, Garfield, Utah. Floor board at edge of cab floor missing; 1 injured.

\*\*November 16, 1929, locomotive 1407, Soldier Summit, Utah. Superheater flue broke off, due to thin safe end; safe end apparently not of proper thickness when applied; 1 injured.

January 15, 1930, locomotive 54, Denver, Colo. Grates burned and warped, rendering them difficult to operate; 1 injured. Three accidents; 3 injured.

## DETROIT, TOLEDO &amp; IRONTON RAILROAD:

August 29, 1929, locomotive 306, Springfield, Ohio. Fire door stuck in open position due to fire-door guide being out of line; 1 injured.

One accident; 1 injured.

## ERIE RAILROAD:

August 28, 1929, locomotive 3176, near Graham, N. Y. Superheater flue failed for about two-thirds of its circumference at prosser groove flush with back flue sheet; metal at point of failure reduced to approximately one-sixteenth inch in thickness; 1 injured.

September 13, 1929, locomotive 2929, Binghamton, N. Y. Fire door closed suddenly after having stuck in open position; excessive lost motion between door and slides allowing door to tilt; fire door was reported defective on September 11 and repairs reported to have been made; 1 injured.

\*\*September 18, 1929, locomotive 3016, Glen Echo, Ohio. Water gauge burst, breaking sight glass in water-gauge shield; flying glass struck engineer, causing loss of sight in one eye; 1 injured.

October 2, 1929, locomotive 4126, Nay-Aug, Pa. Steam pipe failed inside of smoke box, causing back draft (a piece approximately  $26\frac{1}{2}$  by 14 inches was blown out); steam pipe was of poor material and uneven thickness, being one-half inch less in thickness at one side of rupture than required by company's standard; 1 injured.

October 5, 1929, locomotive 3084, Huntington, Ind. Whistle lever broke at fusion weld, causing engineer to lose his balance and fall from cab window; 1 injured.

\*\*October 30, 1929, locomotive 3132, Blackwell, Pa. Grate stuck open while being shaken; excessive lost motion in shaker post; grate side carrier iron not properly secured in bracket allowing carrier iron to tip inward, destroying clearance between grates and carrier and causing grates to bind; 1 injured.

November 9, 1929, locomotive 3301, Allegany, N. Y. Steam grate shaker power arm moved back suddenly striking employee; throttle valve to grate shaker leading due to a groove cut into seat; 1 injured.

December 23, 1929, locomotive 2513, Collins, N. Y. Insufficient clearance between fire-door air valve and reverse lever; 1 injured.

Eight accidents; 8 injured.

## GRAND TRUNK WESTERN RAILWAY:

\*\*August 20, 1929, locomotive 664, Holly, Mich. Driving-wheel brake-hanger pin broke due to old fracture and material crystallized; 1 injured.

One accident; 1 injured.

## GREAT NORTHERN RAILWAY:

September 6, 1929, locomotive 2004, Goodland, Minn. Bolts in coupler carrier iron broke, permitting carrier iron to pull away from tender end sill and coupler to drop causing tender to uncouple from train; resulting emergency application of brakes caused brakeman to be thrown against seat box in caboose; old fractures in the two carrier iron bolts on one side extending over approximately 50 per cent of cross-sectional area; 1 injured.

February 15, 1930, locomotive 2004, Cambridge, Minn. Steam thaw-out hose blew off connection due to being insecurely clamped; 1 injured.

February 27, 1930, locomotive 1456, Crookston, Minn. Crushed by falling coal hopper on tender. Hopper had stuck in raised position due to operating piston overtraveling because of insecurely attached and defective nonpressure cylinder head; 1 injured.

Three accidents; 3 injured.

## GULF, COLORADO &amp; SANTA FE RAILWAY:

September 3, 1929, locomotive (A. T. & S. F.) 1900, near Miles, Tex. Main driving axle broke, due to old fractures covering approximately 90 per cent of cross-sectional area; 1 injured.

November 25, 1929, locomotive 761, Silsbee, Tex. Water glass burst; injured while closing water-glass cocks; 1 injured.

Two accidents; 2 injured.

## HARBOR BELT LINE RAILROAD:

May 15, 1930, locomotive (A. T. & S. F.) 2103, San Pedro, Calif. Throttle fulcrum lever broke, permitting throttle valve to open while reverse lever was in extreme forward position, causing locomotive to run into turntable pit; failure occurred at old fracture transversely in line with a disused hole which had been plugged; metal around point of failure badly crystallized; 1 injured.

One accident; 1 injured.

## ILLINOIS CENTRAL SYSTEM:

\*\*July 19, 1929, locomotive 208, Louisville, Ky. Lubricator filling plug blew out when attempt was made to tighten it; threads on plug badly worn; 1 injured.

July 29, 1929, locomotive 5004, Robinsonville, Miss. Squirt-hose valve handle defective; 1 injured.

\*\*August 26, 1929, locomotive 1830, Mattoon, Ill. Scalded due to leaky squirt-hose valve; 1 injured.

\*\*September 25, 1929, locomotive 1896, Markham, Ill. Brakeman's cab seat would not drop properly and permit passage, due to being so wide that it fouled on boiler head, and when employee placed his knee on seat in attempt to reach over it, the seat tipped over causing his knee to strike on boiler stud; cab-seat supporting hinge loose account of screws missing; 1 injured.

\*\*November 29, 1929, locomotive 1884, Aetna, Ill. Blower-valve bonnet blew out; valve was leaking and when attempt was made to tighten it, bonnet broke at root of thread at old flaw covering approximately 80 per cent of cross-section; 1 injured.

January 23, 1930, locomotive 1171, Broadview, Ill. Water glass burst; injured while closing water glass cocks; 1 injured.

\*June 18, 1930, locomotive 178, Louisville, Ky. Water glass burst; injured while shutting off water-glass valves; 1 injured.

Seven accidents; 7 injured.

## INTERNATIONAL-GREAT NORTHERN RAILROAD:

September 7, 1929, locomotive 1102, Taylor, Tex. Cut by flying glass from burst reflex type water gauge; 1 injured.

December 12, 1929, locomotive (M. P.) 6422, Houston, Tex. Insufficient clearance between reverse lever and air pipe; 1 injured.

Two accidents; 2 injured.

## KANSAS CITY SOUTHERN RAILWAY:

August 24, 1929, locomotive 550, Air Line Junction, Mo. Fire door operating link disconnected from piston pin permitting fire-door wings to close unexpectedly and catch fireman's hand; left wing bolt and hole in link badly worn and

excessive lateral worn between left wing and cylinder apron; "The link that connects fire-door wings together slips off, can't operate door" was reported at conclusion of incoming trip on August 24, and report approved by foreman though proper repairs had not been made; 1 injured.

March 5, 1930, locomotive 516, Heavener, Okla. Grate-shaker reach rod disconnected from front section of grates due to connecting bolt missing; 1 injured.

June 26, 1930, locomotive 807, Pittsburg, Kans. Insufficient tension in valve gear counterbalance spring and insufficient clearance between boiler and reverse shaft offset; 1 injured.

Three accidents; 3 injured.

#### LAKE ERIE & EASTERN RAILROAD:

June 10, 1930, locomotive 9187, Youngstown, Ohio. Water glass burst; injured while closing top water-glass cock; 1 injured.

One accident; 1 injured.

#### LEHIGH VALLEY RAILROAD:

October 28, 1929, locomotive 1139, East Ithaca, N. Y. Main-rod strap broke, due to old flaw at adjusting-wedge bolt hole; 1 injured.

October 28, 1929, locomotive 1812, Sayre, Pa. Squirt hose parted at splice; hose spliced with a nipple and no clamps were applied to hold parts together; 1 injured.

\*\*January 6, 1930, locomotive 369, Plainsville, Pa. Whistle valve stuck open; 1 injured.

January 24, 1930, locomotive 758, Cranford, N. J. Employee injured when his foot caught on raised edge of tender deck pan; bolt securing right back corner of deck pan was missing and compaction of coal between tender deck and deck pan had raised rear edge of deck pan  $2\frac{1}{4}$  inches above tender deck; rear edge of deck pan was broken and rough in numerous places; 1 injured.

April 25, 1930, locomotive 708, Athens, Pa. Iron tool box dropped from top of tender cistern due to failure of fusion welding that had been applied to hold it in place; 1 injured.

Five accidents; 5 injured.

#### LOS ANGELES & SALT LAKE RAILROAD:

\*\*January 21, 1930, locomotive 5509, near Stockton, Utah. Left guides and guide yoke broke, causing locomotive to be stripped on that side; 1 injured.

One accident; 1 injured.

#### LOUISVILLE & NASHVILLE RAILROAD:

\*\*July 1, 1929, locomotive 902, Cincinnati, Ohio. Insufficient clearance between end of apron and tender-cistern anchor bolt; anchor bolt improperly applied; 1 injured.

July 8, 1929, locomotive 1224, Opp, Ala. Sprinkler pipe leaking under cab, due to hole rusted through  $\frac{1}{2}$ -inch union in pipe; 1 injured.

July 12, 1929, locomotive 2075, Birmingham, Ala. Squirt hose burst due to having been burned; 1 injured.

\*\*July 28, 1929, locomotive 1482, Flat Shoals, Ky. Back end main rod strap broke, due to old fracture covering approximately 90 per cent of cross-sectional area; "Back end of left main rod pounding" was reported on previous day and report indicated that repairs were made. A proper inspection of driving gear at this time would have disclosed the defective condition of strap; 1 injured.

\*\*September 2, 1929, locomotive 1795, Geddes, Ky. Squirt hose valve leaking; valve seat badly cut; 1 injured.

\*\*October 4, 1929, locomotive 2129, Radnor, Tenn. Engineer's view was obstructed by steam escaping from injector overflow pipe, which prevented him from observing a stop signal, resulting in a collision; boiler check seat badly cut; 1 injured.

January 4, 1930, locomotive 150, near Winchester, Ky. Injured while operating reverse lever; right valve and valve seat were cut and left valve yoke fitted too tight on valve, causing reverse lever to be difficult to operate; 1 injured.

January 16, 1930, locomotive 1003, Barbourville, Ky. Eccentric strap bolts failed; 1 injured.

February 7, 1930, locomotive 1831, near Lebanon Junction, Ky. Crown-sheet failure caused by overheating due to low water; a  $\frac{3}{4}$ -inch iron washer crosswise in right injector throttle reduced the opening approximately 83 per cent; check valve missing from warning-pipe connection to left injector; many of the apertures had been handled prior to this investigation and their conditions at time of accident could not be determined; 1 injured.

March 16, 1930, locomotive 1100, Glendale, Tenn. Main rod broke at old weld about two feet from front end, due to old fracture covering approximately 65 per cent of cross-sectional area; 1 injured.

March 18, 1930, locomotive 1556, Kinney, Tenn. Crown-sheet failure caused by overheating, due to low water; 2 killed, 1 injured.

June 26, 1930, locomotive 411, near Rocky Hill, Ky. Main rod broke at old fracture covering approximately 20 per cent of cross-sectional area; 1 injured.

Twelve accidents; 2 killed, 12 injured.

#### MAINE CENTRAL RAILROAD:

March 21, 1930, locomotive 508, Clinton, Me. Angle iron over tender sill step loose and projecting over step, causing employee's foot to slip off step; 1 injured.

\*June 6, 1930, locomotive 624, Woodfords, Me. Brakes applied in emergency causing sudden stop; defective brake-pipe vent valve gasket on tender; 1 injured.

Two accidents; 2 injured.

#### MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY:

July 27, 1929, locomotive 2644, Stevens Point, Wis. Right front footboard loose on brackets, due to nuts missing from three of the bolts securing footboard to hangers and nut on the remaining bolt was very loose; "Tighten right front footboard to bracket" was reported on July 24; 1 injured.

December 7, 1929, locomotive 712, Enderlin, N. Dak. Bonnet screwed out of blow-down valve in auxiliary steam dome; 1 injured.

December 18, 1929, locomotive 1022, Enderlin, N. Dak. Arm rest gave way due to brackets not being properly secured; 1 injured.

Three accidents; 3 injured.

#### MISSOURI-KANSAS-TEXAS LINES:

\*July 19, 1929, locomotive 392, Brewer, Okla. Rear axle of engine truck broke, due to old defect; 1 injured.

December 10, 1929, locomotive 508, Rising Star, Tex. Driving brake-beam hanger post broke off at fillet of shoulder between hanger and enlarged portion of post; old fracture at point of failure and metal crystallized; 1 injured.

December 14, 1929, locomotive 261, near Albany, Tex. Tender axle broke, due to old fracture covering approximately 60 per cent of cross-sectional area, causing tender and three cars to derail; previous to accident, tender axle had been grooved and dented for a distance of 7 inches and the fracture started at bottom of this groove; 2 injured.

December 21, 1929, locomotive 639, Houston, Tex. Drawbar broke through back pin hole and both safety chains broke at defective welds in links allowing locomotive and tender to separate, throwing employee who was in gangway to the ground; drawbar crystallized around pin hole; 1 injured.

\*\*April 12, 1930, locomotive 478, Plasterco Junction, Tex. Engine truck driver equalizer broke, allowing front end of locomotive to drop and strike the rails; failure occurred through internal transverse flaw in equalizer below center pin hole covering approximately 20 per cent of cross-sectional area; 1 injured.

Five accidents; 6 injured.

#### MISSOURI PACIFIC RAILROAD:

\*July 18, 1929, locomotive 503, Nashville, Ark. Flooder valve to ash pan became disconnected; 1 injured.

October 21, 1929, locomotive 1241, Dupon, Ill. Board in false tender deck split  $3\frac{1}{2}$  inches from outside edge when engineer stepped on it and end board gave way, due to not being properly nailed; 1 injured.

October 25, 1929, locomotive 5335, near Middlebrook, Mo. Cut by glass when stoker steam-gauge glass burst; soldered joint between gauge tube and fitting failed, permitting pressure to build up back of glass; 1 injured.

\*\*December 6, 1929, locomotive 1509, Dozier, Mo. Throttle valve in steam line to grate-shaking apparatus leaking and operating levers dropped from neutral position due to catches being worn, permitting pressure to build up in shaker cylinder and cause power arm to move forward unexpectedly, catching fireman's finger between power arm dog and housing; 1 injured.

\*\*March 14, 1930, locomotive 137, near Myrick, Mo. Blow-off cock rod too long, preventing blow-off cock from closing; 1 injured.

\*\*March 20, 1930, locomotive 1318, Randles, Mo. Fire door stuck open; air cylinder not lubricated and cushion valves missing; 1 injured.

Six accidents; 6 injured.

## MOBILE &amp; OHIO RAILROAD:

January 30, 1930, locomotive 48, Jackson, Tenn. Spring hanger broke; one side of hanger at gib hole broken for some time; 1 injured.  
One accident; 1 injured.

## NASHVILLE, CHATTANOOGA &amp; ST. LOUIS RAILWAY:

\*\*July 19, 1929, locomotive 535, Chattanooga, Tenn. Back bracket of front section of right running board loose on smoke box account of nuts on bracket bolt having worked loose, causing employee to fall; 1 injured.

February 8, 1930, locomotive 663, Cowan, Tenn. Improvised water-crane hook slipped off crane, causing employee to fall from top of tank; locomotive not equipped with a proper water-crane hook; 1 injured.

\*May 13, 1930, locomotive 605, Nashville, Tenn. Power reverse piston rod broke; 1 injured.

Three accidents; 3 injured.

## NEW YORK CENTRAL RAILROAD—EAST:

\*August 14, 1929, locomotive 3743, Savannah, N. Y. Injured by steam from oil separator vent when attempting to measure water in tender cistern; 1 injured.

September 3, 1929, locomotive 3092, Saranac Lake, N. Y. Crown-sheet failure caused by overheating, due to low water; 1 injured.

December 24, 1929, locomotive 3685, Schenectady, N. Y. Grate-shaker bar broke through defective weld connecting socket to shaker bar handle; 1 injured.

January 4, 1930, locomotive 5146, near Winburne, Pa. While attempting to remove obstruction from stoker elevators, stoker started to operate and caught employee's hand in right elevator; stoker throttle valve defective and had been reported leaking on December 1, 4, 9, 17, 20, 24, 26, 28, and January 3 (two times); right stoker elevator shifter pawl difficult to put in neutral position; 1 injured.

June 1, 1930, locomotive 3120, near Copake Falls, N. Y. Bracket supporting automatic brake valve broke due to old fracture covering approximately 90 per cent of cross-sectional area; 1 injured.

June 11, 1930, locomotive 3668, Catskill, N. Y. Main crank pin broke off flush with wheel fit, due to old flaw covering approximately 85 per cent of cross-sectional area; 1 injured.

Six accidents; 6 injured.

## NEW YORK CENTRAL RAILROAD—WEST:

\*\*September 4, 1929, locomotive 281, Toledo, Ohio. Locomotive moved forward while engineer was removing tender brake beam which had dropped down, due to hanger breaking; old fracture in hanger extending over approximately 50 per cent of cross-sectional area; air reverse cylinder slide valve leaking badly, due to seat cut and worn; teeth in reverse lever latch and notches in quadrant so badly worn that reverse lever would move forward without latch being lifted; excessive openings in lubricator chokes allowed steam pressure to build up in valve chambers; 1 injured.

September 12, 1929, locomotive 4704, Lake View, N. Y. Reverse lever latch stuck open and lever suddenly moved forward and backward jerking engineer's arm; tumbling-shaft arm loose on shaft; notches in quadrant badly worn and valves dry; reversing gear reported defective on September 6, 7, and 11; 1 injured.

October 5, 1929, locomotive 3873, Tab, Ind. Main-rod strap broke permitting rod to strike tumbling-shaft arm, throwing strain on reverse lever which caused it to break at quadrant and the upper end struck engineer; old fracture in upper section of main-rod strap extending over more than 75 per cent of cross-sectional area; 1 injured.

October 7, 1929, locomotive 5266, Kendallville, Ind. Left main crank pin failed at hub fit, due to old fractures; 3 injured.

November 25, 1929, locomotive 2596, near Ligonier, Ind. Steam pipe to left duplex stoker elevator jet broke at connection to stoker barrel due to rear furnace bearing plates being loose, permitting boiler to move and place strain on pipe at this connection; stoker pawls badly worn, allowing stoker elevator to drop to operating position when placed in neutral; proper inspection and repairs not made after enginemen reported stoker loose on October 26, 29, 31, November 11, and 22; 1 injured.

December 21, 1929, locomotive 111, Latimer, Ohio. Both lower coupler pocket bolts at front end of locomotive failed, permitting coupler pocket and coupler to raise and become disengaged from coupler of leading locomotive; 1 injured.

January 28, 1930, locomotive 12, Arnold, Ohio. Crown sheet failure caused by overheating, due to low water; lead gasket inserted between right lower water glass fitting and drain valve almost completely closed the opening; 3 killed.

April 28, 1930, locomotive 756, Buffalo, N. Y. Top slide of vertical type fire door became disconnected from operating arm due to operating arm being bent; 1 injured.

June 20, 1930, locomotive 3857, Meigs, Ohio. Main driving axle broke, due to old fracture extending from inside journal fillet through approximately 80 per cent of cross-sectional area of axle; greater part of old fracture was outside of driving box and could have been detected by inspection; 1 injured.

Nine accidents; 3 killed, 10 injured.

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

December 10, 1929, locomotive 855, Toledo, Ohio. Steam-heat hose on locomotive dropped down and caught in switch point while locomotive was moving, breaking heater throttle valve off at fountain; hose was disconnected between locomotive and tender and ends of hose fastened up with wire which came loose on locomotive, permitting locomotive end of hose to fall; 1 injured.

December 12, 1929, locomotive 397, near Russiaville, Ind. Insufficient clearance between reverse lever and boiler back head; 1 injured.

February 19, 1930, locomotive 589, near Bluffton, Ohio. Crown sheet failure caused by overheating, due to low water; right top water-glass gasket mashed over top of glass almost entirely obstructing the opening; opening in left bottom water glass cock fitting into boiler reduced by accumulation of scale to about  $\frac{3}{16}$  inch; bottom gauge-cock nipple stopped up; 3 injured.

Three accidents; 5 injured.

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

\*\*July 15, 1929, locomotive 3202, Hopewell Junction, N. Y. Grate shaker bar slipped off lever due to improper fit; 1 injured.

August 28, 1929, locomotive 1014, South Boston, Mass. Bell ringer did not operate properly; 1 injured.

\*\*September 2, 1929, locomotive 3414, Boston, Mass. Unused extension valve handle dropped down and struck fireman on head; valve handle not removed when location of fire valve was changed, nor was it securely fastened in place; 1 injured.

September 16, 1929, locomotive 834, Hyannis, Mass. Pipe bushing in boiler check valve casing broke off when fireman attempted to tighten it; bushing had been leaking previously and was corroded and worn to about  $\frac{1}{32}$  inch in thickness; 1 injured.

\*\*October 12, 1929, locomotive 1319, New Haven, Conn. Steam-heat hose broke between locomotive and head car; while shutting off steam-heat regulating valve, employee's wrist was cut on a wire which was wound around the valve; 1 injured.

\*\*October 23, 1929, locomotive 1093, Wallingford, Conn. Shaker bar slipped off post; shaker-bar keeper pin missing; 1 injured.

\*\*October 25, 1929, locomotive 3009, Congamond, Mass. Coal doors on tender very difficult to close account of hinges being sprung; 1 injured.

\*\*January 18, 1930, locomotive 1316, East Hartford, Conn. Reverse lever difficult to operate account of tight rings in valve chamber and valves dry; 1 injured.

\*\*January 21, 1930, locomotive 3247, Derby, Conn. Reach rod to front grates became disconnected while grates were being shaken; pin connecting reach rod to rocker shaft missing; 1 injured.

\*\*April 6, 1930, locomotive 3554, New London, Conn. Injured while attempting to remove two fire brick which had fallen from brick arch; 1 injured.

\*\*April 15, 1930, locomotive 1327, Hampton, Conn. Struck by reverse lever; link blocks seized in links due to being fitted too tight and quadrant became disconnected from frame; 1 injured.

Eleven accidents; 11 injured.

## NORFOLK &amp; WESTERN RAILWAY:

January 20, 1930, locomotive 1460, near Dooms, Va. Reducer in air pipe from main reservoir to ash pan blower broke off, and while engineer was on running board attempting repairs the horizontal cab handhold failed at old defect, causing him to fall to the ground; old fracture covered about 70 per cent of cross-sectional area of handhold and handhold was reduced to about three-fourths of its 1-inch nominal diameter at point of failure which was at the beginning of the flattened end at offset; 1 injured.

One accident; 1 injured.

## NORFOLK SOUTHERN RAILROAD:

\*July 10, 1929, locomotive 205, Charlotte, N. C. Handrail pulled out of socket, causing employee to fall; rivet securing handrail in socket had broken off; 1 injured.

One accident; 1 injured.

## NORTHERN PACIFIC RAILWAY:

\*\*August 7, 1929, locomotive 605, Mandan, N. Dak. Nut worked loose on arm controlling slide for automatic fire door; 1 injured.

November 14, 1929, locomotive 2253, Dilworth, Minn. Injector steam pipe collar failed; 1 injured.

\*\*November 28, 1929, locomotive 2263, Chehalis, Wash. Employee fell while attempting repairs to defective headlight; locomotive not equipped with suitable steps for the use of men in getting to and from headlight; 1 injured.

\*May 31, 1930, locomotive 2604, Sterling, N. Dak. Brake-hanger pin on tender broke or worked out, permitting brake beam to come down and cause derailment of locomotive and eight cars; 3 injured.

June 13, 1930, locomotive 1539, near Drummond, Mont. Front end netting repeatedly stopped up, necessitating cleaning while en route. While returning to cab after cleaning the netting, employee lost hold of horizontal cab handhold, due to handhold being obstructed by a flapping canvas awning, and fell to the ground; a serious leak in joint between exhaust base and saddles contributed to the clogging of the netting; 1 injured.

Five accidents; 7 injured.

## OREGON SHORT LINE RAILROAD:

November 5, 1929, locomotive 593, Kemmerer, Wyo. Fell from running board while repairing air pump; "Put gasket under oil cup to low pressure air end of pump" was reported by relief engineer; 1 injured.

January 18, 1930, locomotive 5309, Payette, Idaho. Blow-off cock lever inoperative account of pin between lever and valve stem missing; missing pin reported on January 16 and 17; 1 injured.

Two accidents; 2 injured.

## OREGON-WASHINGTON RAILROAD &amp; NAVIGATION Co.:

December 29, 1929, locomotive 1748, The Dalles, Ore. Grab iron came loose, due to nut missing from bolt securing it to bulkhead, causing employee to fall; 1 injured.

January 29, 1930, locomotive 2140, Umatilla, Ore. Brake rod to rear tender truck broke; rod had worn on the bottom and had been built up to its normal diameter by fusion welding; 1 injured.

Two accidents; 2 injured.

## PENNSYLVANIA RAILROAD:

\*July 2, 1929, locomotive 1258, Larue, Pa. Driving spring dropped from locomotive due to failure of short equalizer hanger; 1 injured.

July 4, 1929, locomotive 8903, near Dexter, Ill. Crown-sheet failure caused by overheating due to low water; 1 injured.

\*\*July 10, 1929, locomotive 8624, Scully, Pa. Reverse lever very difficult to move, account of defective valve gear; valves dry, due in part to water in boiler foaming; reversing gear reported on May 30, 31, June 2, 3, 4, 7, 10, 11, 14, 19, 20, 22, 23, 26, July 1, 9, 11, and 12, and all reports except one were approved by the foreman, indicating that repairs were made; 1 injured.

July 30, 1929, locomotive 4573, Greensburg, Pa. Glass in reflex-type water gauge burst; body of gauge slightly distorted; employee fatally injured in attempt to avoid escaping steam and hot water; 1 injured.

August 4, 1929, locomotive 4656, Altoona, Pa. Coupler and coupler pocket missing from front end of locomotive; 1 killed.

August 7, 1929, locomotive 4659, Gould, Ohio. Squirt-hose valve worked open; valve defective; 1 injured.

August 7, 1929, locomotive 6258, near Hinsdale, N. Y. Main rod broke, due to old fracture extending over approximately 50 per cent of cross-sectional area; rod reported pounding on July 2, 4, and 5; wrist pin nut reported loose on July 6, 8, 20, 23, August 3, and 7; front end main-rod key reported loose on August 2 and 5; 1 injured.

\*\*August 14, 1929, locomotive 1507, Marysville, Pa. Locomotive derailed, due to engine truck springs being out of place, causing derailment of nine cars; 1 injured.

August 18, 1929, locomotive 3719, Gallitzin, Pa. Glass in reflex-type water gauge burst; employee injured by flying glass and in attempt to avoid escaping steam and hot water; 1 injured.

August 22, 1929, locomotive 818, Nisbet, Pa. Main crank pin broke at fillet practically flush with outside face of wheel center, due to old fractures covering approximately 88 per cent of cross-section; inspection and repair reports show that considerable trouble had been experienced with bad pounds in rods and boxes; 1 injured.

\*\*August 26, 1929, locomotive 4313, Newark, Ohio. Tender brake hanger broke and dropped down and caught in switch, causing tender and second locomotive to derail; sudden stop caused brakeman to be thrown against caboose grab iron; old fracture in brake hanger extending over approximately 50 per cent of cross-sectional area; 1 injured.

\*\*September 7, 1929, locomotive 1054, near Brockway, Pa. Throttle worked open, due to defective latch, and when engineer moved reverse lever the locomotive moved back suddenly causing brakeman to be thrown against locker in caboose; 1 injured.

September 12, 1929, locomotive 4468, Swissmont, Pa. Locomotive, tender, and 10 cars derailed, due to loss of engine truck spring hanger gib; 1 injured.

October 7, 1929, locomotive 4340, Ridgeview Park, Pa. Connecting rod to ash-pan hopper door became disconnected and struck air-hose coupling between engine and tender, causing coupling to part and brakes to apply in emergency; 1 injured.

October 12, 1929, locomotive 3380, near Monmouth Junction, N. J. Track employee was struck by a part of front cylinder head which fell from a passing locomotive; center of cylinder head was knocked out by piston nut coming in contact with it due to close clearance and lost motion in main driving box and main rod; 1 injured.

October 19, 1929, locomotive 1511, Sharpsburg, Pa. Flexible stay bolt was driven out of inside throat sheet while being caulked under steam pressure, permitting steam and hot water to escape into the fire box; head on inside end of bolt was entirely missing due to frequent caulking, and there were practically no threads on bolt or in throat sheet; threads on stay bolt cap and sleeve were badly eroded, due to leakage caused by cap having been applied without copper gasket, and when stay bolt was struck the cap came off sleeve permitting stay bolt to come out of inner sheet; fire box in generally bad condition which should have been detected at time of last monthly inspection; 1 injured.

\*\*November 4, 1929, locomotive 444, Mapleton, Pa. Water-scoop operating lever was thrown forward and struck employee, due to scoop fouling on bottom of water pan and being forced upward; lost motion in operating mechanism and links were 1½ inches longer than standard links; 1 injured.

\*\*November 6, 1929, locomotive 648, Jersey City, N. J. Brake rigging dropped down, due to key coming out; 1 injured.

November 7, 1929, locomotive 8904, Schererville, Ind. Flue broke off at front flue sheet, due to being badly deteriorated. Inspection after accident showed three other flues broken at front flue sheet and several others badly deteriorated; 2 injured.

\*\*November 7, 1929, locomotive 4584, Blasdell, N. Y. Locomotive, tender, and three cars derailed due to left No. 1 driving box sticking while locomotive was passing crossover; driving box wedge oil grooves practically stopped up with dirt and heavy grease and both sides of wedge showed dry spots and chafing; left No. 1 front driving spring hanger and cross-equalizer block in hanger cutting hard into main frame; 2 injured.

November 21, 1929, locomotive 6891, Duncannon, Pa. Deteriorated insulation on train-control wiring prevented forestalling and caused undesired application of brakes; defective air-brake equipment on locomotive contributed to severe stop; 1 injured.

November 24, 1929, locomotive 578, South Oil City, Pa. Tube broke off through prosser groove at front flue sheet. Two adjacent tubes found to be badly grooved and leaking; 22 tubes renewed on July 14 showed indications of grooving; locomotive had tube failures on July 18 and November 22 in the immediate vicinity of the failed tube which caused this accident; 1 injured.

November 30, 1929, locomotive 9989, Pittsburgh, Pa. Tank hose burst; 1 injured.

\*\*November 30, 1929, locomotive 830, Philadelphia, Pa. Undesired quick action of brakes, caused by failure of water scoop cylinder supply pipe at defective nipple connection to scoop operating valve; 1 injured.



\*\*December 14, 1929, locomotive 2299, Terre Haute, Ind. House blower pipe was blown off smokebox casting connection due to threads on connection being badly stripped; 1 injured.

December 18, 1929, locomotive 3703, near Conemaugh, Pa. Tube broke off at defective safe-end weld near front flue sheet; 1 injured.

December 19, 1929, locomotive 3612, Frederick Road, Md. Rear coupler yoke pin failed, permitting leading locomotive to separate from second locomotive, causing a sudden stop; 1 injured.

December 22, 1929, locomotive 1349, Baltimore, Md. Pilot-beam step bracket broke, due to old fracture covering approximately 90 per cent of cross-sectional area; 1 injured.

December 30, 1929, locomotive 1537, Shafton, Pa. Back cab curtain fell from supporting hooks, striking employee; shape of hooks was such that curtain was not securely held in place; 1 injured.

\*\*January 20, 1930, locomotive 2172, Scully, Pa. Injured while attempting to open throttle; throttle lever very difficult to operate beyond the first lift; 1 injured.

January 24, 1930, locomotive 4658, Girard, Ohio. Reflex-type water glass burst; pipe connection at steam and water ends of water glass were out of line and cage surfaces sprung; 1 injured.

February 3, 1930, locomotive 3853, New Brunswick, N. J. Piece of driving brake shoe broke off and was thrown from rapidly moving locomotive; 1 injured.

February 7, 1930, locomotive 3840, between Odenton and Severn, Md. Fire door closed unexpectedly account of cylinder packing leather leaking; 1 injured.

February 10, 1930, locomotive 7467, Coleman Yards, Pa. Headlights failed, due to failure of generator; ball retaining ring of main bearing of generator broken in two places, permitting balls to become dislocated in ball race; 1 injured.

February 16, 1930, locomotive 703, East Pittsburgh, Pa. Tube failed in prosser groove near back flue sheet, due to being badly grooved and thinned to less than  $\frac{1}{2}$  inch in thickness; leaks in fire box or flues reported on January 17, 21, 23, 24, 27, February 1, 7, 8 (two times), and 11; 1 injured.

\*\*March 27, 1930, locomotive 7519, near New Hope, Ohio. Eccentric crank arm broke in three pieces at crank pin fit due to fractures in crank arm; fractures caused by building up arm with fusion welding. One of the fractures extended over approximately 70 per cent of cross-sectional area and could easily have been detected by ordinary inspection; 1 injured.

\*\*April 3, 1930, locomotive 40, Enola, Pa. Driving brake adjusting rod screw threads stripped, allowing sudden excessive driving brake piston travel which permitted fulcrum arm to drop and strike employee who was making inspection; 1 injured.

\*\*April 21, 1930, locomotive 4659, Columbus, Ohio. Defective handle on squirt-hose valve fouled on blower valve handle; 1 injured.

April 22, 1930, locomotive 4484, Langdon, Pa. Operating steam pipe to cylinder cock broke off at tee connection; 1 injured.

May 4, 1930, locomotive 1299, Smyser, Pa. Mechanically operated fire door stuck shut, due to inherent defect in design; 1 injured.

May 18, 1930, locomotive 1650, Moore, Pa. Safe end of boiler tube broke off at weld; safe end deteriorated and overheated in welding; 3 injured.

June 28, 1930, locomotive 758, Sinnemahoning, Pa. Shovel caught on loose spike in shoveling sheet; shoveling sheet improperly fastened; 1 injured.

Forty-two accidents; 1 killed, 45 injured.

#### PERE MARQUETTE RAILWAY:

\*\*February 12, 1930, locomotive 1008, Muskegon, Mich. Stoker steam gauge exploded, blowing shattered glass into employee's eye; gauge tube cracked and choke missing from bottom of tube; "Steam gauge to stoker leaks" was reported 14 hours previous to accident; 1 injured.

One accident; 1 injured.

#### PITTSBURGH & LAKE ERIE RAILROAD:

\*\*August 2, 1929, locomotive 199, Edenburg, Pa. Superheater flue failed at defective safe-end weld; safe end badly thinned and partially collapsed prior to failure; 1 injured.

September 20, 1929, locomotive 207, West Ellwood Junction, Pa. Stoker intermediate throttle valve bonnet nut failed, permitting bonnet to blow out of valve body; inside flange of nut broke away due to having been turned down against shoulder of valve bonnet too tightly; nut had been defective for some time and fracture was further increased by forcing nut down on the threads of

body in attempts to stop leakage until the flange was torn almost off the nut; 1 injured.

December 18, 1929, locomotive 9230, near Aliquippa, Pa. Injured when foot caught on protruding deck bolt head; 1 injured.

May 5, 1930, locomotive (N. Y. C.) 3287, Coraopolis, Pa. Main rod strap failed, due to old defect extending from rear inside corner through approximately 60 per cent of cross section; 1 injured.

Four accidents; 4 injured.

#### PITTSBURGH, SHAWMUT & NORTHERN RAILROAD:

\*\*April 30, 1930, locomotive 65, St. Marys, Pa. Spanner nut at injector delivery-pipe connection to left boiler check broke in three pieces while being tightened under pressure; spanner nut of inferior material and contained a large number of sand holes; many sand holes were visible on the surface; 1 injured.

One accident; 1 injured.

#### READING COMPANY:

\*\*July 5, 1929, locomotive 1026, Hershey, Pa. Reverse lever unlatched and moved back suddenly; reverse lever latch defective; 1 injured.

\*\*July 8, 1929, locomotive 1041, St. Nicholas, Pa. Tank filling hole cover which was latched in vertical position slipped under the latch and dropped to closed position, catching employee's foot between cover and top of tank; latch bolt a very loose fit in latch hole and nut a very loose fit on the bolt; 1 injured.

\*\*September 7, 1929, locomotive 1751, Tamaqua, Pa. Bell rope broke; 1 injured.

December 18, 1929, locomotive 1673, Fort Washington, Pa. Lower section of sand pipe and union became detached and were thrown from locomotive, striking track employee; threads on lower end of top section of sand pipe were defective and one clamp on lower section was missing and the remaining clamp was loose; 1 injured.

January 29, 1930, locomotive 1151, Philadelphia, Pa. Driving wheel tire broke at old fracture, causing locomotive to derail and turn over, derailing tender and first two cars in train; tire was reported loose on wheel center on January 26, at which time it was improperly shimmed; 2 injured.

May 8, 1930, locomotive 3004, Womelsdorf, Pa. Plug blew out of grease cup on back end of main rod when attempt was made to fill cup account of bearing running hot; brass floating bushing was siezed in steel bushing which was loose in rod; approximately 75 per cent of grease holes in floating bushing and one of the two grease holes in the steel bushing were plugged with hard graphite; plug fitted loosely in first four threads of cup; floating bushing was broken transversely into three pieces, the fractures being approximately 80 per cent old defects; pins and rod brasses reported on April 6, 12, 16, 21 (twice), 22, 27, and May 5; 1 injured.

June 4, 1930, locomotive 403, New Hope, Pa. Bell ringer did not operate properly; bell ringer reported on May 14 and June 2; 1 injured.

Seven accidents; 8 injured.

#### ST. LOUIS-SAN FRANCISCO RAILWAY:

September 10, 1929, locomotive 36, St. Louis, Mo. Water glass burst; employee's hand and arm scalded while closing water-glass cocks; 1 injured.

\*April 7, 1930, locomotive 560, Depew, Okla. Employee stumbled over U-bolt which stuck up above level of running board about 1 inch; 1 injured.

June 1, 1930, locomotive 1111, near Amber, Okla. Insufficient clearance between reverse lever and sander pipe on boiler head; stop pin missing from forward end of quadrant; 1 injured.

Three accidents; 3 injured.

#### SEABOARD AIR LINE RAILWAY:

July 4, 1929, locomotive 929, near Brewster, Fla. Crown sheet failure caused by overheating, due to low water; 3 killed.

July 20, 1929, locomotive 205, Rincon, Ga. Whistle became loose; 1 injured.

\*\*September 10, 1929, locomotive 514, Richland, Ga. While making coupling to locomotive, employee's hand was cut on edge of air-hose connection which was worn sharp; 1 injured.

October 11, 1929, locomotive 518, Eldorado, Ga. Driving box wedge dropped down, due to defective wedge bolt. Employee injured while attempting to make proper adjustment on line of road; 1 injured.

November 27, 1929, locomotive 633, Louisburg, N. C. Scalded by steam and water from burst tubular water glass; 1 injured.

February 20, 1930, locomotive 261, Denmark, S. C. Sprinkler pipe connection to injector feed pipe broke, due to old fracture covering approximately 75 per cent of circumference of bushing; bushing and nipple badly deteriorated by internal pitting; nipple was three-thirtyeighths inch too short, which permitted bushing to spring apart; 1 injured.

\*\*March 4, 1930, locomotive 222, Hamlet, N. C. Grate-shaker bar slipped off fulcrum lever; 1 injured.

March 22, 1930, locomotive 520, near Williams, Ga. Squirt hose came off nipple, due to nut being loose on squirt-hose clamp bolt; squirt-hose valve was pointed toward seat box instead of downward toward the deck; 1 injured.

June 21, 1930, locomotive 247, Moncure, N. C. Air pipe between main reservoir and pump governor broke off at reservoir connection; 1 injured.

Nine accidents; 3 killed, 8 injured.

#### SOUTHERN RAILWAY SYSTEM:

August 24, 1929, locomotive 536, Greensboro, N. C. Blow-off cock blew out of boiler, account of poor threads on end of nipple; 1 injured.

August 29, 1929, locomotive 6186, near Dayton, Tenn. Insufficient clearance between reverse lever and cab floor; 1 injured.

September 1, 1929, locomotive 692, Bluford, Ill. Main driving wheel axle broke at keyway, due to old fracture covering approximately 90 per cent of cross-sectional area; 2 injured.

September 7, 1929, locomotive 4902, Brice, Ga. Grate-shaker latch closed by falling back in position and stopped shaker bar suddenly, resulting in injury to fireman; design of latch did not allow it to be opened wide enough to prevent it from falling back in position when placed near stoker elevator; 1 injured.

\*\*September 26, 1929, locomotive 5077, Bridgewater, N. C. Driving brake beam slipped in hanger due to loss of cotter pin; 1 injured.

December 3, 1929, locomotive 6374, Danville, Ky. Threads in elbow on ash-pan blower pipe stripped, section of pipe and globe valve broke off and struck an employee; elbow not screwed on pipe far enough to provide sufficient holding power; a water trap in ash-pan blower pipe permitted ice to accumulate in pipe which employee was endeavoring to thaw out when accident occurred; 1 killed.

\*\*December 30, 1929, locomotive 6359, Stearns, Ky. Employee slipped and fell while standing on eccentric rod to oil valve gear; step on link frame provided for oiling valve gear was missing; step reported defective on December 29 at Oakdale, Tenn., at which point it was removed but not replaced; 1 injured.

\*\*January 8, 1930, locomotive 1373, Greenville, S. C. Shaker bar slipped off fulcrum post, due to improper fit; stoker lubricator located directly over grate-shaker fulcrum, permitting waste oil to drip on fulcrum posts; 1 injured.

January 15, 1930, locomotive 541, Hendersonville, N. C. Molding on side of tender floor was loose and caught employee's glove as he was getting off locomotive, causing him to fall; 1 injured.

\*\*February 8, 1930, locomotive 697, Greenville, S. C. Fire hose burst near nozzle; orifice in nozzle too small; 1 injured.

\*\*March 21, 1930, locomotive 699, Powder Springs, Ga. Bottom guide-bar lug broke off at face of cylinder head through a crack which extended from a defect in the metal; 1 injured.

\*\*March 22, 1930, locomotive 6926, Enterprise, Miss. Injured while attempting to repack hot intermediate driving box; 1 injured.

\*\*April 5, 1930, locomotive 1571, Knoxville, Tenn. Fire hose failed; small reel on which hose was wound caused a bend to form and damage hose; 1 injured.

\*\*April 27, 1930, locomotive 4560, Iuka, Miss. Grate-shaker bar slipped off post due to improper shape of bar; 1 injured.

May 20, 1930, locomotive 678, Cochran, Ga. Plug missing from tee fitting in ash-pan blower pipe; 1 injured.

May 22, 1930, locomotive 4615, Columbia, S. C. Nipple of ash-pan blower blew out of tee connection; nipple cross-threaded when applied and entered tee slightly more than two threads; 1 injured.

\*\*May 30, 1930, locomotive 5015, near Delrio, Tenn. Front driving wheel tires slipped on wheel centers; 1 injured.

June 30, 1930, locomotive 6892, Laurel, Miss. Fire hose burst; hose worn at point of failure; 1 injured.

Eighteen accidents; 1 killed, 18 injured.

#### SOUTHERN PACIFIC—LINES EAST:

September 20, 1929, locomotive (G. H. & S. A.) 800, Ferris, Tex. Brakeman's foot caught between cab apron and angle iron, due to insufficient clearance; 1 injured.

One accident; 1 injured.

#### SOUTHERN PACIFIC—LINES WEST:

\*July 5, 1929, locomotive 1216, Tracy, Calif. Packing nut on blow-down valve on top of steam dome leaking; 1 injured.

\*July 6, 1929, locomotive (E. P. & S. W.) 3317, Corona, N. Mex. Brake fulcrum casting under tender broke, due to flaw in metal; 1 injured.

\*\*July 15, 1929, locomotive 2549, Conger, Ariz. Squirt-hose valve worked open; 1 injured.

August 15, 1929, locomotive 3234, Massie, Nev. Crosshead wrist-pin nut worked off allowing wrist pin to work out of position and be struck by front section of side rod, resulting in damage to the locomotive; locomotive was being operated with driving wheel tires badly flattened and apparently the constant pounding loosened the wrist-pin nut and sheared the keeper wire, permitting nut to work off; 1 injured.

September 12, 1929, locomotive (C. P.) 4017, Foliage, Oreg. Crown-sheet failure caused by overheating, due to low water; defective boiler check between right injector and preheater section of boiler which stuck at times and made it difficult to get injector to work after having been shut off; neither injector would supply sufficient water to the boiler under ordinary working conditions; insufficient margin of safety due to limitation of maximum height of water that could be carried on the 3.3 per cent grade where accident occurred; 1 killed, 1 injured.

\*\*December 2, 1929, locomotive 4020, Cruzette, Oreg. Superheater flue failed near front flue sheet; 3 injured.

\*\*February 19, 1930, locomotive (E. P. & S. W.) 3318, Mongola, N. Mex. Nipple in train line branch pipe of locomotive rusted out at distributing valve, causing nipple to break off, applying brakes in emergency; 1 injured.

February 23, 1930, locomotive 3655, El Paso, Tex. Air hose between locomotive and tender blew off tender brake-pipe nipple, causing sudden stop; nipple worn and hose not properly clamped; 1 injured.

March 27, 1930, locomotive (E. P. & S. W.) 3303, near Palomas, N. Mex. Superheater flue broke off at back flue sheet where it has been thinned and cut through by excessive rolling. Fusion welding had been applied to the part of the circumference that was cut through; 1 injured.

June 6, 1930, locomotive 2659, Alhambra, Calif. Squirt hose burst; 1 injured. Ten accidents; 1 killed, 12 injured.

#### SPOKANE, PORTLAND & SEATTLE RAILWAY:

\*\*January 15, 1930, locomotive 507, Goodnoe, Wash. Cotter key missing from handle of steam valve to exhaust steam injector, permitting handle to become disconnected; 1 injured.

One accident; 1 injured.

#### TEXAS & PACIFIC RAILWAY:

\*July 23, 1929, locomotive 482, Fort Worth, Tex. Boiler check stuck open and when hammered in endeavor to seat the valve, check cap blew off; threads in boiler check body worn; 1 injured.

\*August 1, 1929, locomotive 904, Big Spring, Tex. Handhold at gangway failed at cab waist sheet connection due to old fracture around bolt hole; 1 injured.

\*\*January 5, 1930, locomotive 312, Honey Grove, Tex. Cradle hanger pin in swing center engine truck worked out of position; cotter keys missing from front ends of both cradle hanger pins on right side at front end and from outer pin at back end; 1 injured.

May 3, 1930, locomotive 324, near Keller, Tex. Crown-sheet failure caused by overheating due to low water; 2 killed.

Four accidents; 2 killed, 3 injured.

#### UNION PACIFIC RAILROAD:

\*\*December 18, 1929, locomotive 5057, Ogallala, Nebr. Defective air hose on rear of tender burst, applying brakes in emergency; 1 injured.

One accident; 1 injured.

**WABASH RAILWAY:**

\*\*August 10, 1929, locomotive 2220, Milan, Mich. Stoker elevator pawl spring broken, permitting elevator to reverse when attempt was made to set it in neutral; 1 injured.

One accident; 1 injured.

**WESTERN MARYLAND RAILWAY:**

\*\* January 23, 1930, locomotive 1112, near Lap, Md. Rear coupler on tender broke, due to old fracture, permitting locomotive to separate from train and cause sudden stop; 1 injured.

\*\* January 25, 1930, locomotive 1012, Elkins, W. Va. Rough edge on side curtain stiffening member permitted splinter to enter engineman's hand; 1 injured.

Two accidents; 2 injured.

**WHEELING & LAKE ERIE RAILWAY:**

January 12, 1930, locomotive 6002, Brewster, Ohio. Squirt hose burst; 1 injured.

\*\* June 22, 1930, locomotive 5106, Brewster, Ohio. Ash-pan cleaning hose connection at delivery pipe broke off; hose was not secured in position and was dragging on the ground; 1 injured.

Two accidents; 2 injured.

**ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1930, BY ROADS**

[A double star (\*\*) indicates accident not properly reported, as required by rule 335. A complete investigation, therefore, could not be made, inasmuch as the bureau was not apprised of the accident in sufficient time after it occurred to permit it to be properly investigated.]

**NEW YORK, NEW HAVEN & HARTFORD RAILROAD:**

October 2, 1929, locomotive unit 026, South Mount Vernon, N. Y. Engineer received shock due to cross between power and control circuits caused by defective lighting transfer relay; 1 injured.

December 20, 1929, locomotive unit 036, Woodmont, Conn. Injured by inhaling gas while attempting to extinguish fire caused by flash over in switch group; 1 injured.

Two accidents; 2 injured.

**PENNSYLVANIA RAILROAD:**

\*\* May 20, 1930, locomotive unit 3906, New York, N. Y. Carburetor float valve stuck causing gasoline to escape through vent on top of carburetor. Gasoline became ignited and seriously burned employee who attempted to close supply valve; 1 injured.

One accident; 1 injured.



TABLE XIII.—Number of steam locomotives inspected

Parts defective, inoperative or missing, or in violation of the rules	Akron, Canton & Youngstown	Alabama, Tennessee & Northern Aliquippa & Southern	Ann Arbor	Atchison, Topeka & Santa Fe	Atlanta & West Point	Atlanta, Birmingham & Coast	Atlantic & Yadkin	
1 Air compressors.....	2		2	30				
2 Arch tubes.....				2				
3 Ash pans and mechanism.....				1				
4 Axles.....								
5 Blow-off cocks.....	1		1	12		1		
6 Boiler checks.....				6				
7 Boiler shell.....				13				
8 Brake equipment.....	2	1	1	33		1		
9 Cabs, cab windows, and curtains.....	2		1	35		2		
10 Cab aprons and decks.....	2	1	1	5		2		
11 Cab cards.....				2				
12 Coupling and uncoupling devices.....	1			2				
13 Crossheads, guides, pistons, and piston rods.....	2	2	2	27		1		
14 Crown bolts.....								
15 Cylinders, saddles, and steam chests.....		3	2	55	1			
16 Cylinder cocks and rigging.....	1	1	1	24				
17 Domes and dome caps.....				1				
18 Draft gear.....	2	2		14		1		
19 Draw gear.....	3	2	2	8		1		
20 Driving boxes, shoes, wedges, pedestals, and braces.....		1		23				
21 Fire-box sheets.....	1			1				
22 Flues.....				5				
23 Frames, tailpieces, and braces, locomotive.....	1			23		3		
24 Frames, tender.....				6				
25 Gauges and gauge fittings, air.....		1		9				
26 Gauges and gauge fittings, steam.....				16				
27 Gauge cocks.....	1	2	1	21				
28 Grate shakers and fire doors.....	1			22		2		
29 Handholds.....	3			16				
30 Injectors, inoperative.....				5				
31 Injectors and connections.....	5	2	3	109	1	3		
32 Inspections and tests not made as required.....	14	1	6	177		1		
33 Lateral motion.....		2		7				
34 Lights, cab and classification.....				1				
35 Lights, headlights.....				4				
36 Lubricators and shields.....			1	8				
37 Mud rings.....				16				
38 Packing nuts.....	3			20		1		
39 Packing, piston rod and valve stem.....	1		1	30				
40 Pilot and pilot beams.....	2			3				
41 Plugs and studs.....				9				
42 Reversing gear.....	1			9		1		
43 Rods, main and side, crank pins, and collars.....	2	1	1	59				
44 Safety valves.....								
45 Sanders.....	3		1	16				
46 Springs and spring rigging.....	6		2	64		2		
47 Squirt hose.....	4			11				
48 Stay bolts.....				8		1		
49 Stay bolts, broken.....				2			1	
50 Steam pipes.....	4			7				
51 Steam valves.....	2	1		4				
52 Steps.....	1		2	19		3		
53 Tanks and tank valves.....	2		1	9		4	2	
54 Telltale holes.....								
55 Throttle and throttling rigging.....	4	1	1	23		1		
56 Trucks, engine and trailing.....				20		3		
57 Trucks, tender.....	1	3	3	24		4		
58 Valve motion.....				26		1		
59 Washout plugs.....	4			49		1	2	
60 Train-control equipment.....								
61 Water glasses, fittings, and shields.....				20				
62 Wheels.....		3	2	16			2	
63 Miscellaneous-signal appliances, badge plates, brakes (hand).....				24				
Number of defects.....	89	20	25	22	1,210	3	45	8
Locomotives reported.....	24	19	19	57	1,980	53	96	17
Locomotives inspected.....	90	21	37	150	3,104	56	157	31
Locomotives defective.....	21	8	7	7	407	2	16	6
Percentage of inspected found defective.....	23	38	19	5	13	4	10	19
Locomotives ordered out of service.....	1	2	1	1	11			

found defective, and ordered from service, etc.

Atlantic Coast Line	Baltimore & Ohio Lines East	Baltimore & Ohio Lines West	Bangor & Aroostook	Belt Ry. of Chicago	Bessemer & Lake Erie	Birmingham Southern	Boston & Albany	Boston & Maine	Buffalo & Susquehanna	Buffalo Creek	Buffalo, Rochester & Pittsburgh	Camas Prairie	Canadian National	Canadian Pacific	Carnegie Steel	Carolina & North-western	Central of Georgia
3	8	10	1	1	1		1	5				1	1	1	1	1	1
3	1	1															1
1	6	3						2									4
1	4	3						1									5
3	3	3						4									6
3	3	3						1									7
8	24	37			1			29									8
6	28	37	1		9			63									9
4	7	7			3			4									10
1	3	4			3			4									11
6	14	19			1			1									12
1	4	1						1									13
4	19	15			3			2									14
1	3	7			2			1									15
1	1	4			1			2									16
1	1	1			1			1									17
6	7	15			2			3									18
8	7	13	2		2			11									19
8	8	22			4			4									20
6	5	3			2			7									21
1	1	2			2			2									22
5	28	9			3			6									23
1	3	1			1												24
2	6	6			3			8									25
3	7	13			4			11									26
5	6	3			3			2									27
8	5	5			2			9									28
8	5	4			1			4									29
50	29	26	1	5	17		5	4	4								30
62	74	118	5	14	34		54	125	3								31
2	9	3			1			3									32
2	1	5			2			6									33
6	6	7			1			2									34
6	3	8			3			2									35
6	1	15			2			5									36
1	13	12			4			1									37
2	2	1			1			7									38
9	9	24			1			2									39
5	27	20			22			13									40
3	4	3			2			5									41
2	3	23			1			1									42
13	44	64			9			31									43
1	1	1			2			4									44
19	10	4			13			13									45
5	5	12			12			3									46
2	2	1			5			2									47
8	12	9			1			7									48
29	22	17			2			17									49
1	1	1			1			1									50
13	7	18			6			8									51
9	20	24			1			11									52
10	12	15			5			12									53
13	13	14			9			2									54
29	16	3						19									55
13	13	13			8			1									56
5	12	9			7			5									57
4	7	4			2			2									58
386	598	723	17	93	260		215	400	49		304	24	258	86	41	18	252
1,007	2,370		81	101	149		318	773	47	20	273	18	259	155	39	13	329
1,600	2,354	2,105	52	104	205		399	1,195	82	14	483	20	172	92	56	27	447
212	181	170	7	24	60		78	191	11		53	12	51	29	10	7	83
13	3	8	13	23	24		20	16	13		11	60	30	32	18	26	19
	8	8	1	1	13		4	4	3		5	1	7	1	1		3

TABLE XIII.—Number of steam locomotives inspected,

Parts defective, inoperative, or missing, or in violation of the rules	Central R. of New Jersey	Central Vermont	Charleston & Western Carolina	Chesapeake & Ohio	Chicago & Alton	Chicago & Eastern Illinois	Chicago & Illinois Midland	Chicago & North-western
1 Air compressors.....	12			10		2		11
2 Arch tubes.....			1			3		1
3 Ash pans and mechanism.....								
4 Axles.....	3	2		3				6
5 Blow-off cocks.....	2		1	4		1		5
6 Boiler checks.....	5		1	3		3	1	3
7 Boiler shell.....	2	2		8		7		66
8 Brake equipment.....	19	2	2	28		16		29
9 Cabs, cab windows, and curtains.....	36	18		5		1		3
10 Cab aprons and decks.....	9			1				3
11 Cab cards.....								2
12 Coupling and uncoupling devices.....	14	3		9		5		14
13 Crossheads, guides, pistons, and piston rods.....	1					5		
14 Crown bolts.....	1	1	1	31		20		55
15 Cylinders, saddles, and steam chests.....	17			10		13		79
16 Cylinder cocks and rigging.....	4			2				
17 Domes and dome caps.....	2	1		7		11		12
18 Draft gear.....	15	1		6		5		17
19 Draw gear.....	6			15		2		20
20 Driving boxes, shoes, wedges, pedestals, and braces.....	17	2	1	10		8	1	1
21 Fire-box sheets.....	11	2		2		3		
22 Flues.....	3	1		14	1			9
23 Frames, tailpieces, and braces, locomotive.....	12	2	1			2		1
24 Frames, tender.....	4	1		1		3		4
25 Gauges and gauge fittings, air.....	2	1		3		4		6
26 Gauges and gauge fittings, steam.....	3	2		2		5		9
27 Gauge cocks.....	2			4		1		1
28 Grate shakers and fire doors.....	20			2		1		5
29 Handholds.....	7		2					2
30 Injectors, inoperative.....				16	3	18		34
31 Injectors and connections.....	22	32	22	38	3	51	1	119
32 Inspections and tests not made as required.....	69							5
33 Lateral motion.....	2	3		1		1		1
34 Lights, cab and classification.....	3			1		1		1
35 Lights, headlights.....	1			1		4		5
36 Lubricators and shields.....	1	1		1		4		2
37 Mud rings.....	1			7		1		8
38 Packing nuts.....	4	1		10		7		54
39 Packing, piston rod and valve stem.....	20			2		2		3
40 Pilot and pilot beams.....	2	1	1	8				1
41 Plugs and studs.....	1	1	1	1		4		12
42 Reversing gear.....	3	1		1		6		43
43 Rods, main and side, crank pins, and collars.....	16	5		19		1		4
44 Safety valves.....	2			4		3		23
45 Sanders.....	8			18	2	6		39
46 Springs and spring rigging.....	26	8		6				3
47 Squirt hose.....	3			1		3		2
48 Stay bolts.....	1	3		1		2		2
49 Stay bolts, broken.....	5	2		6		10		11
50 Steam pipes.....	6			3		2		4
51 Steam valves.....	4			8		9		23
52 Steps.....	6	1	2	4		7		19
53 Tanks and tank valves.....	2	3	4	7		7		21
54 Telltale holes.....				7		4		15
55 Throttle and throttle rigging.....	5	1	2	6		12		17
56 Trucks, engine and tralling.....	16	4	2	7		5		6
57 Trucks, tender.....	9	2		4		15		14
58 Valve motion.....	6	3		10				14
59 Washout plugs.....	4	5						14
60 Train-control equipment.....	4							14
61 Water glasses, fittings, and shields.....	18	3	4	15		5		9
62 Wheels.....	12			7				9
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....	3			5				6
Number of defects.....	513	122	59	392	10	305	3	882
Locomotives reported.....	526	67	59	934	292	292	24	1,820
Locomotives inspected.....	686	280	82	1,583	645	638	40	3,506
Locomotives defective.....	183	39	22	136	3	89	1	264
Percentage of inspected found defective.....	27	15	27	9	0.6	17	2	8
Locomotives ordered out of service.....	8	1	1	3	1	14		3

found defective, and ordered from service, etc.—Continued

Chicago & Western Indiana	Chicago, Burlington & Quincy	Chicago Great Western	Chicago, Indianapolis & Louisville	Chicago, Milwaukee, St. Paul & Pacific	Chicago River & Indiana	Chicago, Rock Island & Pacific	Chicago, St. Paul, Minneapolis & Omaha	Chicago Short Line	Chicago, West Pullman & Southern	Cleveland, Cincinnati, Chicago & St. Louis	Clinchfield	Colorado & Southern	Colorado & Wyoming	Columbus & Greenville	Conemaugh & Black Lick	Copper Range	Copper River & North-western	
1	21	7	3	4		17	3			19	2	1					1	
2	4		1			4				1	1						2	
3																	3	
4																	4	
5																	5	
6																	6	
7																	7	
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62																	62	
63																	63	
68	1,064	548	288			1,763		1,665	234	4	16	1,172	86	111	8	4	19	27
26	1,539	216	174			66	1,493	323	11	12		952	87	141	27	27	33	20
40	3,108	638	312			30	3,216	646	28	28		1,296	127	217	32	39	20	18
12	342	119	81				486	75	2	6		291	18	33	2	2	3	7
30	11	19	26				15	12	7	23		22	14	5	6	5	15	39
1	16	6	6				2	18	4	4		24	3	1		3	2	

TABLE XIII.—Number of steam locomotives inspected,

Parts defective, inoperative or missing, or in violation of the rules	Cumberland & Pennsylvania	Davenport, Rock Island & Northwestern	Delaware & Hudson	Delaware, Lackawanna & Western	Denver & Rio Grande Western	Denver & Salt Lake	Detroit & Mackinac	Detroit & Toledo Shore Line
1 Air compressors.....				9	25		1	
2 Arch tubes.....					1			
3 Ash pans and mechanism.....					2			
4 Axles.....				6	1			
5 Blow-off cocks.....				2	2			
6 Boiler checks.....				12	1			
7 Boiler shell.....				9	24		1	
8 Brake equipment.....			16	18	37		1	9
9 Cabs, cab windows, and curtains.....				2	4		1	
10 Cab aprons and decks.....				1	1			
11 Cab cards.....				27	82			
12 Coupling and uncoupling devices.....				3	30	1		
13 Crossheads, guides, pistons, and piston rods.....			2	8	37	1		
14 Crown bolts.....	1							
15 Cylinders, saddles, and steam chests.....				3	3			
16 Cylinder cocks and rigging.....				18	1			1
17 Domes and dome caps.....				3	18	1		
18 Draft gear.....		1		3	6			
19 Draw gear.....		1	1	1	6	1		
20 Driving boxes, shoes, wedges, pedestals, and braces.....		1	1	6	71	1		
21 Fire-box sheets.....	1	1	1	8				
22 Flues.....		1	1					
23 Frames, tailpieces, and braces, locomotive.....				3	44			
24 Frames, tender.....				1	2			
25 Gauges and gauge fittings, air.....				3	4		1	
26 Gauges and gauge fittings, steam.....		1	1	7				
27 Gauge cocks.....		1	1	3	7			
28 Grate shakers and fire doors.....				1	1			1
29 Handchids.....		1	6	7	12	1	1	
30 Injectors, inoperative.....		1	1	2	2			
31 Injectors and connections.....		1	4	33	42		1	1
32 Inspections and tests not made as required.....	1	5	16	33	65		5	5
33 Lateral motion.....				3	2			
34 Lights, cab and classification.....				5	6			1
35 Lights, headlights.....				4	1			
36 Lubricators and shields.....	1			2	4	1		
37 Mud rings.....				12	2			
38 Packing nuts.....				2	18		6	
39 Packing, piston rod and valve stem.....		1	1	14	36	2		
40 Pilot and pilot beams.....				2	4	1		
41 Plugs and studs.....	3			2	1			1
42 Reversing gear.....			3	1	3		1	
43 Rods, main and side, crank pins, and collars.....			1	12	54			
44 Safety valves.....				3	2			
45 Sanders.....				3	25			1
46 Springs and spring rigging.....			12	16	59	4		
47 Squirt hose.....				6	6			
48 Stay bolts.....				1	1			
49 Stay bolts, broken.....		4	3	4	2			
50 Steam pipes.....	1			5	7			
51 Steam valves.....				3	17			
52 Steps.....		2	2	11	8			1
53 Tanks and tank valves.....				10	14			
54 Telltale holes.....				6	29	1		
55 Throttle and throttle rigging.....				4	18			3
56 Trucks, engine and trailing.....		4	5	5	24			
57 Trucks, tender.....				9	14		1	
58 Valve motion.....								
59 Washout plugs.....								
60 Train-control equipment.....								
61 Water glasses, fittings, and shields.....	1	3	2	6	18	2	3	
62 Wheels.....				3	14			
63 Miscellaneous—Signal appliances, badge plates, brakes (hand). Number of defects.....	9	26	90	344	933	16	23	24
Locomotives reported.....	16	11	446	650	475	58	22	30
Locomotives inspected.....	17	38	797	1,084	847	81	30	23
Locomotives defective.....	4	2	27	132	215	4	5	6
Percentage of inspected found defective.....	24	5	3	12	25	5	17	26
Locomotives ordered out of service.....		2			31			

found defective, and ordered from service, etc.—Continued

Detroit Terminal	Detroit, Toledo & Ironton	Donora Southern	Duluth & North-eastern	Duluth, Missabe & Northern	Duluth, South Shore & Atlantic	East Broad Top Railroad & Coal	East St. Louis Junction	East Tennessee & Western North Carolina	Elgin, Joliet & Eastern	Erie	Florida East Coast	Fort Smith & Western	Fort Worth & Denver City	Galveston, Houston & Henderson	Georgia & Florida	Georgia	Gifford Hill & Co.
1			3	4					2	24	2		1		1		1
2										9							
3										29							
4										48							
5										40	2		1				
6										78		4	1				
7	1									40			8				
8	1									40			1				
9	1									113			2				
10	4	2								34			1				
11	3									2			2				
12										4			1				
13	1									53			1				
14										3			1				
15										84		4	7				
16										6			4				
17										5			4				
18	1									39			4				
19	4									48			1				
20										45			1				
21										20			2				
22										11	1		1				
23										79		3	1				
24										17			1				
25										12			2				
26										20		1	3				
27	1									41			1				
28	3									41		1	1				
29										18			1				
30										2			13				
31										252		13	21				
32	2	3								56			1				
33	9	4								6			1				
34										15							
35										16			1				
36										20							
37	4									25		4	7				
38										37		1	4				
39										13			4				
40										33			4				
41										29		1	2				
42										127		2	2				
43										1			2				
44										26			6				
45										158		2	5				
46										21			6				
47										16		2	2				
48										16			4				
49										15			4				
50										2			3				
51										28			1				
52										27			1				
53										117		2	2				
54										4			4				
55										51		1	2				
56										73		3					
57										83		4	5				
58										53			1				
59										42		1	3				
60										2							
61										67		1	1				
62										39			9				
63										39			3				
47	15	6	21	47	53	7	19	68	82	2,577	10	56	135		96	8	
34	78	14	12	186	70	11	11	12	265	1,113	176	26	116	12	32	67	13
31	162	7	13	140	92	21	14	21	312	2,212	148	39	166	11	52	105	
10	8	1	7	19	16	4	5	13	16	591	8	15	27		31	3	
3	5	14	54	14	17	19	36	62	6	27	5	38	16		60	3	
1			2	3	2			6	1	63		7			7		

TABLE XIII.—Number of steam locomotives inspected,

	Grand Trunk Western	Great Northern	Green Bay & Western	Gulf Coast Lines	Gulf, Colorado & Santa Fe	Gulf, Mobile & Northern	High Point, Thomasville & Denton	Hocking Valley
1 Air compressors.....	9	12			2	1	1	4
2 Arch tubes.....								1
3 Ash pans and mechanism.....		4						1
4 Axles.....		6			1	2		1
5 Blow-off cocks.....	4	5	1		1	1		1
6 Boiler checks.....		11			1	1	1	
7 Boiler shell.....		11						
8 Brake equipment.....	16	125	7	9	12	2	2	3
9 Cabs, cab windows, and curtains.....	32	94	1		3	2	2	3
10 Cab aprons and decks.....	5	26	1		1	1		1
11 Cab cards.....	1	3			1			1
12 Coupling and uncoupling devices.....		5						
13 Crossheads, guides, pistons, and piston rods.....	3	16		3	1	2		1
14 Crown bolts.....	3	3						1
15 Cylinders, saddles, and steam chests.....	3	25	2		7	1		6
16 Cylinder cocks and rigging.....	2	24			5			3
17 Domes and dome caps.....	1	2	1					
18 Draft gear.....	2	46						
19 Draw gear.....	1	48	4	1	1		2	4
20 Driving boxes, shoes, wedges, pedestals, and braces.....	2	41	1	1	4			4
21 Fire-box sheets.....	3	5						2
22 Flues.....		3					1	1
23 Frames, tallpieces, and braces, locomotive.....		42	1	1	6			2
24 Frames, tender.....		11						1
25 Gauges and gauge fittings, air.....	1	7			2		1	1
26 Gauges and gauge fittings, steam.....	11	15		1	2		1	1
27 Gauge cocks.....	15	3			1	2		2
28 Grate shakers and fire doors.....	6	12		1	1			2
29 Handholds.....	8	24	1	3	2	2		
30 Injectors, inoperative.....		1						
31 Injectors and connections.....	33	68			16	2	2	3
32 Inspections and tests not made as required.....	90	122	12	9	29	3	2	4
33 Lateral motion.....		6			1		1	
34 Lights, cab and classification.....	1	30						
35 Lights, headlights.....	4	22						
36 Lubricators and shields.....	2	13			1			
37 Mud rings.....	3	16	4		2	2	1	4
38 Packing nuts.....	35	3					1	
39 Packing, piston rod and valve stem.....	4	15	3		8			5
40 Pilots and pilot beams.....	1	7			1			
41 Plugs and studs.....	3	3	1		2			
42 Reversing gear.....	1	7		3				3
43 Rods, main and side, crank pins, and collars.....	4	62		1	15			6
44 Safety valves.....		4						
45 Sanders.....	23	33	2	1	4			1
46 Springs and spring rigging.....	6	117	1	5	13			3
47 Squirt hose.....	2	4			1	2		
48 Stay bolts.....	3	11			1			
49 Stay bolts, broken.....	7	4			2	2		
50 Steam pipes.....	5	17		2	1			1
51 Steam valves.....	5	6	1				1	
52 Steps.....	13	25	1		4			3
53 Tanks and tank valves.....	9	35		1		4		5
54 Telltale holes.....	3	11						
55 Throttle and throttle rigging.....	11	14			7		1	2
56 Trucks, engine and trailing.....		31		2	2			1
57 Trucks, tender.....	6	52	2	2	12	2		8
58 Valve motion.....		10	1	4	8			2
59 Washout plugs.....	12	18		2	3			2
60 Train-control equipment.....								
61 Water glasses, fittings, and shields.....	18	55		2	2		1	3
62 Wheels.....		11	2		5			1
63 Miscellaneous—Signal appliances, badge plates, brakes (hand). .....	3	23			2			
Number of defects.....	451	1,470	53	65	190	86	16	102
Locomotives reported.....	330	1,169	47	105	(O) 91	77	11	148
Locomotives inspected.....	440	2,155	91	209	428	140	22	189
Locomotives defective.....	108	436	17	17	56	18	7	31
Percentage of inspected found defective.....	25	20	10	16	12	13	32	16
Locomotives ordered out of service.....	3	23	1	1	6	3		2

1 Atchison, Topeka & Santa Fe.

found defective, and ordered from service, etc.—Continued

	Huntingdon & Broad Top Mountain	Illinois Central	Illinois Terminal System	Indiana Harbor Belt	Indianapolis Union	International - Great Northern	Interstate	Jacksonville Terminal	Kansas City Southern	Kansas City Terminal	Kansas, Oklahoma & Gulf	Kentucky & Indiana Terminal	Lake Erie & Eastern	Lake Superior & Ishpeming	Lake Superior Terminal & Transfer	Lake Terminal	Lehigh & Hudson River	Lehigh & New England
		9					2						1				1	1
		1																2
																		3
		7					2							1				4
		8					1							2				5
		11							1				1				2	6
		40	1				3		2				1				3	7
		49	1				2		1				1				20	8
		12	1				2						1					9
		4					1		1							1		10
		33	1				1			2							2	11
		2											1					12
		59					1										4	13
		34																14
		2					1											15
		13					3						3					16
		17							1									17
		13																18
		17					1						1					19
		38					5										8	20
		10	1				1											21
		4																22
		21					2											23
		7																24
		4																25
		23					2											26
		16					4		1									27
		23																28
		16											1					29
		23												2				30
		51				1	3	4					1				3	31
		176	5	1		2	2		6		1	3	2	5		2	5	32
		6							1									33
		2																34
		4																35
		7																36
		4																37
		23	1				1											38
		42							2					3				39
		5							1									40
		5											1					41
		4																42
		54	2			1	7		1				1					43
		1					1						1					44
		20																45
		96					4	4	1									46
		7					2						1					47
		12	1										2					48
									3									49
		31					2											50
		10											3					51
		34					2						3					52
		34	3	1		2	3							1				53
		5					1											54
		9					3											55
		29					1											56
		30					2											57
		8					1											58
		20					2		3									59
		20																60
		28	1				1						1					61
</																		

TABLE XIII.—Number of steam locomotives inspected,

Parts defective, inoperative or missing, or in violation of the rules		Lehigh Valley	Litchfield & Madison	Long Island	Los Angeles & Salt Lake	Louisiana & Arkansas	Louisiana & North-west	Louisiana, Arkansas & Texas
1	Air compressors.....	31	1	7	5	4	1	1
2	Arch tubes.....	2		2				
3	Ash pans and mechanism.....	1		1				
4	Axles.....					1		
5	Blow-off cocks.....	1		2				
6	Boiler checks.....	2		3				
7	Boiler shell.....	16	1	4		1		
8	Brake equipment.....	66	1	18	7	27	6	14
9	Cabs, cab windows, and curtains.....	70	1	32		6		
10	Cab aprons and decks.....	10	1	4	1	5		7
11	Cab cards.....	2		2				
12	Coupling and uncoupling devices.....	2						
13	Crossheads, guides, pistons, and piston rods.....	22		1		3	2	3
14	Crown bolts.....	2						
15	Cylinders, saddles, and steam chests.....	89	4		2	18	3	6
16	Cylinder cocks and rigging.....	19	4		1	18		4
17	Domes and dome caps.....	4		1				
18	Draft gear.....	17		1	4	9		2
19	Draw gear.....	5	1	1	1	15		5
20	Driving boxes, shoes, wedges, pedestals, and braces.....	36		4	1	4		
21	Fire-box sheets.....	6		2				
22	Flues.....	12						
23	Frames, tailpieces, and braces, locomotive.....	12		2	1	16	1	10
24	Frames, tender.....	6	1	2		2		
25	Gauges and gauge fittings, air.....	8		1		2		
26	Gauges and gauge fittings, steam.....	9		6	1	4		1
27	Gauge cocks.....	5		9	3	7		
28	Grate shakers and fire doors.....	9		16		1		
29	Handholds.....	23		9		6	1	6
30	Injectors, inoperative.....				13			
31	Injectors and connections.....	41	1	11	9	24	3	5
32	Inspections and tests not made as required.....	167	6	7	32	68	7	14
33	Lateral motion.....	11				1	1	
34	Lights, cab and classification.....			2				
35	Lights, headlights.....	12	1	3	2			
36	Lubricators and shields.....	8		3	1	2		1
37	Mud rings.....	4	1	2				
38	Packing nuts.....	8	1	4	4	1		
39	Packing, piston rod and valve stem.....	36	3	5	1	28	5	7
40	Pilot and pilot beams.....	1			2	11		10
41	Plugs and studs.....	3		3				
42	Reversing gear.....	17		3		1		
43	Rods, main and side, crank pins, and collars.....	41	1	9	2	10	2	9
44	Safety valves.....	7		1				
45	Sanders.....	8		1	3	1		1
46	Springs and spring rigging.....	54		12	3	14	3	5
47	Squirt hose.....	2	1	2	1	3		
48	Stay bolts.....	3		1				
49	Stay bolts, broken.....	14			4	29		7
50	Steam pipes.....	15	1	5	2			
51	Steam valves.....	6		5	2			
52	Steps.....	11	2	4	2	12		6
53	Tanks and tank valves.....	28		20	5	5		5
54	Telltale holes.....	2		5	2			1
55	Throttle and throttle rigging.....	8		3	2	1		5
56	Trucks, engine and trailing.....	35		4	1	4		2
57	Trucks, tender.....	7		7	10	41		2
58	Valve motion.....	4		1	1	3		3
59	Washout plugs.....	9		9	3	9		2
60	Train-control equipment.....	2						
61	Water glasses, fittings, and shields.....	22	1	5	2	4		
62	Wheels.....	10		2		14	1	1
63	Miscellaneous—Signal appliances, badge plates, brakes (hand).....	6		10	2			
	Number of defects.....	1,088	33	278	138	453	38	143
	Locomotives reported.....	722	12	121	200	91	13	15
	Locomotives inspected.....	1,242	10	175	221	234	26	56
	Locomotives defective.....	299	6	71	57	74	9	21
	Percentage of inspected found defective.....	24	60	41	26	31	38	37
	Locomotives ordered out of service.....	21	2	5	3	35	3	11

found defective, and ordered from service, etc.—Continued

Louisville & Nashville	McCloud River	McKeesport Connecting	Macon, Dublin & Savannah	Maine Central	Maryland & Pennsylvania	Michigan Central	Midland Valley	Minarets & Western	Minneapolis & St. Louis	Minneapolis, Northfield & Southern	Minneapolis, St. Paul & Sault Ste. Marie	Minnesota & International	Minnesota, Dakota & Western	Minnesota Transfer	Mississippi Central	Missouri & North Arkansas	Missouri-Illinois
21				4	1	38			2			1				1	1
2						1					1						2
3																	3
4																	4
5																	5
6																	6
7																	7
8																	8
9																	9
10																	10
11																	11
12																	12
13																	13
14																	14
15																	15
16																	16
17																	17
18																	18
19																	19
20																	20
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27																	27
28																	28
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30																	30
31																	31
32																	32
33																	33
34																	34
35																	35
36																	36
37																	37
38																	38
39																	39
40																	40
41																	41
42																	42
43																	43
44																	44
45																	45
46																	46
47																	47
48																	48
49																	49
50																	50
51																	51
52																	52
53																	53
54																	54
55																	55
56																	56
57																	57
58																	58
59																	59
60																	60
61																	61
62																	62
63																	63
1,573																	
1,341	13	16	14	199	14	611	24	10	218	12	449	19	12	20	19	32	26
2,185	4	17	47	290	18	844	59	8	493	18	854	29	9	39	34	109	55
422			8	91	15	306			48	7	69	6	1	6	4	62	10
19			17	31	54	36			10	39	8	21	11	15	12	57	18
13				1	1	15			5	1	7	1				9	5

TABLE XIII.—Number of steam locomotives inspected,

	Missouri-Kansas-Texas	Missouri Pacific	Mobile & Ohio	Monongahela Connecting	Monongahela	Montour	Montpelier & Wells River
1 Air compressors.....		7	3				
2 Arch tubes.....							
3 Ash pans and mechanism.....							
4 Axles.....							
5 Blow-off cocks.....		4					
6 Boiler checks.....		1	1				
7 Boiler shell.....		3					
8 Brake equipment.....	1	10	6				
9 Cabs, cab windows, and curtains.....		36					
10 Cab aprons and decks.....		5	1				
11 Cab cards.....		10	1				
12 Coupling and uncoupling devices.....							
13 Crossheads, guides, pistons, and piston rods.....		9	2	2			
14 Crown bolts.....		1					
15 Cylinders, saddles, and steam chests.....		15	4	1			
16 Cylinder cocks and rigging.....		12					
17 Domes and dome caps.....		2					
18 Draft gear.....		3	3				1
19 Draw gear.....		6	1				
20 Driving boxes, shoes, wedges, pedestals, and braces.....		13	3				
21 Fire-box sheets.....		2	1				
22 Flues.....		1	1				
23 Frames, tailpieces, and braces, locomotive.....		13	1				
24 Frames, tender.....		2					
25 Gauges and gauge fittings, air.....		3					
26 Gauges and gauge fittings, steam.....		12	3				
27 Gauge cocks.....		11	2				
28 Grate shakers and fire doors.....		5					1
29 Handholds.....		6	1				
30 Injectors, inoperative.....	2						
31 Injectors and connections.....	1	15					
32 Inspections and tests not made as required.....	1	87	33	1	1		2
33 Lateral motion.....		4	2				
34 Lights, cab and classification.....		1	2				
35 Lights, headlights.....		2					
36 Lubricators and shields.....		3					
37 Mud rings.....		3					
38 Packing nuts.....		7	1				
39 Packing, piston rod and valve stem.....		8	5				
40 Pilot and pilot beams.....		1	1				
41 Plugs and studs.....		3					
42 Reversing gear.....		4					
43 Rods, main and side, crank pins, and collars.....		8					
44 Safety valves.....		1	11	5			
45 Sanders.....		3					
46 Springs and spring rigging.....	2	13	1				
47 Squirt hose.....		33	25	1			
48 Stay bolts.....		2	1	1			
49 Stay bolts, broken.....		11					
50 Steam pipes.....		7					
51 Steam valves.....		3					
52 Steps.....		1	3				
53 Tanks and tank valves.....		10					
54 Telltale holes.....		6	1				
55 Throttle and throttle rigging.....		5	1				
56 Trucks, engine and trailing.....		11	4				
57 Trucks, tender.....		3	6				
58 Valve motion.....		11					
59 Washout plugs.....		9					
60 Train-control equipment.....		13	13	2			
61 Water glasses, fittings, and shields.....							
62 Wheels.....		16	2				
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....	2	9					
Number of defects.....	9	494	152	13	1		4
Locomotives reported.....	515	1,274	225	31	69	22	15
Locomotives inspected.....	593	2,582	332	33	78	27	30
Locomotives defective.....	196	4	70	5	2		2
Percentage of inspected found defective.....	33	22	31	15	3		7
Locomotives ordered out of service.....	11	9	8				

found defective, and ordered from service, etc.—Continued

Nashville, Chattanooga & St. Louis	Nevada Northern	Newburgh & South Shore	New Orleans Great Northern	New York Central Lines East	New York Central Lines West	New York, Chicago & St. Louis	New York, New Haven & Hartford	New York, Ontario & Western	Norfolk & Portsmouth Belt Line	Norfolk & Western	Norfolk Southern	Northern Pacific	Northern Pacific Terminal	Northwestern Pacific	Ogden Union Railway & Depot	Oregon Short Line	Oregon-Washington Railroad & Navigation
2			1	17	46	12	2	1		4		20				1	2
3				4												1	2
4				1						1		1				1	2
5																	3
6				6	5	3	31			2		2				1	1
7				7	27	21	3	2		5		2				1	1
8			1	5	14	9	7	4		9		4				4	5
9				31	26	31	3	11		11	4	67				4	7
10				32	30	106	8	9		14	4	79		1		8	8
11				18	5	11	16	5		1	1	14			15	3	10
12				4	6	2	1			1	1	4					
13				2	1	1	1			1	1					1	
14				8	2	1	1			1	1					11	1
15				2	3					6	5	17					
16				21	11	21	21			6	1	20			1	3	1
17				7	6	1	3			2	2	11			1	1	1
18				31	18	13	22			4	2	18			3	3	3
19				26	5	27	30			2	2	11			2	2	3
20				32	15	6	5	16		24	1	8		1	1	1	2
21				10	4	4	9	5		3	5	1			1	2	2
22				1	2	4	2			4		1					
23				65	19	7	23	10		15		15			2	2	2
24				2	2	4	1			1		4			1	1	1
25				1	7	6	3			2	1	10			1	1	1
26				2	8	1	2			5	1	6			1	5	2
27				3	9	11	8			3	3	5			1	2	5
28				13	16	6	5			12	1	11			2	2	1
29				5	13	18	6			5	4	11			2	1	2
30				12	21	14	10			6	4	28			4	6	6
31				1	1	1	3			1		1				5	3
32				26	47	71	44			8	18	31			3	8	5
33				129	4	1	59			128	26	32			6	7	3
34				7	5	4	1			2	9	7			1	2	3
35				2	1	1	1			1	1	5			1	1	3
36				11	12	5	7			4	15	3			1	2	3
37				13	6	7	7			4	3	4				1	1
38				10	13	46	31			1	1	5			3	3	3
39				10	19	15	27			1	1	29			3	2	3
40				3	1	2				2		5			1	1	4
41				11	7	9	3			9	1	8			1	2	4
42				4	18	19	25			1	3	2				2	2
43				31	2	1	41			6	7	12			2	7	4
44				2	10	4				4		19			1	1	4
45				3	10	4				3		3			7	2	4
46				3	22	14				2	2	31			1	3	4
47				127	25	60	31			8		88			3	4	25
48				3	3	10				2		4				4	4
49				6	6	6				8		3				1	4
50				2	18	10				3		9				1	2
51				7	5	33	14			3		5				2	5
52				4	6	5	2			6		6				9	4
53				7	19	11	4			1	2	14				4	5
54				34	12	38	12			6	2	4				4	2
55				9	3	2	1			1	2	4					5
56				5	25	35	21			5	2	3				1	1
57				14	9	14	8			7	1	17			1	4	2
58				37	17	26	8			23	5	23			1	7	5
59				11	23	17	6			4	5	21			5	2	5
60				38	3	26	24			12	2	27			4	6	5
61				11	47	58	29			10	5	13			1	6	2
62				31	11	10				6		22			1	1	3
63				6	28	31	10			3	3	8				1	3
970	15	19	783	1,215	970	405	265	13	459	96	818	4	26	149	127		
250	17	31	34	1,771	1,331	846	810	177	23	781	101	1,054	13	68	15	310	271
593	3	18	42	1,964	1,450	956	1,046	257	55	1,259	257	1,366	11	35	9	225	445
196		4	9	216	267	240	164	76	10	197	60	269		4	4	55	64
33		22	21	11	18	28	16	30	18	16	23	20		11	44	24	14
11			2	20	31	31		7		3	1	6		1	3		3





TABLE XIII.—Number of steam locomotives inspected,

	San Antonio, Uvalde & Gulf	San Diego & Arizona	Sandy River & Rangeley Lakes	San Joaquin & Eastern	Savannah & Atlanta	Seaboard Air Line	Sierra R. R. of California
1 Air compressors.....		1				7	
2 Arch tubes.....							
3 Ash pans and mechanism.....						3	
4 Axles.....							
5 Blow-off cocks.....		2					
6 Boiler checks.....						3	
7 Boiler shell.....	1	1				14	
8 Brake equipment.....		1				4	
9 Cabs, cab windows, and curtains.....				1	1	22	
10 Cab aprons and decks.....		1				19	
11 Cab cards.....		1				10	
12 Coupling and uncoupling devices.....		2		2			
13 Crossheads, guides, pistons, and piston rods.....		3				3	
14 Crown bolts.....						6	
15 Cylinders, saddles, and steam chests.....						1	
16 Cylinder cocks and rigging.....		2				4	
17 Domes and dome caps.....						4	
18 Draft gear.....						1	
19 Draw gear.....	1					7	
20 Driving boxes, shoes, wedges, pedestals, and braces.....				1		5	
21 Fire-box sheets.....						4	
22 Flues.....						9	
23 Frames, tailpieces, and braces, locomotive.....						8	
24 Frames, tender.....	1				2	4	
25 Gauges and gauge fittings, air.....						2	
26 Gauges and gauge fittings, steam.....						4	
27 Gauge cocks.....						12	
28 Grate shakers and fire doors.....		2				12	
29 Handholds.....						2	
30 Injectors, inoperative.....		3				9	
31 Injectors and connections.....						1	
32 Inspections and tests not made as required.....	1	10			7	36	
33 Lateral motion.....						49	
34 Lights, cab and classification.....						4	
35 Lights, headlights.....						2	
36 Lubricators and shields.....		2				1	
37 Mud rings.....						1	
38 Packing nuts.....						14	
39 Packing, piston rod and valve stem.....	1				1	16	
40 Pilot and pilot beams.....						3	
41 Plugs and studs.....						3	
42 Reversing gear.....						6	
43 Rods, main and side, crank pins, and collars.....						2	
44 Safety valves.....						10	
45 Sanders.....						1	
46 Springs and spring rigging.....						2	
47 Squirt hose.....	1					39	
48 Stay bolts.....						1	
49 Stay bolts, broken.....						8	
50 Steam pipes.....						11	
51 Steam valves.....	2					4	
52 Steps.....						7	
53 Tanks and tank valves.....	1					14	
54 Telltale holes.....						30	
55 Throttle and throttle rigging.....						2	
56 Trucks, engine and trailing.....	1				1	18	
57 Trucks, tender.....						19	
58 Valve motion.....						25	
59 Washout plugs.....						10	
60 Train-control equipment.....	2			4		46	
61 Water glasses, fittings, and shields.....						22	
62 Wheels.....	2					2	
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....	1			2		10	2
						3	
Number of defects.....	2	47		3	20	599	2
Locomotives reported.....	15	18	10	12	13	691	10
Locomotives inspected.....	37	55	16	5	7	1,525	8
Locomotives defective.....	2	19		2	7	269	2
Percentage of inspected found defective.....	5	35		40	33	18	25
Locomotives ordered out of service.....		2				13	

found defective, and ordered from service, etc.—Continued

Stose-Sheffield Steel & Iron	South Buffalo	Southern Pacific Lines—East	Southern Pacific Lines—West	Southern Pacific of Mexico	Southern	Spokane International	Spokane, Portland & Seattle	Steelton & Highspire	Sumpter Valley	Tennessee Central	Tennessee Coal, Iron & R. R.	Terminal Railroad Association of St. Louis	Texas & Pacific	Texas Mexican	Texas Pacific-Miscellaneous Terminal of New Orleans	Tionesta Valley	Toledo, Peoria & Western
	1		21		9				1	3						1	1
			2		1					1							2
					4												3
	1		12		4					3							5
	3		21		11					1							6
	6		18		8					7							7
	1	1	48		6		4										8
	5		20		1		1										9
	11		22		4					8							10
	1		1		9					3							11
	3		7		1					2							12
			3		1					1							13
			2		2					4							14
			48		2												15
			10		1					1							16
	3		38		1					3							17
	2		14		2					2							18
			3		1					1							19
			12		1					2							20
			31		1					3							21
			32		5					3							22
			14		4					3							23
			12		3					3							24
			29		2					1							25
			8		3					4							26
			5		4					5							27
			8		3					1							28
			24		1					3							29
			31		1					3							30
			112		5					12							31
			159		21					3							32
			7		1					4							33
			14							1							34
			5							2							35
			10							4							36
			17							2							37
			21		4					1							38
			12		2					2							39
			12		2					3							40
			9		3					1							41
			35		5					9							42
			39							9							43
			1							1							44
			46							2							45
			56							8							46
			24							19							47
			3							2							48
			4							7							49
			51							7							50
			17							1							51
			16							2							52
			8							1							53
			19							6							54
			30							3							55
			7							1							56
			3							3							57
			25							5							58
			37							11							59
			14							8							60
			13							2							61
			40							10							62
			4							3							63
			54							3							64
			55							4							65
			16							8							66
			12							3							67
	31	62	159	1,490						219	2	138	4	14		4	128
Locomotives reported.....	16	39	620	1,704	63	2,236	11	102	13	10	40	60	179	370	17	18	17
Locomotives inspected.....	19	40	1,025	2,112	3	3,401	11	20	13	51	17	140	525	23	23	25	48
Locomotives defective.....	8	15	49	510	5	361	1										



TABLE XIII.—Number of steam locomotives inspected,

Parts defective, inoperative or missing, or in violation of the rules	Toledo Terminal	Toronto, Hamilton & Buffalo	Tremont & Gulf	Trinity & Brazos Valley	Utah	Ulster & Delaware	Union Pacific
1 Air compressors.....							40
2 Arch tubes.....							1
3 Ash pans and mechanism.....							
4 Axles.....							2
5 Blow-off cocks.....							4
6 Boiler checks.....							1
7 Boiler shell.....				2			1
8 Brake equipment.....							29
9 Cabs, cab windows, and curtains.....							80
10 Cab aprons and decks.....				1			9
11 Cab cards.....							
12 Coupling and uncoupling devices.....							
13 Crossheads, guides, pistons, and piston rods.....							18
14 Crown bolts.....							
15 Cylinders, saddles, and steam chests.....							101
16 Cylinder cocks and rigging.....							28
17 Domes and dome caps.....							2
18 Draft gear.....							6
19 Draw gear.....				2			10
20 Driving boxes, shoes, wedges, pedestals, and braces.....						1	48
21 Fire-box sheets.....							3
22 Flues.....							
23 Frames, tailpieces, and braces, locomotive.....				2			5
24 Frames, tender.....							1
25 Gauges and gauge fittings, air.....							2
26 Gauges and gauge fittings, steam.....							15
27 Gauge cocks.....				1			3
28 Grate shakers and fire doors.....							6
29 Handholds.....							16
30 Injectors, inoperative.....							1
31 Injectors and connections.....				3		1	35
32 Inspections and tests not made as required.....				3		1	46
33 Lateral motion.....							1
34 Lights, cab and classification.....							6
35 Lights, headlights.....							3
36 Lubricators and shields.....							3
37 Mud rings.....							6
38 Packing nuts.....							34
39 Packing, piston rod and valve stem.....							3
40 Pilot and pilot beams.....							3
41 Plugs and studs.....							2
42 Reversing gear.....				1			1
43 Rods, main and side, crank pins, and collars.....							47
44 Safety valves.....							1
45 Sanders.....							2
46 Springs and spring rigging.....							44
47 Squirt hose.....							4
48 Stay bolts.....							6
49 Stay bolts, broken.....							7
50 Steam pipes.....							6
51 Steam valves.....							7
52 Steps.....							6
53 Tanks and tank valves.....							4
54 Telltale holes.....							11
55 Throttle and throttle rigging.....							2
56 Trucks, engine and trailing.....							3
57 Trucks, tender.....							13
58 Valve motion.....				1			9
59 Washout plugs.....							6
60 Train-control equipment.....							20
61 Water glasses, fittings, and shields.....							2
62 Wheels.....				2			17
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....							4
							17
Number of defects.....				18		3	796
Locomotives reported.....	21	18	12	33	10	29	855
Locomotives inspected.....	19	2	10	44	20	84	1,655
Locomotives defective.....	6			6		1	230
Percentage of inspected found defective.....				14		1	14
Locomotives ordered out of service.....				1			11

found defective, and ordered from service, etc.—Continued

Union Railroad & Upper Merion Plymouth	Utah	Virginian	Wabash	Washington Terminal	Western Maryland	Western Pacific	Wheeling & Lake Erie	Wheeling Steel Corporation	Wichita Falls & Southern	Winston Bros. Co.	Winston-Salem South-bound	Woodward Iron Co.	Wrightsville & Ten-mile	Roads with less than 10 locomotives	Total defects
		2			1	2								55	873
					4		1							8	87
														5	76
														7	12
														33	325
														43	521
														302	579
														320	2,706
														83	3,066
														66	710
														39	228
														104	122
														14	13
														95	14
														177	15
														83	318
														11	848
														136	154
														136	950
														136	1,003
														136	1,359
														53	471
														52	21
														52	254
														95	1,271
														28	177
														9	290
														41	553
														62	783
														31	767
														181	865
														9	103
														360	3,275
														476	7,456
														51	372
														5	119
														63	373
														20	312
														31	445
														99	828
														176	1,429
														44	272
														27	348
														47	41
														31	579
														251	2,488
														6	116
														45	804
														239	3,311
														37	313
														34	395
														464	1,098
														32	730
														48	399
														184	1,021
														238	1,426
														39	183
														84	1,175
														106	1,141
														307	1,531
														45	827
														48	1,283
														1	48
														124	1,501
														157	1,025
														27	691
														6,140	60,292
														147	61,947
														53	100,794
														6	3,076
														11	1,175
														3	16,300
														3	16
														198	1,200







TABLE XV.—Summary of comparison of the percentage of steam locomotives inspected and found defective, with the number ordered out of service for the years ended June 30, on roads reporting on 25 or more locomotives

Table with columns: Road, Percentage inspected defective (1930-1925), Ordered out of service (1930-1925). Rows include various railroad lines like Ann Arbor, Atchison, Topeka & Santa Fe, etc.

TABLE XV.—Summary of comparison of the percentage of steam locomotives inspected and found defective, with the number ordered out of service for the years ended June 30, on roads reporting on 25 or more locomotives—Continued

Table with columns: Road, Percentage inspected defective (1930-1925), Ordered out of service (1930-1925). Rows include various railroad lines like Louisville & Nashville, Maine Central, Michigan Central, etc.