

INTERSTATE COMMERCE COMMISSION

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THIRTY-FOURTH ANNUAL REPORT

OF THE  
DIRECTOR  
BUREAU OF LOCOMOTIVE INSPECTION  
TO THE  
INTERSTATE COMMERCE COMMISSION

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FISCAL YEAR ENDED  
JUNE 30, 1945



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

OCTOBER 1, 1945.

*To the Interstate Commerce Commission:*

In compliance with section 7 of the act of February 17, 1911, as amended, the Thirty-fourth Annual Report of the Director of the Bureau of Locomotive Inspection, covering the work of the Bureau during the fiscal year ended June 30, 1945, 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 Act and those reported to the Bureau of Transport Economics and Statistics under the Accident Reports 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 the number of persons injured 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 found defective, the number for which written notices for repairs were issued in accordance with section 6 of the law, and the total number of 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.

TABLE I.—*Reports and inspections—Steam locomotives*

	Year ended June 30—					
	1945	1944	1943	1942	1941	1940
Number of locomotives for which reports were filed.....	43, 019	43, 297	43, 064	42, 951	43, 236	44, 274
Number inspected.....	115, 979	117, 334	116, 647	113, 451	105, 675	102, 164
Number found defective.....	11, 975	12, 710	11, 901	10, 970	9, 570	8, 565
Percentage inspected found defective.....	10	11	10	10	9	8
Number ordered out of service.....	506	636	487	474	560	487
Number of defects found.....	53, 367	56, 617	51, 350	44, 928	37, 691	32, 677

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

	Year ended June 30—					
	1945	1944	1943	1942	1941	1940
Number of accidents.....	410	403	319	222	153	164
Percent increase or decrease from previous year.....	↑ 1.7	↑ 26.3	↑ 43.7	↑ 45.1	6.7	↑ 7.9
Number of persons killed.....	20	25	27	34	15	18
Percent increase or decrease from previous year.....	20.0	7.4	20.6	↑ 126.7	16.7	↑ 20.0
Number of persons injured.....	429	466	373	227	182	225
Percent increase or decrease from previous year.....	7.9	↑ 24.9	↑ 64.3	↑ 24.7	19.1	↑ 37.2

↑ 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—							
	1945	1944	1943	1942	1941	1940	1915	1912
Number of accidents.....	141	141	129	81	43	67	424	856
Number of persons killed.....	13	17	25	30	12	16	13	91
Number of persons injured.....	154	194	173	83	64	110	467	1,005

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

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

	Year ended June 30—									
	1945		1944		1943		1942		1941	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....	5	117	7	128	11	109	10	79	5	41
Firemen.....	9	183	11	181	10	143	12	73	5	68
Brakemen.....	2	61	2	67	4	47	4	32	3	21
Conductors.....	1	11		11		8		7		8
Switchmen.....	1	10		5		12		5		6
Roundhouse and shop employees:										
Boilermakers.....	1	10	2	5		2		4		3
Machinists.....		6		2		3		5		2
Foremen.....		6		2		1		1		
Inspectors.....	1		1	2		2		1		
Watchmen.....		1		1	1	3			1	2
Boiler washers.....										
Hostlers.....		5		12		1		4		3
Other roundhouse and shop employees.....		4	1	4		4		3		1
Other employees.....		5		6		11		2		9
Nonemployees.....		10	1	40	1	23		9		18
Total.....	20	429	25	466	27	373	34	227	15	182

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

	Year ended June 30—					
	1945	1944	1943	1942	1941	1940
Number of locomotive units for which reports were filed.....	6,094	5,139	4,351	3,957	3,389	2,987
Number inspected.....	9,888	7,711	6,847	6,728	5,558	4,974
Number found defective.....	447	378	298	358	319	298
Percentage of inspected found defective.....	4.5	4.9	4.4	5	6	6
Number ordered out of service.....	16	9	6	12	21	16
Number of defects found.....	1,212	1,026	849	928	905	766

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

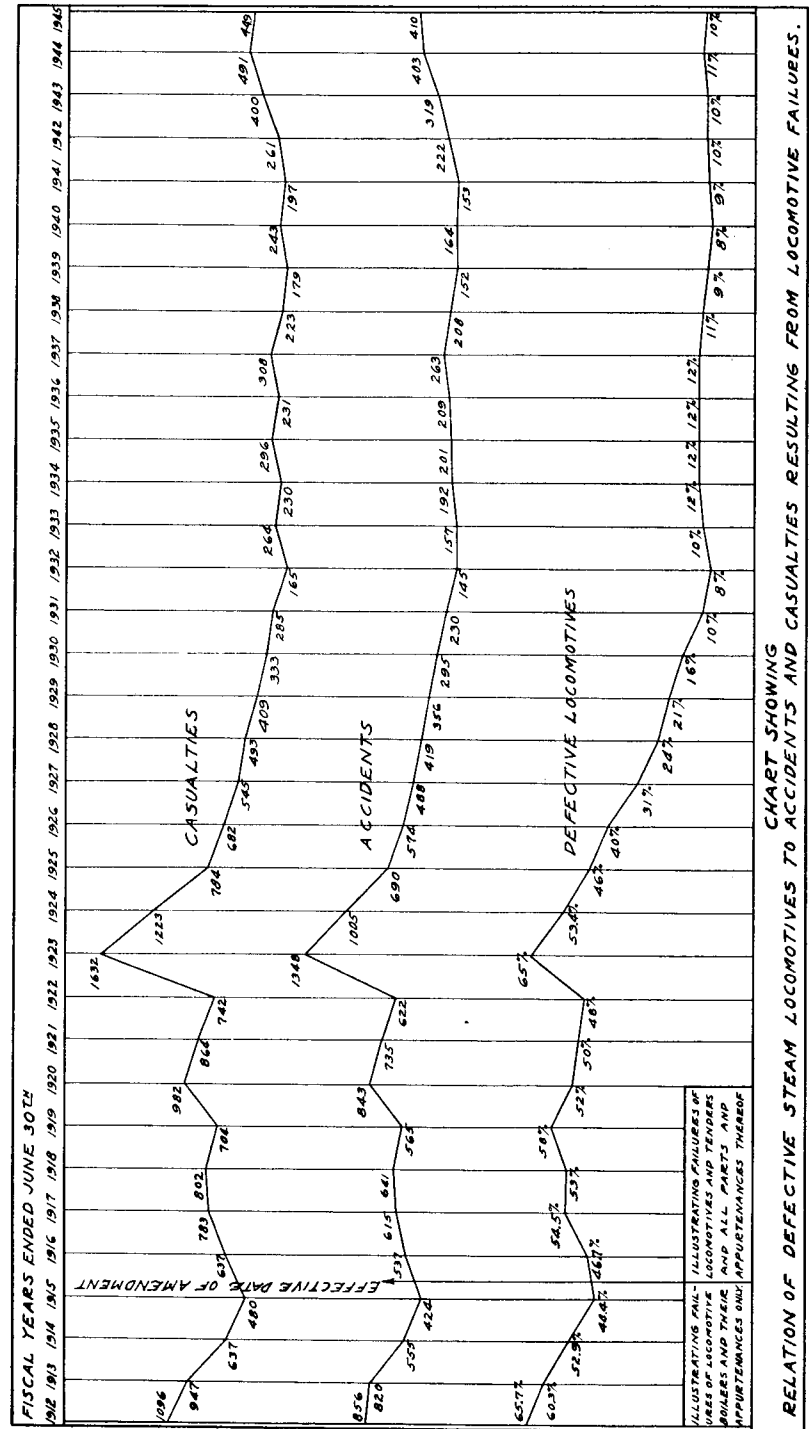
	Year ended June 30—					
	1945	1944	1943	1942	1941	1940
Number of accidents.....	29	17	15	9	11	7
Number of persons killed.....	1					
Number of persons injured.....	40	23	18	9	11	7

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

	Year ended June 30—									
	1945		1944		1943		1942		1941	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....	4		4		3		5		1	
Firemen.....	14		4		9		2		5	
Brakemen.....	1		1		1		1		1	
Conductors.....	1		1		1				1	
Switchmen.....	2				1		1			
Maintenance employees.....	1	3	4		2					2
Other employees.....	8		1		1					
Nonemployees.....	7		8							1
Total.....	1	40	23		18		9			11

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

Part or appurtenance which caused accident	Year ended June 30—														
	1945			1944			1943			1942			1941		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Air reservoirs	1		1	3		4		1	1	1					
Aprons	8		8				1								
Arch tubes															
Ashpan blowers	2	1	1				1		1	1					4
Axles	2		5	5	1	5	1		1	1		1			
Blow-off cocks	7		7	8		8	8		8						
Boiler checks	6		6	9		9	8	1	7	3		4	1		5
Boiler explosions:															
A. Shell explosions															
B. Crown sheet; low water; no contributory causes found	7	9	11	12	7	19	19	22	48	8	18	11	7	6	27
C. Crown sheet; low water; contributory causes or defects found	1		1	7	5	43	4		6	5	5	7	4	5	2
D. Miscellaneous firebox failures	1		1				2	2	2	2	2	2			6
Brakes and brake rigging	10		10	12		12	11		13	4	1	3	5		1
Couplers	5		6	6		9	3		3	3		3	1		2
Crank pins, collars, et cetera	5	1	4	7		9	6	1	9	1		1	2		2
Crossheads and guides	2		2	8		8	2		2	2		1			1
Cylinder cocks and rigging	1		1	3		3	4		4	1		1			1
Cylinder heads and steam chests	2		3	1		1	5		5	1		1			1
Dome caps															1
Draft appliances	2		3	2		3	1		1	1		2	1		1
Draw gear	2		2	1		1	1		1	1		1	1		7
Fire doors, levers, et cetera	8		8	6		6	5		5	6		6	7		6
Flues	5		6	8		9	5		10	3	1	2	5		6
Flue pockets															
Footboards	13	1	12	6		6	4		4	5		5	2		2
Gage cocks	1		1	1		1	1		1	1		1	1		1
Grease cups	1		1	1		1	2		3	3		3	1		4
Grate shakers	17		17	19		19	18		18	12		12	4		1
Handholds	26	1	25	14		14	18		18	10		10	11		11
Headlights and brackets	7		7				4		4	1		1			
Injectors and connections (not including injector steam pipes)	12		12	8		8	7		7	4		4	3		3
Injector steam pipes	1		1				2		2	2		2	3		3
Lubricators and connections	4		4	5		5	7		7	5		5	3		3
Lubricator glasses	1		1	1		1	1		1	1		1			2
Patch bolts															
Pistons and piston rods	2	1	1	3		3	1		1	1		1	1		2
Plugs, arch tube and washout	5	2	6	6	3	7	2		3	3	1	5	1		2
Plugs in firebox sheets															
Reversing gear	13		13	16		16	14		14	19		19	11		12
Rivets	1		1												
Rods, main and side	7		11	7		2	9		7	10		4	5	3	2
Safety valves															
Sanders	8		8	12		12	2		2	2		2	2		2
Side bearings															
Springs and spring rigging	5	1	4	6	2	8	7		8	2		2	6		6
Squirt hose	23		25	21		22	16		16	2	1	6	3		3
Staybolts	4		4	4		4	4		4	2		2	1		1
Steam piping and blowers	12		14	11		14	9		15	6		5	2		2
Steam valves	7		7	7		7	9		10	5		1	4		4
Studs	1		1				1		1	1		1	2		2
Superheater tubes	4		6	2		2	4		5	2		2	2		2
Throttle glands	2		2	2		2	2		4	1		1			
Throttle leaking	2		3	1		1	1		1	4		4	4		5
Throttle rigging	6		6	9		9	4		4	4		4	4		4
Trucks, leading, trailing, or tender	5		5	5		5	3		4	13		3	11		5
Valve gear, eccentrics, and rods	7		7	10		1	9		3	3		4	4		4
Water glasses	10		10	14		1	13		11	7		7			
Water-glass fittings	1		1	2		3			2						
Wheels	1		1				2		2	1		1	2		1
Miscellaneous	124	3	126	103		106	70		1	69		48	50	42	43
Total	410	20	429	403	25	466	319	27	373	222	34	227	153	15	182



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

Part or appurtenance which caused accident	Year ended June 30—														
	1945			1944			1943			1942			1941		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Brakes and brake rigging	3	8	1	3	1	1				1		1			
Carburetors															
Couplers	1	4	3	3	1	1	1	1	1						
Crank pins and connecting rods	2	2													
Fires: Due to overflowing or leakage of fuel, crank case explosions, back firing, et cetera	6	6	4	5	3	5	3	3	3	4		4		4	
Generators and starting devices					1	1				1		1		1	
Insulation	1	1							1						
Pantographs and trolleys	2	1	1		1	1	1	1	1						
Short circuits	2	2	1	1	3	4									
Miscellaneous	12	16	8	11	5	5	3		3	5		5		5	
Total	29	1	40	17	23	15	18	9	9	11		11		11	

TABLE X.—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—					
	1945	1944	1943	1942	1941	1940
1. Air compressors	1,054	1,146	968	829	684	567
2. Arch tubes	17	45	50	27	31	20
3. Ashpans and mechanism	81	93	71	80	67	37
4. Axles	11	15	15	2	5	3
5. Blow-off cocks	361	289	291	238	205	191
6. Boiler checks	511	533	503	393	313	288
7. Boiler shell	416	406	377	290	271	266
8. Brake equipment	2,755	2,914	2,661	2,382	1,945	1,506
9. Cabs, cab windows, and curtains	1,057	1,169	1,102	1,163	1,087	1,078
10. Cab aprons and decks	426	381	390	335	307	277
11. Cab cards	91	104	142	131	97	101
12. Coupling and uncoupling devices	57	65	66	70	74	53
13. Crossheads, guides, pistons and piston rods	2,079	2,140	1,961	1,273	858	815
14. Crown bolts	90	105	66	75	97	54
15. Cylinders, saddles, and steam chests	1,801	2,133	1,395	1,514	1,332	1,320
16. Cylinder cocks and rigging	454	624	430	521	438	447
17. Domes and dome caps	187	189	196	112	94	78
18. Draft gear	486	576	599	651	620	508
19. Draw gear	447	515	469	369	347	306
20. Driving boxes, shoes, wedges, pedestals, and braces	1,803	2,026	2,053	1,743	1,348	1,243
21. Firebox sheets	319	347	303	255	224	191
22. Flues	260	274	215	178	150	147
23. Frames, tail pieces, and braces, locomotive	852	1,019	894	869	863	665
24. Frames, tender	97	126	86	193	83	78
25. Gages and gage fittings, air	151	158	191	263	236	211
26. Gages and gage fittings, steam	353	328	584	497	373	400
27. Gage cocks	449	532	492	491	430	273
28. Grate shakers and fire doors	558	539	483	378	433	353
29. Handholds	527	464	66	47	39	30
30. Injectors, inoperative	41	2,867	2,637	2,220	1,882	1,330
31. Injectors and connections	2,553	9,037	9,037	8,186	7,215	6,218
32. Inspections and tests not made as required	9,067	898	700	498	357	313
33. Lateral motion	977	243	184	131	50	49
34. Lights, cab and classification	167	268	184	218	190	180
35. Lights, headlight	306	257	292	234	196	185
36. Lubricators and shields	257	301	256	244	187	213
37. Mud rings	654	746	669	689	508	418
38. Packing nuts	845	879	724	738	675	660
39. Packing, piston rod and valve stem	171	193	194	188	142	140
40. Pilots and pilot beams	245	281	259	173	156	156
41. Plugs and studs	439	454	452	411	387	320
42. Reversing gear	2,569	3,280	2,798	1,986	1,565	1,199
43. Rods, main and side, crank pins, and collars	84	77	74	67	68	61
44. Safety valves						

BUREAU OF LOCOMOTIVE INSPECTION

TABLE X.—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—					
	1945	1944	1943	1942	1941	1940
45. Sanders	658	609	642	738	490	415
46. Springs and spring rigging	4,734	4,625	3,583	3,349	2,597	2,174
47. Squirt hose	98	94	92	67	62	50
48. Stay bolts	351	400	367	272	239	227
49. Stay bolts broken	308	232	247	274	198	271
50. Steam pipes	416	435	414	290	385	255
51. Steam valves	157	161	159	150	110	106
52. Steps	681	872	729	594	555	449
53. Tanks and tank valves	1,215	1,400	1,321	1,150	952	768
54. Telltale holes	78	69	78	79	59	95
55. Throttle and throttle rigging	948	987	887	786	688	647
56. Trucks, engine and trailing	1,151	1,155	1,020	833	636	598
57. Trucks, tender	974	928	900	786	773	705
58. Valve motion	991	1,021	998	779	580	506
59. Wash-out plugs	820	845	685	569	445	478
60. Train-control equipment	2	5	9	7	1	2
61. Water glasses, fittings, and shields	1,328	1,323	1,454	1,133	788	753
62. Wheels	899	759	728	664	536	554
63. Miscellaneous—Signal appliances, badge plates, brakes (hand)	1,211	1,167	1,142	970	785	564
Total number of defects	53,367	56,617	51,350	44,928	37,691	32,677
Locomotives reported	43,019	43,297	43,064	42,951	43,236	44,274
Locomotives inspected	115,979	117,334	116,647	113,451	105,675	102,164
Locomotives defective	11,975	12,710	11,901	10,970	9,570	8,565
Percentage of inspected found defective	10	11	10	10	9	8
Locomotives ordered out of service	506	630	487	474	560	487

TABLE XI.—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—					
	1945	1944	1943	1942	1941	1940
Air compressors	14	7	7	13	22	8
Axles, truck and driving			6		5	1
Batteries		1	2	1	6	10
Boilers	8		1	5	4	1
Brake equipment	114	85	62	86	69	50
Cabs and cab windows	59	40	33	27	45	22
Cab cards	25	21	17	20	24	13
Cab floors, aprons, and deck plates	60	54	31	10	14	17
Clutches	2	1	2	1		
Controllers, relays, circuit breakers, magnet valves, and switch groups	18	14	9	12	7	16
Coupling and uncoupling devices	6	3	1	5	2	6
Current collecting apparatus	10		1	1	3	1
Draft gear	14	14	15	19	15	31
Draw gear	8		2	3	3	2
Driving boxes, shoes, and wedges	29	12	25	16	36	29
Frames or frame braces	12	12	7	5	1	12
Fuel system	45	33	32	81	62	51
Gages or fittings, air	7	6	3	8	3	1
Gages or fittings, steam		2	1		2	2
Gears and pinions		1	4	4	2	1
Handholds	13	6	19	14	12	6
Inspections and tests not made as required	297	278	223	274	243	207
Insulation and safety devices	17	8	4	3	4	2
Internal-combustion engine defects, parts and appurtenances	133	86	50	62	54	35
Jack shafts	6	8	2	1	3	7
Jumpers and cable connectors	9	2	3	1		
Lateral motion, wheels	20	9	10		4	5
Lights, cab and classification	1	1	1	5	2	1
Lights, headlight	1	2	2	1	1	3
Meters, volt and ampere	2	2	3	2		4
Motors and generators	12	14	14	16	16	12
Pilots and pilot beams	1	2	4	10	12	10
Plugs and studs	1					
Quills	29	18	9	6		4
Rods, main, side, and drive shafts	3	10		2	4	2

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

Defects defective, inoperative or missing, or in violation of rules	Year ended June 30—					
	1945	1944	1943	1942	1941	1940
and spring rigging, driving and truck	50	59	41	57	56	34
ropes	38	44	18	35	58	50
boards, et cetera	6	3	1	1	1	4
hand-operated, and fuses	28	25	25	21	35	22
transformers, resistors, and rheostats	7	2	2	2	2	3
valves	42	47	3	3	3	1
brackets, fittings, and shields	2	1	4	1	1	1
signal appliances	2	4	2	5	1	1
miscellaneous	46	74	107	43	28	22
Total number of defects	16	13	16	14	8	15
Total number of defects	1, 212	1, 026	849	926	905	766
Locomotive units reported	6, 094	5, 139	4, 351	3, 957	3, 389	2, 987
Locomotive units inspected	9, 888	7, 711	6, 847	6, 728	5, 558	4, 974
Locomotive units defective	447	378	298	358	319	298
Locomotive units inspected found defective	4. 5	4. 9	4. 4	5	6	6
Locomotive units ordered out of service	16	9	6	12	21	16

INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF LOCOMOTIVES

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

STEAM LOCOMOTIVES

One hundred and ten accidents occurred in connection with steam locomotives resulting in 20 deaths and 429 injuries. This represents an increase of 7 accidents, a decrease of 5 in the number of persons killed and a decrease of 37 in the number of persons injured compared with the preceding year.

Chart on page 5 shows the relation between the percentage of defective steam locomotives and the number of accidents and casualties resulting from failures thereof, and illustrates the effect of operating locomotives in defective condition.

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

During the year 10 percent of the steam locomotives inspected by our inspectors were found with defects or errors in inspection that have been corrected before the locomotives were put into use;

this represents a decrease of 1 percent compared with the next preceding year. Five hundred and six locomotives were ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe; this is a decrease of 124 locomotives compared with the next preceding year.

Detailed results of our inspections of steam locomotives of each railroad are shown in table XII.

EXPLOSIONS AND OTHER BOILER ACCIDENTS

Eight boiler explosions occurred in the fiscal year; all were caused by overheating of the crown sheets due to low water. Nine employees were killed in these accidents, and 12 employees were injured. There was a reduction of 11 in the number of boiler explosions, a reduction of 3 in the number of persons killed, and a reduction of 50 in the number of persons injured as compared with the next preceding year.

One of these accidents, in which two employees were injured, occurred while the locomotive was hauling a passenger train at an estimated speed of 30 miles per hour. The boiler was broken from the frame and cylinder saddle attachments and forced out of alignment but remained on the frame. The arch tubes, grates, ashpan, and brick arch were blown from the locomotive and scattered in various directions within a radius of 300 feet from the point of explosion. The trailing truck wheels, the tender, the first two cars, and the front truck of the third car were derailed, and the locomotive and train stopped in a distance of approximately 265 feet.

In another accident, in which the locomotive was hauling a passenger train, the explosion occurred while standing at a signal governing movement over an approach cross-over leading into a passenger station. One arch tube, grates, and brick arch were blown out of the firebox. Pieces of brick arch started fires in a woodworking shop 300 feet distant, part of the stoker exhaust pipe was found near some boarding cars 250 feet away, and a piece of grate side frame was found imbedded in an engine house door 300 feet from the point of explosion. One employee was killed and one employee was injured in this accident.

Two employees were killed in an explosion which occurred while the locomotive was hauling a troop train at an estimated speed of 30 miles per hour. The force of the explosion tore the boiler from the running gear and hurled it upward and forward. The boiler struck the ground, rebounded twice, and came to rest 265 feet ahead of the point of explosion and 33 feet to the right of the track. Parts of the wreckage were scattered over an area within a radius of 415 feet.

Three employees were killed and 1 employee was injured in an explosion which occurred while the locomotive was hauling a freight train at an estimated speed of 40 to 45 miles per hour. The locomotive, tender, and 22 cars were derailed, 15 cars and the locomotive

and tender frame were massed within a space of 160 feet, and the lading in 13 cars was badly damaged or destroyed by fire.

Three employees were killed in an explosion which occurred while the locomotive was hauling a freight train at an estimated speed of 12 to 15 miles per hour. The boiler was torn from the running gear and hurled 190 feet forward, where it struck and damaged the track, rebounded, and came to rest at the foot of a fill, 374 feet from the point of explosion. The running gear, tender, and the first six cars of the train were derailed at the damaged section of the track, and the running gear and tender overturned. Parts of the wreckage were scattered over an area within a radius of 675 feet.

Eight employees were injured in the remaining three accidents.

The boilers of the locomotives involved in the first, second, and fourth explosions cited above were equipped with low-water alarms. In the first and second instances the low-water alarms were sounding and giving clearly audible warnings that the water was at or below the danger point, and there was sufficient time from the first soundings of these alarms until the explosions occurred to either restore a safe water level or to dump the fire and thus avoid the explosions. It is not known whether the low-water alarm on the boiler in the fourth instance functioned before the explosion occurred as all employees on the locomotive were killed in the accident and others on the train were not sufficiently close to the locomotive to hear the alarm if it had sounded. Parts of this alarm were damaged in the accident to such extent as to preclude the making of a service test prior to repairs and adjustment, but such tests as could be made indicated that the alarm had been in operative condition, and it is known to have functioned as intended on the last trip of the locomotive before the accident occurred.

In the third cited instance, low steam pressure occurred, apparently principally due to tramp iron in the coal interfering with proper operation of the front feed stoker. A stop had been made to remove the foreign matter from the stoker, but further trouble was experienced with low steam pressure, work on the fire was done at two stops, and a whistle signal calling for a relief locomotive at the next terminal was sounded at a tower; the explosion occurred about 1½ miles beyond this point. There was a placard in the cab of the locomotive showing five illustrations of the wreckage caused by a boiler explosion and with printed instructions over the name of the vice president of the railroad, "Do not trade water for steam—if you are losing water with feed water pump and injectors working, stop and investigate. If unable to correct—remove fire, avoiding damage to crown sheet."

The results for the year represent 58 percent reduction in the number of explosions, 25 percent reduction in the number of persons killed, and 81 percent reduction in the number of persons injured compared with 1944; reduction of 68 percent in the number of explosions,

reduction of 63 percent in number of persons killed, and reduction of 79 percent in the number of persons injured compared with 1943; reduction of 38 percent in the number of explosions, reduction of 61 percent in the number of persons killed, and reduction of 33 percent in the number of persons injured compared with 1942; reduction of 27 percent in the number of explosions, reduction of 18 percent in the number of persons killed, and reduction of 59 percent in the number of persons injured compared with 1941. These statistics represent a decided improvement in the safety of employees and travelers, but recurrence of explosions caused by overheating of crown sheets indicates that efforts, the futility of which should be recognized in advance, are continuing to be exerted to avoid delays that would occur if the rate of working of the locomotive was reduced or the train stopped until a safe water level could be restored, or the fire dumped or extinguished.

Explosions on the line of road caused by overheating of crown sheets due to low water are the result of either over anxiety to avoid stalling, stopping of the train, or loss of running time; or unintentional lapse of the necessary vigilance normally exercised in the maintenance of safe water level probably brought about in most instances by attention being diverted to some unusual condition in operation of the locomotive or train which may appear at the time to be of paramount importance.

Efforts beyond the scope of their assigned duties are often voluntarily assumed by practically all railroad employees in attempts to keep trains moving and on time as nearly as this is humanly possible. Such efforts should be made only if they can be carried to conclusion without introduction of hazard to life, limb, or property. Attempts to maintain steam pressure by trading a safe water level for steam and supplying fuel to the fire to keep up the steam pressure when the water level in the boiler has receded to where it is not visible in the water glass, or, if visible, is so low that part of the crown sheet will be uncovered if the locomotive is headed upward on an ascending grade, can result only in accidents of the character described above. The operating rules of all railroads contain instructions, applicable to any condition of train or locomotive operation that may arise, to the effect that in case of doubt the safe course shall be taken. The only safe course in the prevention of explosions caused by overheating of crown sheets is to maintain the water level so that it is readily visible at the proper height in the water glass, reducing the rate of working of the locomotive to accomplish this if, from any cause, water is being used at a rate in excess of that at which it can be supplied to the boiler. The water level shown in the water glasses should be under practically constant observation, the glasses should be blown out sufficiently often during each trip, and movement of the water in the glasses carefully noted at that time and thereafter.

to insure that the level in the glasses moves freely with the water level in the boiler which is subject to practically constant motion over a narrow range when the locomotive is working. Gage cocks should be tried frequently to check the level in the water glasses.

If observation of the water level has been inadvertently overlooked until the level has receded below the lowest reading of the water glass, or proportionately higher if the locomotive is headed upward on an ascending grade, the fire should be dumped or extinguished at once irrespective of whether the discharge from the lowest gage cock may be construed as indicating the presence of water.

A false sense of security is sometimes brought about by closing the top water-glass cock in attempts to find water when it is so low that it is not visible in the water glass. Under some conditions when the top water-glass cock is closed, the glass will promptly fill with water when water is absent from part or all of the crown sheet. Indulgence in this practice and that of interpreting a flutter of water from the lowest gage cock as indicating a sufficient depth of water on the crown sheet to protect it from overheating have caused many explosions. The lowest indication of any of the water level indicating devices when observed in the normal manner should be controlling; in other words, the least favorable should be considered as the correct indication. Artificial or trick means should not be used to induce assumption that there is sufficient water in the boiler to protect the crown sheet from overheating.

Boiler and appurtenance accidents other than explosions resulted in the death of 4 employees and injuries to 142 employees: this is a decrease of 1 death and an increase of 10 injuries as compared with the preceding year.

#### EXTENSION OF TIME FOR REMOVAL OF FLUES

One thousand seven hundred and twenty-nine applications were filed for extensions of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 43 of these cases the condition of the locomotives was such that extensions could not properly be granted. Thirty-six were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Forty extensions were granted after defects disclosed by our investigations were required to be repaired. Fifty-seven applications were canceled for various reasons. One thousand five hundred and fifty-three applications were granted for the full period requested.

#### LOCOMOTIVES PROPELLED BY POWER OTHER THAN STEAM

There was an increase of 12 in the number of accidents occurring in connection with locomotives other than steam and an increase of 17 in the number of persons injured as compared with the preceding year.

One employee was killed; this is the only death as a result of these accidents since the year 1931.

During the year 4.5 percent of the locomotives inspected by our inspectors were found with defects or errors in inspection that should have been corrected before the locomotives were put into use; this represents a decrease of 0.4 percent compared with the results obtained in the preceding year. Sixteen locomotives were ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe, this represents an increase of seven locomotives compared with the next preceding year.

#### SPECIFICATION CARDS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 331 specification cards and 5,767 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, 1,045 specifications and 120 alteration reports were filed for locomotive units and 228 specifications and 166 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.

#### SPECIAL WORK

In response to requests from military and naval authorities and other Government agencies engaged in the war effort, inspections of various locomotives were made to determine the condition and suitability for use, and cooperative assistance was rendered in other respects. These locomotives are being generally maintained to the standards prescribed by the locomotive inspection law and rules governing the condition of locomotives used on the lines of common carriers, and inspections are currently made by our inspectors.

#### ACKNOWLEDGMENT

I wish to acknowledge and express my sincere appreciation for the fine spirit of cooperation of the entire personnel of the Bureau and to our inspectors for the energy and good judgment exercised in the performance of their duties.

JOHN M. HALL,  
Director.



# ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES AND TENDERS AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1945, BY ROADS

BUREAU OF LOCOMOTIVE INSPECTION

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

## ALTON RAILROAD:

September 14, 1944, locomotive 5290, near Willow Springs, Ill. An unsecured steel shim or filler piece which had been inserted between a main air reservoir hanger bracket and the running board lost out and was thrown through the cab window; one injured.

\*\*September 22, 1944, locomotive 4349, South Joliet, Ill. Tender brake hanger became disengaged at the brake beam, due to excessively worn brake head, permitting brake beam to fall on the track; brake shoe and key were missing, permitting undue wear of brake head; one injured.

Two accidents; two injured.

## ALTON & SOUTHERN RAILROAD:

\*January 24, 1945, locomotive 18, East St. Louis, Ill. Curtain rod became dislodged; one injured.

One accident; one injured.

## ATCHISON, TOPEKA & SANTA FE RAILWAY:

July 6, 1944, locomotive 3244, Belen, N. Mex. Union in train steam heat pipe in cab parted while being tightened with hammer and chisel, while under approximately 200 pounds pressure; union nut had been applied cross-threaded, causing repeated use of hammer and chisel; furnace bearer anchor sheet at back end of firebox was broken and working badly at the bottom end, causing the locomotive to ride rough; cab loose and locomotive riding rough had been reported repeatedly; one injured.

\*\*July 28, 1944, locomotive 3755, Topock, Ariz. Cab floor extension near fireman's seat box was badly worn and was oil-soaked by oil dripping from the lubricator; one injured.

August 9, 1944, locomotive 3400, La Junta, Colo. Broken radial stay blew out of firebox crown sheet; threads on the tapered end of stay and in crown sheet were very poor; one injured.

August 14, 1944, locomotive 3865, near Laguna, N. Mex. Bolt for securing the cab back drop curtain to cab broke or worked out, permitting the bracket and curtain to drop and strike employee; one injured.

\*\*August 15, 1944, locomotive 3253, Cheto, Ariz. Coal slide in tender was difficult to operate; one injured.

August 19, 1944, locomotive 3928, Hereford, Tex. Steam valve to feed water-pump lubricator was inoperative by use of the extension operating rod in cab. When repairs were attempted, the bonnet turned with the valve stem and unscrewed the bonnet nut, permitting the bonnet to blow out; threads on bonnet nut and valve body were worn; one injured.

\*\*August 19, 1944, locomotive 3522, near Siberia, Calif. Main driving spring hanger pin broke, and driving spring was thrown from the locomotive; one injured.

\*\*August 30, 1944, locomotive 578, San Bernardino, Calif. Water glass burst; one injured.

\*\*September 14, 1944, locomotive 3246, Sibley, Mo. Nipple in stoker lubricator steam pipe broke through threads at elbow connection to turret in cab; old flaw extended through approximately 25 percent of cross-sectional area of nipple; one injured.

October 3, 1944, locomotive 3238, Adamana, Ariz. Hinge on tender water tank filling hole cover broke at weld; one injured.

November 16, 1944, locomotive 3522, Bean, Calif. Cylinder relief valve worked open; one injured.

November 24, 1944, locomotive 3729, Dalies, N. Mex. Hinge of manhole cover on tender feed water tank was broken, allowing manhole cover to swing out of place; one injured.

December 9, 1944, locomotive 1618, Pueblo, Colo. Cab steam heat gage glass was blown out due to tube in gage becoming disconnected at socket due to failure of the soft metal joint; cab steam heat reducing valve was inoperative, valve nozzle was distorted, and valve seat steam cut; one injured.

\*\*December 11, 1944, locomotive 2104, Los Angeles, Calif. Leak at oil-pipe connection under tender fuel oil tank permitted oil to accumulate on tender deck; one injured.

\*December 12, 1944, locomotive 3876, Crookton, Ariz. Water pump valve was broken and could not be operated from the cab; one injured.

\*\*December 13, 1944, locomotive 3892, near North Garcia, N. Mex. Air brake reducing valve gasket blew out; one injured.

\*\*December 26, 1944, locomotive 2019, Los Angeles, Calif. Pilot beam hand-rail broke through a 50-percent progressive flaw in shank of the palm where it was riveted to the pilot beam; one injured.

\*\*December 29, 1944, locomotive 1264, Calwa, Calif. Oil on locomotive deck caused employee to fall; one injured.

January 10, 1945, locomotive 3716, Dilco, N. Mex. Stoker conveyor trough slide stuck; one injured.

January 24, 1945, locomotive 567, Los Angeles, Calif. Insufficient clearance between cab apron and projecting end of running board; one injured.

\*\*February 24, 1945, locomotive 3149, Needles, Calif. Sand on running board; one injured.

\*\*March 2, 1945, locomotive 2551, Amarillo, Tex. Water glass burst; one injured.

\*March 20, 1945, locomotive 1257, Escalon, Calif. Clamps on sand-pipe brace broke, permitting sand pipe to fall on rail; one injured.

\*March 24, 1945, locomotive 3407, Lariat, Tex. Condensate return pipe became disconnected between locomotive and tender, and the pipe bounced up and broke the train line, causing an emergency application of the brakes; one injured.

March 29, 1945, locomotive 1961, Corona, Calif. Drinking water ice keg fell from its position on tender; one of the two bolts for securing the keg on the tender oil tank was broken off; one injured.

\*\*April 20, 1945, locomotive 806, Bakersfield, Calif. Employee slipped and fell on top of tender feed water tank; "Clean off top of tank" was reported on April 12, 16, and 20 (after accident); one injured.

\*\*May 2, 1945, locomotive 3834, near Pinta, Ariz. Boiler jacket was loose inside of cab, permitting particles of asbestos lagging to work out and be blown about in the cab; one injured.

May 12, 1945, locomotive 3746, near Angell, Ariz. Boiler jacket was loose inside of cab, permitting particles of asbestos lagging to work out and be blown about in the cab; one injured.

May 22, 1945, locomotive 796, El Paso, Tex. Fire hose burst; two injured.

\*\*May 24, 1945, locomotive 1696, near Caliente, Calif. Sand-box lid fell, striking employee; hinges of sand-box lid were broken; one injured.

May 29, 1945, locomotive 1129, Buchanan, N. Mex. Employee slipped on cab apron on which fuel oil had accumulated; bolts which secured the filter screens in both fuel oil tank filling holes were missing, leaving openings approximately 3/8 inch in diameter in the coamings of the filling holes which permitted oil to splash out on top of the tank and flow down on tender deck and cab apron; one injured.

June 5, 1945, locomotive 5023, Clovis, N. Mex. Section of steam pipe to fuel oil tank heater, located near handhold, was not protected by insulation; one injured.

\*\*June 6, 1945, locomotive 3769, near Corona, Calif. Two fusce stubs were spiked to running board at edge of brakemen's cab seat to hold drinking water container in position, causing an obstruction which interfered with movement around cab seat; one injured.

June 8, 1945, locomotive 1321, La Junta, Colo. Tender water tank manhole cover catch caught under back flange of oil tank when cover was opened; one injured.

June 20, 1945, locomotive 3856, Pinta, Ariz. Oil on top of tender water tank; one injured.

June 21, 1945, locomotive 4028, Canyon, Tex. Oil on top of tender, caused by pieces of waste having lodged under fuel oil tank manhole cover gasket which prevented the cover from closing properly; one injured.

\*\*June 25, 1945, locomotive 3776, Daggett, Calif. Hinge of damper inspection plate in cab floor was broken; one injured.

Thirty-seven accidents; 38 injured.

## ATLANTA & SAINT ANDREWS BAY RAILWAY:

\*\*August 13, 1944, locomotive 402, Saunders, Fla. Driving spring hanger broke; one killed.

One accident; one killed.

## ATLANTA, BIRMINGHAM &amp; COAST RAILROAD:

August 25, 1944, locomotive 72, Senoia, Ga. Tender water crane hook straightened out while being used, causing employee to fall; hook was of too light construction; one injured.

\*\*October 15, 1944, locomotive 302, near La Grange, Ga. Valve gear motion plate became displaced due to the four cross-head shoe bolts which secured it to the cross head breaking off; bolt holes in motion plate were approximately  $\frac{1}{8}$  inch in diameter larger than the bolts; "Valves out badly" was reported 7 hours prior to the accident and the report bore notation: "Not done"; one injured.

November 6, 1944, locomotive 231, Abbottsford, Ga. Crown-sheet failure caused by overheating due to low water; three killed.

February 2, 1945, locomotive 121, Birmingham, Ala. Cab apron raised and fell on employee's foot; chafing iron worked up and out of its pocket, pushing the apron above the firing deck; no means provided to prevent the locomotive chafing iron from working up in its pocket; one injured.

Four accidents; three killed, three injured.

## ATLANTIC COAST LINE RAILROAD:

\*\*August 2, 1944, locomotive 1213, Petersburg, Va. Hinge on feed water tank filling hole cover broke near welded connection to the cover; the other hinge was cracked in the weld connecting it to the cover; one injured.

November 11, 1944, locomotive 1152, Jacksonville, Fla. Handle pulled from extension rod to throat sheet blow-off cock; threads on rod were worn, and rod could be inserted to the bottom of the hole in the handle without being turned; one injured.

\*\*March 17, 1945, locomotive 823, Goldsboro, N. C. Oil pipe to right cylinder was leaking at connection to mechanical lubricator; "Oil pipe to right cylinder leaks back of lubricator" was reported on March 15; one injured.

March 30, 1945, locomotive 1620, Naylor, Ga. Coal-pusher cylinder was cracked and leaking, permitting a pool of hot water to accumulate in tender coal space; coal pusher was reported inoperative eight times in the 10 days immediately preceding the accident; one injured.

April 13, 1945, locomotive 1109, Waycross, Ga. Bottom board of coal gate was missing; one injured.

\*\*April 28, 1945, locomotive 438, Emporia, Va. Hook slipped from water crane; crane hooks not furnished as standard equipment on tenders by this carrier; one injured.

Six accidents; six injured.

## BALTIMORE &amp; OHIO RAILROAD:

August 29, 1944, locomotive 2266, Mansfield, Ohio. Steam pipe to generator broke off through nipple connection to main steam fountain box, due to 90 percent old fracture in nipple; one injured.

August 29, 1944, locomotive 385, Demmler, Pa. Throttle moved suddenly from closed to full open position, caused by badly worn throttle latch, badly worn throttle quadrant, and weak latch spring; two teeth near center of latch were broken and all other teeth were worn; defective condition of throttle was reported on August 25 and 28; one injured.

\*November 4, 1944, locomotive 4859, Savage, Md. Insufficient clearance between handhold and tender foot plate; one injured.

November 15, 1944, locomotive 4716, Glenwood, Pa. Flue broke off near front flue sheet; flue had been grooved around entire circumference and was less than  $\frac{1}{4}$  inch in thickness at point of failure; one injured.

December 10, 1944, locomotive 1075, near Willock, Pa. Crown-sheet failure caused by overheating due to low water; four injured.

December 21, 1944, locomotive 5222, Cincinnati, Ohio. Broken radial stay blew out of crown sheet when attempt was made to caulk it while under pressure; threads on firebox end of stay were defective; roof sheet end of telltale hole in the stay was closed with sediment and firebox end of the telltale hole had been hammered closed; one injured.

January 10, 1945, locomotive 5088, near Buck Lodge, Md. Crown-sheet failure caused by overheating due to low water; two killed.

\*January 18, 1945, locomotive 2534, Hamilton, Ohio. Mechanically operated fire door did not work properly; one injured.

\*\*March 1, 1945, locomotive 7023, Rodemer, W. Va. Nut worked off bolt in bracket holding whistle lever connecting rod, permitting the rod to fall and strike employee's foot; one injured.

March 22, 1945, locomotive 7537, Cloe, Pa. Water-glass drain valve packing nut blew off; one injured.

April 27, 1945, locomotive 6178, Glendale, Ohio. Squirt hose burst; hose had been burned at point of the failure; one injured.

\*\*April 30, 1945, locomotive 4272, Connersville, Ind. Bolt came out of grate-shaker rod at shaker arm; one injured.

May 29, 1945, locomotive 4577, Huey, Ill. Main rod broke through old fracture which extended through approximately 38 percent of cross-sectional area; rod had repeatedly been reported pounding; one injured.

Thirteen accidents; 2 killed, 15 injured.

## BANGOR &amp; AROOSTOOK RAILROAD:

\*October 17, 1944, locomotive 171, Stockton, Maine. Fire door did not operate properly, due to bolt that held union link to top of door having worked out and was striking on air operating cylinder; one injured.

March 31, 1945, locomotive (B. & M.) 2684, near Northern Maine Junction, Maine. Locomotive separated from train due to locomotive coupler being too low, on account of broken drawbar carrier iron; carrier iron broke in top bend of the right riser on the previous trip and repairs were attempted by welding the broken parts together; however, the carrier iron broke in this weld soon after the locomotive was returned to service; one injured.

Two accidents; two injured.

## BELT RAILWAY OF CHICAGO:

September 10, 1944, locomotive 3, Clearing, Ill. Sand pipes were obstructed by foreign matter; "Clean out sanders" was reported on September 8 and 9; one injured.

One accident; one injured.

## BOSTON &amp; MAINE RAILROAD:

\*\*January 27, 1945, locomotive 626, East Somerville, Mass. Throttle stuck open; throttle latch bound on quadrant due to quadrant being sprung outward; one injured.

\*\*March 13, 1945, locomotive 2659, Princeton, Mass. Welded sand-pipe clamp broke, allowing sand pipe to drop and foul the track; while attempting to bend the pipe to clear the track the pipe broke off at a weld near bottom end; one injured.

Two accidents; two injured.

## BURLINGTON-ROCK ISLAND RAILROAD:

\*\*December 19, 1944, locomotive (F. W. & D. C.) 409, near Donie, Tex. Brakeman's drop seat in cab fell, due to supporting leg slipping on cab deck; no socket provided in deck to secure bottom end of supporting leg; one injured.

March 27, 1945, locomotive (C. R. I. & P.) 835, near Richards, Tex. Blow-off pipe became disconnected from elbow at muffler connection; threads on close nipple which screwed into elbow were defective and nipple extended into elbow only three or four threads; defective threads in back portion of second union in blow-off pipe assembly; one injured.

Two accidents; two injured.

## CENTRAL OF GEORGIA RAILWAY:

\*\*November 8, 1944, locomotive 438, Columbus, Ga. Bracket supporting step in stairway from pilot beam to running board failed, causing employee to fall from step to the ground; one injured.

January 18, 1945, locomotive (I. C.) 1440, near Junction City, Ga. Crown-sheet failure caused by overheating due to low water; three injured.

\*April 1, 1945, locomotive 495, Macon, Ga. Nozzle came off squirt hose; one injured.

Three accidents; five injured.

## CENTRAL RAILROAD OF NEW JERSEY:

September 29, 1944, locomotive 163, Raritan, N. J. Burned by steam and hot water from main steam-heat valve in cab; packing nut disconnected from valve bonnet due to its not having been properly applied; insufficient clearance between handwheel of steam-heat valve and cab roof; one injured.

\*\*December 8, 1944, locomotive 764, Dunellen, N. J. Steam-whistle valve stuck open, due to pieces of bronze slag having lodged under valve seat; apparently the slag had been left in whistle body when cylindrical portion of whistle was recently repaired by bronze welding; one injured.

December 12, 1944, locomotive 299, Penobscot, Pa. Oil-control valve stem broke and blew out of hydrostatic lubricator when attempt was made to force the valve open with a wrench; oil-control valve seized to its seat and could not be opened by hand; valve and seat were not of uniform bearing; one injured.

June 22, 1945, locomotive 763, Raritan, N. J. Coal gate lock bar slipped from position when used as a step; lock bar keeper pin was missing; one injured.  
Four accidents; four injured.

#### CHESAPEAKE & OHIO RAILWAY:

January 31, 1945, locomotive 473, near Gauley, W. Va. Crown-sheet failure caused by overheating due to low water; two injured.  
One accident; two injured.

#### CHICAGO & NORTH WESTERN RAILWAY:

\*\*August 4, 1944, locomotive 2060, Neenah, Wis. Handle of cracker valve of mechanically operated fire door was broken off, rendering the valve inoperative; one injured.

September 8, 1944, locomotive 2807, near Allen, Ill. Front end steam pipe to cylinder failed due to insufficient thickness of steam pipe wall, caused by the core having shifted or been misplaced; edges of the broken out sections varied from  $\frac{3}{16}$  inch to  $\frac{1}{2}$  inch in thickness; one injured.

\*\*September 24, 1944, locomotive 1221, Elgin, Ill. Threads of grease cup and plug in main rod failed while being tightened; threads were badly worn; one injured.

November 7, 1944, locomotive 2140, Chicago, Ill. Bottom lug of coupler was broken and distorted at knuckle pinhole; "Piece of eye broke off front drawbar at knuckle pin" was reported at end of previous trip; one injured.

December 17, 1944, locomotive 2490, Upton, Ill. Ice on rungs of ladder on rear of tender; one injured.

January 21, 1945, locomotive 1638, West Bend, Wis. No clearance between ashpan door operating lever and the boiler fill-up connection projecting from the injector delivery pipe; one injured.

May 3, 1945, locomotive 2617, Racine, Wis. Insufficient clearance between gangway handhold and tender deck while on curve; one injured.

May 7, 1945, locomotive 2617, Racine, Wis. Insufficient clearance between gangway handhold and tender deck while on curve; one injured.

June 27, 1945, locomotive 1385, Ripon, Wis. Grate-shaker bar slipped off lever, due to dirty fire; one injured.

Nine accidents; nine injured.

#### CHICAGO, BURLINGTON & QUINCY RAILROAD:

\*\*September 4, 1944, locomotive 5313, East St. Louis, Ill. Insufficient clearance between tender floor and vertical cab handhold when on curve; one injured.

\*\*February 12, 1945, locomotive 4970, Buda, Ill. Insufficient clearance between ashpan door lever and blow-off cock pipe; one injured.

Two accidents; two injured.

#### CHICAGO GREAT WESTERN RAILWAY:

July 8, 1944, locomotive 865, St. Joseph, Mo. Dump grate shaker post latch fell back into position while grates were being shaken; latch was obstructed by water-glass drain pipe bracket at deck which prevented it from being properly raised and secured; one injured.

September 7, 1944, locomotive 883, Stockton, Ill. Grate-shaker bar slipped off post; drain pipe from gage cock dripper obstructed the application of shaker bar to post; one injured.

\*\*January 9, 1945, locomotive 320, Austin, Minn. Handle of ashpan operating lever fouled on bottom of ashpan wing; one injured.

Three accidents; three injured.

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

\*\*August 22, 1944, locomotive 391, near Kellogg, Minn. Stoker slide hook slipped out of hole in stoker-conveyor slide while employee was attempting to move the slide forward; slide grooves of stoker-conveyor trough were bent and partially closed which prevented the slide cover from being moved forward; one injured.

\*\*November 15, 1944, locomotive 535, St. Paul, Minn. Injector did not operate properly; injector overflow valve was closed; one injured.

November 25, 1944, locomotive 315, near Hastings, Minn. Stoker was inoperative due to a coupler knuckle pin having lodged between the stoker-conveyor screw and crusher; one killed.

January 22, 1945, locomotive 1520, Elgin, Ill. Manually operated reverse lever unexpectedly disengaged from quadrant; main steam valves were dry and valves and balance strips were worn and blowing excessively; reverse lever quadrant was loose on connections to running board and running board was deteriorated and loose; one injured.

\*\*February 22, 1945, locomotive 527, near Blackhawk, Ind. Stoker elevator barrel was broken; one injured.

\*\*March 30, 1945, locomotive 425, Walworth, Wis. Coal on top of tender behind fuel space; one injured.

Six accidents; one killed, five injured.

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

October 29, 1944, locomotive 952, Gem, Kans. Blow-off pipe separated at union near muffler; pipe clamp near the union had been broken for some time and threads on pipe and coupling in union were stripped; one injured.

November 2, 1944, locomotive 5109, Dalhart, Tex. Boiler check stuck open, due to accumulation of scale; one injured.

November 18, 1944, locomotive 1740, near Antelope, Kans. Headlight bulb burned out; one injured.

November 23, 1944, locomotive 1923, El Reno, Okla. Cab steam heat radiator shield was overheated, due to being bent inward against the radiator pipes; one injured.

\*\*March 26, 1945, locomotive 2609, Kremlin, Okla. Engineer's drop seat in cab collapsed; supporting leg of drop seat was too short and was placed on a wooden block nailed on cab floor in order to make the seat level; no means provided to secure the leg on the wooden block; one injured.

May 31, 1945, locomotive 5024, Wichita, Kans. Fuel oil burner was loose in adjustable bracket and out of alignment, resulting in rapid accumulation of carbon on floor of fire pan; adjust burner and engine not steaming properly were reported repeatedly in the 30 days preceding the accident; one injured.

Six accidents; six injured.

#### COLORADO & SOUTHERN RAILWAY:

\*\*October 31, 1944, locomotive 912, Bowen, Colo. Headlight defective, caused by loose connection at headlight switch in cab; one injured.

One accident; one injured.

#### DELAWARE & HUDSON RAILROAD:

\*\*November 19, 1944, locomotive 1122, Mechanicville, N. Y. Bolt securing combination flagstaff and marker lamp column casting to the pilot beam broke, causing employee to fall from step near front end to the road bed; the combination column casting had been raised with an improvised spacer and did not have sufficient bearing on pilot beam; one injured.

January 11, 1945, locomotive 1520, near Ararat, Pa. Marker lamp socket broke when employee attempted to turn the lamp; tap bolt for holding marker socket together was missing and socket was cracked; one injured.

May 21, 1945, locomotive 1217, Lanesboro, Pa. Grate connecting rod became disconnected; split key worked out of pin in grate connecting rod, permitting the pin to work out; one injured.

Three accidents; three injured.

#### DELAWARE, LACKAWANNA & WESTERN RAILROAD:

\*\*July 29, 1944, locomotive 359, Port Morris, N. J. Insufficient clearance between cab apron and windbreaker shield; one injured.

August 15, 1944, locomotive 2202, Groveland, N. Y. Cast-iron throttle valve case in smoke box failed, causing back draft; numerous old fractures and fusion welds in valve case indicated that it was defective when applied to this locomotive on June 24, 1944; compensating lever was improperly applied; "Engine had bad blow in front end" was reported at end of previous trip; one injured.

February 18, 1945, locomotive 2225, near Dover, N. J. Cast-iron throttle valve case in smoke box failed around entire circumference of the body, causing back draft; failure occurred through fusion welds which had been applied to repair cracks in the outer side of body walls; two of the ribs which connected the inside chamber with outer body of the case were broken prior to the accident; two injured.

\*\*May 3, 1945, locomotive 2147, East Binghamton, N. Y. Sander was stopped up; one injured.

Four accidents; five injured.

#### DENVER & RIO GRANDE WESTERN RAILROAD:

\*\*January 31, 1945, locomotive 1185, Grand Valley, Colo. Top of tender behind fuel space was obstructed by water crane hook; one injured.

February 5, 1945, locomotive 3300, Salt Lake City, Utah. Undesired sudden movement of power reverse gear; one injured.

May 1, 1945, locomotive 1196, Malta, Colo. Dump grate was broken; one injured.

Three accidents; three injured.

#### DONORA SOUTHERN RAILROAD:

\*August 6, 1944, locomotive 9, Donora, Pa. Squirt hose blew off nipple; hose was so badly deteriorated that clamp would not hold it; one injured.

February 7, 1945, locomotive 22, Donora, Pa. Locomotive 27 collided with locomotive 22, caused by absence of proper headlight; lights on locomotive 22 failed, due to back brush holder of turbo-generator being loose and insulating arm between binding post and brush holder being broken and out of position; one injured.

Two accidents; two injured.

#### ERIE RAILROAD:

August 1, 1944, locomotive 133, Elmira, N. Y. Cab gangway handhold fouled the end of tender deck plank when on curve; one injured.

September 25, 1944, locomotive 121, Buffalo, N. Y. Throttle was difficult to operate, due to throttle stem packing expanding excessively and binding on stem and gland; one injured.

October 10, 1944, locomotive 220, Warren, Ohio. Insufficient clearance between cab vertical handhold and tender deck while on curve; one injured.

December 4, 1944, locomotive 135, Corning, N. Y. Throttle stem packing blew out of throttle gland stuffing box; one injured.

\*\*December 7, 1944, locomotive 3396, Jamestown, N. Y. Coal on top of tender behind fuel space; one injured.

December 17, 1944, locomotive 3183, Shenango, Pa. Extension applied to front end of stoker divider cover had no hand clearance at fire door; one injured.

February 3, 1945, locomotive 3179, Campville, N. Y. Knuckle pin worked out of rod, causing side of locomotive to be stripped; one injured.

February 22, 1945, locomotive 2907, Mansfield, Ohio. Vertical support of handrail on top of tender water tank failed at lower end when used as a handhold; support section was too short for proper engagement in union at fastening to tank; upper connection to handrail was worn, permitting the support section to turn on handrail and swing out of position; one injured.

\*\*April 15, 1945, locomotive 3392, Meadville, Pa. Head of rivet in firebox flue sheet seam broke off and rivet blew out when flue sheet was tapped with a hammer while under pressure in attempt to locate the source of a leak in the seam; rivet was overheated when applied; one injured.

May 14, 1945, locomotive 3061, Chicago, Ill. Injured while attempting to close cab-roof ventilator during a severe rain storm; no means provided for closing the fully opened ventilator from inside the cab; one injured.

June 30, 1945, locomotive 3202, North Tonawanda, N. Y. Cab handhold fouled on tender deck when on curve; one injured.

Eleven accidents; 11 injured.

#### FLORIDA EAST COAST RAILWAY:

\*July 1, 1944, locomotive 818, Miami, Fla. Shut-off valve to steam heat line was defective; one injured.

\*September 14, 1944, locomotive 432, Jacksonville, Fla. Feed water pump was inoperative; one injured.

December 26, 1944, locomotive 439, near St. Augustine, Fla. Cylinder head blew out; combination lever broke at old fracture, causing steam to be trapped in cylinder; two injured.

March 19, 1945, locomotive 445, Bunnell, Fla. Emergency fuel oil valve latch became disconnected; one injured.

Four accidents; five injured.

#### FORT WORTH & DENVER CITY RAILWAY:

August 7, 1944, locomotive 457, near Murdo, Tex. Handrail on top of tender broke; one killed.

\*November 2, 1944, locomotive 460, Hedley, Tex. Nut lost off valve stem; one injured.

November 23, 1944, locomotive (C. B. & Q.) 5227, Goodnight, Tex. Feed water pump became steam bound; pump was reported inoperative or defective on November 1, 2, 4, 9, 13 (two times), 20, and 21; one injured.

March 27, 1945, locomotive (C. B. & Q.) 5262, Clarendon, Tex. Tender water-spout safety chain became disengaged from catch on manhole collar, and water spout raised out of manhole and swung around, knocking employee from top of the tender; one injured.

June 28, 1945, locomotive (C. B. & Q.) 5221, near Jolly, Tex. Squirt-hose valve opened; valve packing nut had backed off the threads; one injured.

Five accidents; one killed, four injured.

#### GRAND TRUNK WESTERN RAILWAY:

September 3, 1944, locomotive 6408, near Schoolcraft, Mich. Nipple insteam pipe to air compressor broke flush with compressor; nipple was out of round prior to threading, causing the die to penetrate deeper into the high sides, and the failure originated in thin section at point of deep penetration; one injured.

January 8, 1945, locomotive 6312, near Schoolcraft, Mich. Side rod broke and rear portion swung around and punctured outside and inside throat sheets; failure occurred through a fracture which originated in a nick in the top edge of rod and extended through approximately 32 percent of cross-sectional area of rod before failure occurred; three injured.

Two accidents; four injured.

#### GREAT NORTHERN RAILWAY:

August 4, 1944, locomotive 612, Morris, Minn. Throttle worked hard and throttle gland blew out when employee partially disconnected the throttle operating mechanism and the packing stuffing box gland to make repairs while the boiler was under approximately full pressure; "Loosen packing in throttle, same very tight" was reported on August 2; one injured.

November 17, 1944, locomotive 3130, Cutbank, Mont. Water glass burst, resulting in glass panels in water-glass shield being shattered and louvered metal section being blown from the shield; one injured.

\*\*November 24, 1944, locomotive 764, Sand Point, Idaho. Spring hanger broke; one injured.

\*\*December 28, 1944, locomotive 3387, Harlem, Mont. Injector was inoperative due to extension handle to water valve being disconnected; cotter key which secured extension handle to flexible joint at top of water valve stem was missing which allowed handle to become disconnected; fitting on end of extension handle was badly worn or improperly fitted, causing loose fit at connection to water valve stem; one injured.

May 16, 1945, locomotive 3252, Wayne, Mont. Both No. 4 driving boxes ran hot; "Left No. 4 driving box hot—put extra grease in it" was reported on May 13; one injured.

May 23, 1945, locomotive 3249, Havre, Mont. Water glass burst, breaking glass panels in water-glass shield; one injured.

Six accidents; six injured.

#### GULF COAST LINES:

August 26, 1944, locomotive (I.-G. N.) 358, Highlands, Tex. Inside link block plate of valve motion became loose and fouled link saddle, due to supporting rivets being loose, causing manually operated reverse lever to bind and stop suddenly while being moved to backward position; one injured.

December 15, 1944, locomotive (St. L. B. & M.) 253, Raymondville, Tex. Undesired movement of manually operated reverse lever, caused by excessive lost motion at reverse lever fulcrum pin; "Reverse lever won't stay hooked up" was reported on December 1, 2, and 4; one injured.

February 27, 1945, locomotive (N. O. T. & M.) 306, Port Barre, La. Main air reservoir supply pipe broke through a 50-percent old fracture in threaded section inside of cut-out cock; one injured.

Three accidents; three injured.

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

July 16, 1944, locomotive (A. T. & S. F.) 1903, Sweetwater, Tex. Main air reservoir gage indicator caught on test date tag on the dial of gage, causing a false registration of the air pressure; one injured.

July 21, 1944, locomotive (A. T. & S. F.) 1907, Coleman, Tex. Oil on top of tender fuel oil tank caused employee to slip and fall; "Clean top of oil tank" was reported on July 10, 11, 13, and 18; one injured.

August 18, 1944, locomotive (A. T. & S. F.) 3926, Comanche, Tex. Fuel oil on top of tender fuel oil tank and top of feed water tank; "Clean off top of oil and water tanks" was reported on August 16; one injured.

\*January 10, 1945, locomotive 1381, near Temple, Tex. Driving wheel axle broke through progressive fracture which extended through approximately 75 percent of cross-sectional area; four injured.

\*\*May 27, 1945, locomotive (A. T. & S. F.) 4034, Brownwood, Tex. Train steam heat fountain valve on locomotive was leaking; one injured.

May 28, 1945, locomotive (A. T. & S. F.) 4069, Overbrook, Okla. Flue failed in defective safe end weld; one injured.  
 June 19, 1945, locomotive (A. T. & S. F.) 1121, Temple, Tex. Oil on top of fuel oil tank; one injured.  
 Seven accidents; 10 injured.

#### GULF, MOBILE & OHIO RAILROAD:

May 3, 1945, locomotive 259, Mantee, Miss. Superheater flue broke off at defective safe end weld; one injured.  
 One accident; one injured.

#### HOUSTON BELT & TERMINAL RAILWAY:

February 20, 1945, locomotive 4, Houston, Tex. Cab apron and deck were slippery; apron was not properly roughened and apron and deck were oily and wet; one injured.  
 One accident; one injured.

#### ILLINOIS CENTRAL RAILROAD:

August 17, 1944, locomotive 2543, near Birkbeck, Ill. Stoker operating valve bonnet broke and came off while valve was being closed; failure occurred through an old fracture at root of thread near the bonnet seat on valve body; valve had been leaking, valve body was steam cut, and valve disk was damaged; one injured.  
 \*\*September 21, 1944, locomotive 3621, East St. Louis, Ill. Fire hose burst; one injured.

\*\*December 25, 1944, locomotive 2449, Chicago, Ill. Plug missing from tee in blow-off pipe; one injured.

\*\*February 20, 1945, locomotive 2434, Champaign, Ill. Train heating steam-pipe connection failed at high pressure side of pressure reducing valve in cab when threads in connecting nut stripped; nut was poor fit on valve and steam-pipe line was so clamped as to cause undue stress on the joint; one injured.

Four accidents; four injured.

#### KANSAS CITY SOUTHERN RAILWAY:

\*November 24, 1944, locomotive 223, Myrtis, La. Squirt hose burst; one injured.

\*\*March 17, 1945, locomotive (St. L.-S. F.) 1271, Leesville, La. Rigid stay-bolt head blew out of firebox side sheet when struck with a hammer in attempt to stop a leak while boiler was under steam pressure; one injured.

May 8, 1945, locomotive 556, Sallisaw, Okla. Fire flashed out of open firebox door; atomizer valve would not remain set in desired position account of defective packing; one injured.

Three accidents; three injured.

#### LAKE TERMINAL RAILROAD:

October 24, 1944, locomotive 13, Lorain, Ohio. Cab floor board tipped, causing employee's foot to slip from floor board to cab deck; floor board was badly worn and loose on retaining nails; one injured.

One accident; one injured.

#### LEHIGH & NEW ENGLAND RAILROAD:

\*July 21, 1944, locomotive 401, Brodhead, Pa. Boiler check stuck open; one injured.

One accident; one injured.

#### LEHIGH VALLEY RAILROAD:

\*October 14, 1944, locomotive 443, Wende, N. Y. Sand did not run properly; one injured.

One accident; one injured.

#### LONG ISLAND RAILROAD:

November 5, 1944, locomotive 265, Morris Park, N. Y. Arch tube washout plug cap on boiler back head broke circumferentially while being tightened under pressure and the outer end of cap blew from sleeve; old fracture extended through approximately 20 percent of cross-sectional area of cap; cap was badly battered; one killed, one injured.

November 6, 1944, locomotive 27, Floral Park, N. Y. Flue broke off in prosser groove adjacent to back flue sheet; metal at point of failure appeared to have been overheated; one injured.

Two accidents; one killed, two injured.

#### LOUISVILLE & NASHVILLE RAILROAD:

August 28, 1944, locomotive 1121, McLeansboro, Ill. Steam pipe failed at connection to dry pipe T in smoke box, causing back draft; old fracture in

steam-pipe flange and pipe wall covered approximately 80 percent of the broken area; joint ring had poor fit on both the steam-pipe and dry-pipe T; one injured.

September 28, 1944, locomotive 1356, Shepards, Tenn. Threaded end of cross-head pin broke off at old fracture which extended through 95 percent of cross-sectional area and cross-head pin came out; "Nut loose on right cross-head pin" was reported on September 27; one injured.

November 22, 1944, locomotive 1363, Biloxi, Miss. Insufficient clearance between handle of stoker steam jet valve and fire door in fully open position; one injured.

November 26, 1944, locomotive 1260, Pace Junction, Fla. Grate shaker rod became disconnected from fulcrum arm, due to cotter pin being missing; one injured.

\*\*January 7, 1945, locomotive 1555, Cloverport, Ky. Broken hinge on tender water tank filling hole cover; one injured.

\*\*January 12, 1945, locomotive 2115, Mobile, Ala. Defective board in cab floor gave way; two adjacent top boards and one filler board in cab floor were rotten; one injured.

January 26, 1945, locomotive 1006, Birmingham, Ala. Right back cab door swung back and forth; fasteners for securing the door in open and closed positions were missing; one injured.

January 31, 1945, locomotive 1884, near Brodhead, Ky. Coupler shank broke at junction with coupler head; failure occurred through a shrinkage crack; one injured.

\*\*March 31, 1945, locomotive (N. C. & St. L.) 422, Nashville, Tenn. Shovel caught in drawbar pin hole in shoveling sheet; pin hole was excessive in size; one injured.

June 9, 1945, locomotive 2057, Birmingham, Ala. Footboard bracket struck wing of track frog and was bent under the locomotive; height of footboard was approximately 1½ inches below the minimum requirement; one killed.

\*\*June 21, 1945, locomotive 1790, Jemison, Ala. Gasket to hot-water pump was leaking; one injured.

Eleven accidents; 1 killed, 10 injured.

#### MINNEAPOLIS & ST. LOUIS RAILWAY:

\*December 17, 1944, locomotive 630, Waseca, Minn. Main driving box ran hot; one injured.

One accident; one injured.

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

September 28, 1944, locomotive 1024, Carrington, N. Dak. Wire obstruction around handrail over cab window caused employee to lose hold on handrail and fall to the ground; one injured.

November 3, 1944, locomotive 4004, near Waupaca, Wis. Whistle operating lever became disconnected from shaft and fell, striking employee; tapered pin for securing operating lever to shaft was missing; one injured.

January 14, 1945, locomotive 2704, Owen, Wis. Hinged lock and safety chain for steam manifold casing covers were broken, permitting covers to blow open, and one of the covers fouled the whistle operating rod; one injured.

Three accidents; three injured.

#### MISSOURI-KANSAS-TEXAS RAILROAD:

July 9, 1944, locomotive 866, Mingo, Tex. Injector did not operate properly; one injured.

\*\*August 21, 1944, locomotive 909, near Witcher, Okla. Water glass burst; one injured.

\*\*November 20, 1944, locomotive 50, Houston, Tex. Water glass burst; one injured.

\*\*November 24, 1944, locomotive 405, Denison, Tex. Sand pipe not in alignment with track rail; one injured.

\*December 17, 1944, locomotive 395, Sedalia, Mo. Hook slipped off water spout; hook was not properly bent; one injured.

February 2, 1945, locomotive 40, Parsons, Kans. Water glass burst; one injured.

February 17, 1945, locomotive 106, Fort Worth, Tex. Injector water valve stuck in closed position; one injured.

March 7, 1945, locomotive 760, Denison, Tex. Front handrail broke through progressive fracture at bend, causing employee to fall from the locomotive; handrail vibrated badly due to insufficient support; one injured.

\*June 3, 1945, locomotive 723, Watauga, Tex. Oil on top of tender; one injured.

\*\*June 16, 1945, locomotive 385, near Sprinkle, Tex. Scale from firebox door edged in employee's eye; one injured. Ten accidents; 10 injured.

#### MISSOURI PACIFIC RAILROAD:

October 21, 1944, locomotive 9305, North Little Rock, Ark. Reflex water ass burst; glass was worn approximately 20 percent under original thickness; one injured.

\*\*November 26, 1944, locomotive 1557, Poplar Bluff, Mo. Boiler check stuck open; one injured.

\*\*December 23, 1944, locomotive 1468, Osage City, Kans. Employee slipped on ice on top of tender water tank; "Clean off back of tank" was reported on December 16 and 23; one injured.

\*\*February 5, 1945, locomotive 1451, Dupou, Ill. Insufficient clearance between whip lever and blow-off cock; one injured.

\*\*March 7, 1945, locomotive 2113, La Crosse, Kans. Engine truck wheel roller bearing ran hot; roller bearing heat indicating plug on left side of housing was partially broken off, causing an opening into wall of the plug which allowed the oil to drain from the housing; one injured.

\*\*March 27, 1945, locomotive 1524, Osawatomie, Kans. Blow-off cock operating rod stuck; one injured.

\*\*April 19, 1945, locomotive 1466, near Rantoul, Kans. Divider plate in stoker transfer hopper could not be secured in position; divider plate and anchor pivot at bottom of the plate were badly deteriorated and pivot hole in hopper was filled with rust, preventing anchorage of the pivot; one injured.

\*\*April 26, 1945, locomotive 9765, Alexandria, La. Boiler checks stuck in open position; cap to left injector blow-back valve was loose, and when attempt was made to put lubricating oil into the left delivery pipe through the loose blow-back cap, in attempt to prevent the boiler check from sticking, the blow-back cap blew off; one injured.

\*\*June 1, 1945, locomotive 1268, Gordon, La. Fuel oil on top of tender water tank; oil on top of tank was reported twice on May 31; one injured.

\*\*June 6, 1945, locomotive 142, Mellwood, Ark. Plank used as engineer's side foot rest moved out of position, causing employee to slip and fall from the seat; foot rest was not secured to cab floor; one injured. Ten accidents; 10 injured.

#### ASHVILLE, CHATTANOOGA & ST. LOUIS RAILWAY:

December 20, 1944, locomotive 664, Camden, Tenn. Headlight generator did not operate properly; governor end of turbine shaft was bent; one injured. One accident; one injured.

#### NEW YORK CENTRAL SYSTEM:

July 18, 1944, locomotive 5412, Manitou, N. Y. Nipple in brake pipe to distributing valve broke off near distributing valve, due to old fracture and vibration of the brake valve pedestal; brake valve pedestal base stud and bolts were loose and pedestal brace was loose on boiler; "Brake valve pedestal bolts loose" was reported at end of previous trip; one injured.

August 26, 1944, locomotive (Erie) 3179, near Ansonia, Pa. Outside unit bars in front section of grates fouled on blind grate when going over center, due to excessive motion of unit bar on carrier bar; one injured.

October 21, 1944, locomotive 5318, Chesterton, Ind. Piston rod nut and piston separated from piston rod, resulting in front cylinder head being knocked out and the parts being thrown from the locomotive; one killed.

\*\*November 6, 1944, locomotive 7442, Collinwood, Ohio. Insufficient clearance between gangway handhold and tender sill step when on sharp curve; one injured.

\*\*December 20, 1944, locomotive 1947, Piney Fork, Ohio. Crank pin was ineffective; one injured.

December 26, 1944, locomotive 5219, Elkhart, Ind. Crown-sheet failure caused by overheating due to low water; one killed, one injured.

\*\*January 3, 1945, locomotive 5209, near Vermilion, Ohio. Driving-wheel tire broke in three places; apparently the first break occurred through an internal flaw in the tire; tire was reported working on December 15, 27, and 30; one injured.

\*February 1, 1945, locomotive 7742, Cleveland, Ohio. Gangway handhold on locomotive contacted tender sill step when on curve; one injured.

February 5, 1945, locomotive 5234, near Bryan, Ohio. Main driving rod broke; one injured.

March 11, 1945, locomotive 2927, Cincinnati, Ohio. Centrifugal feed water pump exploded, caused by excessive speed of turbine due to the control apparatus failing to function; trip lever bracket holder was broken; one injured.

\*\*March 20, 1945, locomotive 2717, South Bend, Ind. Low water in the boiler, apparently caused by boiler water foaming; "Blow down not working—Boiler foams—Water pump don't supply boiler" was reported at end of previous trip. In the 25 days preceding the accident, the blow down was reported not working 5 times, water in the boiler was reported in poor condition 14 times, and the feed water devices were reported ineffective 13 times; two injured.

March 27, 1945, locomotive 2771, De Witt, N. Y. Handwheel of Precision reversing gear spun violently out of control and handle on handwheel struck employee's wrist; tumbling shaft reversing spring arrangement was loose on boiler waist sheet and out of alignment, due to one bolt being missing and the other bolt loose, preventing it from functioning properly; reversing gear was reported 12 times in the 21 days preceding the accident; one injured.

April 2, 1945, locomotive 2897, Schenectady, N. Y. Handwheel of Precision reversing gear spun violently out of control and handle on handwheel struck employee's wrist; left valve overtraveled in back motion and stuck on bushing, causing gear to stick, and when gear released the handwheel spun rapidly; eccentric rod was too short, half of exhaust ring was missing, and link motion bushing was worn; one injured.

\*\*April 3, 1945, locomotive 5259, Rochester, N. Y. Handwheel of Precision reversing gear spun violently out of control and the handle on handwheel struck employee's wrist; nut lost off rear splice bolt in left radius bar, permitting bolt to work out and foul on outside member of the link support frame, retarding the intended movement of the gear, then the bolt bent or broke and released the gear, permitting it to spin rapidly; one injured.

\*\*April 10, 1945, locomotive 7053, Chicago, Ill. Throttle was difficult to operate; throttle reported on March 24, 25, 26, 28, and 30, and April 4 and 7; one injured.

April 15, 1945, locomotive 2781, Utica, N. Y. Handwheel of Precision reverse gear spun violently out of control and handle on the wheel struck employee's hand; bolt which secured the inside radius bar to reverse yoke worked out, due to cotter, nut, and collar of bolt being missing, and the bolt fouled on head of the inside bolt securing the pin in top end of gear connecting rod which caused the valve gear to bind and when handwheel was forced the valve gear freed suddenly and caused the handwheel to spin; one injured.

April 17, 1945, locomotive 2708, Voorheesville, N. Y. Locomotive separated from train, causing emergency application of the brakes; inside bolt on right side of rear coupler carrier iron broke, nuts were nearly off the other bolt on right side, and both bolts on left side were loose, permitting the carrier iron to drop sufficiently to allow the coupler on car to pull over the locomotive coupler; carrier iron bolt was badly worn and broke through an old fracture which extended through approximately 80 percent of cross-sectional area; carrier iron bolts were reported loose 10 times in the 30 days preceding the accident; two injured.

April 22, 1945, locomotive 7756, Toledo, Ohio. Piston head broke; employee was struck by a bolt which was blown through smokestack by the exhaust; one injured.

April 28, 1945, locomotive 2793, St. Johnsville, N. Y. Handwheel of Precision reverse gear spun violently out of control and handle on the wheel struck employee's hand and knee; reverse shaft box bearing had been reduced by planing off the bearing cap and was too tight and gripped the reverse shaft when in full forward or full backward motion, retarding the intended movement of the gear and causing the reverse gear to bind, and when the gear freed suddenly the handwheel spun rapidly; one injured.

\*June 22, 1945, locomotive (C. C. C. & St. L.) 6826, Indianapolis, Ind. Insufficient clearance between grate-shaker bar and boiler head; one injured.

June 24, 1945, locomotive 7700, Cleveland, Ohio. Injector extension rod handle universal joints were loose on steam ram and overflow valves. While employee was riding on gangway step to observe the injector, his hand was mashed due to insufficient clearance between cab handhold and tender step when on a curve; one injured.

June 30, 1945, locomotive 2577, Auburn, N. Y. Boiler check and line check valves were leaking; one injured.

Twenty-two accidents; 2 killed, 24 injured.

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

\*July 2, 1944, locomotive 76, Cleveland, Ohio. Cab curtain rod fell from position and struck employee; nut came off the bolt which secured the curtain rod; one injured.

July 11, 1944, locomotive 302, Cleveland, Ohio. Nozzle fitting parted from fire hose; two injured.



November 1, 1944, locomotive 300, Buffalo, N. Y. Fire hose burst; hose deteriorated; one injured.

\*\*November 1, 1944, locomotive 656, Neoga, Ill. Stoker engine reversing rod broke; one injured.

Four accidents; five injured.

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

July 29, 1944, locomotive 1308, Hingham, Mass. Flue failed in prosser groove near back flue sheet; flue excessively eroded and reduced in thickness at point of failure; two injured.

\*August 10, 1944, locomotive 1346, Boston, Mass. Grease on top of tender water tank; one injured.

\*August 30, 1944, locomotive 3237, West Patterson, N. Y. Injured while attempting to open cab window from inside the cab; window had been nailed in closed position from the outside; one injured.

\*October 14, 1944, locomotive 1012, Sharon, Mass. Combination lever and reach rod were broken; one injured.

\*\*November 5, 1944, locomotive 278, South Boston, Mass. Broken flexible staybolt and welded sleeve blew out of throat sheet when attempt was made to chalk a leak in the welding; one injured.

\*\*December 15, 1944, locomotive 1018, Campello, Mass. Guide yoke broke; one injured.

Six accidents; seven injured.

#### NORFOLK & WESTERN RAILWAY:

\*\*January 30, 1945, locomotive 375, Pulaski, Va. Mechanically operated fire door hung in open position, due to fire door connecting link bolt having worked outward and fouled on operating cylinder; one injured.

\*\*February 12, 1945, locomotive 701, Lynchburg, Va. Apron between deckless locomotive and tender pushed up against fire-door pedal, due to uneven track, permitting fire door to close unexpectedly; one injured.

Two accidents; two injured.

#### NORTHERN PACIFIC RAILWAY:

\*\*July 19, 1944, locomotive 5106, Sampson, Mont. Main crank pin broke through old fractures at fillet inside crank-pin hub; crank pin was worn below the carrier's standard condemning limit; one injured.

\*\*August 1, 1944, locomotive 1619, Elma, Wash. Front drawbar casting bolt was broken; this defect was reported on July 28, 29, 31, and August 1; one injured.

August 22, 1944, locomotive 2193, near Ramsey, Idaho. Manually operated reverse lever became unlatched and moved rapidly to front end of the quadrant, striking employee's foot; back end of reverse lever quadrant was loose; one injured.

\*\*September 2, 1944, locomotive 5123, near Bozeman, Mont. Squirt-hose valve was accidentally opened while hose was lying on cab deck; tube provided in cab deck for holding the hose when not in use was stopped up with coal and waste; squirt-hose valve was so located that it might easily be kicked accidentally; one injured.

\*September 4, 1944, locomotive 5107, near Trout Creek, Mont. Derailment caused by broken locomotive frame; one injured.

\*\*September 21, 1944, locomotive 4024, Old Stampede, Wash. Nipple blew out of end of squirt hose; nipple was not standard equipment and was not clamped in place; one injured.

October 28, 1944, locomotive 2666, Skones, Mont. Coal guard on tender, which was accidentally released, fell on employee's foot; link-type fastener at top of coal guard could easily be lifted accidentally while tools were being taken from the rack back of coal guard; one injured.

November 2, 1944, locomotive 1908, Belfry, Mont. Piece of pipe being used for nozzle at end of squirt hose blew out; hose was not clamped on the pipe; one injured.

\*\*December 3, 1944, locomotive 5106, Sampson, Mont. Plug blew out of bottom of cylinder cock; this was the second plug to blow from this location since the locomotive was dispatched; one injured.

December 17, 1944, locomotive 2667, Spokane, Wash. Feed water pump did not start properly; one injured.

\*\*December 27, 1944, locomotive 2232, near Perma, Mont. Employee fell from coal gate; locomotive was supplied with coal containing unusually large lumps which would not feed into the stoker conveyor trough, making it necessary for employee to go over coal gate to break the lumps; one injured.

\*June 8, 1945, locomotive 5109, Tuscor, Mont. Trailer wheel had flat spot; one injured.

June 21, 1945, locomotive 2626, Paradise, Mont. Front end door lug stud broke while being tightened; one injured.

Thirteen accidents; 13 injured.

#### PENNSYLVANIA RAILROAD:

August 25, 1944, locomotive 1387, Baltimore, Md. Employee lost his grip on rear tender handhold and fell to the ground; handhold had grease or oil on it; one injured.

August 30, 1944, locomotive 6906, near Spruce Creek, Pa. Insufficient clearance between grate-shaker bar and throttle lever; one injured.

August 31, 1944, locomotive 9628, Cincinnati, Ohio. Upper section of blow-off discharge pipe blew out of union; threads on pipe and in union were badly worn and deteriorated; one injured.

\*\*October 14, 1944, locomotive 4351, Corliss, Pa. Stalled in tunnel due to stoppage of air compressor which was caused by carry over of water from foaming boiler; one injured.

October 16, 1944, locomotive 8205, Mansfield, Ohio. Roller wheel of sliding door at rear of cab came off the track; nut on roller pin was loose and pin was worn and the excessive play permitted the wheel to derail; one injured.

October 21, 1944, locomotive 227, Trinway, Ohio. Headlight bulb failed; one injured.

\*\*October 25, 1944, locomotive 4529, near Torrance, Pa. Reverse shaft bearing cap stud came out and was thrown backward through clear-vision window; threads in stud hole were defective; stud was reported missing on October 22 and loose on October 24; one injured.

November 9, 1944, locomotive 5408, near Derry, Pa. Grate-shaker bar stuck on post, due to edge of shaker-bar socket being burred and closed in; one injured.

November 18, 1944, locomotive 6623, Buffalo, N. Y. Flue failed at front flue sheet due to having been excessively thinned when rolled and expanded; flues had been too heavily rolled and expanded; one injured.

\*November 22, 1944, locomotive 5433, Gary, Ind. Main crank pin broke off flush with wheel center, due to old defect which extended through approximately 75 percent of cross-sectional area; one injured.

December 2, 1944, locomotive 6885, Piteairn, Pa. Washout cap on the roof sheet of the boiler blew off, due to not having been properly applied; one killed.

\*December 22, 1944, locomotive 855, Philadelphia, Pa. Knuckle on tender fell from position, due to broken knuckle pin; one injured.

December 28, 1944, locomotive 8157, Goldsboro, Pa. Injector starting valve was difficult to operate, due to extension handle being too long; one injured.

December 30, 1944, locomotive 4461, Corliss, Pa. Retaining ring around pawl casing on stoker elevator broke loose from its fastenings at top of elevator housing, due to retaining ring lugs being broken, allowing the wearing plate between the casing and the elevator housing to be thrown out as the elevator screw revolved; apparently the retaining ring lugs had broken at some time prior to the accident and repairs had been attempted by means of fusion welding, and the failure of this welding caused the accident; one injured.

January 4, 1945, locomotive 4362, Toronto, Ohio. Stoker was inoperative due to defective stoker engine steam reversing valve; stoker reversing valve and side wall were broken; one injured.

\*\*January 6, 1945, locomotive 6755, Columbus, Ohio. Drawbar and safety bar broke through pin holes at front end and the tender ran rearward on descending grade and collided with another locomotive; due to a manufacturing defect the drawbar pin hole was off center and one side of bar at pin hole was  $\frac{1}{4}$  inch less than standard width; primary failure occurred in the reduced width through an old fracture from the pin hole; metal of drawbar and safety bar had been over-annealed; one injured.

January 27, 1945, locomotive 4528, Latrobe, Pa. Union in train line below the cab separated due to becoming unscrewed; one injured.

\*\*February 5, 1945, locomotive 1742, Bellwood, Pa. Brake pipe air hose between locomotive and tender burst, due to having been badly abraded; hose did not have sufficient clearance above the rails; one injured.

\*March 22, 1945, locomotive 5422, Alexis, Ohio. Tender brake beam came down due to hanger breaking and nut pulling off truss rod, breaking the steam connector which in turn struck the cut lever on car and parted the train; one injured.

March 27, 1945, locomotive 5455, near New Cumberland, Pa. Ashpan blower valve worked open; one killed.

March 30, 1945, locomotive 1603, East Altoona, Pa. Smoke-box step turned, causing employee to fall; nut lost off one of the bolts supporting the step, permitting the bolt to work out of step; one injured.

April 19, 1945, locomotive 1969, Wilkinsburg, Pa. Nipple in train line pipe at rear of tender, with the angle cock and air hose attached, blew out of coupling due to improper fit; threaded portion of nipple was approximately  $\frac{3}{16}$ -inch undersize; threads on nipple were badly deteriorated and walls of nipple were thinned due to erosion; train line was insecurely supported; one injured.

\*May 1, 1945, locomotive 6871, Metuchen, N. J. Defective hinges on door of brakeman's cabin; one injured.

May 8, 1945, locomotive 716, Davis, Del. Driving spring hanger broke; one injured.

May 12, 1945, locomotive 809, Avonmore, Pa. Hole,  $2\frac{3}{4}$  inches in diameter, in wall of ashpan hopper; one injured.

June 7, 1945, locomotive 5010, Philadelphia, Pa. Hood of spark arrester fell from smokestack and struck employee, causing him to fall from the locomotive; fixed bolt that engaged the hinge bolt of hood worked out of place due to nut working off, and the exhaust through smokestack forced the hood from its position, causing it to fall; hinge bolts of spark arrester were too long, permitting hood to have excessive vertical motion; one injured.

\*\*June 16, 1945, locomotive 3642, Baltimore, Md. Locomotive derailed at cross-over switch, caused by flange of left leading truck wheel being excessively worn; left radial bar was approximately 1 inch longer than right radial bar; "Sharp flange left engine truck wheel" was reported on June 15; one injured.

Twenty-seven accidents; 2 killed, 25 injured.

#### PERE MARQUETTE RAILWAY:

April 3, 1945, locomotive 1198, New Richmond, Mich. Handrail at front of locomotive became disengaged from one of the two supporting columns, causing employee to fall from the pilot beam; one injured.

One accident; one injured.

#### PITTSBURGH & LAKE ERIE RAILROAD:

\*December 10, 1944, locomotive 8072, Beaver Falls, Pa. Insufficient clearance between grab handhold on locomotive and firing deck of tender when on curve; one injured.

March 29, 1945, locomotive 7296, Pittsburgh, Pa. Insufficient clearance between cab gangway handhold and tender step while locomotive was on a sharp curve; one injured.

Two accidents; two injured.

#### PITTSBURGH & WEST VIRGINIA RAILWAY:

November 6, 1944, locomotive 1001, Rook, Pa. Threads on lubricator glass packing nut failed, due to improper fit, releasing the glass, steam, and hot oil from lubricator bowl; a reclaimed packing nut had been applied in a tapped oversize opening in lubricator bowl and the standard metal washer, or follower, had not been applied between packing nut and gasket; one injured.

One accident; one injured.

#### READING COMPANY:

September 6, 1944, locomotive 2019, Wyomissing, Pa. Cast-iron steam pipe in front end burst; failure apparently originated in an old fracture,  $3\frac{1}{2}$  inches in length, which extended from the inside approximately half way through the steam-pipe wall; three injured.

One accident; three injured.

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

\*August 12, 1944, locomotive 1528, Birmingham, Ala. Train line air hose blew off nipple on front end of locomotive, due to the clamp not being sufficiently tight; one injured.

November 21, 1944, locomotive 1621, Pearl, Mo. Cab handhold at gangway was obstructed by a back-up storm window; storm window was improperly applied; one injured.

November 30, 1944, locomotive 1060, Red Fork, Okla. Engine truck stirrup type spring hanger broke through both bottom inside corners; old fracture extended through approximately 80 percent of the cross-sectional area of the inside bottom corner; one injured.

March 21, 1945, locomotive 1225, Springfield, Mo. Steam leak at packing nut on injector starting valve stem; one injured.

April 19, 1945, locomotive 4147, Neosho, Mo. Locomotive booster latch was

difficult to engage; latch lever was not in proper alignment with booster latch, caused by booster latch lever stop pin being bent; one injured.

Five accidents; five injured.

#### SAN DIEGO & ARIZONA EASTERN RAILWAY:

\*June 13, 1945, locomotive 102, Campo, Calif. Fire hose burst; one injured. One accident; one injured.

#### SEABOARD AIR LINE RAILWAY:

July 5, 1944, locomotive 2502, Athens, Ga. Grate-shaker bar slipped off lever due to improper fit; taper in shaker-bar socket did not correspond with taper of shaker levers; one injured.

\*\*July 6, 1944, locomotive 344, Cordesville, S. C. Employee's arm was injured by contact with a tack which protruded from the rear end of arm rest at cab window; one injured.

July 24, 1944, locomotive 342, Estill, S. C. Employee's hand was injured on cotter key which protruded from fire door air cylinder stud; one injured.

July 25, 1944, locomotive 350, Georgetown, S. C. Running board on top of tender was obstructed by lumps of coal; one injured.

July 25, 1944, locomotive 338, Comer, Ga. Collar bolt in radius bar worked out of hole and reversing yoke worked out of position and the collar bolt and reversing yoke fouled on valve gear, preventing the gear from operating properly; one injured.

July 29, 1944, locomotive 2407, Cayce, S. C. Grate-shaker bar slipped off post, due to improper fit; one injured.

August 12, 1944, locomotive 1113, Jacksonville, Fla. Lid of employee's clothes chest on tender fell from open position and crushed employee's finger; lid would not remain in open position when released and no means were provided to hold it open; one injured.

\*\*August 17, 1944, locomotive 492, Lilesville, N. C. Squirt hose was defective; one injured.

August 20, 1944, locomotive 501, near Preston, Ga. Lifting arm of valve gear tumbling shaft broke off, permitting steam to be trapped in cylinder which caused main rod to buckle and break crank pin and resulting in much other damage to the locomotive; lifting arm failed through an old fracture in a weld adjacent to the round section of shaft; crank pin failed through a progressive fracture; one injured.

\*\*November 15, 1944, locomotive 2400, Charlotte, N. C. Insufficient clearance between injector handle and ashpan handle, due to ashpan handle being improperly located; one injured.

December 1, 1944, locomotive 253, Hamlet, N. C. Grate-shaker bar slipped off post, due to improper fit; shaker post was burred; one injured.

February 3, 1945, locomotive 495, Hamlet, N. C. Shaker bar slipped off post; grates were hard to shake; one injured.

February 6, 1945, locomotive 490, Hemingway, S. C. Shaker bar slipped off post; planking on raised portion of cab deck supporting left seat box extended too near shaker post, preventing normal operation of the post; one injured.

March 14, 1945, locomotive 1091, Jacksonville, Fla. Spark arrester fell from smokestack due to broken hinge; hinge failed through old fracture which extended through 90 percent of cross-sectional area; one injured.

March 24, 1945, locomotive 328, Indiantown, Fla. Stoker conveyor trough cover plate was inoperative; one killed.

March 26, 1945, locomotive 2499, near Tucker, Ga. Side rod broke at old fracture which extended through approximately 80 percent of cross-sectional area; two injured.

\*\*April 11, 1945, locomotive 357, West Jacksonville, Fla. Steam pipe to turbo-generator disconnected; one injured.

April 14, 1945, locomotive 418, near Aberdeen, N. C. Grate-shaker bar fell from a small bracket on cross brace above coal gates and struck employee's foot; shaker bar was too long to hang on the standard shaker-bar bracket; one injured.

April 29, 1945, locomotive 387, near Moncure, N. C. Superheater flue failed at safe end weld due to being reduced in thickness; flue had been excessively rolled when safe end was applied and was wasted away on water side and cinder cut; three injured.

Nineteen accidents; 1 killed, 21 injured.

#### SOUTH BUFFALO RAILWAY:

December 19, 1944, locomotive 16, Lackawanna, N. Y. Crown-sheet failure caused by overheating due to low water; two flues loose in flue sheet and leaking badly due to having been excessively worked; several other flues were fire-cracked



and leaking; excessive scale on crown sheet and flues at back flue sheet; flues had been repeatedly reported leaking; one injured.  
One accident; one injured.

## SOUTHERN RAILWAY:

July 3, 1944, locomotive 6353, Flat Rock, Ky. Air compressor stopped, stalling the locomotive and train in a tunnel; one injured.

\*\*July 8, 1944, locomotive 827, Alston, S. C. Nail protruded from cab floor; one injured.

\*\*July 15, 1944, locomotive 1389, Greensboro, N. C. Brake pipe hose blew off engine, causing emergency application of the brakes; hose was deteriorated; one injured.

\*\*August 10, 1944, locomotive 4537, near Blythewood, S. C. Defective insulation on headlight wires caused a short circuit which resulted in application of the automatic train control and the sudden stop of the train; one injured.

\*\*August 17, 1944, locomotive 1473, Morganton, N. C. Employee was burned by steam and hot water which was discharged from injector overflow; improper adjustment of injector operating lever on the cab stand caused the injector to operate at reduced capacity and to discharge steam and hot water from overflow intervals; injector had been reported repeatedly; one injured.

August 19, 1944, locomotive 1331, Eddy, Fla. Squirt hose broke in two; material of hose was of poor quality; one injured.

\*\*September 10, 1944, locomotive 4525, Mooresville, N. C. Steam-heat pipe was broken; one injured.

\*\*September 18, 1944, locomotive 4833, Busick, N. C. Squirt-hose valve worked open; one injured.

December 10, 1944, locomotive 4828, near Alto, Ga. Crown-sheet failure caused by overheating due to low water; three killed, one injured.

\*\*December 16, 1944, locomotive 1081, Potter, Ala. Tender step was worn; one injured.

\*\*January 25, 1945, locomotive 572, Jellico, Tenn. Employee slipped on ice at cab step and fell to the ground; vent in injector discharged water on cab running board and step under side of cab when injector was being primed; one injured.

\*January 29, 1945, locomotive 6308, Sheffield, Ala. Oil on steel deck between locomotive and tender; one injured.

February 2, 1945, locomotive 861, near Depauw, Ind. Main crank pin broke through two old fractures in wheel fit which covered approximately 80 percent of cross-sectional area of pin; one killed.

April 6, 1945, locomotive 5076, Marion, N. C. Left side sheet-crown sheet lap-welded seam cracked for a distance of 8 feet and right side sheet-crown sheet lap-welded seam cracked for a distance of 2 feet; one injured.

\*\*April 19, 1945, locomotive 5220, John Sevier, Tenn. Washout plug blew out barrel of boiler; plug was applied cross-threaded and entered boiler sheet only 1/2 inch; one injured.

\*\*May 10, 1945, locomotive 4880, Salisbury, N. C. Pilot was too low; one injured.

\*\*June 9, 1945, locomotive 711, Canton, N. C. Squirt hose burst; hose badly deteriorated; one injured.

\*\*June 16, 1945, locomotive 4846, Wellford, S. C. Squirt-hose valve worked open, due to loose packing nut; one injured.

\*\*June 23, 1945, locomotive 4508, Melrose, N. C. Obstruction in squirt-hose valve; one injured.

\*\*June 26, 1945, locomotive 5069, Morganton, N. C. Injector feed pipe strainer was stopped up; one injured.

\*\*June 30, 1945, locomotive 794, Knoxville, Tenn. Squirt-hose valve stuck open; one injured.

Twenty-one accidents; 4 killed, 20 injured.

## SOUTHERN PACIFIC—LINES WEST:

July 14, 1944, locomotive 2825, Phoenix, Ariz. Flange on injector steam pipe collar failed through a fracture when attempt was made to stop leakage while the steam pipe was under about 165 pounds pressure; collar was not properly brazed to steam pipe and steam pipe was not belled or flanged at the joint end of the collar; one injured.

July 16, 1944, locomotive 3123, near Myoma, Calif. Brakeman's cab seat tilted from elevated storage position on cab back wall, due to seat latch being broken; one injured.

July 28, 1944, locomotive 3811, Gallinas, N. Mex. Face of reflex-type water glass which contacted water-glass gasket was steam cut, causing leak at gasket;

July 28, 1944, locomotive 4209, Yuma, Ariz. Firebox door did not open properly, due to door liner being distorted by heat which caused the door to foul on door hole collar; insufficient clearance between fire-door latch and air-gage stand shield; one injured.

July 28, 1944, locomotive 1215, Sacramento, Calif. Oil on cab apron caused it to be slippery; one injured.

August 2, 1944, locomotive 3801, Carrizozo, N. Mex. Employee stumbled over blocking which had been left on the front platform of the locomotive and fell to the ground; blocking should have been removed prior to the locomotive being dispatched; one injured.

August 7, 1944, locomotive 3659, Newkirk, N. Mex. Nozzle blew off end of ashpan air blower hose, permitting the hose to whip about and strike employee's face; nozzle was insecurely fastened; one injured.

August 23, 1944, locomotive 4207, Mott, Calif. Gas explosion in firebox of oil burning locomotive; excessive amount of moisture in fuel oil supply caused interrupted flow of oil to burner; two injured.

August 29, 1944, locomotive 3744, Wells, Nev. Oil on gangway handhold caused employee's hand to slip from handhold and he fell to the ground; one injured.

\*\*September 8, 1944, locomotive 3120, Akers, Calif. Squirt-hose valve worked open; one injured.

September 23, 1944, locomotive 3693, Imlay, Nev. Top of tender fuel oil tank was obstructed by a water-spout hook; one injured.

\*\*September 27, 1944, locomotive 2539, Ashland, Oreg. Broken board in cab deck; one injured.

\*\*September 27, 1944, locomotive 3321, Coolidge, Ariz. Floor board under fireman's cab seat was badly worn and slippery; fuel oil from overfilled tender fuel tank had been tracked on the edge of the board; one injured.

\*\*September 27, 1944, locomotive 1788, Gerber, Calif. Oil fire went out, then suddenly ignited, causing hot gasses to blow back through open firebox door; flues were leaking; flues leaking, engine not steaming, and smoking were reported on a number of inspection reports since September 1; one injured.

\*\*October 1, 1944, locomotive 2479, Martinez, Calif. Feed water pump was inoperative due to being steam bound; feed water pump was reported defective on September 9, 11, 12, 14, 18, 19, 20, 23, and 27; one injured.

\*\*October 8, 1944, locomotive 4238, Crescent Lake, Oreg. Fire door was difficult to open due to door liner fouling on door frame; liner was warped, due to having been burned. When door was forced it suddenly went to full open position, causing injury to employee's hand; insufficient clearance between gage panel bracket and fire-door handle when fire door was fully open; one injured.

October 20, 1944, locomotive 4195, Palm Springs, Calif. Fusion-welded hinges of tender feed water tank manhole cover were broken, causing employee to fall into the tank; hinges were reported broken on October 18 (two times) and 19; one injured.

October 30, 1944, locomotive 2730, Mt. Hebron, Calif. Oil on top of tender fuel oil tank; one injured.

November 7, 1944, locomotive 2569, Placerville, Calif. Insufficient clearance between the spokes of brake handwheel on tender and the bolt that secured the ratchet wheel dog; one injured.

November 12, 1944, locomotive 2787, Lincoln, Calif. Employee fell into open water tank manhole while preparing to take water; excessive amount of dirt and oil on top of tender fuel oil tank; one injured.

November 25, 1944, locomotive 3753, Moor, Nev. Fuel oil sprayed from the tender tank, due to overheating, and was carried forward by a strong wind to the cab, cab curtains, and wrapper sheet where it became ignited; four injured.

December 18, 1944, locomotive 3057, Tucson, Ariz. Manually operated reversing gear was difficult to operate; pin in front end of transmission bar had broken off which disconnected the valve and allowed it to move forward in the valve chamber, blocking steam in the cylinders and valve chambers; one injured.

\*January 4, 1945, locomotive 1258, Emeryville, Calif. Blow-off pipe rusted off in the union at blow-off drum, permitting the pipe to become disconnected when blow-off cock was opened; one injured.

\*January 10, 1945, locomotive 3709, Olney, Utah. Side rod broke due to a progressive crack; one injured.

\*\*January 24, 1945, locomotive 4175, Roseville, Calif. Deck apron was turned over, leaving the opening between locomotive and tender decks uncovered; one injured.

February 17, 1945, locomotive 2578, Tucson, Ariz. Burned by hot oil which was discharged from lubricator drain cock; drain cock was applied to lubricator

body so that the discharge was directed toward the left side of cab instead of vertically downward toward the drain receptacle; one injured.

\*\*February 18, 1945, locomotive 4124, Bakersfield, Calif. Tender gangway handhold broke in fusion weld in bend near bottom end; old flaw extended through more than 75 percent of cross-sectional area at point of failure; one injured.

March 18, 1945, locomotive 5020, Nunez, Ariz. Reflex-type water glass burst; one injured.

\*\*March 25, 1945, locomotive 4118, between Los Angeles and Bakersfield, Calif. Gage cock leaking; one injured.

April 3, 1945, locomotive 5026, El Paso, Tex. Tank valve to suction pipe partly closed, causing the feed water pump to lose its prime; one injured.

April 18, 1945, locomotive 4346, Albany, Oreg. Indicator lights were not burning. Employee fell from running board while attempting repairs; running board was obstructed by steam supply pipe to air compressor; one injured.

\*\*April 23, 1945, locomotive 4153, Moorpark, Calif. Wood block on top of tender behind fuel space; one injured.

April 23, 1945, locomotive 2360, Calexico, Calif. Insufficient clearance between cab handhold and tender gangway ladder when locomotive was on a sharp curve; handhold was bent about 4 inches out of alignment; one injured.

\*April 24, 1945, locomotive 3702, Gonzales, Calif. Packing nut on injector worked loose; one injured.

\*\*April 25, 1945, locomotive 2428, near Stoval, Ariz. Manually operated reverse lever stuck and was difficult to operate; reversing gear was reported on April 15, 22, 26, and 30; one injured.

April 25, 1945, locomotive 2857, Redwood Junction, Calif. Reverse gear was inoperative; two rivets were missing from left link block and remaining link-block rivets were loose, permitting link-block plates or rivets to foul on link saddle; defects reported prior to accident indicate that valve gear was not properly maintained; one injured.

\*\*May 3, 1945, locomotive 4222, Klamath Falls, Oreg. Air compressor reversing valve cap nut broke and blew off and reversing piston and rings blew out of cylinder; cap nut broke through old fracture which extended around entire circumference adjacent to top thread and included 60 percent of cross-sectional area; cotter key and castle nut for securing reversing valve to reversing rod were missing; one injured.

May 16, 1945, locomotive 3672, Oreana, Nev. Tender journal ran hot; one injured.

\*\*May 18, 1945, locomotive 2413, Crescent Lake, Oreg. Injured while attempting to change position of manually operated reverse lever; one injured.

June 1, 1945, locomotive 5017, Sentinel, Ariz. Excessive opening between planking on top of tender feed water tank; one injured.

June 6, 1945, locomotive 565, Los Angeles, Calif. Top bracket of cab gangway handhold broke through old fracture in bracket column, permitting handhold to come loose and cause employee to fall; one injured.

\*June 13, 1945, locomotive 4464, Davis, Calif. Oil on top of tender; one injured.

\*June 14, 1945, locomotive 2467, Martinez, Calif. Oil on top of tender; one injured.

June 15, 1945, locomotive (C. R. I. & P.) 4044, Tucumcari, N. Mex. Cab curtains became ignited; one injured.

\*June 15, 1945, locomotive 2428, Hachita, N. Mex. Journal ran hot; one injured.

June 20, 1945, locomotive 1828, Los Angeles, Calif. Leaking boiler washout plug blew out of wrapper sheet inside the cab when attempt was made to tighten it while boiler steam pressure was about 135 pounds; plug had been applied cross-threaded and the first six threads on plug were badly corroded; two injured.

\*June 23, 1945, locomotive 3277, Tracy, Calif. Oil on sand box; one injured.

\*\*June 30, 1945, locomotive 4267, Douglas, Ariz. Blower valve packing nut was leaking; nut needed repacking and could not be tightened; one injured.

Forty-eight accidents; 53 injured.

#### SPokane, PORTLAND & SEATTLE RAILWAY:

October 13, 1944, locomotive (G. N.) 2031, Redmond, Oreg. Driving box ran hot; blocking had been left on top of the driving box when a spring hanger had been removed; one injured.

One accident; one injured.

#### TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS:

\*\*April 2, 1945, locomotive 170, East St. Louis, Ill. Cab-seat box lid slipped off, causing employee to fall to the deck; screws missing from hinges which secured

June 22, 1945, locomotive 179, East St. Louis, Ill. Squirt hose was badly deteriorated; one injured.

\*\*June 29, 1945, locomotive 115, East St. Louis, Ill. Squirt hose was deteriorated; one injured.

Three accidents; three injured.

#### TEXAS & PACIFIC RAILWAY:

August 24, 1944, locomotive 648, Fabens, Tex. Handhold at gangway came loose at bottom end, causing employee to fall from gangway steps; bolt for securing bottom end of handhold to cab wind sheet was missing; one injured.

\*October 7, 1944, locomotive 602, Baird, Tex. Top rung of ladder on rear of tender gave way, due to old fracture; one injured.

January 27, 1945, locomotive 637, Judd, Tex. Top rung of tender rear end ladder failed through old fracture which extended through approximately 50 percent of cross-sectional area of rung at fit in side frame; one injured.

March 25, 1945, locomotive 488, Shreveport, La. Nut worked off throttle lever latch bolt, permitting bolt to come out of latch; one injured.

Four accidents; four injured.

#### UNION PACIFIC RAILROAD:

\*\*September 10, 1944, locomotive 3994, Hannah, Wyo. Handhold at gangway failed through old fracture in flattened section above rivet holes at bottom end; one injured.

\*\*September 23, 1944, locomotive 2515, Brown, Nev. Nail protruded from cab seat box; one injured.

December 29, 1944, locomotive 2554, Dewey, Utah. Temporary backup headlight cord obstructed the gangway, causing employee to fall from the locomotive; temporary headlight cord was applied account of a short in the permanent headlight wire; one injured.

February 17, 1945, locomotive 2877, Kansas City, Kans. Arch tube plug in back head blew out when attempt was made to tighten it while under steam pressure; threads on plug were crossed and stripped due to improper application of the plug; two injured.

March 1, 1945, locomotive 3545, Cheyenne, Wyo. Superheater flue failed due to being reduced in thickness by cinder cutting; one injured.

\*\*March 31, 1945, locomotive 2028, Pocatello, Idaho. Lateral spring missing from tender coupler carrier iron; one injured.

April 10, 1945, locomotive 5047, Willow Island, Nebr. Packing blew out of feed water pump piston rod gland, due to packing nut having loosened and backed off threads on the gland, causing excessive steam leak when the pump was in operation; one killed.

May 5, 1945, locomotive 823, Omaha, Nebr. Two superheater flues failed at defective safe end welds; one injured.

\*\*May 18, 1945, locomotive (O. W. R. & N.) 2116, Huntington, Oreg. Front cab door slide latch bolt was bent and would not hold door in closed position; whistle-lever spring fouled the bent latch bolt; one injured.

Nine accidents; one killed, nine injured.

#### VIRGINIAN RAILWAY:

October 5, 1944, locomotive 432, Victoria, Va. Hard working throttle; one injured.

December 11, 1944, locomotive 443, Roanoke, Va. Front end netting was stopped up; two injured.

February 13, 1945, locomotive 483, Morgan, Va. Ashpan hopper doors were difficult to operate; one injured.

Three accidents; four injured.

#### WABASH RAILROAD:

September 1, 1944, locomotive 695, Brunswick, Mo. Injector delivery pipe leaking at spanner nut which secured pipe to elbow under boiler check; one injured.

\*October 14, 1944, locomotive 2317, Decatur, Ill. Boiler check stuck open; one injured.

Two accidents; two injured.

#### WESTERN PACIFIC RAILROAD:

\*\*September 3, 1944, locomotive (D. & R. G. W.) 1206, Lago, Utah. Eccentric rod collar bolt broke; one injured.

\*\*September 4, 1944, locomotive 25, Lathrop, Calif. Blow down valve on auxiliary steam dome worked open; one injured.

\*October 20, 1944, locomotive 122, Turner, Calif. Driving rod broke; one injured.

\*\*November 3, 1944, locomotive 26, Doyle, Calif. Crank pin ran hot; one injured.

January 7, 1945, locomotive 307, Livermore, Calif. Tender sill step covered with oil; one injured.

\*January 29, 1945, locomotive 406, Deeth, Nev. Side rod broke; one injured.

\*\*February 19, 1945, locomotive 329, Portola, Calif. Employee slipped on sloping deck apron; the difference in height of locomotive and tender decks exceeded the prescribed maximum limit; one injured.

March 9, 1945, locomotive 71, Chilcoot, Calif. Blow-off cock lever became disconnected; connecting pin missing from blow-off cock lever and linkage; one injured.

Eight accidents; eight injured.

#### ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1945, BY ROADS

[A star (\*) indicates accidents taken from records of the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission. A double star (\*\*) indicates accidents not properly reported, as required by rule 335. Complete investigations, therefore, could not be made, inasmuch as the Bureau was not apprised of the accidents in sufficient time after they occurred to permit them to be properly investigated.]

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

\*November 15, 1944, unit 116, Kingman, Ariz. Oil on floor of unit; one injured.

\*\*December 13, 1944, unit 122-B, near Trojan, Calif. Wooden rack supporting lubricating oil barrel in engine room collapsed; rack had previously split where bolted together and had not been properly repaired; one injured.

December 23, 1944, unit 7, Morena, Calif. Oil seal between engine blower housing and the engine failed, allowing oil to enter blower housing and be blown in vapor form into engine air box when engine was idling and when engine was speeded up this vapor became ignited and exploded; engine blower right rotor shaft was broken inside the bearing hub; one injured.

April 26, 1945, unit 121-A, Cliffs, Ariz. Connecting rod broke through progressive fracture which extended through center of crank-pin bearing bore; one injured.

Four accidents; four injured.

##### ATLANTIC COAST LINE RAILROAD:

\*\*September 2, 1944, unit 752, Nahunta, Ga. Undesired emergency application of the brakes; adjusting nut, spring, and valve were missing from emergency relief valve in air line to compressor; three injured.

\*November 22, 1944, unit 508, Jacksonville, Fla. Air hose parted between Diesel unit and first car in train; the standard 2-inch nipple extension to air-brake pipe was missing; four injured.

April 28, 1945, unit 758, Deland, Fla. Water hose on unit was not closed or coupled; one injured.

Three accidents; eight injured.

##### BOSTON & MAINE RAILROAD:

\*\*January 18, 1945, unit 6000, Walpole, N. H. Section of traction motor gear casing fell from Diesel-electric power car, due to the bolts which secured it in position losing out; five injured.

One accident; five injured.

##### CHESAPEAKE & OHIO RAILWAY:

June 15, 1945, unit 9051, Low Gap, W. Va. Connecting rod of gasoline engine failed, breaking the crankcase; one injured.

One accident; one injured.

##### CHICAGO & NORTH WESTERN RAILWAY:

February 19, 1945, unit 1036, Proviso, Ill. Crankcase explosions caused by piston overheating, due to lubrication being destroyed when water leaked into the cylinder; engine cylinder jacket leaked water badly at upper ring; one injured.

One accident; one injured.

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

May 10, 1945, unit E-4, Black River Junction, Wash. Employee came in contact with electrically energized part or appurtenance of unit; one injured.

One accident; one injured.

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

January 24, 1945, unit 629, Pocasset, Okla. Crankcase explosion due to overheated front connecting rod bearing, caused by lubricating oil passage being closed by dislocation of the front main bearing shells; one injured.

##### DENVER & RIO GRANDE WESTERN RAILROAD:

\*\*February 5, 1945, unit 74, Denver, Colo. Cab-door handle came off, due to failure of the brazing which secured it to keeper ring and defective threads on handle and in ring; "Left cab door handle broken" was reported approximately 14 hours previously; one injured.

One accident; one injured.

##### GREAT NORTHERN RAILWAY:

June 2, 1945, unit 5006-A, near Chumstick, Wash. No. 4 traction motor armature bearing ran hot; lining of bearing was defective; bearing was reported hot on June 1 and twice on June 2 prior to the accident; one injured.

One accident; one injured.

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

\*October 2, 1944, unit 0324, New York, N. Y. Locomotive uncoupled from passenger train, caused by coupler link being bent and too short, resulting in sudden stop; four injured.

\*\*March 12, 1945, unit 0613, Mansfield, Mass. Brake valve difficult to operate; one injured.

May 13, 1945, unit 0705, Groton, Conn. Radiator fan belt broke and the other belts left the pulleys; one injured.

\*June 16, 1945, unit 0745, Brewster, N. Y. Oil on engine room floor; one injured.

Four accidents; seven injured.

##### PENNSYLVANIA RAILROAD:

September 21, 1944, unit 4787, near Elizabethtown, Pa. Short circuit between bus bars leading to the traction motor switches, caused by deterioration of insulation on the bars; an accumulation of cinders and dirt had collected on top of and between the bars; one injured.

October 20, 1944, unit 4896, Washington, D. C. Employee came in contact with energized pantograph; one killed.

January 20, 1945, unit 4912, Washington, D. C. Fire door of oil-fired steam heating boiler blew open; threads on lock bolt and lock nut to fire door were stripped; one injured.

February 26, 1945, unit 4781, near Perryville, Md. Flash-over from uninsulated bus bars to cab partition; one injured.

March 5, 1945, unit 4864, Washington, D. C. Air cylinder to pantograph latch would not release the latch when hand pump was used, due to wear on piston packing leathers; employee came in contact with energized pantograph latch handle while attempting to raise the pantograph; one injured.

Five accidents; one killed, four injured.

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

October 29, 1944, unit 208, St. Louis, Mo. Outside handle was missing from rear cab door; handle broke through reduced section just behind the retaining plate; handle was reported missing on October 26, 27, and 28; one injured.

One accident; one injured.

##### ST. LOUIS SOUTHWESTERN RAILWAY:

\*January 23, 1945, unit 910-B, Lewisville, Ark. Crankcase explosion; one injured.

One accident; one injured.

##### SEABOARD AIR LINE RAILWAY:

\*March 1, 1945, unit 3001, Grandy, Va. Explosions occurred in crankcase of Diesel-electric unit, caused by a hot main bearing; one injured.

March 26, 1945, unit 3016, near Hyatts, S. C. Explosions occurred in crankcase of Diesel-electric unit; a connecting-rod bearing had failed and closed the oil hole, causing parts to become overheated; one injured.

Two accidents; two injured.

##### SOUTHERN PACIFIC—LINES WEST:

July 19, 1944, unit 1334, Gila, Ariz. Employee fell from the top of motor hood of Diesel-electric locomotive while working at the train indicator boxes; secure footing and adequate handhold were not provided for the use of persons working at the indicators; one injured.

One accident; one injured.

##### VIRGINIAN RAILWAY:

February 9, 1945, unit 22, Pepper, Va. No. 2 pole change-over switch flashed over, burning employee; one injured.

One accident; one injured.



TABLE XII.—Number of steam locomotives inspected,

	Chicago, St. Paul, Minneapolis & Omaha	Chicago, West Pullman & Southern	Cincinnati Union Terminal	Clinchfield	Colorado & Southern	Colorado & Wyoming	Columbus & Greenville	Conemaugh & Black Lick	Copper Range	Cuyahoga Valley	Davenport, Rock Island & N. W.	Delaware & Hudson	Delaware, Lackawanna & Western	Denver & Rio Grande Western
1 Air compressors.....	4			3	3							1	18	12
2 Arch tubes.....				1									3	1
3 Ashpans and mechanism.....				1									3	1
4 Axles.....				1									2	3
5 Blow-off cocks.....				1	2		2					1	11	1
6 Boiler checks.....	1			2								1	2	3
7 Boiler shell.....				2									3	1
8 Brake equipment.....	19			25	4		1					1	39	14
9 Cabs, cab windows, and curtains.....	1			1			1					4	4	4
10 Cab aprons and decks.....							1					3	3	2
11 Cab cards.....							1					3	3	2
12 Coupling and uncoupling devices.....							2						4	2
13 Crossheads, guides, pistons, and piston rods.....	3			12	10		5	4				8	42	22
14 Crown bolts.....				1			5						6	9
15 Cylinders, saddles, and steam chests.....	2			4	5		5	4					49	44
16 Cylinder cocks and rigging.....	1			3			3						19	5
17 Domes and dome caps.....	3			1			3						4	5
18 Draft gear.....	3			3	1		3						2	5
19 Draw gear.....							1						8	1
20 Driving boxes, shoes, wedges, pedestals, and braces.....	4			1	16		1					3	21	32
21 Firebox sheets.....				2			1					3	9	1
22 Flues.....	1			9	3		2					1	12	9
23 Frames, tail pieces, and braces, locomotive.....				1			2						12	9
24 Frames, tender.....				1									3	1
25 Gages and gage fittings, air.....	1			1								1	3	1
26 Gages and gage fittings, steam.....				1			1						2	1
27 Gage cocks.....	2			1			1					1	3	6
28 Grate shakers and fire doors.....	1			5			7					2	2	1
29 Handholds.....				1								4	4	2
30 Injectors, inoperative.....				9	6		2				2	4	47	21
31 Injectors and connections.....				45	24		3	10		2		32	112	77
32 Inspections and tests not made as required.....	21			2	5		2				3	2	10	8
33 Lateral motion.....				1									1	1
34 Lights, cab and classification.....				8									8	3
35 Lights, headlight.....	1			5									5	3
36 Lubricators and shields.....				1									4	3
37 Mud rings.....				4									5	3
38 Packing nuts.....				4									30	8
39 Packing, piston rod and valve stem.....	2			5									3	1
40 Pilots and pilot beams.....	3			2			1	2					3	1
41 Plugs and studs.....	1			4								2	3	8
42 Reversing gear.....	1			1									60	26
43 Rods, main and side, crank pins, and collars.....	6			16	14		7	2					1	1
44 Safety valves.....				4									3	1
45 Sanders.....	3			4									66	21
46 Springs and spring rigging.....	4			16	4		3	10				13	66	21
47 Squirt hose.....	1			1									6	1
48 Stay bolts.....				2								5	6	2
49 Stay bolts, broken.....				2									5	2
50 Steam pipes.....	1			1			5					1	3	1
51 Steam valves.....	1			2			1						12	3
52 Steps.....	2			3			3					2	23	5
53 Tanks and tank valves.....				5			3						2	5
54 Telltale holes.....				2			2					2	16	14
55 Throttle and throttle rigging.....	1			2			1	3				2	22	7
56 Trucks, engine and trailing.....	3			12			3						22	7
57 Trucks, tender.....	2			2			6						7	6
58 Valve motion.....	2			4			5						7	7
59 Washout plugs.....	1											6	62	7
60 Train-control equipment.....													6	2
61 Water glasses, fittings, and shields.....	4			7			1					3	16	11
62 Wheels.....				2			1					4	51	8
63 Miscellaneous — Signal appliances, badge plates, brakes (hand).....	2			7			2					1	13	8
Number of defects.....	106			214	149		14	92	19			118	886	433
Locomotives reported.....	220	13	20	77	92	20	27	32	11	10	10	352	359	315
Locomotives inspected.....	753	36	20	160	354	37	49	77	18	22	36	1,402	1,289	1,223
Locomotives defective.....	25			46	30	3	12	2		3		38	184	92
Percentage of inspected found defective.....	3.3			29	8	8	24	2.6				2.7	14	8
Locomotives ordered out of service.....				11	1								14	2

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

found defective, and ordered from service, et cetera—Continued

Denver & Salt Lake	Detroit & Mackinac	Detroit & Toledo Shore Line	Detroit Terminal	Detroit, Toledo & Iron-ton	Donora Southern	Duluth, Missabe & Iron Range	Duluth, South Shore & Atlantic	Elgin, Joliet & Eastern	Erie	Florida East Coast	Fort Worth & Denver City	Georgia & Florida	Georgia	Grand Trunk Western	Great Northern	Green Bay & Western	Gulf Coast Lines	Gulf, Colorado & Santa Fe	Gulf, Mobile & Ohio	Harbor Belt Line	Houston Belt & Terminal	Illinois Central	Illinois Terminal	Indiana Harbor Belt
					1	1		2	17	3	4	1			6			3	6		3	15		
								1	9		2				13			2				2		
								1	11		1				10			2	2			11		
								1	6		2				20			12	18		4	15		
								1	12		1				10			2	2		1	3		
								1	2		2				13			2	3			6		
								1	1		1				1			1	1			1		
								1	11		5				16			12	18		2	18		
								1	13		1				19			3	3		1	7		
								1	1		1				5			2	3		1	2		
								1	13		1				5			3	3		1	9		
								1	7		5				5			2	4		1	3		
								1	4		2				4			2	2		1	9		
								1	8		1				8			1	1		1	3		
								1	5		1				4			2	12		2	11		
								1	4		3				26			2	2		1	2		
								1	4		3				1			1	1		1	11		
								1	1		1				3			1	1		1	2		
								1	14		1				13			5	3		8			
								1	1		1				5			3	2		1	1		
								1	1		1				4			3	1		2	1		
								1	1		1				6			1	3		1	1		
								1	11		2				11			1	3		1	2		
								1	2		2				4			7	6		2	6		
								1	11		2				11			1	6		3	2		
								1	2		2				4			4	17		2	16		
								1	23		9				30			6	17		2	6		
								1	15		12				163			4	26		5	12		
								1	1		1				4			5	4		1	2		
								1	4		2													

TABLE XII.—Number of steam locomotives inspected,

Parts defective, inoperative or missing, or in violation of the rules	Indianapolis Union	International—Great Northern	Interstate	Jacksonville Terminal	Kansas City Southern	Kansas City Terminal	Kansas, Oklahoma & Gulf	Kentucky & Indiana Terminal	Lake Superior & Ishpeming	Lake Superior Terminal & Transfer	Lake Terminal	Lehigh & Hudson	Lehigh & New England
1 Air compressors				14	2								
2 Arch tubes													
3 Ashpans and mechanism				3									
4 Axles													
5 Blow-off cocks				1									
6 Boiler checks				2									
7 Boiler shell				3									
8 Brake equipment				65	3							1	2
9 Cabs, cab windows, and curtains				19	2								4
10 Cab aprons and decks				3									1
11 Cab cards													
12 Coupling and uncoupling devices													
13 Crossheads, guides, pistons, and piston rods		1		52	1								2
14 Crown bolts													
15 Cylinders, saddles, and steam chests		2		14	5						2		
16 Cylinder cocks and rigging				1							1		
17 Domes and dome eaps											1		
18 Draft gear				10							1		
19 Draw gear		1		5							1		
20 Driving boxes, shoes, wedges, pedestals, and braces													2
21 Firebox sheets			3	88	1	2							1
22 Flues				3	2							1	
23 Frames, tail pieces, and braces, locomotive		2		28									
24 Frames, tender				1									
25 Gages and gage fittings, air				2									
26 Gages and gage fittings, steam				3									1
27 Gage cocks				7									3
28 Grate shakers and fire doors				12		1							
29 Handholds				6	1								
30 Injectors, inoperative				1									
31 Injectors and connections	1			26	1	2					1		11
32 Inspections and tests not made as required	2	5	2	108	19	3		1		5	2		16
33 Lateral motion		1	1	38	1								
34 Lights, cab and classification				1									
35 Lights, headlight				6	3								2
36 Lubricators and shields				5									
37 Mudrings				3									
38 Packing nuts		2		7	2							1	
39 Packing, piston rod and valve stem		5		8	4						3		
40 Pilots and pilot beams				12							3		1
41 Plugs and studs				4									
42 Reversing gear				2	1								
43 Rods, main and side, crank pins, and collars				66	9	1						1	1
44 Safety valves													
45 Sanders				13	4								
46 Springs and spring rigging		2	2	112	1	1					3	1	2
47 Squirt hose													
48 Stay bolts		1		3									
49 Stay bolts, broken				33									
50 Steam pipes				1									
51 Steam valves				2									
52 Steps			1	6									
53 Tanks and tank valves		1	1	25	3								
54 Telltale holes													
55 Throttle and throttle rigging		1		21							1		3
56 Trucks, engine and trailing				22									
57 Trucks, tender				3	1								
58 Valve motion				14	3								2
59 Washout plugs				7	4								
60 Train-control equipment													
61 Water glasses, fittings, and shields		3		57	6	2	2						4
62 Wheels				2									1
63 Miscellaneous—Signal appliances, badge plates, brakes (hand)		1		14	1								2
Number of defects	4	27	10	960	84	12	3			21	1	8	61
Locomotives reported	14	132	13	14	136	14	16	26	32	13	17	19	43
Locomotives inspected	42	251	27	12	562	89	59	11	100	65	44	109	204
Locomotives defective	2	5	2	146	19	4	1			5	1	2	18
Percentage of inspected found defective	4.8	2	7	26	21	7	9			8	2.3	1.8	9
Locomotives ordered out of service		1		14	2								

found defective, and ordered from service, et cetera—Continued

Lehigh Valley	Long Island	Louisiana & Arkansas	Louisville & Nashville	McCloud River	McKeesport Connecting	Macon, Dublin & Savannah	Maine Central	Maryland & Pennsylvania	Midland Terminal	Midland Valley	Minneapolis & St. Louis	Minneapolis, St. Paul & S. S. Marie	Minnesota Transfer	Mississippi Central	Missouri & Arkansas	Missouri-Kansas-Texas	Missouri Pacific	Monessen Southwestern	Monongahela Connecting	Monongahela	Montour	Nashville, Chattanooga & St. Louis	New Orleans Public Belt	New York Central
2	5	1	19				1	1			3		3	2	2		15		2			14	1	75
1																	2							5
1	1							1			1						1							6
1	1		4								1						1							30
1	1		2								1					6	18	1	1					78
1	1		3								1					1	1							33
1	1		11	9							6					12	2							166
1	1		3								4					2	60							89
1	1		3								5					4	10							33
1	1		2								1					1	3							4
1	1		2								1					2	8							9
1	1		2								1					2	3							10
1	1		2								1					3	3							11
1	1		2								1					2	1							2
1	1		2								1					3	3							13
1	1		2								1					3	3							5
1	1		2								1					13	13							14
1	1		2								1					13	12							15
1	1		2								1					1	1							16
1	1		2								1					1	3							65
1	1		2								1					1	8							17
1	1		2								1					3	3							21
1	1		2								1					3	3							18
1	1		2								1					3	3							15
1	1		2								1					7	8							19
1	1		2								1					8	6							20
1	1		2								1					1	1							21
1	1		2								1					1	1							22
1	1		2								1					1	1							23
1	1		2								1					1	1							24
1	1		2								1					1	1							11
1	1		2								1					2	4							25
1	1		2								1					1	4							3
1	1		2								1					6	6							37
1	1		2								1					1	5							29
1	1		2								1					1	1							30
1	1		2								1					2	4							2
1	1		2								1					4	20							31
1	1		2								1					6	6							2
1	1		2								1					27	96							88
1	1		2								1					5	2							10
1	1		2								1					6	6							6
1	1		2								1					1	1							3
1	1		2								1					2	3							4
1	1		2								1					3	3							3
1	1		2								1					5	5							17
1	1		2								1					4	10							4
1	1		2								1					1	3							1
1	1		2								1					2	3							1
1	1		2								1					17	15							3
1	1		2								1					1	24							25
1	1		2								1					2	15							3
1	1		2								1					2	2							6
1	1		2	</																				





