

INTERSTATE COMMERCE COMMISSION

---

FORTY-THIRD ANNUAL REPORT  
OF THE  
DIRECTOR OF LOCOMOTIVE INSPECTION  
TO THE  
INTERSTATE COMMERCE COMMISSION

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FISCAL YEAR ENDED  
JUNE 30, 1954



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## ANNUAL REPORT OF THE DIRECTOR OF LOCOMOTIVE INSPECTION

SEPTEMBER 30, 1954.

*To the Interstate Commerce Commission:*

In compliance with section 7 of the act of February 17, 1911, as amended, the Forty-third Annual Report of the Director of Locomotive Inspection, covering the work of the fiscal year ended June 30, 1954, is respectfully submitted.

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

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. Tables are also given showing 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 locomotive units other than steam.

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

	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
Number of locomotives for which reports were filed.....	12,135	15,798	20,490	26,595	29,743	33,866
Number inspected.....	19,999	28,899	45,220	62,113	66,809	85,353
Number found defective.....	2,599	3,583	6,234	7,995	6,740	7,035
Percentage of inspected found defective.....	13.0	12.4	13.8	12.9	10.1	8.2
Number ordered out of service.....	117	163	370	508	399	436
Number of defects found.....	9,763	12,980	24,738	34,657	28,504	28,642

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

	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
Number of accidents.....	32	59	122	167	169	228
Percent increase or decrease from previous year.....	45.8	51.6	26.9	1.2	25.9	33.1
Number of persons killed.....	1	12	3	14	7	10
Percent increase or decrease from previous year.....	91.7	1300.0	78.6	100.0	30.0	33.3
Number of persons injured.....	39	62	126	170	184	243
Percent increase or decrease from previous year.....	37.1	50.8	25.9	7.6	24.3	32.7

<sup>1</sup> Increase.

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

	Year ended June 30—							
	1954	1953	1952	1951	1950	1949	1915	1912
Number of accidents.....	19	18	35	51	59	81	424	856
Number of persons killed.....	1	10	2	3	4	9	13	91
Number of persons injured.....	26	19	36	59	70	94	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—									
	1954		1953		1952		1951		1950	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
<b>Members of train crews:</b>										
Engineers.....	1	13	4	23	1	36	2	51	2	64
Firemen.....		10	4	21	2	45	3	62	2	64
Brakemen.....		4	3	8		19	1	20	2	29
Conductors.....		2		3		3		6		4
Switchmen.....				2		2	1	8		5
<b>Roundhouse and shop employees:</b>										
Boilermakers.....						2		2		2
Machinists.....		2		1		2	1	2		1
Foremen.....				1		2		2		1
Inspectors.....						2		2		2
Watchmen.....		2				2	1		1	4
Boiler washers.....						8		4		1
Hostlers.....						1				
Other roundhouse and shop employees.....				2		2		2		2
Other employees.....				1		1		3		4
Nonemployees.....		6		1		2	4	6		1
<b>Total.....</b>	<b>1</b>	<b>39</b>	<b>12</b>	<b>62</b>	<b>3</b>	<b>126</b>	<b>14</b>	<b>170</b>	<b>7</b>	<b>184</b>

TABLE V.—Reports and inspections—Locomotive units other than steam

	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
Number of locomotive units for which reports were filed.....	27,135	25,374	22,716	19,320	15,719	12,692
Number inspected.....	83,338	75,170	65,263	52,948	42,503	30,684
Number found defective.....	7,395	6,571	6,087	4,375	2,748	1,238
Percentage of inspected found defective.....	8.9	8.7	9.3	8.3	6.5	4.0
Number ordered out of service.....	140	118	135	106	42	20
Number of defects found.....	19,640	17,163	16,613	11,935	6,325	2,804

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

	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
Number of accidents.....	73	75	74	54	51	49
Number of persons killed.....	2		1	2	3	
Number of persons injured.....	263	88	77	129	50	67

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

	Year ended June 30—									
	1954		1953		1952		1951		1950	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
<b>Members of train crews:</b>										
Engineers.....		24		14		15		11		15
Firemen.....		29		36		31	1	30		21
Brakemen.....		7		12	1	12		4		3
Conductors.....		2		5		4				4
Switchmen.....		3		2		8		5		1
Maintenance employees.....	2	8		4		6	1	3		3
Other employees.....		2		2		1		13	1	2
Nonemployees.....		188		13				63	2	1
<b>Total.....</b>	<b>2</b>	<b>263</b>		<b>88</b>	<b>1</b>	<b>77</b>	<b>2</b>	<b>129</b>	<b>3</b>	<b>50</b>

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—														
	1954			1953			1952			1951			1950		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Air reservoirs						1		1							
Aprons									1		1		2		2
Arch tubes									1		1		1		1
Asphan blowers															
Axles			1		1										
Blow-off cocks	1	1				2		2		2		2			2
Boiler checks	1		1			3		3		3		3			3
Boiler explosions:															
A. Shell explosions															
B. Crown sheet; low water; no contributory causes found				3	10		3	1	5	5	3	8	8	4	12
C. Crown sheet; low water; contributory causes or defects found	1	1	7	1		2	1	1	1		5	1			2
D. Miscellaneous firebox failures															
Brakes and brake rigging				2		2	2	2	3	3	3	2			2
Couplers				2		2	2	2	4	4	4	1			4
Crank pins, collars, etc.															
Crossheads and guides			2	2	4	1	1	1	1	1	1	1			2
Cylinder cocks and rigging															
Cylinder heads and steam chests			1		1										
Dome caps															
Draft appliances	1		1												1
Draw gear															
Fire doors, levers, etc.	1	1	2	2	3	4	1	1	1	1	1	1			2
Flues	1	1	3	6	1	1	3	3	3	6					9
Flue pockets															
Footboards	1	1	2	2	9	9	8	8	8	8					8
Gage cocks															
Grease cups					3	3	7	7	6						1
Grate shakers															6
Handholds	2	2	4	4	8	8	14	14	11						11
Headlights and brackets	1	1			1	1	1	1	1	1					1
Injectors and connections (not including injector steam pipes)	4	4	3	3	9	1	8	3	3	7					7
Injector steam pipes	1	1			1	1	1	1	1	1					
Lubricators and connections	1	1			1	1	4	4	2						2
Lubricator glasses															1
Patch bolts															
Pistons and piston rods															
Plugs, arch tube and washout								2	2	1					1
Plugs in firebox sheets															
Reversing gear			1	1	5	7	5	5	9	1					8
Rivets															
Rods, main and side					3	1	3			1					2
Safety valves															
Sanders					3	3	1	1	4						4
Side bearings															
Springs and spring rigging					1	1	2	2	3						3
Squirt hose	2	2			4	4	6	6	9						9
Staybolts															1
Steam piping and blowers	2	3	2	2	1	1	3	3	3						6
Steam valves	2	2	2	2	2	2	3	3	3						3
Studs															1
Superheater tubes	1	1													3
Throttle glands					1	1									2
Throttle leaking							5	5	5						2
Throttle rigging			1	1	5	5	5	5	7						7
Trucks, leading, trailing, or tender					1	1	2	2	2						
Valve gear, eccentrics, and rods			1	1	2	2	1	1	3						3
Water glasses															
Water-glass fittings	1	1	2	2											
Wheels	1	1	1	1											
Miscellaneous	8	8	23	23	45	45	61	61	59	46					49
Total	32	1	39	59	12	62	122	3	126	167	14	170	169	7	184

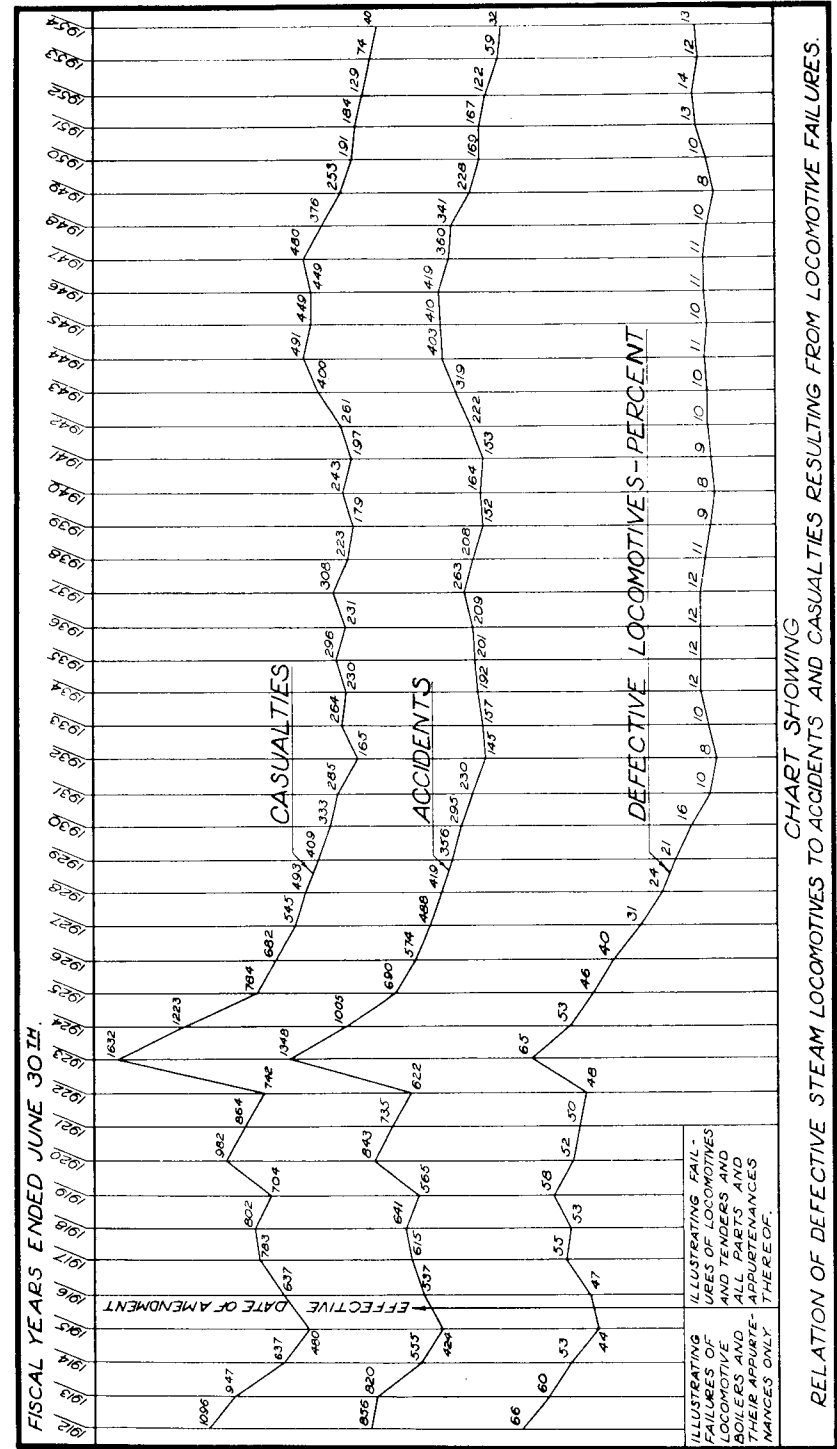


TABLE IX.—Accidents and casualties resulting from failures of locomotive units other than steam, and their appurtenances

Part or appurtenance which caused accident	Year ended June 30—														
	1954			1953			1952			1951			1950		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Brakes and brake rigging.....				3		3	5		6	2		3	4		4
Carburetors.....															
Couplers.....	1		1	2		3	2		2	1		1	1		1
Crank pins and connecting rods.....															
Fires due to overflowing or leakage of fuel, crankcase explosions, back firing, etc.....	5		7	13		24	7		8	9		10	4		4
Generators and starting devices.....	3		3	1		1			2	2		2	1		1
Insulation.....	3		3									1	1		
Pantographs and trolleys.....				1		1				1		1	1		1
Short circuits.....	5		6	9		9		11	9	9		9	2		2
Miscellaneous.....	56	2	243	46		47	51	1	50	29	1	103	38	2	38
Total.....	73	2	263	75		88	74	1	77	54	2	129	51	3	50

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

Parts defective, inoperative or missing, or in violation of the rules	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
1 Air compressors.....	304	351	671	897	719	693
2 Arch tubes.....	4	5	12	17	9	11
3 Ashpans and mechanism.....	24	36	59	64	59	52
4 Axles.....	3		1	4	1	4
5 Blow-off cocks.....	121	185	299	262	220	220
6 Boiler checks.....	158	182	356	477	386	337
7 Boiler shell.....	79	94	174	226	211	208
8 Brake equipment.....	835	1,038	1,955	2,453	1,845	1,806
9 Cabs, cab windows, and curtains.....	298	354	694	1,173	862	781
10 Cab aprons and decks.....	133	179	295	395	364	355
11 Cab cards.....	27	40	53	83	97	95
12 Coupling and uncoupling devices.....	22	30	42	54	41	42
13 Crossheads, guides, pistons, and piston rods.....	398	478	1,035	1,363	1,100	1,147
14 Crown bolts.....	20	27	38	52	53	46
15 Cylinders, saddles, and steam chests.....	364	455	908	1,437	1,160	1,155
16 Cylinder cocks and rigging.....	132	136	328	474	376	356
17 Domes and dome caps.....	20	45	85	131	90	82
18 Draft gear.....	150	168	313	441	368	370
19 Draw gear.....	79	108	189	297	280	300
20 Driving boxes, shoes, wedges, pedestals, and braces.....	258	345	681	1,145	1,037	1,070
21 Firebox sheets.....	37	55	141	203	181	191
22 Flues.....	32	49	121	184	152	156
23 Frames, tail pieces, and braces, locomotive.....	151	225	368	486	451	451
24 Frames, tender.....	14	10	26	47	34	39
25 Gages and gage fittings, air.....	47	61	136	173	116	118
26 Gages and gage fittings, steam.....	89	112	228	325	272	268
27 Gage cocks.....	120	211	337	435	386	375
28 Grate shakers and fire doors.....	90	121	282	339	326	286
29 Handholds.....	146	196	353	420	439	421
30 Injectors, inoperative.....	33	18	34	60	45	39
31 Injectors and connections.....	674	843	1,615	2,190	1,767	1,795
32 Inspections and tests not made as required.....	24	53	68	120	122	104
33 Lateral motion.....	98	137	274	465	389	507
34 Lights, cab and classification.....	39	26	44	118	60	58
35 Lights, headlight.....	56	42	100	108	131	157
36 Lubricators and shields.....	63	81	160	222	157	147
37 Mud rings.....	65	78	149	153	145	157
38 Packing nuts.....	240	294	552	638	558	474
39 Packing, piston rod and valve stem.....	154	220	494	765	510	511
40 Pilots and pilot beams.....	52	48	102	124	126	73
41 Plugs and studs.....	22	50	91	117	104	405
42 Reversing gear.....	170	216	429	631	404	405
43 Rods, main and side, crankpins, and collars.....	315	459	990	1,511	1,213	1,408
44 Safety valves.....	15	19	39	45	34	45
45 Sanders.....	277	324	532	806	641	608
46 Springs, and spring rigging.....	834	1,322	2,424	3,340	2,848	3,177
47 Squirt hose.....	39	41	69	90	74	63
48 Stay bolts.....	108	144	254	280	229	227

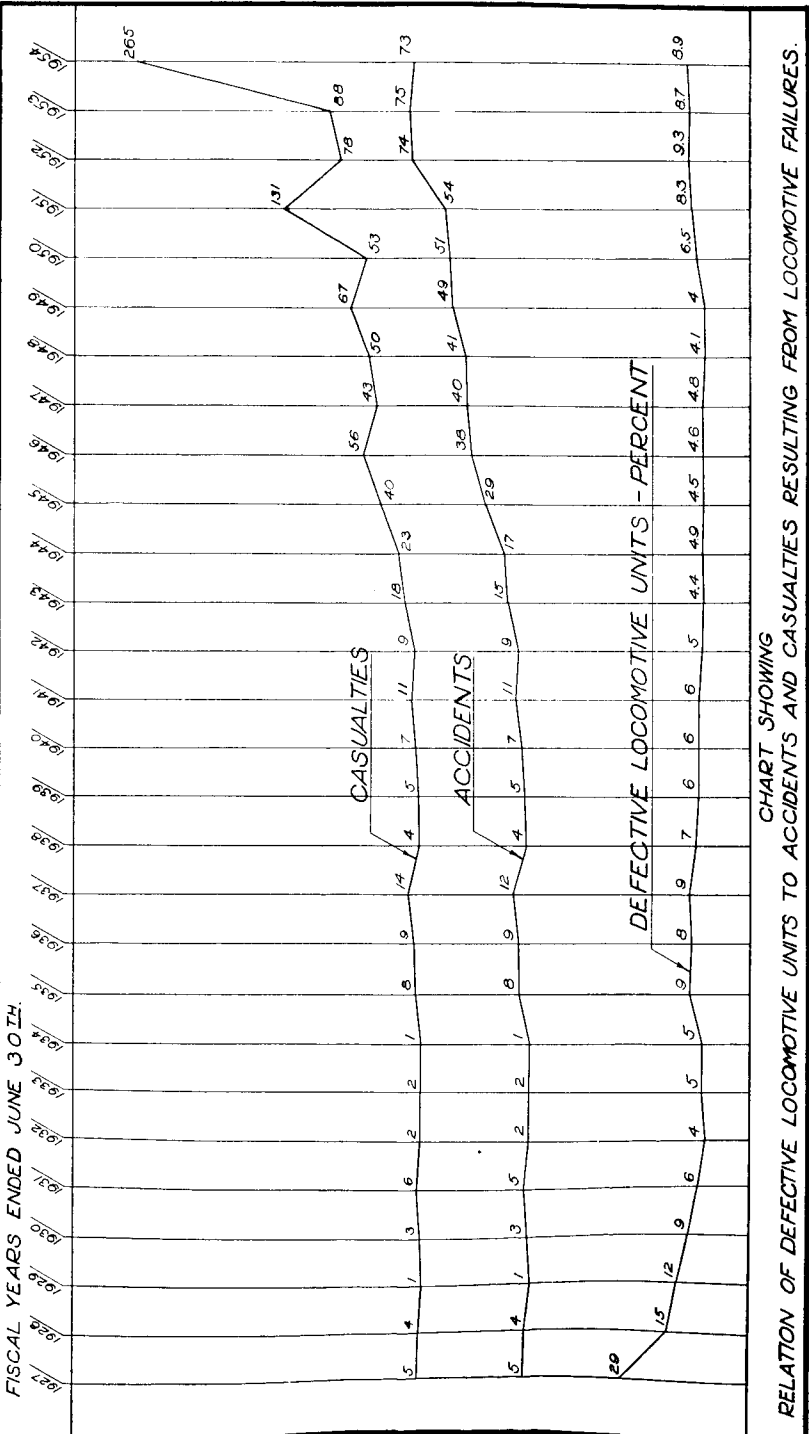


TABLE X.—Number of steam locomotives reported, inspected, found defective, and ordered out of service—Continued

Parts defective, inoperative or missing, or in violation of the rules	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
49 Stay bolts, broken.....	55	125	159	282	193	196
50 Steam pipes.....	87	161	232	342	302	256
51 Steam valves.....	69	68	146	181	131	133
52 Steps.....	255	321	561	805	680	652
53 Tanks and tank valves.....	340	466	980	1,304	1,205	1,228
54 Telltale holes.....	13	6	15	33	28	33
55 Throttle and throttle rigging.....	228	327	608	927	664	709
56 Trucks, engine and trailing.....	171	263	427	700	580	545
57 Trucks, tender.....	152	219	474	710	540	471
58 Valve motion.....	174	195	437	673	486	484
59 Washout plugs.....	79	138	266	325	289	268
60 Stokers.....	55	133	253	306	261	216
61 Water glasses, fittings, and shields.....	282	357	651	858	907	920
62 Wheels.....	107	151	340	536	394	455
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....	263	339	569	774	652	626
Number of defects.....	9,763	12,980	24,738	34,657	28,504	28,642
Locomotives reported.....	12,135	15,798	20,490	26,595	29,743	33,866
Locomotives inspected.....	19,999	28,899	45,220	62,113	66,809	85,353
Locomotives defective.....	2,599	3,583	6,234	7,995	6,740	7,035
Percentage of inspected found defective.....	13.0	12.4	13.8	12.9	10.1	8.2
Locomotives ordered out of service.....	117	163	370	508	399	436

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

Parts defective, inoperative or missing, or in violation of the rules	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
1 Air compressors.....	326	210	206	146	99	26
2 Axles, truck and driving.....	4	7	3	2	2	1
4 Batteries.....	82	40	39	85	20	13
5 Boilers.....	175	103	69	43	46	9
6 Brake equipment.....	2,126	1,698	1,450	1,166	673	299
8 Cabs and cab windows.....	858	679	813	672	377	159
9 Cab cards.....	135	128	139	100	75	46
10 Cab floors, aprons, and deck plates.....	1,703	1,589	1,694	1,281	726	234
11 Clutches.....	5	9	5	4	1	2
12 Controllers, relays, circuit breakers, magnet valves and switch groups.....	454	424	222	166	61	35
13 Coupling and uncoupling devices.....	139	95	76	35	32	15
14 Current collecting apparatus.....	12	6	5	9	18	20
16 Draft gear.....	291	218	202	141	91	66
17 Draw gear.....	55	42	28	46	27	13
18 Driving boxes, shoes, and wedges.....	154	128	98	38	51	33
20 Frames or frame braces.....	32	22	33	27	9	5
22 Fuel system.....	1,951	1,853	1,751	1,082	483	191
23 Gages or fittings, air.....	136	138	110	70	29	11
24 Gages or fittings, steam.....	56	44	11	14	14	2
25 Gears and pinions.....	12	13	26	9	15	6
26 Handholds.....	230	121	127	97	70	53
28 Inspections and tests not made as required.....	185	175	159	143	116	90
29 Insulation and safety devices.....	105	77	102	64	48	36
30 Internal-combustion engine defects, parts and appurtenances.....	4,848	4,564	4,768	3,270	1,456	602
32 Jack shafts.....	1	1	5	8	11	11
33 Jumpers and cable connectors.....	178	156	191	190	86	8
35 Lateral motion, wheels.....	5	7	8	11	2	7
36 Lights, cab and classification.....	232	109	49	23	7	5
37 Lights, headlight.....	28	42	22	16	9	3
39 Meters, volt and amperc.....	40	27	41	14	7	3
40 Motors and generators.....	813	655	674	314	106	46
42 Pilots and pilot beams.....	71	46	53	36	29	16
43 Plugs and studs.....	3	3	3	3	3	3
44 Quills.....	11	6	15	26	10	9
46 Rods, main, side, and drive shafts.....	1	1	15	2	6	1
48 Sanders.....	1,200	1,224	1,202	902	356	151
49 Springs and spring rigging, driving and truck.....	241	178	153	108	103	43
51 Stay bolts, broken or defective.....	1	1	1	1	1	1
53 Steam pipes.....	154	119	89	24	32	17
54 Steps, footboards, et cetera.....	622	505	480	377	284	213
55 Switches, hand-operated, and fuses.....	34	17	18	15	9	1
56 Transformers, resistors, and rheostats.....	6	3	2	9	9	2
57 Trucks.....	503	439	390	234	182	84
59 Water tanks.....	34	31	47	33	20	2

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

Parts defective, inoperative or missing, or in violation of the rules	Year ended June 30—					
	1954	1953	1952	1951	1950	1949
60 Water glasses, fittings, and shields.....	11	14	38	11	27	2
61 Warning signal appliances.....	121	122	117	83	21	9
62 Wheels.....	257	212	230	215	95	98
63 Miscellaneous.....	1,005	864	638	574	377	109
Number of defects.....	19,640	17,163	16,613	11,935	6,325	2,804
Locomotive units reported.....	27,135	25,374	22,716	19,320	15,719	12,692
Locomotive units inspected.....	83,338	75,170	65,203	52,948	42,503	30,684
Locomotive units defective.....	7,395	6,571	6,087	4,375	2,748	1,238
Percentage of inspected found defective.....	8.9	8.7	9.3	8.3	6.5	4.0
Locomotive units ordered out of service.....	140	118	135	106	42	20

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

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

#### STEAM LOCOMOTIVES

Thirty-two accidents occurred in connection with steam locomotives resulting in 1 death and 39 injuries. This represents a decrease of 27 accidents; a decrease of 11 in the number of persons killed, and a decrease of 23 in the number of persons injured compared with the preceding year.

The 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 and fatal accidents in the past 5 years. If the information contained in this table is taken advantage of and proper inspections and repairs made in accordance with the requirements of the law and rules many accidents will be avoided.

During the year 13 percent of the steam 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 is an increase of 0.6 percent from the results of the preceding year. One hundred and seventeen 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 46 locomotives compared with the preceding year.

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

#### EXPLOSIONS AND OTHER BOILER ACCIDENTS

The single boiler explosion which occurred in the fiscal year was caused by overheating of the crown sheet due to low water. One person was killed and 7 were injured in this accident. There was a decrease of 3 boiler explosions as compared with the preceding year; a decrease of 9 fatalities and an increase of 5 in number of injuries from this cause as compared with the preceding year.

The locomotive involved in the explosion was engaged in terminal switching service and at the time of the accident was standing in a freight car yard. Examination of the boiler subsequent to the accident disclosed that the water level at time of the explosion as shown by sheet discoloration was approximately 6½ inches below the highest part of the crown sheet. It was also determined that gage cock nipples extended into the dripper thereby obstructing clear view of gage cock discharge.

A piece of the wall of the main steam pipe in the front end of a steam locomotive, approximately 6 x 16½ inches in size, broke out while the locomotive was hauling a freight train at an estimated speed of 35 miles per hour and resulted in serious injuries to 2 employees. The failure occurred in an area where the pipe wall was very thin, a fissure existed and the metal contained old fractures. The thin wall apparently was caused by a shifted core when the pipe was cast.

Another front-end accident occurred when the petticoat pipe in the smokebox of a steam locomotive became displaced; diverted the flow of exhaust steam and caused heavy back draft while the locomotive was hauling a freight train at an estimated speed of 35 miles per hour and caused serious injury to an employee. The bottom edge of the petticoat pipe had been attached to the top ring of the spark arrester by spot welds instead of bolts as specified by the manufacturer. Cinder cutting had caused detachment of some spot welds and heavy vibration had caused the remaining welds to fail.

Eighteen boiler and appurtenance accidents other than the explosion resulted in injuries to 19 persons. This represents an increase of 4 accidents and an increase of 2 in the number of persons injured in boiler accidents other than explosions as compared with the preceding year.

#### EXTENSION OF TIME FOR REMOVAL OF FLUES

Four hundred and ninety-eight applications were filed for extension of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 28 of these cases the condition of the locomotives or other circumstances were such that extensions could not properly

be granted. Eleven extensions were granted after defects disclosed by our investigations were required to be repaired. Thirty-three applications were canceled for various reasons. Four hundred and twenty-six applications were granted for the full period requested.

#### LOCOMOTIVE UNITS PROPELLED BY POWER OTHER THAN STEAM

Seventy-three accidents, resulting in 2 deaths and injuries to 263 persons occurred in connection with locomotive units propelled by power other than steam. This represents a decrease of 2 in the number of accidents, an increase of 2 in the number of persons killed and an increase of 175 in the number of persons injured compared with the preceding year.

During the year, 8.9 percent of the locomotive units inspected by our inspectors were found with defects or errors in inspection that should have been corrected before the units were put into use; this represents an increase of 0.2 percent compared with the results obtained in the preceding year. One hundred and forty locomotive units were ordered withheld from service by our inspectors because of the presence of defects that rendered the units immediately unsafe; this represents an increase of 22 units compared with the preceding year. Locomotive units found defective were not ordered out of service if such defects did not render them unsafe for the service to which they were put.

The chart on page 6 shows the relation between percentage of defective locomotive units and the number of accidents and casualties resulting from failures thereof, and illustrates the effect of operating locomotives other than steam in defective condition.

Detailed results of our inspection of locomotive units other than steam are shown in Table XIII.

#### ACCIDENTS INVOLVING OTHER THAN STEAM LOCOMOTIVE UNITS

In derailment of 2 locomotive units and 11 cars of a passenger train caused by a false flange on a slid flat driving wheel resulting from a seized traction motor pinion bearing on a Diesel-electric locomotive unit, 184 passengers, 4 mail clerks and 1 dining car employee were injured. Evidence developed during investigation of the accident indicated that the locked pair of wheels had been sliding for a distance of more than 24 miles prior to point where derailment occurred. No lubricant was found in the seized bearing which showed evidence of extreme overheating. The extent of damage to the bearing precluded determination of the cause of its failure. Because of the serious potentiality of accidents caused by sliding wheels it was recommended in a report prepared jointly with the Section of Railroad Safety that action be taken to provide that an indication of any slipping or sliding wheel on any Diesel-electric unit in the locomotive of a train will be shown in the control cab.

During the year, 11 persons were injured in falls caused by oil or grease accumulations on walking surfaces of Diesel-electric locomotive units. Disability in these accidents amounted to 171 man-days. Oil leaks represented a large proportion of 1,703 defects reported by inspectors of locomotives under item of "cab floors, aprons and deck plates." Action to avoid continuance of this type defect and accidents resulting therefrom is being stressed.

Incidence of cracked and broken wheels under Diesel-electric locomotive units continues, but no accident was reported from this cause during the past year. Necessity for careful and frequent inspection of Diesel unit wheels is well recognized, and apparently the railroads are exercising diligence in the matter of wheel inspections.

One person was killed when his clothing became entangled around a moving and unguarded fan shaft as he attempted to obtain a water sample from an inconveniently located water glass drain cock. Three other persons suffered amputation of a total of 9 fingers and 2 of these also had arms broken when caught in auxiliary generator drive belts that were not properly protected. Because of limited space within hoods and under hoods of Diesel-electric locomotive units, complete protection of moving and rotating parts is essential if accidents are to be avoided.

Three crankcase explosions and 2 fires about Diesel engines resulted in injuries to 6 persons. Electrical fires in engine compartments, about units, short circuits and explosions caused by flash-overs in electrical cabinets caused injuries to 9 persons. Because of danger of fires resulting from the liquid fuel and the high pressures and temperatures used in Diesel engines and the possibility of accident from electrical short circuits, a high standard of inspection and maintenance required at all times if accidents are to be avoided.

#### SPECIFICATION CARDS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 45 specification cards and 1,036 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, 1,975 specifications and 811 alteration reports were filed for locomotive units, and 39 specifications and 430 alteration reports were filed for boilers mounted on locomotive units other than steam. These were checked and analyzed and corrective measures taken with respect to discrepancies found.

#### APPEALS

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

#### ACKNOWLEDGMENT

Despite difficulties resulting from reduced personnel, inadequate operating funds, and resultant increase in workload, all members of this organization have assiduously discharged the duties of their respective positions and are commended for their cooperation and their interest in the advancement of locomotive safety.

JAMES E. FRIEND,

*Asst. Director of Locomotive Inspection.*

#### ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES AND TENDERS AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1954, BY ROADS

[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.]

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

July 2, 1953, locomotive 3766, Emporia, Kans. Cab window became disengaged from supporting brackets and fell to lowered position inside cab walls; inadequate provision for securing drop sash in the upper closed position and insufficient clearance between top rail of drop sash frame and top edge of inner cab wall; one injured.

One accident; one injured.

##### ATLANTIC COAST LINE RAILROAD:

December 14, 1953, locomotive 2715, Waycross, Ga. Injector steam pipe collar in cab broke through 80 percent old fracture when set was used to tighten steam pipe spanner nut while under steam pressure; one injured.

One accident; one injured.

##### BOSTON & MAINE RAILROAD:

May 16, 1954, locomotive 3630, Salem, Mass. Flue broke at front flue sheet; flue thinned due to erosion; one injured.

One accident; one injured.

##### BROOKLYN EASTERN DISTRICT TERMINAL RAILROAD:

July 19, 1953, locomotive 14, Brooklyn, N. Y. Crown-sheet failure caused by overheating due to low water; gage cock nipples extended into dripper, obstructing clear view of gage cock discharge; one killed, seven injured.

One accident; one killed, seven injured.

##### CHESAPEAKE & OHIO RAILWAY:

April 7, 1954, locomotive 1511, Raleigh, W. Va. Inspirator telltale pipe return bend was bent approximately 30 degrees out of center with drain pipe opening in the cab, permitting some of the discharge to strike reducer wall and top of drain pipe and be deflected into the cab; one injured.

One accident; one injured.

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

December 21, 1953, locomotive 382, near Chillicothe, Mo. Defective and improperly applied petticoat pipe became displaced and closed exhaust opening to stack, resulting in back draft; one injured.

One accident; one injured.

##### ILLINOIS CENTRAL RAILROAD:

July 3, 1953, locomotive 2607, near Manteno, Ill. Squirt hose valve opened; squirt hose valve, hose and storage tube were not the carrier's standard applica-



tion; carrier's standard choke fitting in squirt hose pipe line was missing; one injured.

\*\*July 15, 1953, locomotive 2720, East St. Louis, Ill. Boiler check stop valve bonnet blew out; threaded portion of bonnet was badly deteriorated and too small for proper fit in valve body; one injured.

August 17, 1953, locomotive 1820, Paducah, Ky. Injector water valve extension handle was broken off through cotter pin hole; break occurred through old fracture; one injured.

Three accidents; three injured.

#### MISSOURI PACIFIC RAILROAD:

October 12, 1953, locomotive 1257, Smackover, Ark. Blow-off cock was hard to operate; excessive accumulation of scale around operating valve stem and inside of valve stem bushing; one injured.

June 15, 1954, locomotive 9734, El Dorado, Ark. Employee fell when extension handle became disconnected from air compressor steam valve on steam turret; valve stuck in closed position; valve stem threads excessively worn and cotter pin missing; one injured.

Two accidents; two injured.

#### NEW YORK CENTRAL SYSTEM:

\*\*August 5, 1953, locomotive 3322, near Hudson Lake, Ind. Leaking gaskets at top and bottom of water test glass; one injured.

August 20, 1953, locomotive 5405, Bryan, Ohio. Broken nipple in steam line to coal pusher mechanism; one injured.

December 7, 1953, locomotive 6777, Jackson, Mich. Hinged cab seat fell from raised position; no receptacle on cab floor or other means provided for securing the lower end of bar which supported seat in raised position; one injured.

February 5, 1954, locomotive 1989, near Cory, Ind. Main steam pipe failure; a thin and defective section approximately 6 x 16½ inches was broken from pipe wall; no test holes on side of pipe where failure occurred, though thickness at test holes in other parts of pipe varied from ¾ inch to 1¼ inches; two injured.

Four accidents; five injured.

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

July 11, 1953, locomotive 743, Sheffield, Ohio. Superheater flue failed due to being thinned by cinder cutting; all small flues and five large flues near the failed flue were honeycombed and plugged with cinders, causing excessive draft on the remaining flues; one injured.

One accident; one injured.

#### NORFOLK & WESTERN RAILWAY:

December 3, 1953, locomotive 127, Luray, Va. Gangway handhold broke through old fracture at bend near top connection to cab wall; one injured.

One accident; one injured.

#### NORTHERN PACIFIC RAILWAY:

August 9, 1953, locomotive 2662, Staples, Minn. Air compressor was inoperative; employee was injured while attempting to get compressor started; "Both air pumps need oil" was reported before locomotive was placed in service; one injured.

One accident; one injured.

#### PENNSYLVANIA RAILROAD:

August 23, 1953, locomotive 6753, near Columbia, Pa. Injector operating lever became disengaged from quadrant; lever was worn at fulcrum pin and improper repairs had been made which interfered with movement of the lever; injector was reported hard to operate on August 11, 12, 16, 17, and 23 (three times) before the locomotive left the terminal; one injured.

September 26, 1953, locomotive 6782, Huntingdon, Pa. Squirt hose valve worked open; valve was defective; one injured.

\*\*November 23, 1953, locomotive 7562, Logansport, Ind. Injector operating lever flew back suddenly due to guide pin coming out of lever; cotter pin in end of guide pin had sheared, releasing guide pin; "Left injector falling apart" was reported on November 22; one injured.

Three accidents; three injured.

#### PITTSBURGH & LAKE ERIE RAILROAD:

\*\*September 24, 1953, locomotive 211, McKees Rocks, Pa. Insufficient clearance between cab and tender when on curve; one injured.

One accident; one injured.

#### SOUTHERN PACIFIC—LINES WEST:

September 8, 1953, locomotive 4111, Oakland, Calif. Air compressor stopped; one injured.

September 9, 1953, locomotive 4169, Bayshore, Calif. Employee slipped on top of tender water tank and fell into open manhole; one injured.

September 29, 1953, locomotive 2825, Sunnyvale, Calif. Oil and water on cab deck and apron; one injured.

January 27, 1954, locomotive 1727, Fresno, Calif. Storm window storage bracket was not properly secured to cab wall; one injured.

February 2, 1954, locomotive 2700, Brawley, Calif. Headlight at rear of tender did not meet the requirements of rule 129 (b); one injured.

\*\*February 16, 1954, locomotive 3744, Chowchilla, Calif. Flames entered cab around fire door when flash occurred in firebox; upper half of fire door frame gasket was missing and blow-back valve was leaking; "Replace fire door gasket" was reported on February 2 and "Oil pipe leaks under left blow-off cock" reported on February 4 and 6; one injured.

May 18, 1954, locomotive 2554, Santa Clara, Calif. Insufficient clearance between cab vertical handhold and tender gangway ladder and tender deck bracket; one injured.

June 22, 1954, locomotive 2355, Niland, Calif. Presence of oil caused fireman's foot to slip from step leading to indicator box; one injured.

June 25, 1954, locomotive 2746, Los Angeles, Calif. Sudden gush of hot water from hydrostatic lubricator filler plug opening; lubricator steam valve was frozen in open position and turret steam valve was leaking excessively; one injured.

Nine accidents; nine injured.

#### UNION PACIFIC RAILROAD:

January 27, 1954, locomotive 1905, Laramie, Wyo. Packing nuts at steam fountain were leaking; "Repack all valve stems at fountain" was reported on January 20 and 23; one injured.

One accident; one injured.

### ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1954, BY ROADS

[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:

December 21, 1953, unit 2438, Argentine, Kans. Ice and snow on running board; one injured.

January 6, 1954, unit 2725, Purcell, Okla. Spring clasp type catch on cab door which was attached to handrail to secure cab door in open position was hard to apply and release; one injured.

March 19, 1954, unit 410, Cassoday, Kans. Swivel-type cab seat fell from stand; stove bolts for fastening seat to stand were missing; no means provided for locking or securing stove bolts in position; one injured.

\*\*April 17, 1954, unit 2264, Slaton, Tex. Main generator did not load properly. While attempting repairs, employee's hand and arm were caught in drive belts and pulley of auxiliary generator exciter unit through opening between the auxiliary generator and main generator frames; auxiliary generator drive belts were not adequately guarded; one injured.

Four accidents; four injured.

#### ATLANTIC COAST LINE RAILROAD:

February 12, 1954, unit 638, Wilmington, N. C. Cab door was difficult to open; bent and improperly applied hasp on door fouled on cab wall at top of door opening; one injured.

One accident; one injured.

#### BOSTON & MAINE RAILROAD:

July 29, 1953, unit 4217-A, Williamstown, Mass. Breakage of traction motor blower belt threw off the second of three belts and caused misalignment of the remaining belt; one injured.

One accident; one injured.

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

August 2, 1953, unit 96-C, St. Paul, Minn. Fire in engine room of unit caused by breakdown of insulation on wires in auxiliary generator leads to high voltage cabinet and resulting short circuit; wires were in metal conduit lying at base of main generator pit where oil and moisture leaking from the engine and appurtenances accumulated and eventually caused failure of the insulation; one injured.

November 3, 1953, unit 37-C, Newtown, Mo. Crankcase explosion caused by an overheated connecting rod bearing; a cleaning rag, found in intake end of lube oil manifold, covered oil passage to the main bearing through which the connecting rod bearing received lubrication; one injured.

May 28, 1954, unit E-11, Avery, Idaho. Employee electrocuted by contact with an electrically energized part of locomotive; one killed.

Three accidents; one killed, two injured.

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

February 3, 1954, unit 471, El Reno, Okla. Crankcase explosion; crankcase exhaust was inoperative; lower part of exhaust discharge pipe was obstructed with sludge; one injured.

June 25, 1954, unit 750, Hallam, Nebr. A false flange on a slid-flat driving wheel, resulting from a seized traction motor pinion bearing on a Diesel-electric locomotive unit, displaced a rail and caused derailment of 2 locomotive units and 11 cars of a passenger train; 189 injured.

Two accidents; 190 injured.

## DELAWARE &amp; HUDSON RAILROAD:

October 24, 1953, unit 4010, Oneonta, N. Y. Diesel engine failed to speed up properly during a switching movement due to defective control equipment, and cut of cars being shifted collided with remainder of the train; throttle handle support was worn on cam shaft and one of two springs at star wheel was weak; one injured.

One accident; one injured.

## DENVER &amp; RIO GRANDE WESTERN RAILROAD:

\*\*August 8, 1953, unit 119, Denver, Colo. Front uncoupling levers were hard to operate; uncoupling levers and yoke were bent; one injured.

March 31, 1954, unit 5202, Denver, Colo. Steps at rear corner of unit were slippery due to accumulation of snow and ice; one injured.

Two accidents; two injured.

## ERIE RAILROAD:

July 16, 1953, unit 734-D, near Ashville, N. Y. Crankcase explosion; weld between top and bottom of No. 4 piston burned off for approximately 70 percent of circumference; top oil ring and compression rings broken; side of top piston member burned; piston worn at wrist pin fit and piston and liner badly scored; one injured.

\*\*August 2, 1953, unit 1008, near Burbank, Ohio. Oil on walkway in engine compartment; gasket joint on lubricating oil strainer was leaking; strainer element had been renewed on the preceding day; one injured.

August 12, 1953, unit 520, Meadville, Pa. Employee fell when attempting to board unit; top of metal strap forming outside frame of bottom gangway step tread was worn smooth; one injured.

September 4, 1953, unit 19, New York, N. Y. Reducing valve pipe and feed valve pipe were leaking under the floor of front operating cab; "Air compressor will not keep air up \* \* \*" was reported on September 3; one injured.

October 1, 1953, unit 707-D, Maybrook, N. Y. Fires on unit caused by grounded high voltage cable; one injured.

October 21, 1953, unit 800-A, Ohio City, Ohio. Employee's foot slipped from bottom stirrup step of gangway ladder when boarding unit; tread of step was rolled inwardly and curving outer edge was worn smooth; tread was approximately 23 inches above the top of the rail; one injured.

February 2, 1954, unit 862, Waldwick, N. J. Spot welds applied on cab step for roughening were worn smooth at outer edge of step; one injured.

June 13, 1954, unit 302, Jersey City, N. J. Employee slipped on oil on front platform of unit; oil pipe flange, nipple, and hose connections in lubricating oil line were leaking, permitting oil to fall on floor inside equipment hood and run onto front platform, running boards, and right front step; one injured.

Eight accidents; eight injured.

## INDIANA HARBOR BELT RAILROAD:

\*\*October 10, 1953, unit 8845, Blue Island, Ill. Cab seat back rest bracket broke; back rest bracket was badly bent; one injured.

One accident; one injured.

## KENTUCKY &amp; INDIANA TERMINAL RAILROAD:

May 2, 1954, unit 54, Louisville, Ky. Employee's clothing became entangled around the moving and unguarded fan shaft on Diesel-electric unit when he attempted to obtain a water sample from the water-glass drain cock; location of water cock was such as to cause employees to assume an awkward and uncomfortable position when taking water samples from left side of the fan; one killed.

One accident; one killed.

## LOUISVILLE &amp; NASHVILLE RAILROAD:

\*\*February 15, 1954, unit 2221, Montgomery, Ala. Front cab door was difficult to release from latched open position; handle on door was inadequate and improperly located for safe use in supplying force necessary to disengage door from spring latch on outside wall of cab; one injured.

One accident; one injured.

## MAINE CENTRAL RAILROAD:

April 11, 1954, unit 671-A, North Concord, Vt. Oil on engine-room floor due to lubricating oil drain pipe connection to suction strainer box leaking; oil on engine room floor was reported on March 12, 14, 16, 19, 20, and April 5 and 12; one injured.

One accident; one injured.

## MISSOURI-KANSAS-TEXAS RAILROAD:

February 23, 1954, unit 1572, Osage, Okla. Engine did not load up properly; two of the auxiliary generator drive belts were too long and were found out of their sheaves and riding on top of other belts; engine had been reported not loading up properly on February 7 and 16; auxiliary generator drive belts were not adequately guarded; one injured.

One accident; one injured.

## NEW YORK CENTRAL SYSTEM:

August 28, 1953, unit 4061-A, Toledo, Ohio. Cab door stop was hard to operate; movable members of door stop were stuck by hardened sprayed paint; one injured.

\*\*September 8, 1953, unit 620, Detroit, Mich. Sandbox cover was hard to raise; cover weighed 141½ pounds and cover hinges were rusty; one injured.

September 27, 1953, unit 8346, near Germantown, N. Y. Right front cab window blew from frame and struck an occupant of the cab while unit was running at high speed; window was not proper fit in frame; one injured.

January 22, 1954, unit 8290, Syracuse, N. Y. Cab seat steelplate pedestal broke at top end adjacent to fusion weld which joined the hollow shaft to pedestal; one injured.

January 30, 1954, unit 9308, Selkirk, N. Y. Cab seat broke away from cab floor; base of seat was insecurely fastened to floor; one injured.

\*\*April 15, 1954, unit 8592, Troy, N. Y. Excessive fuel-oil and exhaust fumes in cab; because of water, rust and sediment in fuel system, three of six injection nozzles were stuck in open position and failed to atomize heavy discharges of fuel oil in the cylinders; two injured.

\*\*June 26, 1954, unit 9629, Cleveland, Ohio. Cab seat back rest broke loose, causing employee to fall; locking pin for adjusting back rest had become disengaged from locking plate; locking plate was bent out of line at bottom and holes in plate were badly distorted; one injured.

Seven accidents; eight injured.

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

January 17, 1954, unit 125, East St. Louis, Ill. V-belts driving exciter and auxiliary generator shaft were not properly guarded, permitting employee's finger to be caught under front belt; one injured.

One accident; one injured.

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

\*\*August 17, 1953, unit 0422, Bay Ridge, N. Y. Oil on engine room floor; oily floor was reported two times on August 12, and "H. P. fuel pumps leaking" was reported on August 15; one injured.

September 22, 1953, unit 0748, New London, Conn. Oil on engine-room floor; engine-room floor reported to be cleaned 25 times since September 1; one injured.

February 1, 1954, unit 313, Stamford, Conn. Short circuit and electrical flash occurred due to breakdown of insulation in corded wire bundle from main AC transformer to auxiliary and control changeover switches; one injured.

February 1, 1954, unit 0736, Myricks, Mass. Two cylinder head studs were broken causing fire about engine and excessive smoke and gas in engine room; one injured.

February 5, 1954, unit 0710, Boston, Mass. Oil on engine-room floor at walkway; "Clean engineroom floor" was reported on 11 of 16 days immediately preceding the accident; one injured.

February 9, 1954, unit 0770, New Haven, Conn. Oil on engine-room floor; defective condition of floor resulting from leaks was reported 32 times in the period, January 22-February 9, inclusive; one injured.

February 11, 1954, unit 0752, Providence, R. I. Oil and water on boiler compartment floor resulting from loose and leaking crankcase drain plug of steam heating generator feed water pump; floors reported to be cleaned and/or oil leaks had been reported repeatedly; one injured.

February 27, 1954, unit 0740, near Old Saybrook, Conn. High pressure fuel injection pipe on No. 2 engine was leaking badly; one injured.

May 27, 1954, unit 0727, near Westbrook, Conn. Oil on engine-room floor; numerous oil leaks reported and engine room reported to be cleaned 16 times since May 10; one injured.

Nine accidents; nine injured.

#### NORTHERN PACIFIC RAILROAD:

March 10, 1954, unit 5406-A, near Quendall, Wash. Air hose supplying main contactors separated from fitting, allowing contactor to open under load; hose had not been properly applied; one injured.

One accident; one injured.

#### PENNSYLVANIA RAILROAD:

July 4, 1953, unit 8720, Mayville, N. Y. Load ammeter on engineer's control panel exploded, showering shattered glass; brush shunt on No. 1 traction motor, which was loose, grounded on frame and caused a heavy electrical surge in high voltage system and, due to a ground in ammeter, caused explosion in ammeter before function of the tripped ground relay was completed; apparently the spiral lead in ammeter was not properly insulated; no protection from shattered glass in case of ammeter breakage was provided; one injured.

August 21, 1953, unit 7853, New York, N. Y. Bus bars from preventive coils to transformer power contactor grounded at bus bar support, due to insulation failure, and sparks ignited snow curtains which were stored below; one injured.

September 12, 1953, unit 4710, near Quarryville, Pa. Cab order lamp conduit support clamp dropped from conduit and struck employee; nuts on bolts holding the two members of conduit clamp worked off; one injured.

September 24, 1953, unit 9700-A, Kane, Pa. Explosion and fire occurred in electrical control cabinet in cab of leading unit; two injured.

\*\*November 25, 1953, unit 9703-B, Tome, Md. Insufficient head clearance under engine cooling system air duct which was suspended from the roof and padding protection not provided on angled parts of the duct; one injured.

December 8, 1953, unit 9547-A, Altoona, Pa. Diesel engine air box inspection hole cover plate became disengaged from fastening and blew off; one injured.

January 14, 1954, unit 5879-A, Williamsport, Pa. Sliding rear end door of unit was stuck in closed position; supporting member at top of door was loose, allowing door to drop down on lower runner; three screws were broken and remaining screws were loose in the top supporting member; one injured.

February 1, 1954, unit 5757-A, Cleveland, Ohio. Bonnet nut of steam heat end valve blew off; threads on valve body were corroded and wasted away; valve wheel-type handle and bonnet nut showed evidence of the use of hammer and chisel in tightening; one injured.

February 15, 1954, unit 4904, Washington, D. C. Steam heating boiler back-fired through open fire door when attempt was made to relight it; burner would not go on high flame; difficulty in keeping boiler lighted was due to oil-pressure failure; upper fuel line strainer was missing and no gaskets in strainer cap and lower fuel line strainer was stopped up; two injured.

February 21, 1954, unit 5822-A, Pitcairn, Pa. Oil on engine-room floor caused by oil leakage at crankcase-engine bed joint due to loose frame bolts; "Engine leaking oil" was reported on February 19, and floor was reported to be cleaned on February 8, 17, and 19; one injured.

\*\*March 18, 1954, unit 9705-B, Pitcairn, Pa. Diesel engine crankshaft failed through old fracture in No. 1 crankweb; one injured.

June 9, 1954, unit 9004, Philadelphia, Pa. Tread of bottom step on side of unit broke off through welds to end supports at both ends; one injured.

Twelve accidents; 14 injured.

#### SEABOARD AIR LINE RAILROAD:

December 1, 1953, unit 1402, Baldwin, Fla. Footboard was deteriorated and piece broken from outside end; one injured.

One accident; one injured.

#### SOUTHERN RAILWAY:

August 22, 1953, unit 4211, near Ellenwood, Ga. Flash from high voltage cabinet in engine room of trailing unit burned employee who had opened cabinet doors and was attempting to determine the cause of unit not delivering full power; engine on trailing unit did not operate at speed corresponding with throttle position in operating cab due to defective "B" solenoid coil in governor; one injured.

April 20, 1954, unit 4176, near Hurt, Va. Unbalanced air pressure between operating cab and engine room caused sudden closing of compartment door; no means provided to prevent violent movement of passageway door; one injured.

Two accidents; two injured.

#### SOUTHERN PACIFIC—LINES WEST:

July 27, 1953, unit 6416, Colton, Calif. Employee stumbled on a ½-inch rise in walkway in unit, over the car body bolster cover plate, and fell; one injured.

October 17, 1953, unit 6366, Los Angeles, Calif. Employee fell when stairway between cab and engine room gave way; stairway had not been properly replaced after removal for adjustment of reverser; one injured.

\*\*November 7, 1953, unit 6439, Indio, Calif. Employee's head struck a steel bracket which protruded 5½ inches from the cab wall into the nose of the unit; bracket which had been applied to support automatic train stop equipment was not taken off when this equipment was removed; one injured.

December 11, 1953, unit 6325, Santa Barbara, Calif. Shattered glass on cab floor from radio instruction chart frame caused employee to slip and fall; one injured.

December 15, 1953, unit 5272, Tarzana, Calif. Cab steps were badly bent; one injured.

March 8, 1954, unit 1461, Los Angeles, Calif. Step at front corner of unit fell off, due to failure of spot welds applied to secure it at ends; step had no other support than the spot welds; one injured.

April 16, 1954, unit 6363, Yuma, Ariz. Broken train indicator numeral lying on the floor of nose of unit caused employee to slip and fall; metal floor in nose was not roughened; one injured.

April 24, 1954, unit 5904, Tucson, Ariz. Bonnet blew out of steam heat shut off valve at rear of unit; gate valve fulcrum pin on inside of shut off valve was disconnected and threads on valve body were badly worn; one injured.

June 26, 1954, unit 1383, Los Angeles, Calif. Oil on running board; one injured.

Nine accidents; nine injured.

#### TEXAS & PACIFIC RAILROAD:

May 4, 1954, unit 1565, near Jal, N. Mex. Oil on engine-room floor; oil leaks from crankcase covers and front valve cover; one injured.

One accident; one injured.

#### UNION PACIFIC RAILROAD:

September 25, 1953, unit 1502-B, near Goff, Oreg. Fire occurred in V bank of D-E engine; engine running very hot due to leaking radiator hose; cylinder head cover over Nos. 15 and 16 cylinders was bent and improper fit, permitting hot lube oil to pass into bank of engine and on to base of hot exhaust manifold where it became ignited; "Engine shut down due to running hot" was reported en route and the repairs made were inadequate; two injured.

One accident; two injured.

#### VIRGINIAN RAILWAY:

October 18, 1953, unit 28, near Matoaka, W. Va. High tension bus line failed at connection to bracket on top of insulator and flashed to ground; one injured.

One accident; one injured.

#### WABASH RAILROAD:

October 17, 1953, unit 129, Decatur, Ill. Steps to rear platform did not have proper nonskid protection; one injured.

One accident; one injured.



TABLE XII.—Number of steam locomotives inspected, found

Table with 11 columns for locomotive categories and 11 columns for parts defective. Rows list parts like Air compressors, Arch tubes, Ashpans and mechanism, etc., up to Number of defects. Totals: 25 locomotives reported, 10 inspected, 3 defective, 17 ordered out of service.

defective, and ordered from service, et cetera—Continued

Continuation of Table XII with 11 columns for locomotive categories and 11 columns for parts defective. Rows list categories like Pennsylvania, Pennsylvania-Reading Seashore Lines, etc. Totals: 660 locomotives reported, 18 inspected, 7 defective, 429 ordered out of service.



TABLE XIII.—Number of locomotive units other than steam inspected,

	Chicago River & Indiana	Chicago, Rock Island & Pacific	Chicago, St. Paul, Minneapolis & Omaha	Chicago, South Shore & South Bend	Cincinnati Union Terminal	Cleveland Union Terminals	Clinchfield	Colorado & Southern	Colorado & Wyoming	Conemaugh & Black Lick	Delaware & Hudson	Delaware, Lockawanna & Western	
1		25									3	4	
2		3											
4		4									1	3	
5		18	1										
6		263	16				9	2			8	8	
8		78	10								2	1	
9		19									1	1	
10		110	5				1				9	9	
11		2											
12		58					2				1	1	
13		16	4									1	
14													
16		10	4				1	1			4		
17		4									6		
18		10									1		
20											1		
22		120	17				2				43	2	
23		11											
24		8											
25		2											
26		19	3				1				1		
28		26											
29		12	2									1	
30		284	13				2				107	32	
32													
33		21										6	
35													
36		4											
37													
39		3					1						
40		47	1								5	12	
42		5											
43													
44													
46													
48		180	2								3	3	
49		11	8				2						
51													
53		21	1										
54		35	2				1				6		
55		2									1		
56		1											
57		53	3								2		
59		1	1								2	1	
60		1											
61		18									1	1	
62		1									1	2	
63		72	3				2	1			5	3	
	Number of defects.....	5,159	97				24	4			214	90	
	Locomotive units reported.....	27	534	69	19	14	27	59	29	19	28	181	215
	Locomotive units inspected.....	58	2,547	248	40			240	284	62	49	1,148	605
	Locomotive units defective.....	3	518	32				14	2		115	36	
	Percentage of inspected found defective.....	5.2	20.3	12.9				5.8	0.7		10.0	6.0	
	Locomotive units ordered out of service.....	1	11	1				2					

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

Denver & Rio Grande Western	Detroit & Toledo Shore Line	Detroit Terminal	Detroit, Toledo & Iron-ton	Donora Southern	Duluth, Missabe & Iron Range	Duluth, South Shore & Atlantic	Elgin, Joliet & Eastern	Eric	Florida East Coast	Fort Dodge, Des Moines & Southern	Forth Worth & Denver	Georgia	Grand Trunk Western	Great Northern	Green Bay & Western	Gulf Coast Lines	Gulf, Colorado & Santa Fe
4								6					2	4			1
6													2				4
23		1						3	14	3	1	3	22	36			6
28		4						3	3				27	19			8
33								3	1	2				6			9
15		1				1		3	38	5			14	19			10
11							1							3			11
3							1		3				2	4			12
6									2	1			2	4			13
1									2					2			14
24									1	1				1			16
1									1	1				1			17
4									1					2			18
2									2					1			20
4									4					2			22
46									7	4				8			23
6														1			24
14														1			25
1														1			26
24														1			28
2														1			29
20														2			30
2														2			32
3														2			33
6														2			35
2														2			36
11														2			37
4														3			39
31														3			40
281														5			42
217	16	15	38	14	16	24	155	476	72	18	33	31	67	627	15	84	(1)
1,400	79	46	60	11	24	25	1,366	213	31	106	101	192	1,765	98	246	635	
58		2	1	1	1	3	13	104	27	2	3	6	40	117	2	2	4
4.1		4.3	1.7	9.1	4.2	12.0	6.8	7.6	12.7	6.5	2.8	5.9	20.8	6.6	2.0	0.8	0.6
								1	1					1			

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









TABLE XIII.—Number of locomotive units other than steam inspected,

	Savannah & Atlanta	Seaboard Air Line	South Buffalo	Southern Pacific, lines east	Southern Pacific, lines west	Southern	Spokane International	Spokane, Portland & Seattle	Steakton & Highspire	Tennessee Central	Tennessee Coal & Iron Division	Terminal R. R. Association of St. Louis
1 Air compressors		1			17	40				2	1	
2 Axles, truck and driving						1						
4 Batteries		4			10	11						
5 Boilers						15		1				
6 Brake equipment	2	40	1	9	100	166	1	23		3	19	
8 Cabs and cab windows		11		2	59	48					22	
9 Cab cards	1	4			3	6						
10 Cab floors, aprons and deck plates		32		5	184	82		1			7	
11 Chutches												
12 Controllers, relays, circuit breakers, magnet valves and switch groups		6		2	4	52		1				
12 Coupling and uncoupling devices		3			22	4						
14 Current collecting apparatus												
16 Draft gear		7		2	12	20				1	3	
17 Draw gear		3				5						
18 Driving boxes, shoes and wedges						5						
20 Frames or frame braces						1						
22 Fuel system	1	39		4	189	128				1	17	
23 Gages or fittings, air		4		4	4	16		3				
24 Gages or fittings, steam						8						
25 Gears and pinions						2						
26 Handholds		15			7	8						
28 Inspections and tests not made as required		6			7	5						
29 Insulation and safety devices		1			5	5						
30 Internal-combustion engine defects, parts and appurtenances	2	71		6	388	350		10		16	33	12
32 Jack shafts												
33 Jumpers and cable connectors		7		1	7	5						
35 Lateral motion, wheels												
36 Lights, cab and classification					28	9						
37 Lights, headlight					3			1				
39 Meters, volt and ampere		1	1			7					1	
40 Motors and generators		9		4	76	81					2	
42 Pilots and pilot beams		8				6						
43 Plugs and studs												
44 Quills												
46 Rods, main, side, and drive shafts												
48 Sanders	1	61		10	47	90				1	1	4
49 Springs and spring rigging, driving and truck				8	5	13					2	
51 Stay bolts, broken or defective												
53 Steam pipes		7			2	15						
54 Steps, footboards, et cetera	4	37		5	41	40					2	6
55 Switches, hand-operated, and fuses					5	3						
56 Transformers, resistors and rheostats												
57 Trucks		16		3	10	44					3	
59 Water tanks						7						
60 Water glasses, fittings and shields						1						
61 Warning signal appliances		4			1	10					2	
62 Wheels					6	8		2		4	3	
63 Miscellaneous		14		1	76	36					5	
Number of defects	11	411	2	62	1,320	1,351	1	42		28	123	22
Locomotive units reported	10	492	54	313	1,108	891	12	91	23	19	45	99
Locomotive units inspected	27	1,561	322	922	3,793	3,540	20	331	18	61	22	152
Locomotive units defective	5	137	1	32	593	401	1	33		12	11	15
Percentage of inspected found defective	18.5	8.8	0.3	3.5	15.6	11.3	5.0	10.0		19.7	50.0	9.9
Locomotive units ordered out of service		4		1	3	9				2	3	

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

Texas & Pacific	Texas Mexican	Toledo, Peoria & Western	Toledo Terminal	Toronto, Hamilton & Buffalo	Union Pacific	Union Railroad	Union Railway	Virginian	Wabash	Washington Terminal	Waterloo, Cedar Falls & Northern	Western Maryland	Western Pacific	Youngstown & Northern	Roads with less than 10, and industrial locomotive units	Total defects
					33								1		7	326
					9								1		4	4
					1										4	82
2	1				125	1			11		1		2		115	175
4					29	1							1		28	858
					4				1						17	135
4					58	2			26		1		5		30	1,703
								2	1						11	5
					58								2		11	454
					3										4	139
																12
					26				1				1		21	291
															6	55
																17
					1										31	32
					142	4			10				3		7	1,951
					7				1						7	136
					1										7	56
					2										24	12
					14										28	230
					13	1		1							28	185
					4										9	105
2		2			364	3	1		25				9		75	4,848
																32
					13				1						2	178
																5
															1	232
					16								12		1	28
															1	40
					58	4			1				2		23	813
					3										1	71
																43
																11
																46
					74	1		1	11				4		21	1,200
					10										6	241
																51
					4								1			154
					27	4			2				1		54	622
					12											34
																55
					2											6
					15	1			2						13	503
																34
					1											11
					17										5	121
					7	3							1		31	257
														10	4	228
					216				1				11		31	1,005
12	1	3			1,495	25	1	5	94		2		57	10	607	19,640
205	18	15	11	10	986	144	11	63	289	26	14	104	166	14	1,206	27,135
609	22	14	57	3	4,557	80	52	66	1,246	8	14	188	508	14	2,181	83,338
5	1	2			466	11	1	3	52		1		21	4	228	7,395
0.8	4.5	14.3			10.2	13.7	1.9	4.5	4.2		7.1		4.1	28.6	10.5	8.9
					7	2								3	14	140