

INTERSTATE COMMERCE COMMISSION

THIRTY-SEVENTH ANNUAL REPORT
OF THE
DIRECTOR
BUREAU OF LOCOMOTIVE INSPECTION
TO THE
INTERSTATE COMMERCE COMMISSION

FISCAL YEAR ENDED
JUNE 30, 1948



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

OCTOBER 1, 1948.

To the Interstate Commerce Commission:

In compliance with section 7 of the act of February 17, 1911, as amended, the Thirty-seventh Annual Report of the Director of the Bureau of Locomotive Inspection, covering the work of the Bureau during the fiscal year ended June 30, 1948, 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—					
	1948	1947	1946	1945	1944	1943
Number of locomotives for which reports were filed.....	37,073	39,578	41,851	43,019	43,297	43,064
Number inspected.....	93,917	94,034	101,869	115,979	117,334	116,647
Number found defective.....	9,417	10,248	11,337	11,975	12,710	11,901
Percentage inspected found defective.....	10	11	11	10	11	10
Number ordered out of service.....	654	708	690	506	630	487
Number of defects found.....	38,855	41,250	56,541	53,367	56,617	51,350

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

	Year ended June 30—					
	1948	1947	1946	1945	1944	1943
Number of accidents.....	341	360	419	410	403	319
Percent increase or decrease from previous year.....	5.3	14.1	12.2	11.7	126.3	143.7
Number of persons killed.....	15	16	10	20	25	27
Percent increase or decrease from previous year.....	6.3	160.0	50.0	20.0	7.4	20.6
Number of persons injured.....	361	464	439	429	466	373
Percent increase or decrease from previous year.....	22.2	15.7	12.3	7.9	124.9	164.3

¹ Increase.

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

	Year ended June 30—							
	1948	1947	1946	1945	1944	1943	1915	1912
Number of accidents.....	104	116	156	141	141	129	424	856
Number of persons killed.....	14	12	10	13	17	25	13	91
Number of persons injured.....	108	124	165	154	194	173	467	1,005

¹ 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—									
	1948		1947		1946		1945		1944	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....	3	109	6	126	4	142	5	117	7	128
Firemen.....	6	155	6	159	4	184	9	183	11	181
Brakemen.....	3	43	1	37		46	2	61	2	67
Conductors.....		5		10		7	1	11		11
Switchmen.....		10		9		10	1	10		5
Roundhouse and shop employees:										
Boilermakers.....		4		3		1	1	10	2	5
Machinists.....	1	2	1			6		6		2
Foremen.....		1				3		6		2
Inspectors.....				1		1	1		1	2
Watchmen.....	2	1		2	2	4		1		1
Boiler washers.....						1				
Hostlers.....		8		6		10		5		12
Other roundhouse and shop employees.....		5		8		3		4	1	4
Other employees.....		12	2	21		13		5		6
Nonemployees.....		6		82		8		10	1	40
Total.....	15	361	16	464	10	439	20	429	25	466

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

	Year ended June 30—					
	1948	1947	1946	1945	1944	1943
Number of locomotive units for which reports were filed.....	9,803	7,805	6,616	6,094	5,139	4,351
Number inspected.....	20,798	13,115	10,908	9,888	7,711	6,847
Number found defective.....	853	633	499	447	378	298
Percentage of inspected found defective.....	4.1	4.8	4.6	4.5	4.9	4.4
Number ordered out of service.....	21	19	17	16	9	6
Number of defects found.....	1,745	1,442	1,385	1,212	1,026	849

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

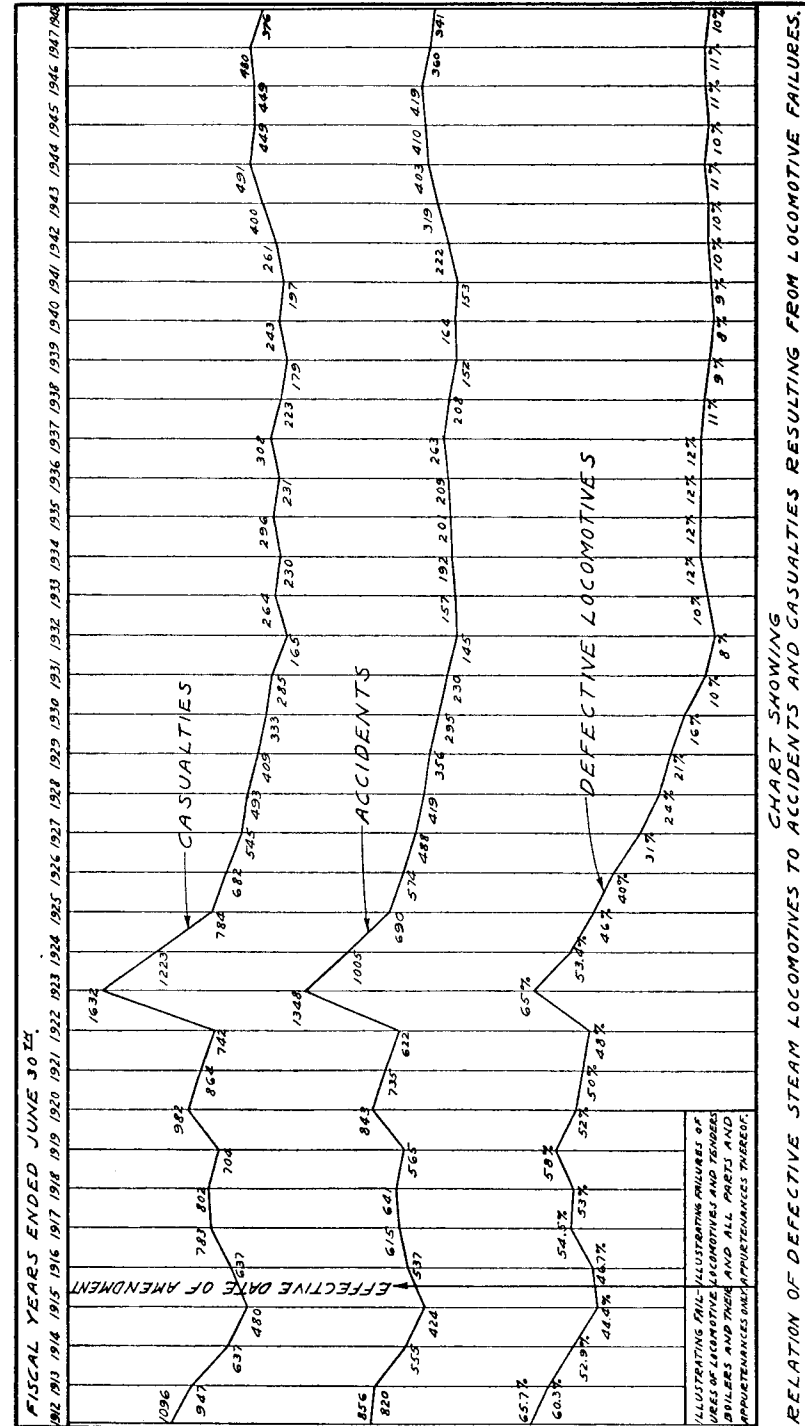
	Year ended June 30—					
	1948	1947	1946	1945	1944	1943
Number of accidents.....	41	40	38	29	17	15
Number of persons killed.....		2		1		
Number of persons injured.....	50	41	56	40	23	18

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

	Year ended June 30—									
	1948		1947		1946		1945		1944	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....		7	1	9		8		4		4
Firemen.....		24		21		14		14		4
Brakemen.....		1		5		3		1		1
Conductors.....		2		1		2		2		1
Switchmen.....		2		1		2		2		
Maintenance employees.....			1	2		4	1	3		4
Other employees.....		2		2		5		8		1
Nonemployees.....		12				18		7		8
Total.....		50	2	41		56	1	40		23

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—															
	1948			1947			1946			1945			1944			
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	
Air reservoirs	1		2	1		1	1		1		1	1		3		4
Aprons	5		5	4		4	1		2		8	7		7		8
Arch tubes																
Asphan blowers																
Axles	3		3	1		2	1		1		2	1		5		5
Blow-off cocks	5		5	8		7	15		16		7	8		8		8
Boiler checks	7	1	6	7		7	8		8		6	6		9		9
Boiler explosions:																
A. Shell explosions																
B. Crown sheet; low water; no contributory causes found	10	12	8	11	7	16	15	7	20	7	9	11	12	7	19	
C. Crown sheet; low water; contributory causes or defects found	3		7	2	4	3	3	3	2	1	1	7	5	43		
D. Miscellaneous firebox failures																
Brakes and brake rigging	11		24	8		12	10		12	10	10	12		12		12
Couplers	4		4	6		5	5		5	5	6	6		6		9
Crank pins, collars, etc	2		2	3		3	5		5	5	1	4		7		8
Crossheads and guides	1		1	2		2	3		3	5	2	8		8		8
Cylinder cocks and rigging	3		3	3		3	1		1	1	1	3		3		3
Cylinder heads and steam chests	1		1	2		2	1		2	3	3	1		1		1
Dome caps																
Draft appliances				1		1	2		2	2	2	2		2		3
Draw gear				2		2	2		2	2	2	1		1		1
Fire doors, levers, etc.	10		10	2		2	2		2	8	6	6		6		6
Flues	8		9	4		4	10		12	5	6	8		8		9
Flue pockets																
Footboards	15		15	15		15	12		12	13	1	12		6		6
Gage cocks																
Grease cups				1		1	1		1	1	1	1		1		1
Grate shakers	15		15	20		20	25		25	17		17	19	19		19
Handholds	12		12	18		18	20		20	26	1	25	14	14		14
Headlights and brackets	3		3	2		2	2		2	7		7		7		7
Injectors and connections (not including injector steam pipes)	10		10	14		14	14		14	12		12	8	8		8
Injector steam pipes	4		5	4	1	4	2		2	1		1		1		5
Lubricators and connections	2		2	4		4	5		5	4		4	5	5		5
Lubricator glasses																
Patch bolts																
Pistons and piston rods	2		2	1		1	1		2	1		3		3		3
Plugs, arch tube and washout	3		3	1		1	1		1	5	2	6		6		7
Plugs in firebox sheets																
Reversing gear	12		12	13		13	11		11	13		13	16	16		16
Rivets																
Rods, main and side	5		7	3	1	2	7		7	7		11	7	2		9
Safety valves																
Sanders	4		4	5		5	4		4	8		8	12	12		12
Side bearings																
Springs and spring rigging	4		4	3		7	6		7	5	1	4	6	2		8
Squirt hose	5		5	19		19	14		15	23		25	21	22		22
Staybolts	4		4	2		2	1		1	4		4	4	1		4
Steam piping and blowers	13	1	13	4		4	15		15	12		14	11	14		14
Steam valves	6		6	8		8	13		13	7		7	7	7		7
Studs																
Superheater tubes	2		3	2		2	2		2	4		6	2	2		2
Throttle glands	1		1	1		1	1		1	2		2	2	2		2
Throttle leaking	1		1	2		2	1		1	2		3	1	1		1
Throttle rigging	10		10	16		17	15		16	6		6	9	9		9
Trucks, leading, trailing, or tender																
Valve gear, eccentrics, and rods	3		3	4		4	7		7	7		7	10	1		9
Water glasses	4		4	8		8	12		13	10		10	14	1		13
Water-glass fittings	3		3	3		3	2		2	1		1	2	3		3
Wheels	3	1	2			1	1		1	1		1	1	1		1
Miscellaneous	121		122	117	1	117	124		127	124	3	126	103	1		106
Total	341	15	361	360	16	464	419	10	439	410	20	429	403	25	466	



ILLUSTRATING THE RELATIONSHIP BETWEEN THE NUMBER OF DEFECTIVE STEAM LOCOMOTIVES AND THE NUMBER OF ACCIDENTS AND CASUALTIES RESULTING FROM LOCOMOTIVE FAILURES.

RELATION OF DEFECTIVE STEAM LOCOMOTIVES TO ACCIDENTS AND CASUALTIES RESULTING FROM LOCOMOTIVE FAILURES. CHART SHOWING

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—														
	1948			1947			1946			1945			1944		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Brakes and brake rigging	3		6	2		2	2		3	3		8	1		3
Carburetors															
Couplers				2		2				1		4	3		3
Crank pins and connecting rods										2		2			
Fires: due to overflowing or leakage of fuel, crankcase explosions, back firing, etc	3		3	7		8	4		5	6		6	4		5
Generators and starting devices	1		1												
Insulation				4	1	5	1		1	1		1			
Pantographs and trolleys				1	1	2	2		2	1		1			
Short circuits	7		7	2		2	2		2	2		1			1
Miscellaneous	27		33	22		22	27		43	12		16	8		11
Total	41		50	40	2	41	38		56	29	1	40	17		23

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

Parts defective, inoperative or missing, or in violation of rules	Year ended June 30—					
	1948	1947	1946	1945	1944	1943
1 Air compressors	1,007	944	1,044	1,054	1,146	968
2 Arch tubes	15	19	27	17	45	50
3 Ashpans and mechanism	72	87	93	81	93	71
4 Axles	8	6	7	11	15	15
5 Blow-off cocks	274	308	388	361	289	291
6 Boiler checks	424	428	526	511	533	503
7 Boiler shell	298	342	462	416	406	377
8 Brake equipment	2,617	2,512	2,992	2,755	2,914	2,661
9 Cabs, cab windows, and curtains	1,049	1,347	1,501	1,057	1,169	1,102
10 Cab aprons and decks	414	428	469	426	381	390
11 Cab cards	109	91	120	91	104	142
12 Coupling and uncoupling devices	55	58	46	57	65	66
13 Crossheads, guides, pistons and piston rods	1,611	1,683	1,941	2,079	2,149	1,961
14 Crown bolts	78	98	88	90	105	66
15 Cylinders, saddles, and steam chests	1,617	2,004	2,217	1,801	2,133	1,395
16 Cylinders and steam chests	494	650	679	454	624	430
17 Domes and dome caps	142	130	164	187	189	196
18 Draft gear	461	449	536	486	576	599
19 Draw gear	413	453	462	447	515	469
20 Driving boxes, shoes, wedges, pedestals, and braces	1,582	1,580	1,922	1,803	2,026	2,053
21 Firebox sheets	302	257	333	319	347	303
22 Flues	201	197	253	260	274	215
23 Frames, tail pieces, and braces, locomotive	576	820	1,003	852	1,019	894
24 Frames, tender	72	63	88	97	126	86
25 Gages and gage fittings, air	185	135	185	151	158	191
26 Gages and gage fittings, steam	354	358	370	353	328	316
27 Gage cocks	474	404	495	449	532	584
28 Grate shakers and fire doors	455	444	555	558	539	492
29 Handholds	513	469	540	527	464	483
30 Injectors, inoperative	66	39	50	41	46	66
31 Injectors and connections	2,329	2,369	2,750	2,553	2,867	2,637
32 Inspections and tests not made as required	148	350	8,885	9,067	9,565	9,037
33 Lateral motion	821	791	862	977	898	700
34 Lights, cab and classification	132	155	161	167	243	184
35 Lights, headlight	183	143	168	222	268	184
36 Lubricators and shields	236	228	351	306	257	292
37 Mud rings	186	217	238	257	301	256
38 Packing nuts	456	575	691	654	746	669
39 Packing, piston rod and valve stem	658	691	776	845	879	724
40 Pilots and pilot beams	132	156	153	171	193	194
41 Plugs and studs	169	236	262	245	281	259

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

Parts defective, inoperative, or missing, or in violations of rules	Year ended June 30—					
	1948	1947	1946	1945	1944	1943
42 Reversing gear	649	528	482	439	454	452
43 Rods, main and side, crank pins, and collars	1,998	2,136	2,581	2,569	3,230	2,798
44 Safety valves	45	70	72	84	77	74
45 Sanders	597	569	784	658	609	642
46 Springs and spring rigging	4,124	4,622	5,195	4,734	4,625	3,583
47 Squirt hose	93	79	120	98	94	92
48 Stay bolts	292	318	360	351	400	367
49 Stay bolts, broken	258	283	268	308	232	247
50 Steam pipes	435	356	551	416	435	414
51 Steam valves	150	146	203	157	161	159
52 Steps	767	778	914	681	872	729
53 Tanks and tank valves	1,757	1,558	1,570	1,215	1,400	1,321
54 Telltale holes	60	69	60	78	69	78
55 Throttle and throttle rigging	923	1,026	979	948	948	887
56 Trucks, engine and trailing	812	1,005	1,261	1,151	1,155	1,020
57 Trucks, tender	652	795	1,101	974	928	900
58 Valve motion	676	778	1,080	991	1,021	998
59 Washout plugs	384	441	740	820	845	685
60 Stokers	270	208				
61 Water glasses, fittings, and shields	1,039	1,318	1,190	1,328	1,323	1,454
62 Wheels	779	583	840	899	759	728
63 Miscellaneous—Signal appliances, badge plates, brakes (hand)	707	870	1,337	1,213	1,172	1,151
Total number of defects	38,855	41,250	56,541	53,367	56,617	51,350
Locomotives reported	37,073	39,578	41,851	43,019	43,297	43,064
Locomotives inspected	93,917	94,034	101,869	115,979	117,334	116,647
Locomotives defective	9,417	10,248	11,337	11,975	12,710	11,901
Percentage of inspected found defective	10	11	11	10	11	10
Locomotives ordered out of service	654	708	690	506	630	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—					
	1948	1947	1946	1945	1944	1943
Air compressors	32	9	15	14	7	7
Axles, truck and driving	3	2				6
Batteries	8	1	2		1	2
Boilers	30	5	11	8		1
Brake equipment	204	178	102	114	85	62
Cabs and cab windows	90	97	46	59	40	33
Cab cards	37	29	24	25	21	17
Cab floors, aprons, and deck plates	134	130	72	60	54	31
Clutches			2	2	1	2
Controllers, relays, circuit breakers, magnet valves, and switch groups	24	14	16	18	14	9
Coupling and uncoupling devices	12	13	6	6	3	1
Current collecting apparatus	11	3	9	10		1
Draft gear	36	30	18	14	14	15
Draw gear	8	4	3	8		2
Driving boxes, shoes, and wedges	16	38	44	29	12	25
Frames or frame braces	2	7	10	12	12	7
Fuel system	136	66	57	45	33	32
Gages or fittings, air	11	10	7	7	6	3
Gages or fittings, steam	2	5			2	1
Gears and pinions	9	1			1	4
Handholds	32	22	18	13	6	19
Inspections and tests not made as required	59	78	357	297	278	223
Insulation and safety devices	10	11	12	17	8	4
Internal-combustion engine defects, parts and appurtenances	241	254	145	133	86	50
Jack shafts	5	3	4	6	8	2
Jumpers and cable connectors	7	1	8	9	2	3
Lateral motion, wheels	18	7	18	20	9	10
Lights, cab and classification	5	1	2		1	1

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

Parts defective, inoperative, or missing, or in violation of rules	Year ended June 30—					
	1948	1947	1946	1945	1944	1943
Lights, headlight.....	3	2	-----	1	2	2
Meters, volt and ampere.....	3	3	4	2	2	3
Motors and generators.....	26	16	15	12	14	14
Pilots and pilot beams.....	23	15	8	1	2	4
Plugs and studs.....	-----	-----	-----	1	-----	-----
Quills.....	16	18	52	29	18	9
Rods, main, side, and drive shafts.....	5	6	11	3	10	-----
Sanders.....	106	82	57	50	59	41
Springs and spring rigging, driving and truck.....	44	63	42	38	44	18
Steam pipes.....	10	4	1	6	3	1
Steps, footboards, et cetera.....	116	68	29	28	25	25
Switches, hand-operated, and fuses.....	3	1	-----	7	2	2
Transformers, resistors, and rheostats.....	6	2	3	-----	-----	3
Trucks.....	65	45	52	42	47	22
Water tanks.....	1	2	1	2	1	4
Water glasses, fittings, and shields.....	18	-----	15	2	4	2
Warning signal appliances.....	7	8	-----	-----	2	3
Wheels.....	72	48	54	46	74	107
Miscellaneous.....	39	40	31	16	13	16
Total number of defects.....	1,745	1,442	1,385	1,212	1,026	849
Locomotive units reported.....	9,803	7,805	6,616	6,094	5,139	4,351
Locomotive units inspected.....	20,798	13,115	10,908	9,888	7,711	6,847
Locomotive units defective.....	853	633	499	447	378	298
Percentage inspected found defective.....	4.1	4.8	4.6	4.5	4.9	4.4
Locomotive units ordered out of service.....	21	19	17	16	9	6

INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF LOCOMOTIVES

All accidents reported to the Bureau as required by the law and rules were carefully investigated and appropriate action taken to prevent 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

Three hundred and forty-one accidents occurred in connection with steam locomotives resulting in 15 deaths and 361 injuries. This represents a decrease of 19 accidents, a decrease of 1 in the number of persons killed, and a decrease of 103 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 10 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 a reduction of 1 percent from the results obtained in the preceding year. Six hundred and fifty-four 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 54 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

Thirteen boiler explosions occurred in the fiscal year; all were caused by overheating of the crown sheets due to low water. Twelve employees were killed in these accidents and 15 were injured. There was a reduction of 1 in the number of boiler explosions, an increase of 1 in the number of employees killed, and a reduction of 7 in the number of employees injured compared with the preceding year.

One of the explosions occurred on a locomotive in passenger-train service, one on a locomotive in mixed-train service, nine on locomotives in freight-train service, and two on locomotives in charge of engine watchmen. Our investigations developed that absence of safe water level was known by employees on six of the locomotives in advance of the occurrence of the explosions.

The locomotive in passenger-train service, upon which one employee was injured, and three of the locomotives in freight train service upon which three employees were killed and three injured were equipped with low-water alarms which gave warnings of impending low water but sufficiently prompt and appropriate action to restore the water level or to extinguish the fires was not taken in any instance.

Water was known to be low prior to explosions of two other boilers of locomotives engaged in freight-train service. These explosions killed one and injured four employees. In one of these instances the fireman was preparing to dump the fire but was stopped by the engineer who said "No, the officials are checking this train tonight and we don't want to delay this important train." In the other instance the train was stopped because of low water and the fireman was preparing to knock the fire.

Anxiety to keep trains moving at the desired speed or to avoid stalling is obviously a principal factor leading to the occurrence of boiler explosions. Reduction in accidents that are brought about by

the influence of this factor, and other accidents in which this factor is apparently involved but where the evidence is less conclusive than in the instances cited, can no doubt be accomplished by continuous and persistent effort on the part of officers and supervisors to discourage attempts to maintain the desired schedule under conditions where the water level may not be visible in the water glass, or, in other words, to continually caution all concerned that the well-known rudimentary safety provision "In case of doubt the safe course shall be taken" be invariably followed.

Ninety-one boiler and appurtenance accidents other than explosions resulted in the death of 2 employees and injuries to 93 employees. This is a decrease of 11 accidents, an increase of 1 in the number of employees killed, and a decrease of 9 injuries compared with the preceding year.

EXTENSION OF TIME FOR REMOVAL OF FLUES

Three hundred and fifty-three applications were filed for extension of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 57 of these cases the condition of the locomotives or other circumstances were such that extensions could not properly be granted. Four were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Ten extensions were granted after defects disclosed by our investigations were required to be repaired. Seven applications were canceled for various reasons. Two hundred and seventy-five applications were granted for the full period requested.

LOCOMOTIVES PROPELLED BY POWER OTHER THAN STEAM

Forty-one accidents, resulting in injuries to 50 persons occurred in connection with locomotives propelled by power other than steam. This represents an increase of one in the number of accidents, a decrease of two in the number of persons killed, and an increase of nine in the number of injured compared with the preceding year.

During the year 4.1 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 0.7 percent compared with the results obtained in the preceding year. Twenty-one 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 two locomotives compared with the preceding year.

SPECIFICATION CARDS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 111 specification cards and 4,265 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, 2,001 specifications and 173 alteration reports were filed for locomotive units, and 530 specifications and 231 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.

AMENDED RULES

The Commission, in an order dated April 27, 1948, amended rules 106 (b), 153 (a), and 157 (c) and (d) which required equipment of steam road locomotives built on or after March 1, 1946, with emergency brake valves, means of ascertaining the height or quantity of water in the tender feed water tank from the cab or tender deck, and steam or auxiliary air supply to air operated reverse gears, and that steam road locomotives built before March 1, 1946, be so equipped the first time class 3 or heavier repairs were applied after June 1, 1946, but not later than June 1, 1948, by eliminating the words "but not later than June 1, 1948."

The amendment leaves in effect all the original order except that part which requires the equipment before June 1, 1948, of locomotives built before March 1, 1946. Installations on these locomotives receiving class 3 or heavier repairs are continuing until all such locomotives are so equipped.

LEGAL

One case of violation of the rules and instructions for inspection and testing of steam locomotives and tenders and their appurtenances, comprising three counts, was transmitted to a United States attorney for prosecution. This case is now pending in the district court.

APPEALS

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

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, 1948, 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 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.]

AKRON, CANTON & YOUNGSTOWN RAILROAD:

July 21, 1947, locomotive 320, Akron, Ohio. Blow-off cock stuck open; one injured.

One accident; one injured.

ATCHISON, TOPEKA & SANTA FE RAILWAY:

**July 10, 1947, locomotive 2902, Emporia, Kans. Injector overflow valve was stuck in closed position and could not be opened from the cab; one injured.

July 23, 1947, locomotive 900, Satanta, Kans. Lubricator steam pipe to air pump broke off; "Examine tallow pipe leaks from Hydro. lubricator" was reported on July 17; one injured.

August 10, 1947, locomotive 3737, Barstow, Calif. Oil on cab apron and deck; one injured.

August 14, 1947, locomotive 3880, Devore, Calif. Explosion and back fire from firebox when employee knocked an accumulation of carbon loose while en route; one injured.

August 16, 1947, locomotive 769, Gallup, N. Mex. Walkway on top of tender was obstructed by coal; one injured.

August 28, 1947, locomotive 3703, Vine Hill, Calif. Boiler check valve broke, permitting boiler pressure to enter the feed water pump and render it inoperative. Employee was burned by steam and hot water which came from squirt hose with force when he opened hose valve to test the action of the feed pump; one injured.

**August 29, 1947, locomotive 839, Kansas City, Kans. Cylinder cock broke off; one injured.

August 30, 1947, locomotive 1830, Argentine, Kans. Dynamo operating valve extension handle universal joint became disconnected from valve stem, due to failure of knuckle pin; one injured.

September 11, 1947, locomotive 5028, Vaughn, N. Mex. Throttle valve stuck shut momentarily and when the pilot valve opened the throttle pulled wide open; employee injured while closing the throttle; one injured.

**September 18, 1947, locomotive 2522, Slaton, Tex. Throttle was difficult to operate, due to throttle rod being out of alignment with stuffing box; one injured.

**September 27, 1947, locomotive 3461, Marceline, Mo. Carbon bar did not conform to carrier's standard; one injured.

October 29, 1947, locomotive 1986, Barstow, Calif. Fire-hose cover on top of tender, which was turned over when the hose was unreeled, rolled off the tender and struck an employee; hose cover was round on top; one injured.

**January 2, 1948, locomotive 4012, Rice, Calif. Fuel oil fire flashed from firebox, due to accumulation of carbon in firebox; apparently firebox was not properly cleaned before locomotive was put in service; one injured.

February 11, 1948, locomotive 1974, Oakland, Calif. Foot guard was missing from end of cab apron; one injured.

February 25, 1948, locomotive 1262, Wasco, Calif. Insufficient clearance between cab seat box and train heat pipe; one injured.

*April 4, 1948, locomotive 3777, La Junta, Colo. Thermic syphon burst; one injured.

April 21, 1948, locomotive 2919, Hector, Ariz. Derailment, caused by tender brake hanger falling from position, due to loss of top hanger pin, and fouling a switch point; 12 injured.

May 13, 1948, locomotive 612, Calwa, Calif. Driver brake hanger broke through old fracture which extended through approximately 35 percent of cross-sectional area; one injured.

June 22, 1948, locomotive 3929, Snyder, Tex. Delivery pipe spanner nut at coupling to boiler check worked loose; delivery pipe goose neck at coupling was defective; one injured.

Nineteen accidents; 30 injured.

ATLANTIC COAST LINE RAILROAD:

**August 8, 1947, locomotive 1541, Dunn, N. C. Floating chafing plate between locomotive and tender fell to the ground; liner between wedge and pocket of buffer was missing, allowing sufficient clearance to permit the floating plate to disengage from the stationary plate; one injured.

October 19, 1947, locomotive 7401, Carara, Ala. Main driving wheel axle broke at the base of fillet through old fracture which extended through 75 percent of cross-sectional area; one injured.

November 4, 1947, locomotive 2019, near Sylvester, Ga. Crown-sheet failure caused by overheating due to low water; two injured.

November 8, 1947, locomotive 1805, Santee River, S. C. Trailing truck wheel was shelled, causing vibration which resulted in journal box cover and other parts being thrown from locomotive; truck binder bolts were reported loose 12 times in the 30 days preceding accident. Employee's head was struck by a bridge truss while he was leaning out cab window to determine the source of the flying parts; one killed.

November 26, 1947, locomotive 1528, near Upton, Ga. Flue failed at defective safe end weld; one injured.

February 6, 1948, locomotive 824, Lake Waccamaw, N. C. Radio communication equipment was so located on top of tender water tank that it interfered with movement of water spout when preparing to take water; one injured.

**February 7, 1948, locomotive 1731, Ocala, Fla. Rake slipped off a clinker while the fire was being cleaned; one injured.

**May 1, 1948, locomotive 466, near Harrisburg, Fla. Glass pane in cab window broke while the window was being raised; no means provided for lifting the window except by pressure on the glass; one injured.

Eight accidents; one killed, eight injured.

BALTIMORE & OHIO RAILROAD:

July 24, 1947, locomotive 6153, Meyersdale, Pa. Tank hose came off fitting at tank connection; nipple used in connection was not carrier's standard fitting; one injured.

July 29, 1947, locomotive 5148, Pittsburgh, Pa. Spanner nut at injector delivery pipe connection to boiler check blew off; nut had been broken by use of a chisel or other sharp tool in tightening; one injured.

August 8, 1947, locomotive 6150, Middletown, Ohio. Driving-wheel tire broke; one injured.

**August 31, 1947, locomotive 5651, Akron Junction, Ohio. Stoker lubricator condensing valve bonnet blew out; valve had not been properly tightened; one injured.

**September 6, 1947, locomotive 714, New Castle Junction, Pa. One section of tender cistern manhole cover was missing; manhole cover hinge strap bolts were broken; cover was reported missing before departure from the ready track; one injured.

October 13, 1947, locomotive 4635, Leipsic Junction, Ohio. Insufficient clearance between extension rod to injector starting valve and reverse lever when injector starting valve was in operation, due to the extension rod not being properly supported to keep it in position; one injured.

October 27, 1947, locomotive 6168, Connellsville, Pa. Lug on marker lamp broke at clamp through old fracture which extended through 95 percent of cross-sectional area; one injured.

October 31, 1947, locomotive 5501, Hyndman, Pa. Lug on marker lamp broke through old fracture which extended through 90 percent of cross-sectional area; one injured.

**November 23, 1947, locomotive 4028, Frederick Junction, Md. Tank hose blew off front connection; a cotter key was found inside the injector steam valve; one injured.

January 15, 1948, locomotive 4630, Lees, Md. Lid of tender cistern manhole cover unexpectedly swung around while being opened, causing employee to fall from the top of tender; hinge strap on the lid was broken at rivet hole and tack welding applied to further secure the strap to the lid was not fused to the strap; one injured.

**February 13, 1948, locomotive 666, Cincinnati, Ohio. Throttle lever unlatched and flew back, striking employee's hand; throttle lever latch teeth were worn; one injured.

March 4, 1948, locomotive 5124, near Laurel, Md. Injector steam pipe collar broke through old fracture and the pipe pulled out of the flanged throttle valve joint; brass collar was distorted, apparently by undue force in tightening the joint; collar ball joint and throttle valve ball joint were not of the same radius; one injured.

April 23, 1948, locomotive 7709, Cumberland, Md. Broken stay blew out of crown sheet; threads on stay and in sheet were badly deteriorated; one injured.

**May 9, 1948, locomotive 5002, Cleveland, Ohio. Cab handhold at gangway failed through old fracture at bolt hole near bottom end; two handholds applied as replacements for this handhold failed at the same location within a period of 7 days after this accident; one injured.

May 11, 1948, locomotive 380, Lima, Ohio. Grate-shaker bar slipped off post; bar was $\frac{1}{2}$ inch loose in longitudinal fit on shaker post; one injured.

Fifteen accidents; 15 injured.

BOSTON & MAINE RAILROAD:

October 15, 1947, locomotive 3718, Northampton, Mass. Locomotive was working water; employee fell while making his second trip to wipe the cab windows in the first 35 minutes of the trip; one injured.

October 19, 1947, locomotive 3715, Fitchburg, Mass. Material being carried on top of tender behind fuel space in violation of rule 153 (c); one injured.

October 31, 1947, locomotive 1420, near Claremont Junction, N. H. Employee slipped on unroughened cover plate over grate-shaker posts; cover plate was not carrier's standard; one injured.

November 19, 1947, locomotive 1429, South Acton, Mass. Bolt heads protruded above the surface of step between locomotive deck and cab floor; bolt heads were not countersunk in accordance with the carrier's standard practice; one injured.

December 7, 1947, locomotive 3710, Somerville, Mass. Handwheel of Precision reverse gear spun violently when unlatched and the handle on the wheel struck employee's hand; sliding box on end of radius rod was applied in reverse position which permitted the box to strike and bind on radius rod fillet, causing the reverse gear to jam and trap air in the cylinder; one injured.

March 18, 1948, locomotive 426, Boston, Mass. Rough spot on tender shoveling sheet; bead of welding around plate welded in hole in shoveling sheet over drawbar pin had not been properly ground down; one injured.

**May 19, 1948, locomotive 3235, Wedgemere, Mass. Employee's foot slipped off fire-door pedal, permitting fire door to close unexpectedly; fire-door pedal struck hinges of grate-shaker post cover plate when pedal was depressed; one injured.

Seven accidents; seven injured.

CENTRAL OF GEORGIA RAILWAY:

January 25, 1948, locomotive 493, near Sunnyside, Ga. Injector steam pipe collar broke off at injector connection; pipe was not flanged over ball joint of collar; injector steam pipe connection was reported leaking on January 5 and 7; one injured.

One accident; one injured.

CENTRAL RAILROAD OF NEW JERSEY:

**January 10, 1948, locomotive 788, Morgan, N. J. Hole in right front sand trap; sand trap body around the hole was worn thin; "Hole in right front sand

trap" and "Right front sand pipe leaks underneath trap" were reported on January 9; one injured.

One accident; one injured.

CHESAPEAKE & OHIO RAILWAY:

September 16, 1947, locomotive 1616, Hinton, W. Va. Crown-sheet failure caused by overheating due to low water; one injured.

September 30, 1947, locomotive (P. M.) 1328, Detroit, Mich. Injector steam pipe broke off in sleeve at injector starting valve; one injured.

May 12, 1948, locomotive 3020, near Chillicothe, Ohio. Crown-sheet failure caused by overheating due to low water; three killed.

Three accidents; three killed, two injured.

CHICAGO & NORTH WESTERN RAILWAY:

July 6, 1947, locomotive 1662, Antigo, Wis. Tender gangway step was broken; one injured.

August 3, 1947, locomotive 2412, Scranton, Iowa. Grate-shaker post broke through old fracture which extended through approximately 75 percent of cross-sectional area; one injured.

October 8, 1947, locomotive 1160, Lake Preston, S. Dak. Crown-sheet failure caused by overheating due to low water; one killed.

**January 29, 1948, locomotive 3006, Clinton, Iowa. Water-glass steam pipe collar broke at flange at water-glass connection; steam pipe was not brazed to flange portion of the collar; one injured.

Four accidents; one killed, three injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

August 14, 1947, locomotive 5263, Denver, Colo. Cylinder cocks were inoperative; cylinder cock slide bar had pulled out of cylinder cock account of stop bolt missing from front end of bar; one injured.

August 23, 1947, locomotive 6137, near Norris, Ill. Stoker stopped due to obstruction in one of the elevators; one injured.

March 8, 1948, locomotive 2812, Chicago, Ill. Part of superheater flue bead broke off; flue had been excessively expanded; one injured.

Three accidents; three injured.

CHICAGO GREAT WESTERN RAILWAY:

August 6, 1947, locomotive 867, McIntire, Iowa. Shaker bar slipped from post; shaker posts were covered with oil; one injured.

December 18, 1947, locomotive 750, Harlan, Iowa. Boiler check stuck open; one injured.

January 12, 1948, locomotive 870, Bondurant, Iowa. Employee's hand was caught between handle of clinker hook and a protruding angle brace on the front of tender water leg; clinker hook was bent; one injured.

Three accidents; three injured.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

November 21, 1947, locomotive 56, near Morton, Wash. Cab seat box lid and cushion fell from seat box; wood strips or cleats which had been applied on under side of seat box lid for securing it on seat box were missing; one injured.

**December 17, 1947, locomotive 204, Portage, Wis. Wheel came off valve stem in exhaust line between steam cylinder and feed water heater compartment in tender, due to retaining nut being missing; one injured.

January 11, 1948, locomotive 1033, near Arlington, Wis. Crown-sheet failure caused by overheating due to low water; one killed, one injured.

**January 29, 1948, locomotive 263, Bensenville, Ill. Headlight turbogenerator failed, caused by excessive speed; steam valve cap on turbine worked loose permitting excessive opening of the valve; one injured.

January 30, 1948, locomotive 208, Franksville, Wis. Broken radial stay blew out of firebox crown sheet; stay was broken through old fractures and threads on stay and in crown sheet were badly damaged; one injured.

February 16, 1948, locomotive 347, South Beloit, Ill. Inspirator water regulating valve was stuck in open position; one injured.

**February 24, 1948, locomotive 1003, Canton, S. Dak. Driving spring hanger broke through fractures at upper corners of gib slot which extended through approximately one-third of cross-sectional area; one injured.

March 1, 1948, locomotive 1122, Monroe, Wis. Both ends of ashpan dump shaft fouled the rear driver brake rods, preventing the usual use of the ashpan dump shaft handle to dump the ashpan; employee was injured while using the dump shaft handle as a bar and hammer to close the ashpan dump; "Cannot get wrench on front ashpan, account brake rod in way; please look after this; we have to clean pan on road" was reported on February 12, and similar reports were made on February 14 and 16; one injured.

Eight accidents; one killed, eight injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILROAD:

**August 1, 1947, locomotive 2697, between Silvis and Geneseo, Ill. Brake-man's cab seat collapsed, due to bolt working out of hinge which fastened the seat to side wall of cab; one injured.

**January 21, 1948, locomotive 2126, El Reno, Okla. Sand pipe was not in line with the rail; sanders were reported on January 1, 13 (three times), 15, 16, and 21; one injured.

**April 28, 1948, locomotive 930, Chicago, Ill. Air compressor lubricator steam pipe broke off at connection to throttle in cab; "Steam pipe on lubricator cracked at valve" was reported approximately 3 hours before the accident; one injured.

*May 29, 1948, locomotive 2584, Burr Oak, Ill. Tender brake beam was down; injured while attempting to remove the dragging brake; one injured.

Four accidents; four injured.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RAILWAY:

July 9, 1947, locomotive 500, Camp Douglas, Wis. Injector steam pipe collar broke through fractures which extended through approximately 50 percent of cross-sectional area; steam pipe was not expanded at lower end of collar; two injured.

February 4, 1948, locomotive 386, Hudson, Wis. Manually operated reverse lever was hard to move; one injured.

Two accidents; three injured.

CLINCHFIELD RAILROAD:

April 21, 1948, locomotive 740, near Poplar, N. C. Crown-sheet failure caused by overheating due to low water; two killed, one injured.

*May 22, 1948, locomotive 735, Forbes, N. C. Bell cord became disconnected from bell; one injured.

Two accidents; two killed, two injured.

COLORADO & SOUTHERN RAILWAY:

January 22, 1948, locomotive (C. B. & Q.) 6300, Trinidad, Colo. Broken radial stay blew out of roof sheet when tapped while under 120 pounds pressure; stay was broken in reduced section and was leaking at roof sheet; apparently stay was loose in roof sheet when applied; one injured.

One accident; one injured.

DELAWARE & HUDSON RAILROAD:

September 20, 1947, locomotive 1114, Cobleskill, N. Y. Grate-shaker bar was not carrier's standard for locomotives of this class and had a pipe extension on the handle end which prevented it from being carried in the pockets provided on tender when not in use; one injured.

October 8, 1947, locomotive 154, Oneonta, N. Y. Insufficient clearance between handle on cab roof ventilator cover and the front or rear edges of ventilator opening when ventilator cover was in either fully open or closed position; one injured.

November 6, 1947, locomotive 301, Schenevus, N. Y. Crank pin ran hot, apparently caused by side rod bushing having been too closely fitted to permit proper lubrication; one injured.

Three accidents; three injured.

DELAWARE, LACKAWANNA & WESTERN RAILROAD:

**December 2, 1947, locomotive 235, Binghamton, N. Y. Employee fell from catwalk of yard locomotive after changing the setting of air compressor governor; unnecessary hazard involved in carrier's regulations requiring air compressor governor settings to be changed to suit the changes in class of service in which the locomotive may be engaged; one injured.

December 12, 1947, locomotive 1629, Hoboken, N. J. Boiler feed water hot water pump apparently stopped; pump drain cock was hard to open; pump cab gage was not indicating properly; one injured.

**January 19, 1948, locomotive 1636, Owego, N. Y. Sliding plates of stoker conveyor were hard to move, due to fine coal and ice in grooves; one injured.

**February 2, 1948, locomotive 1129, Dover, N. J. Cylinder cock valve was leaking; one injured.

March 11, 1948, locomotive 1248, Craigs, N. Y. Blow-off cock stuck open; one injured.

**April 18, 1948, locomotive 1231, Boonton, N. J. Insufficient clearance between cab gangway handhold and tender when on curve; one injured.

**June 28, 1948, locomotive 1261, Norwich, N. Y. Fire hook which was being carried on top of tender water legs became dislodged and fell, striking employee's foot; one injured.

Seven accidents; seven injured.

DENVER & RIO GRANDE WESTERN RAILROAD:

October 2, 1947, locomotive 1028, Carbondale, Colo. Piston bull ring broke; cylinder bushing had been counterbored too far back at the front end and packing ring caught in the counterbore; one injured.

**February 20, 1948, locomotive 318, Montrose, Colo. Pilot caught on guard rail; spring equalizer hanger had broken at a crack starting at burned edge of hanger that had been shaped by torch cutting; one injured.

April 3, 1948, locomotive 1704, East Portal, Colo. Top coal gates were difficult to close, due to angle bars on the rear sides of the gates being bent and binding; one injured.

Three accidents; three injured.

ERIE RAILROAD:

August 26, 1947, locomotive 132, Orange, N. J. Insufficient clearance between locomotive handhold and tender deck when on sharp curve; tender deck did not conform to company's standard; one injured.

**September 11, 1947, locomotive 3199, Youngstown, Ohio. Defective tender coal board fell out of rack; one injured.

September 25, 1947, locomotive 2449, Brockway, Pa. Hot water and steam were discharged through hole in bottom of injector delivery pipe while employee was attempting to determine the cause of a leak in the pipe; interior of the pipe was badly pitted and two holes in pipe had previously been repaired by fusion welding; one injured.

October 24, 1947, locomotive 3306, Decatur, Ind. Cast-iron steam pipe in front end of locomotive burst; thickness of pipe varied from $\frac{3}{4}$ to $1\frac{1}{8}$ inches, due to manufacturing defect, while carrier's specifications provided for uniform thickness of $\frac{7}{8}$ inch; an 11-inch crack in the pipe had been bronze fusion welded; one injured.

January 17, 1948, locomotive 3000, near Freedom, Ohio. Stoker elevator mechanism was held in neutral position by a chisel inserted under elevator pawl shifter; when attempt was made to remove the chisel the stoker mechanism moved unexpectedly; one injured.

February 5, 1948, locomotive 3317, Cameron Mills, N. Y. Large lumps of coal in stoker conveyor trough prevented the proper flow of coal; slash bar used to break the large lumps of coal came in contact with conveyor screw, throwing employee back against the coal boards; one injured.

March 19, 1948, locomotive 3347, Creston, Ohio. Stoker conveyor cover plate slide hook failed through old fracture at lower end of the shaft portion; old fracture extended through approximately 90 percent of cross-sectional area; one injured.

Seven accidents; seven injured.

FLORIDA EAST COAST RAILWAY:

September 2, 1947, locomotive 701, Miami, Fla. Hard working throttle; "Throttle works very hard" was reported on August 26, 28, and 31, and September 2; one injured.

September 26, 1947, locomotive 261, Miami, Fla. Main spring hanger broke, permitting front end of locomotive to drop, and front footboards caught on crossing and were bent back under pilot beam; one injured.

January 9, 1948, locomotive 148, New Smyrna Beach, Fla. Excessive vertical distance between upper and lower sections of footboards on sides of the boiler; one injured.

January 29, 1948, locomotive 815, Titusville, Fla. Employee lost balance and fell from top of tender while taking water; steam-heat pipe to brakeman's cabin was on top of tender near tank manhole; one injured.

February 26, 1948, locomotive 820, Fort Lauderdale, Fla. Bell cord broke. Employee fell from running board while attempting repairs; oil on running board; one injured.

Five accidents; five injured.

FORT WORTH & DENVER CITY RAILWAY:

July 31, 1947, locomotive (C. & S.) 629, Wellington, Tex. Sand saturated with oil on top of tender behind the fuel oil tank created an insecure footing; one injured.

October 27, 1947, locomotive 313, Sterley, Tex. Nuts worked off valve stem; cotter key was missing; one injured.

Two accidents; two injured.

GREAT NORTHERN RAILWAY:

September 10, 1947, locomotive 3397, Malta, Mont. Boiler check stuck open; one injured.

December 4, 1947, locomotive 816, Minot, N. Dak. Water glass burst; one injured.

June 10, 1948, locomotive 2588, Wenatchee, Wash. Air operated bell ringer did not operate properly due to lack of lubrication; employee contacted a high voltage trolley wire when he went to oil the bell while the locomotive was standing at a point where the trolley wire clearance was reduced; one injured.

Three accidents; three injured.

GULF COAST LINES:

July 8, 1947, locomotive (S. A. U. & G.) 299, Kingsville, Tex. Manually operated reverse lever was very difficult to operate with steam pressure in the cylinders, due to the reversing gear counterbalance spring not being properly adjusted; one injured.

January 27, 1948, locomotive (St. L. B. & M.) 259, Hidalgo, Tex. Manually operated reversing gear was difficult to move from forward to back position; "Valve rings blowing L. side" was reported on January 26; one injured.

February 4, 1948, locomotive (St. L. B. & M.) 914, Placedo, Tex. Manually operated reverse gear was difficult to move to back position; reverse gear counterbalance spring was not properly adjusted; piston rod and valve stem packings were blowing; "Both piston rods and valve stems leaking bad. Cannot lubricate engine at all" was reported on February 2 and 3; one injured.

Three accidents; three injured.

GULF, COLORADO & SANTA FE RAILWAY:

**November 8, 1947, locomotive (A. T. & S. F.) 1132, View, Tex. Steam spurted from around main throttle stem when throttle was opened; one injured.

December 13, 1947, locomotive (A. T. & S. F.) 4046, San Angelo Junction, Tex. Oil on tops of tender fuel oil and water tanks; one injured.

May 21, 1948, locomotive (A. T. & S. F.) 3925, Coleman, Tex. Fire brick fell from position and lodged behind burner, resulting in decrease of steam pressure; one injured.

Three accidents; three injured.

ILLINOIS CENTRAL RAILROAD:

**December 7, 1947, locomotive 1366, Blackford, Ky. Boiler water was foaming badly; one injured.

**January 25, 1948, locomotive 1420, Manchester, Iowa. Bracket supporting smoke-box step was broken at bend at smoke-box connection; one injured.

**January 27, 1948, locomotive 2130, Baileyville, Ill. Tail light failed; wires to tail light were shorted in connection between locomotive and tender; connection plug was designed for much smaller cable than used on the locomotive; one injured.

Three accidents; three injured.

INDIANA HARBOR BELT RAILROAD:

**November 13, 1947, locomotive (N. Y. C.) 1444, Blue Island, Ill. Packing nut at bottom of water glass worked off, permitting steam and hot water to blow into the cab; one injured.

**January 6, 1948, locomotive 401, Riverdale, Ill. Tender truck bottom brake rod pin lost out, permitting brake rod to fall from position; one injured.

February 9, 1948, locomotive 327, Gibson, Ind. Air compressor stopped. Employee fell from top of the boiler while going to close air compressor steam throttle which could not be closed from within the cab account of the packing nut being screwed down too tight; "Air pump packing blowing bad" was reported on February 6; one injured.

**February 16, 1948, locomotive 405, Blue Island, Ill. Right back section of grates fouled deck grate account of warped center bar; one injured.

**February 26, 1948, locomotive 44, Gibson, Ind. Employee's vision was obscured by steam leaks from locomotive, causing him to step off footboard of moving locomotive; cylinder head was reported leaking two times, piston packing blowing nine times, and boiler checks leaking seven times since April 1; one injured.

Five accidents; five injured.

KANSAS CITY SOUTHERN RAILWAY:

October 10, 1947, locomotive 223, near Crestline, Kans. Employee slipped on tender oil tank deck plate near the steps to water tank; accumulation of oil on deck plate and steps; clean off top of oil tank and/or steps was reported on September 14, 15, 20, 21, 25, and 27, and October 4, 5, 9, and 11; one injured.

November 2, 1947, locomotive 1010, Kansas City, Mo. Main throttle packing blew out of stuffing box; one injured.

January 23, 1948, locomotive 1020, Heavener, Okla. Gas in firebox exploded and flames and hot oil flashed out between firebox door and frame; locomotive was dispatched with firebox door blocked partially open; one injured.

February 13, 1948, locomotive 906, Eastwood, Mo. Employee lost his balance while digging down coal on tender and stepped into stoker conveyor trough; one conveyor trough slide was missing and another slide was jammed under the tender deck and could not be used; one injured.

Four accidents; four injured.

LEHIGH & HUDSON RIVER RAILWAY:

March 6, 1948, locomotive 11, Belvidere, N. J. Power reverse gear was inoperative account of reverse gear cylinder being frozen; one injured.

One accident; one injured.

LOUISVILLE & NASHVILLE RAILROAD:

October 16, 1947, locomotive 1339, near Greenville, Ala. Insufficient clearance between grate-shaker bar and handle of automatic brake valve; one injured.

November 3, 1947, locomotive 925, Kenton, Ky. Crown-sheet failure caused by overheating due to low water; lowest reading of right water glass and location of bottom gage cock were $\frac{1}{2}$ inch and $1\frac{13}{16}$ inches, respectively, above the highest part of crown sheet, these heights being below the carrier's specifications (4 inches) and below the minimum height prescribed by rule 37 (3 inches); three injured.

**December 23, 1947, locomotive 1758, Bay Minette, Ala. Steam and hot water sprayed from injector telltale drain cup; screen shield was missing from drain cup, permitting coal and other sediment to enter the cup and stop up the drain pipe; one injured.

**January 22, 1948, locomotive 1335, Dossett, Tenn. Adapter for alemite fitting in the top of link block worked out and caught between radius bar and top of an elongated slot in the top of link plate, bending the radius rod downward; one injured.

March 28, 1948, locomotive 1042, Marfak, Ill. Drinking water cooler box fell from its position on top of tender bulkhead, due to not being properly secured; one injured.

**April 12, 1948, locomotive 255, near Pulaski, Tenn. Glass in front cab door was broken; one injured.

May 1, 1948, locomotive 1202, near Pruitton, Ala. Main rod broke through fracture which extended through 45 percent of cross-sectional area; fracture started in a flaw at top outside edge of flange in what appeared to be the end of scarfing on the new end which was forge-welded to the rod; one injured.

May 18, 1948, locomotive 1310, North Pensacola, Fla. Main crank pin broke through old fractures at fillet which extended through approximately 79 percent of

cross-sectional area; main rod pounding, guides loose, and wedges to be adjusted had been reported numerous times since April 1; one injured.

Eight accidents; 10 injured.

MAINE CENTRAL RAILROAD:

December 19, 1947, locomotive 376, Guildhall, Vt. Flue broke at front flue sheet; flue had been excessively expanded and rolled; one injured.

One accident; one injured.

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

September 23, 1947, locomotive 462, Scribner, Minn. Ashpan operating mechanism worked hard; one injured.

One accident; one injured.

MISSOURI-KANSAS-TEXAS RAILROAD:

**November 2, 1947, locomotive 377, Parsons, Kans. Oil on top of tender fuel oil tank; one injured.

November 30, 1947, locomotive 902, North Wagoner, Okla. Running board bracket broke through old fracture at bolt hole; one injured.

April 25, 1948, locomotive 384, Denison, Tex. Dirty cab windows; one injured.

June 25, 1948, locomotive 412, Waco, Tex. Air bell ringer was out of adjustment, permitting bell to turn complete revolutions which caused bell rope to break; one injured.

Four accidents; four injured.

MISSOURI PACIFIC RAILROAD:

**September 3, 1947, locomotive 6436, between New Orleans and Alexandria, La. Employee was burned by heat from fire door of oil-burning locomotive which became red hot; fire-door liner was badly burned and broken and fire door was cracked approximately 10½ inches through peephole; "Put liner on fire door" was reported approximately 12 hours prior to departure of the locomotive; one injured.

**September 18, 1947, locomotive 1458, Pueblo, Colo. Smoke-box blower fitting was leaking; spring for holding the wing-type valve to its seat was missing and the faces of valve and seat were badly cut; one injured.

**September 29, 1947, locomotive 173, between Ferriday, La., and McGehee, Ark. Defective cab seat-box cushion; one injured.

March 20, 1948, locomotive 1405, near Vanndale, Ark. Front end cast-iron steam pipe failed due to cinder cutting; one injured.

**April 26, 1948, locomotive 6420, Reece, Kans. Sanding device did not function properly; one injured.

**May 9, 1948, locomotive 5337, Jefferson City, Mo. Employee was injured while attempting to move water spout over a cinder deflector that was mounted on top of brakeman's cab of an oil-burning locomotive; one injured.

**May 19, 1948, locomotive 1316, Parkin, Ark. Steam discharged from cold water squirt hose caused by accumulation of pressure in water-supply line due to closed injector overflow and injector steam and water-valve levers being out of adjustment; one injured.

Seven accidents; seven injured.

NASHVILLE, CHATTANOOGA & ST. LOUIS RAILWAY:

July 8, 1947, locomotive 377, Chattanooga, Tenn. Left injector "broke" while squirt hose was being used, causing hose to jerk from employee's hand; one injured.

August 5, 1947, locomotive 670, near Pursley, Tenn. Air signal whistle diaphragm chamber became disconnected from bracket and fell, striking employee; air-supply pipe had broken at chamber connection and supply pipe was plugged; one injured.

November 14, 1947, locomotive 663, Cowan, Tenn. Handrail over cab window gave way, due to cab roof being badly deteriorated at the bolting feet which fastened the handrail to the roof; one injured.

April 24, 1948, locomotive 411, Murfreesboro, Tenn. Front coupler was binding in coupler pocket; front end of locomotive was low, necessitating application of excessive thickness of liners on shelf of coupler pocket to raise the coupler to minimum prescribed height; one injured.

May 1, 1948, locomotive 567, Cowan, Tenn. Flue broke off at front flue sheet; flue reduced to ½ inch in thickness at point of failure due to having been excessively rolled and grooved; one injured.

Five accidents; five injured.

NEW YORK CENTRAL SYSTEM:

July 2, 1947, locomotive 2740, Minoa, N. Y. Tender brake beam hanger dropped, due to top hanger pin working out; hanger-pin key was missing; one injured.

August 18, 1947, locomotive (B. & A.) 148, Boston, Mass. Cab apron raised when rounding curve, causing employee to lose balance and his foot slipped off fire-door pedal and permitted the door to close unexpectedly; driving boxes were worn and counterbalance of left main driver was rubbing hard on driving-box saddle; one injured.

August 19, 1947, locomotive 5252, Schenectady, N. Y. Tender water tank overflowed when water was scooped from track pans, breaking windows of caboose of an opposing train; tank filling hole riser, filling hole cover, and its locking devices were defective; one injured.

**August 30, 1947, locomotive 7424, Elkhart, Ind. Clevis bolt at bottom of coupler pin lifter chain was missing which permitted pin-lifter lever to be raised unexpectedly high, causing employee to lose balance and fall from footboard; one injured.

**August 30, 1947, locomotive 7915, Rochester, N. Y. Prongs on fire rake broke; one injured.

**September 8, 1947, locomotive (B. & A.) 151, Boston, Mass. Front uncoupling lever disconnected; one injured.

September 30, 1947, locomotive 2258, near Enos, Ind. Steam pipe to left main cylinder burst; two injured.

October 9, 1947, locomotive (B. & A.) 37, Framingham, Mass. Front uncoupling lever became disconnected; one injured.

**October 14, 1947, locomotive 2809, Andover, Ohio. Grate shaker connecting rod bent; one injured.

**October 24, 1947, locomotive 6014, Schenectady, N. Y. Blower valve stuck open and pipe plug and safety chain were missing from blower line tee; blower valve was difficult to operate due to its extension rod being bent and binding in conduit; one injured.

October 30, 1947, locomotive 2987, East Youngstown, Ohio. Centrifugal feed water pump steam turbine buckets failed and caused the housing to break, permitting parts of the turbine to be thrown from the locomotive; "Test out feed water pump & pipe connections, tank dry on pit" was reported on October 29; one injured.

November 21, 1947, locomotive (B. & A.) 1442, Allston, Mass. Steam leak at feed water pump due to pet cock not being properly closed; "Water pump has bad steam leak" was reported on November 17; one injured.

**December 6, 1947, locomotive 4478, Chicago, Ill. Fire doors fell to extreme lower position due to upper operating arm becoming disengaged from upper fire-door lug; cylinder plate which restricted the outward movement of the operating arms had worked outward due to both cylinder plate nuts having loosened; one injured.

December 10, 1947, locomotive 5500, Germantown, N. Y. Roller bearing main rod locking collar broke, due to old flaw in the solid outer ring, and was thrown from the locomotive; rods pounding and collar retaining bolt nuts and studs loose or missing had been reported repeatedly; one injured.

December 13, 1947, locomotive 3044, Genesee Junction, N. Y. Discharge valve cage blew out of air pump, resulting in sudden application of air; apparently valve cage had not been properly tightened; one injured.

**December 20, 1947, locomotive 2227, Greensburg, Ind. Insufficient clearance between grate-shaker bar and inside edge of right back wall of cab, due to excessive wear on pins and excessive lateral motion in grate levers; one injured.

**December 21, 1947, locomotive (B. & A.) 315, Allston, Mass. Tender water tank was leaking; tank reported leaking on December 19 and 20; one injured.

December 29, 1947, locomotive 5257, Churchville, N. Y. Tender cistern filling hole cover was loose, allowing water to overflow with force when water was scooped from track pan while running at high speed; filling hole cover locking bar latch and rear hinges were worn; one injured.

**January 9, 1948, locomotive 2369, near Morocco, Ind. Emergency application of brakes, due to nipple on air-pipe connection between locomotive and tender becoming loose; one injured.

January 10, 1948, locomotive 5218, Rensselaer, N. Y. Handwheel of Precision Power reverse gear turned with force when unlatched and handle on the handwheel struck employee's hand; front steam ring in left piston valve was missing; one injured.

**January 14, 1948, locomotive 6717, Poughkeepsie, N. Y. Plate which had been placed over the shoveling sheet on tender and not fastened shifted from position; one injured.

**January 15, 1948, locomotive (B. & A.) 616, Pittsfield, Mass. Precision Power reverse gear cylinder was frozen; one injured.

**February 5, 1948, locomotive (B. & A.) 606, between Springfield and Boston, Mass. Excessive steam in cab; 7-inch crack in feed water heater condensate pipe in cab; one injured.

February 9, 1948, locomotive 7291, Toledo, Ohio. Drain cock to boiler check valve broken off; one injured.

February 23, 1948, locomotive 6829, Indianapolis, Ind. Water-glass steam pipe pulled from collar at connection to water glass; steam pipe was not properly flanged in collar; leaks at top water-glass connection had been reported four times in the 10 days preceding the accident; one injured.

March 4, 1948, locomotive 5273, near Westfield, N. Y. Crown-sheet failure caused by overheating due to low water; one injured.

March 16, 1948, locomotive 2835, Willoughby, Ohio. Brake pipe nipple separated from Barco connection between locomotive and tender, resulting in emergency application of the brakes; one injured.

**April 30, 1948, locomotive 5224, East Rochester, N. Y. Main throttle did not operate properly, due to defective throttle valve; multiple valves and camshaft cams were badly worn and had excessive lost motion; throttle was reported to have been inoperative times since April 1; one injured.

May 16, 1948, locomotive 2875, near Berea, Ohio. Flue failed at safe end of boiler; two injured.

**June 9, 1948, locomotive (B. & A.) 30, Worcester, Mass. Brake beam truss failed and broke; one injured.

June 17, 1948, locomotive 5208, Palmyra, N. Y. Throttle valve and throttle lever latch did not function properly; two of the valves and cams of the multiple-valve throttle were excessively worn and lever latch spring was defective; throttle was reported to have been inoperative on June 5, 13, and 18; one injured.

**June 18, 1948, locomotive 6794, Indianapolis, Ind. Employee was burned by contact with unprotected blower steam pipe in cab; carrier's standard wrapping had been removed from the pipe; one injured.

Thirty-two accidents; 34 injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 11, 1947, locomotive 458, East Thompson, Conn. Bolts securing main steam reservoir to running board protruded above running board $1\frac{1}{4}$ and $1\frac{3}{4}$ inches; one injured.

July 17, 1947, locomotive 1404, Boston, Mass. Spanner nut at steam header connection to regulating valve in cab blew off; threads on spanner nut were badly worn; leak at regulating valve was reported on July 11 and 14; one injured.

January 31, 1948, locomotive 3504, Chepianoxet, R. I. Crown-sheet failure caused by overheating due to low water; feed water pump tank valve disconnected from operating rod due to pin coming out; split key in pin had not been properly secured; two parts of tank valve strainer cover were out of position and there was considerable scale inside strainer; feed water pump gage functioned erratically; one injured.

**June 3, 1948, locomotive 1408, near Madison, Conn. Feed water heater tank pump and injector failed; turbo feed water heater governor spring retaining nut broke and caused the governor sleeve to break, preventing a sufficient amount of steam to get to the turbo to operate the heater and pump; leakage of exhaust steam through the heater after it became inoperative heated the water in tank, preventing operation of the injector; one injured.

Four accidents; five injured.

NORFOLK & WESTERN RAILWAY:

**April 29, 1948, locomotive 885, Petersburg, Va. Hard working throttle; throttle reported on April 21 and 29, and May 4; one injured.

June 9, 1948, locomotive 1150, Williamsburg, Ohio. Whistle cord broke due to being badly worn where it rubbed on steam gage bracket plate; pulley-type guide provided for whistle cord at the top of cab was not serviceable account of pulley being rigid due to accumulation of paint and grit; one injured.

Two accidents; two injured.

NORTHERN PACIFIC RAILWAY:

July 29, 1947, locomotive 2682, Crystal Springs, N. Dak. Headlight bulb burned out; one injured.

August 14, 1947, locomotive 5145, Spokane, Wash. Stoker engine stalled; stoker conveyor screw did not extend into elbow as far as provided by company's specifications; stoker reported on June 24 and 27, July 27, August 8 and 14, and September 12; one injured.

**September 11, 1947, locomotive 1175, Duluth, Minn. Spring hanger pin worked out, permitting front end of the locomotive to drop and damage foot-board; one injured.

**September 17, 1947, locomotive 1718, New Salem, N. Dak. Driving box ran hot; one injured.

October 26, 1947, locomotive 23, Helena, Mont. Water glass burst, breaking glass panel in water-glass shield; flanged edges of louvered metal back of shield was $\frac{3}{8}$ inch wider than carrier's standard and did not properly support rear edges of the glass panels in the shield; one injured.

January 16, 1948, locomotive 1567, Pasco, Wash. Bell ringer did not operate properly; bell ringer was reported on January 13, 14, and 15; one injured.

June 23, 1948, locomotive 2680, near Lincoln, Minn. Brakeman's cab seat dropped due to defective supporting assembly; one injured.

Seven accidents; seven injured.

NORTHWESTERN PACIFIC RAILROAD:

July 31, 1947, locomotive 178, Eureka, Calif. Broken stay blew out of firebox crown sheet; attempted to calk stay while under pressure; stay head had been hammered excessively and threads on stay and in sheet were badly deteriorated; one injured.

*April 15, 1948, locomotive (S. P.) 2530, Island Mountain, Calif. Flue failed; one injured.

Two accidents; two injured.

PENNSYLVANIA RAILROAD:

July 2, 1947, locomotive 6605, Baltimore, Md. Movable steel plate at bottom of coal gates came down; keeper pin in plate was out of adjusting holes; movable plates were not the carrier's standard and keeper pin chains were not properly applied; one injured.

July 5, 1947, locomotive 6420, Pitcairn, Pa. Air compressor throttle valve bonnet blew off due to improper fit; bonnet was badly distorted and mutilated by use of a chisel or other sharp tool in efforts to stop leakage; one injured.

July 10, 1947, locomotive 6725, near Barree, Pa. Split key and nuts worked off piston valve stem, permitting front exhaust ring to work out of place and be broken, and some of the loose parts were blown out of smoke stack and struck employee who was leaning out cab window; one injured.

July 12, 1947, locomotive 1126, Rockland, Pa. Main throttle valve moved suddenly to full open position and was hard to close; one injured.

**July 12, 1947, locomotive 6620, Blairsville, Pa. Mechanically operated fire door failed to open properly; one injured.

July 15, 1947, locomotive 6844, Columbus, Ohio. Main air reservoir explosion due to introduction of oil through the air compressor inlet strainers while the locomotive was in enginehouse; driving brake and trailing truck brake cylinder packing cups were defective, and brake cylinder leakage was sufficient to keep air compressor operating continuously when independent brake valve was in application position; two injured.

**July 15, 1947, locomotive 6776, Hamlet, Ind. Blow-off discharge pipe became disconnected at union near muffler; one injured.

July 17, 1947, locomotive 4287, Conway, Pa. Union in stoker steam pipe failed; coupling nut was broken and threads on union were eroded and defective; union had been worked on a few minutes prior to the failure due to a reported leak, at which time proper repairs were evidently not made; one injured.

August 12, 1947, locomotive 7539, Chicago, Ill. Flue failed at front flue sheet; flue had been excessively grooved; leaks at front end were reported on August 4, 5, 7, 8, 9, and 10; one injured.

**August 19, 1947, locomotive 6765, Licking, Ohio. Reflex type water glass burst; one injured.

August 20, 1947, locomotive 6582, Erie, Pa. Shaker-bar handle was badly bent; one injured.

August 27, 1947, locomotive 3509, Ashtabula, Ohio. Squirt hose parted at splice; ends of hose at splice were badly worn; one injured.

September 1, 1947, locomotive 4427, East Altoona, Pa. Boiler wash-out cap blew out; attempted to tighten while under pressure; threaded portion of flange was badly stripped and mutilated; cap was too large for threaded portion of flange and had been applied cross-threaded; one injured.

**September 1, 1947, locomotive 6160, Flint, Ohio. Squirt-hose valve worked open; packing nut on valve was loose; one injured.

September 2, 1947, locomotive 6914, Toledo Junction, Ohio. Stoker slide hook slipped out of hole in stoker cover plate; stoker plate was hard to slide account of it and adjacent plate being bent; knob on slide hook was too small for proper fit in hole in cover plate; one injured.

September 3, 1947, locomotive 4698, Salina, Pa. Stoker elevator casing wearing plate retaining ring broke through bolt hole; ring showed indications of attempted repairs by fusion welding at the point of the failure; one injured.

September 4, 1947, locomotive 6784, Edinburg, Ind. Squirt-hose valve worked open due to loose packing in stuffing box; one injured.

September 5, 1947, locomotive 5479, near Wanatah, Ind. Main driving axle broke through fractures which extended through approximately 88 percent of cross-sectional area; locomotive riding rough and driving boxes and/or rods pounding were reported 20 times in the 30 days preceding the accident; 1 injured.

September 15, 1947, locomotive 5419, near Bowerston, Ohio. Loose cab seat box turned over; bolts for securing seat box to angle iron on cab side wall were missing; one injured.

September 18, 1947, locomotive 1759, Elrama, Pa. Boiler wash-out handhole plate cover was missing; one injured.

September 22, 1947, locomotive 7635, near Bringham, Ind. Crown-sheet failure caused by overheating due to low water; left injector wasted water at overflow when steam pressure was near the working pressure and the capacity was considerably less than that of right injector; interiors of combining and delivery tubes were pitted and water valve and seat were heavily coated with lime deposits; injector was reported as not supplying the boiler 4 times in the 30 days preceding the accident; water in boiler was reported bad on 17 occasions in the 30 days, including report on the day before the accident, and no record was found of the boiler having been blown down nor of boiler water having been tested after this report; 2 injured.

October 18, 1947, locomotive 8377, Weirton Junction, W. Va. Stoker slide hook broke off through a defective forge weld; one injured.

October 20, 1947, locomotive 7569, Canton, Ohio. Insufficient clearance between the handle of blow-off cock extension rod and the bracket to which it was secured; extension rod handle had excessive movement due to improper fit of operating rod on blow-off cock stem; "Automatic blow down inoperative" was reported on the 4 days preceding the accident; one injured.

October 31, 1947, locomotive 9915, near Follansbee, W. Va. Discharge pipe from automatic blow down separator became obstructed, causing water and sludge to be discharged through opening in top plate of separator and strike the boiler, cab, and enginemen; discharge pipe was slightly flattened at a bend and had a scale deposit ¼ inch thick at this point where the reduced opening became clogged with sludge and loose scale; one injured.

November 1, 1947, locomotive 6803, Dyke, Ohio. Injector failure caused by defective steam nozzle and distorted delivery tube; injectors were reported on October 16, 19, 21, 23, and 25; one injured.

December 3, 1947, locomotive 521, Kearny, N. J. Rear cab door closed unexpectedly; hook for fastening the door in open position was missing from cab wall; one injured.

December 7, 1947, locomotive 8831, near Decatur, Ind. Flue failed at front flue sheet at expander tool marks; flue had been excessively expanded and rolled; one injured.

December 11, 1947, locomotive 646, Chambersburg, Pa. Steam-heat valve at rear of tender was leaking; valve seat was defective; one injured.

December 19, 1947, locomotive 4343, Alton, Ohio. Superheater flue failed at defective safe end weld; two injured.

December 19, 1947, locomotive 1415, Trenton, N. J. Flue failed through crack in prosser groove at back flue sheet; flue had been excessively prosser marked; one injured.

January 12, 1948, locomotive 6778, Convoy, Ohio. Main driving axle failed through old fracture in the journal; driving boxes and/or rods were reported pounding on December 23 and 31 and January 9 and 10; one injured.

**February 9, 1948, locomotive 7115, Cleveland, Ohio. Grate shaker bar slipped off post; shaker bar socket was filled with fine coal to a depth of 2½ inches, preventing the bar from properly engaging the shaker post; one injured.

February 14, 1948, locomotive 3548, Philadelphia, Pa. Throttle valve was difficult to operate account of excessive incrustation of boiler compound in grooves of the main valve and side walls of valve chamber; throttle valve was reported on January 26, 27, and 30 (two times), and February 2, 3, 5, and 12; one injured.

**February 18, 1948, locomotive 6866, Licking, Ohio. Squirt hose valve worked open and hose blew out of storage receptacle; one injured.

February 19, 1948, locomotive 6968, Wooster, Ohio. Squirt-hose valve worked open and the end of the hose unexpectedly came out of hose container pipe in the deck; hose valve was not properly packed and container pipe was only 6 inches in length, or 10 inches less than the carrier's standard; one injured.

**February 29, 1948, locomotive 1126, Pitcairn, Pa. Defective throttle latch and quadrant; one injured.

March 7, 1948, locomotive 9861, near Ashtabula, Ohio. Grate-shaker bar slipped off post, due to improper fit; shaker-bar socket was half filled with packed fine coal and other foreign matter and end of socket was burred; one injured.

**March 14, 1948, locomotive 21, Enola, Pa. Poker fell from storage position on tender and struck an employee who was on a passing locomotive; middle supporting guard or holder for the tool was missing and the tool was badly bent and distorted; one injured.

April 7, 1948, locomotive 4046, Philadelphia, Pa. Defective sliding drop cab seat; one injured.

April 9, 1948, locomotive 5058, Gallitzin, Pa. Air compressor stopped, due to lack of lubrication, causing locomotive to stall in a tunnel; orifices between the lubricators and the air cylinders were stopped up with sediment; air compressor was reported on March 22 (two times), 24, 25, 28, 30, and 31, and April 3, 6, and 8; two injured.

May 2, 1948, locomotive 3635, Philadelphia, Pa. Derailment, caused by left No. 1 driving box sticking due to heads of rivets which secured liner to wedge shoe shearing off and lodging between wedge and shoe; one injured.

May 10, 1948, locomotive 9866, Cleveland, Ohio. Insufficient clearance between fire door air valve and the top of fire door when door was fully open; valve was improperly located and was loose on pipe and turned downward, restricting the clearance between it and the door; "Valve for fire door loose" was reported on May 7; one injured.

June 14, 1948, locomotive 2865, near Wellsburg, W. Va. Nut worked off bolt securing throttle lever latch rod to latch operating lever, permitting the bolt to work out and the long end of operating lever to move toward throttle lever and cause injury to employee's hand; throttle lever assembly not maintained in accordance with carrier's standard; one injured.

**June 24, 1948, locomotive 3718, Pitcairn, Pa. Lubricating oil on cab apron and tender deck; one injured.

Forty-four accidents; 48 injured.

PITTSBURGH & LAKE ERIE RAILROAD:

**February 28, 1948, locomotive 7296, Dickerson Run, Pa. Slipped from tender gangway step while descending the steps; step was 3 inches ahead of the step below it; one injured.

One accident; one injured.

FRIDELAND, FREDERICKSBURG & POTOMAC RAILROAD:

March 10, 1948, locomotive 312, near Ashland, Va. Stoker conveyor vision box cover plate in cab deck was out of position, permitting employee to step through vision box into the conveyor trough; one injured.

One accident; one injured.

ST. LOUIS-SAN FRANCISCO RAILWAY:

**October 2, 1947, locomotive 1242, Okmulgee, Okla. Oil on top of tender fuel oil and water tanks; clean oil off tender tanks was reported on September 22, 23, 24, 25, 26, and 29; one injured.

November 24, 1947, locomotive 1303, Enid, Okla. Employee fell from side of cab while going to give attention to injector; the space behind front cab door was obstructed by a shipment of carrier's material, preventing access to the door; one injured.

March 20, 1948, locomotive 1224, Birmingham, Ala. Air operated bell ringer did not operate properly; one injured.

Three accidents; three injured.

ST. LOUIS SOUTHWESTERN RAILWAY:

July 16, 1947, locomotive 605, Shreveport, La. Gas explosion in firebox; accumulation of water in fuel oil cistern and supply line caused fire to go out and gas to accumulate in firebox; work reports for July 9 and 10 requested that water be drained from the oil tank; one injured.

One accident; one injured.

SEABOARD AIR LINE RAILROAD:

July 31, 1947, locomotive 263, Kollocks, S. C. Handwheel of Precision reverse gear spun rapidly out of control and handle on the handwheel struck employee's arm; both bell crank pin lugs were broken from valve gear frame; bell crank bolt was reported loose on July 2, 6, 9, 12, and 16; one injured.

September 12, 1947, locomotive 331, Lincolnton, N. C. Trailing truck tire came off wheel center; tire had been applied with insufficient shrinkage; one injured.

May 11, 1948, locomotive 509, Darlington, S. C. Tender brake hanger broke; one injured.

Three accidents; three injured.

SOUTHERN RAILWAY:

**July 6, 1947, locomotive 1392, near Hardeeville, S. C. Employee was struck by some object while leaning out left cab window; left back binder bolt was found missing at end of the trip; binder bolt was reported loose on June 2, 5, 16, 21, 24, and 27, and July 3; binder was improper fit on leg of pedestal; one injured.

**July 11, 1947, locomotive 5209, Hot Springs, N. C. Grate-shaker bar slipped off post; one injured.

**July 16, 1947, locomotive 4119, Kannapolis, N. C. Oil on locomotive step; one injured.

**September 22, 1947, locomotive 1858, Air Line Junction, N. C. Cotter key projected from front end handrail assembly; one injured.

**September 26, 1947, locomotive 5209, John Sevier, Tenn. Mechanically operated fire door was inoperative, due to air pipe being disconnected at fire-door operating cylinder; joint nut was missing; one injured.

**October 19, 1947, locomotive 6185, New Orleans, La. Loose and wet coal on tender front end sill caused employee to slip and fall; one injured.

**November 24, 1947, locomotive 6332, K. D. Tower, Ky. Train control box which is commonly used as a step when descending from tender coal space to top of tender was obstructed by coal, causing employee to lose his balance and fall from the tender; one injured.

**December 24, 1947, locomotive 601, Concord, N. C. Employee fell while descending front end ladder; vision was obscured by steam escaping from steam chest relief valve and cylinder cocks through leaking throttle valve; antiskid designs on treads of ladder were covered with caked grease and other foreign matter; one injured.

**January 30, 1948, locomotive 5021, Melrose, N. C. Sand did not run freely; sanders reported on January 11, 12, 19, 20, 21, 23, 24, 25, and 29; one injured.

**January 31, 1948, locomotive 754, Johnson City, Tenn. Boiler check stuck open; one injured.

**March 7, 1948, locomotive 4527, Stilton, S. C. Steam heat gage glass blew out; soldered joint at Bourdon tube and gage fitting failed, permitting steam to enter the gage case and pressure to be built up inside the case; "Steam heat gage loose on bracket" was reported on March 2; one injured.

March 20, 1948, locomotive 721, New Orleans, La. Left injector did not operate properly, due to boiler check leaking; "Left injector working very bad"

was reported on March 19, and the report was not signed off as repaired nor approved by the foreman; one injured.

Twelve accidents; 12 injured.

SOUTHERN PACIFIC—LINES EAST:

February 15, 1948, locomotive (T. & N. O.) 921, Marfa, Tex. Employee's head struck cab seat latch bracket located near the top of cab; latch bracket provided to secure a brakeman's cab seat in elevated storage position and the cab-floor extension at the side of cab for the seat were not removed when the seat was removed from the cab; one injured.

One accident; one injured.

SOUTHERN PACIFIC—LINES WEST:

July 1, 1947, locomotive 4200, Silverthorn, Calif. Handhold on tender separated at old fracture; one injured.

July 2, 1947, locomotive 4190, Bowie, Ariz. Top of tender fuel tank covered with oil; one injured.

July 3, 1947, locomotive 3250, Strauss, N. Mex. Knuckle joint pin worked out and fouled driving wheel, resulting in failure of side rod; threads on pin were badly worn, permitting the retaining nut to work off; engine pounding and/or riding rough were reported 25 times in the 30 days preceding the accident; 3 injured.

July 14, 1947, locomotive 4145, Yamsay, Ore. Cab clear vision window blew shut, breaking glass in it which struck and cut employee; latch for holding the window in desired position was missing and the wire substitute was ineffective; one injured.

July 14, 1947, locomotive 1823, Santa Barbara, Calif. Handrail pulled out of column; one injured.

July 15, 1947, locomotive 4364, Cascade Summit, Ore. Insufficient clearance between handhold and tender deck when on curve; one injured.

July 23, 1947, locomotive 3906, Portland, Ore. Section of inspection cover over cylinder saddle and steam pipes worked out of place, due to hinges for securing it being broken; one injured.

August 20, 1947, locomotive 2412, Edom, Calif. Manually operated reverse lever jerked from employee's grasp and moved rapidly forward and backward; valve gear transmission bar hanger was broken; one injured.

**August 23, 1947, locomotive 3612, Wellton, Ariz. Locomotive riding rough due to lost motion between locomotive and tender; injured while adjusting slack wedge; one injured.

August 24, 1947, locomotive 1743, Los Banos, Calif. Fire flashed out of firebox; blow-back valve in fuel-oil line was leaking; one injured.

September 2, 1947, locomotive 1807, Hasson, Calif. Glass was missing from cab window, permitting excessive heat, gas, and smoke to enter the cab while the locomotive was passing through a tunnel; one injured.

September 3, 1947, locomotive 5024, Separ, N. Mex. Prong of water spout hook broke off; one injured.

September 13, 1947, locomotive 4112, Sacate, Calif. A piece of feed-water pump upper head, approximately 7½ by 8 inches, blew out; failure occurred through 66 percent old fracture; one injured.

September 13, 1947, locomotive 3617, Colton, Calif. Gas explosion in firebox of oil-burning locomotive; one injured.

October 8, 1947, locomotive 4181, Santa Barbara, Calif. Insufficient clearance between fire-door latch handle and fire-flash shield; one injured.

October 12, 1947, locomotive 2426, Central Point, Ore. Footrest which was welded on reverse lever quadrant broke off through weld; one injured.

October 18, 1947, locomotive 2848, Talent, Ore. Drinking water cooler fell from position on top of the tender, due to nut coming off the bolt which secured the two ends of the retaining strap and permitting the strap to separate; one injured.

October 19, 1947, locomotive 2426, Central Point, Ore. Reverse lever became unlatched and moved to full forward motion; two quadrant teeth were broken and other quadrant and latch teeth were badly worn; valve gear had excessive wear and lost motion; reverse lever not staying latched was reported on October 13, 15, 17, and 18; footrest which broke off the quadrant on October 12 and 17 had been reapplied but apparently the full repairs needed were not made; one injured.

October 29, 1947, locomotive 4104, Fernley, Nev. Oil on top of tender fuel-oil tank; clean off oil tank was reported 16 times since October 1; one injured.

**November 16, 1947, locomotive 2470, Bayshore, Calif. Fire flashed out of peephole in firebox door; peephole cover plate was improper fit, due to being bent; one injured.

November 19, 1947, locomotive 2811, Roseville, Calif. Boiler washout plug blew out; attempted to tighten while under pressure; plug was loose fit in boiler; one injured.

December 7, 1947, locomotive 3252, Herndon, Calif. Cushion fell from brakeman's cab seat which was in elevated position near cab roof; cushion was not fastened on seat; seat box cab brace was bent and back rest was loose; one injured.

December 20, 1947, locomotive 5020, near Hargis, N. Mex. Relief valve worked open; after closing relief valve, employee lost his balance and fell from running board account of his clothing catching on a boiler jacket band stud which protruded above the running board; one injured.

December 23, 1947, locomotive 1205, Stockton, Calif. Step to cab-seat platform was missing; employee fell when he stepped on a loose box in mounting the platform; one injured.

December 23, 1947, locomotive 1292, Oakland, Calif. Throttle lever flew to open position when unlatched; throttle was hard to open until pressure built up in dry pipe when it would fly open; one injured.

January 12, 1948, locomotive 2821, Carlin, Nev. Employee fell from top of tender while pulling water spout around with spout hook; section of running board located between tank manholes was broken; one injured.

January 22, 1948, locomotive 1250, Tracy, Calif. Oil on tender running board; one injured.

January 30, 1948, locomotive 4122, Santa Margarita, Calif. Bonnet of fuel tank heater drain valve blew off when attempt was made to open valve; bonnet was loose; one injured.

January 31, 1948, locomotive 4280, Carrizozo, N. Mex. Oil on top of tender fuel oil tank; one injured.

January 31, 1948, locomotive 3247, Strauss, N. Mex. Section of handrail connecting handrail on side of boiler to handrail on door ring turned, causing employee to lose his balance and fall from running board; connecting handrail had not been screwed into front pipe coupling; one injured.

February 2, 1948, locomotive 1721, Indio, Calif. Oil on vertical handhold at gangway; one injured.

February 8, 1948, locomotive 3617, Beaumont, Calif. Tender water-tank manhole cover fouled marker box on top of the tank account of insufficient clearance; one injured.

February 14, 1948, locomotive 1658, Tangent, Oreg. Pilot buffer beam handhold broke through an old fracture which was slightly below the top surface of the supporting boss at end of buffer beam; one injured.

February 15, 1948, locomotive 3206, Barth, Nev. Leaking pipe union in squirt-hose pipe line below running board permitted water to squirt along the side of firebox under the cab. Employee fell from gangway or was struck by a bridge superstructure as he apparently leaned outward in attempt to locate the leak; one killed.

February 21, 1948, locomotive 2770, Timber, Oreg. Tender deck plate was slippery; plate was not roughened and was covered with oil and water; one injured.

March 10, 1948, locomotive 2703, Salmonberry, Oreg. Gangway step was worn and had oil on it; one injured.

March 12, 1948, locomotive 3260, Roseville, Calif. Metal plate applied on cab deck, approximately 15 by 24 inches, was not roughened; one injured.

March 24, 1948, locomotive 2841, Albany, Oreg. Top of tender behind fuel space was obstructed by a cast-iron pipe flange and plug, 1¼ inches in height, located 10 inches from corner of cistern manhole; one injured.

March 30, 1948, locomotive 2809, Willow Ranch, Calif. Cab handhold fouled on gangway ladder while locomotive was on a curve; handhold was not carrier's standard; one injured.

April 11, 1948, locomotive 2432, Portland, Oreg. Solution of Oakite and Diesel oil on cab apron; one injured.

April 12, 1948, locomotive 4301, Phoenix, Ariz. Water column hook disengaged from water spout release latch, causing employee to fall from the top of tender; one injured.

April 17, 1948, locomotive (S. D. & A. E.) 105, Northridge, Calif. Front horizontal handrail broke through old fracture in vertical connection to pilot sill; one injured.

April 24, 1948, locomotive 4225, Mescal, Ariz. Radius rod broke through old fracture; driving wheels were slipping badly due to worn tires; wheels reported slipping on March 29 and April 1, 4 (two times), 7, 9, 10, 18, and 24; one injured. Forty-three accidents; 1 killed; 44 injured.

SPokane, Portland & Seattle Railway:

October 8, 1947, locomotive 621, Portland, Oreg. Blow-off cock was inadvertently opened when employee attempted to put on the injector; blow-off cock handles were similar to the injector starting valve handles and similarly located; blow-off cock handles were not properly marked for identification nor provided with locking device to prevent accidental opening; one injured.

October 16, 1947, locomotive (G. N.) 3116, South Cheney, Wash. Locomotive unexpectedly moved forward while water was being taken; tender brakes were found cut out after the accident; one injured.

Two accidents; two injured.

Terminal Railroad Association of St. Louis:

September 13, 1947, locomotive 332, East St. Louis, Ill. Handle of tender cistern manhole cover broke off; one leg of handle was broken prior to the accident and the other leg broke through 95 percent old fracture; one injured.

One accident; one injured.

Texas & Pacific Railway:

November 23, 1947, locomotive 616, near Douro, Tex. Crown-sheet failure caused by overheating due to low water; three killed.

April 4, 1948, locomotive 520, Lovington, N. Mex. Crown-sheet failure caused by overheating due to low water; one killed.

Two accidents; four killed.

Union Railroad:

July 31, 1947, locomotive 159, Hall, Pa. Boiler check cap and valve blew out while cap was being tightened under pressure; cap was improper fit and could be inserted to within two threads of seat before thread engagement; one killed.

March 17, 1948, locomotive 178, Munhall, Pa. Main rod brass adjusting wedge bolt was loose; one injured.

April 10, 1948, locomotive 133, Duquesne, Pa. Grate shaker bar slipped off shaker post due to improper fit; top end of shaker post was worn; one injured.

May 16, 1948, locomotive 5, Clairton, Pa. Mechanically operated fire door failed to open fully; one injured.

Four accidents; one killed, three injured.

Union Pacific Railroad:

**February 16, 1948, locomotive 9009, Pine Bluffs, Wyo. Air compressor discharge valve cap was leaking badly; valve was partly unscrewed; one injured.

One accident; one injured.

Virginian Railway:

December 2, 1947, locomotive 724, Marylane, W. Va. Air compressors stopped; one injured.

December 17, 1947, locomotive 710, Lillybrook, W. Va. Reflex type water glass burst; water-glass cover plate was distorted, placing undue strain on the glass; one injured.

Two accidents; two injured.

Wabash Railroad:

July 28, 1947, locomotive 668, St. Louis, Mo. Brake pipe hose on tender burst, causing brakes to go into emergency; fabric of hose had deteriorated; three injured.

August 19, 1947, locomotive 2718, Dawson, Ill. Main rod broke through old fracture which extended through entire cross-sectional area of upper flanges and one end of the rod swung around and punctured the outside throat sheet of firebox; one injured.

**November 5, 1947, locomotive 525, Chicago, Ill. Chain for securing smokebox cleaning hole cover was broken; one injured.

**November 12, 1947, locomotive 556, Fort Wayne, Ind. Loose coal on top of tender water leg; one injured.

November 24, 1947, locomotive 2800, Tolleston, Ind. Window in cab partition slipped out of closed position and fell to the floor; safety stop to prevent the window from dropping past its open position was missing; safety stop was not properly secured; one injured.

**January 9, 1948, locomotive 660, Decatur, Ill. Wire to classification lamp shorted to conduit, resulting in failure of the lights; insulation was missing from about one-half inch of the wire near junction box; one injured.

January 31, 1948, locomotive 684, Mansfield, Ill. Air cylinders of air compressor were hot and groaning; "Oil air end of air pump" and/or "Fill oil cups on air pump" were reported on January 14, 20, and 28; one injured.

February 21, 1948, locomotive 2816, Wolcottville, Ind. Packing nut on globe valve in steam line from dome to drifting valve was leaking; one injured.

April 14, 1948, locomotive 2726, near Fooseland, Ill. Crown-sheet failure caused by overheating due to low water; one killed, two injured.

Nine accidents; 1 killed, 12 injured.

WESTERN PACIFIC RAILROAD:

**September 5, 1947, locomotive 253, between Bieber and Keddie, Calif. Employee fell from gangway step; accumulation of dirt and oil on step and part of toe guard was bent out of line; one injured.

March 12, 1948, locomotive 206, Little Valley, Calif. Wrist pin came out of crosshead; wrist pin was not properly fitted in crosshead and one bolt that secured wrist pin nut locking plate broke, permitting the nuts to work off wrist pin; one injured.

**April 17, 1948, locomotive 316, Altamont, Calif. Injured while adjusting fire-door damper; one injured.

Three accidents; three injured.

WHEELING & LAKE ERIE RAILWAY:

July 19, 1947, locomotive 6431, Kingsway, Ohio. Stoker slide plate hook slipped from hole in stoker trough cover plate when attempt was made to move the cover plate; one injured.

July 19, 1947, locomotive 4153, Huron, Ohio. Cab apron was badly worn; one injured.

July 24, 1947, locomotive 6431, Brewster, Ohio. Tender bulkhead door fell from its slide groove and struck employee; stop bolt to prevent the door from traveling out of the guides was missing; one injured.

November 30, 1947, locomotive 6422, Norwalk, Ohio. Grates were hard to shake account of poor coal, dirty fire, and ashpan full of frozen ashes; one injured.

Four accidents; four injured.

ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1948, 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:

December 15, 1947, unit 100-B, Purcell, Okla. Battery box cover fell off, striking employee's foot; upper edge of the cover overlapped the lower edge of door to supply cabinet and when the cabinet door was opened the battery-box cover was dislodged from fastenings; one injured.

May 16, 1948, unit 53-B, La Plata, Mo. Metal threshold between cab and engine compartment was not properly roughened or other means provided for secure footing; one injured.

Two accidents; two injured.

ATLANTIC COAST LINE RAILROAD:

**March 28, 1948, unit 334-A, Thomasville, Ga. Step assembly leading from cab to engine room came off supporting lugs at top end and fell outward; step assembly was not properly secured; one injured.

May 30, 1948, unit 319-A, Savannah, Ga. Handle pulled from engine-room door; "Door handle to engine room broken" was reported on May 29; one injured.

Two accidents; two injured.

CHICAGO & NORTH WESTERN RAILWAY:

March 13, 1948, unit 4051-C, La Fox, Ill. Defective air valve of No. 3 transition contactor prevented traction motor transition change from No. 2 to No. 3 position; one injured.

One accident; one injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

September 3, 1947, unit 156-A, near Plymouth, Ill. Crankcase explosion caused by overheated main crankshaft bearings; tangs which held bearing shells in position failed, permitting the shells to turn and cut off the oil supply; one injured.

One accident; one injured.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

June 20, 1948, unit 17-B, between Oakwood and Lake, Wis. Engine of Diesel-electric unit did not carry the load properly; employee was injured while removing the door on belt guard to auxiliary generator to examine the belts while the engine and train were running; one injured.

One accident; one injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILROAD:

February 11, 1948, unit 701, Blue Island, Ill. Overspeed trip functioned and shut down Diesel engine; tachometer was inoperative and no means provided to indicate the engine speed. Employee lost his footing and fell from running board while attempting to restart the engine, due to oily condition of the engine-room floor and running board and a badly worn area of running board where employee would stand while working on the governor; oil on engine-room floor, from leakage around valve plates, heads, and accessory end fittings, seeped under the cowling to the running board; one injured.

One accident; one injured.

DENVER & RIO GRANDE WESTERN RAILROAD:

August 21, 1947, unit 119, Denver, Colo. Oil on platform at front of Diesel-electric switching unit, caused by leak in oil-cooling radiator; one injured.

December 12, 1947, unit 545, Malta, Colo. Sliding door of unit was hard to open, due to dragging on bottom track, and when forced the door opened suddenly and employee's forearm was caught between the door handle and a vertical handhold on inner face of the end wall of the unit; handhold was so located as to create a probability of similar accidents; one injured.

December 19, 1947, unit (M. P.) 7002-A, Denver, Colo. Walkway at side of unit was obstructed by lubricating oil filter and overflow pipe from filter and their coverings; metal sheet which covered overflow pipe was not roughened for safe footing; one injured.

June 18, 1948, unit 103, Denver, Colo. Guard missing from cab heater fan, permitting accidental contact with the fan blades; one injured.

Four accidents; four injured.

FLORIDA EAST COAST RAILWAY:

March 9, 1948, unit 1014, Lake Worth, Fla. Air pipe to dead man feature of the brake system broke, resulting in undesired emergency application of the brakes and sudden stop of the train; four injured.

One accident; four injured.

GRAND TRUNK WESTERN RAILROAD:

January 22, 1948, unit 15805, Richmond, Mich. Fire in combination engine room and cab compartment; bleeder plug was missing from high pressure fuel oil pump, permitting vaporized oil to rise in a high spray and become ignited by hot exhaust manifold or stack; one injured.

One accident; one injured.

GREAT NORTHERN RAILWAY:

**November 25, 1947, unit MC-2301, Kalispell, Mont. Defective end plate between engine and generator permitted lubricating oil to leak badly and be thrown on hot moving parts, resulting in excessive smoke and gas fumes in operating cab and engine room; partition between engine and generator was loose and did not provide proper insulation from fumes, heat, and engine-room noises; partition was

reported loose on August 17, and bad oil leak and smoke were reported on September 11, October 18, and November 1 and 14; one injured.

One accident; one injured.

MISSOURI PACIFIC RAILROAD:

**March 11, 1948, unit 513-B, near Stuart, Colo. Flash occurred at contactor in high voltage cabinet when attempt was made to close P-1 contactor by manual operation of the solenoid magnet valve; contactor would not close magnetically due to failure of the solenoid magnet coil; one injured.

One accident; one injured.

NEW YORK CENTRAL SYSTEM:

July 4, 1947, unit 253, Ossining, N. Y. Bus bar connection to contactor failed under load through upper rivet holes, causing a heavy arc and fire in the apparatus cab; one injured.

September 8, 1947, unit 1612, Ashtabula, Ohio. Main contactors dropped out, due to insufficient air pressure to hold contactors closed while under load; air gage to the control air line to the contactors was 20 pounds light; one injured.

Two accidents; two injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 23, 1947, unit 0734, New Haven, Conn. Oil on engine room floor; one injured.

July 25, 1947, unit 0722, Boston, Mass. Steam heat boiler separator drain pipe was leaking; one injured.

September 15, 1947, unit 0600, Weymouth, Mass. Carbon dust and road deposits at the back end of generator became ignited by heat from the generator; one injured.

October 1, 1947, unit 0716, Hartford, Conn. Air brake hose coupling came out of hose, causing emergency application of the brakes; air brake hose coupling clamp bolt was missing; one injured.

**June 25, 1948, unit 0707, Meriden, Conn. Engine lubricating oil radiators were leaking, permitting oil to run over engine room floor; radiators had been reported leaking 7 times and oil on engine room floor reported 10 times in the week preceding the accident; 1 injured.

Five accidents; five injured.

PENNSYLVANIA RAILROAD:

November 23, 1947, unit 4850, Baltimore, Md. Feed water pump to heating boiler was inoperative; one injured.

*April 24, 1948, unit 4835, New York, N. Y. Employee was struck by a blast of steam and hot water when steam hose was disconnected between unit and train; one injured.

Two accidents; two injured.

READING COMPANY:

June 15, 1948, unit 41, Nicetown, Pa. Cab door unlatched from holder provided to hold it in open position; door holder was worn and defective; "Back cab door holder does not hold door" was reported on June 10, at which time the unit was in shop for annual inspection; one injured.

One accident; one injured.

ST. LOUIS-SAN FRANCISCO RAILWAY:

August 23, 1947, unit 230, Springfield, Mo. Brake pipe angle cock handle moved past closed position, and escaping air caused the air hose to swing around and strike employee; notch in valve core stem, through which angle clock handle pin passed, was worn which permitted the handle to be loose on fit and to work upward to the extent that stop lugs did not engage; one injured.

One accident; one injured.

SEABOARD AIR LINE RAILROAD:

February 26, 1948, unit 2702, Indian Trail, N. C. Inspection plug blew out of engine exhaust pipe; one injured.

May 12, 1948, unit 3103-B, Sycamore, S. C. No. 2 engine of Diesel-electric unit ran hot, evidently due to some obstruction in the cooling system which prevented proper circulation of the water; engine running hot, low oil alarm sounding, and/or engine getting off the line were reported on May 10, 11, and 12; one injured.

*May 21, 1948, unit 3015, Ocala, Fla. Oil on floor of unit; one injured.

Three accidents; three injured.

SOUTHERN RAILWAY:

**July 22, 1947, unit 2001, Atlanta, Ga. Stud supporting bell failed through old fracture, permitting bell to fall and strike employee who was riding on front platform of the unit; one injured.

**November 8, 1947, unit 6000, Danville, Va. Employee slipped on oily step; one injured.

March 12, 1948, unit 4114, near Mount Airy, Ga. Crankcase explosion, resulting from a hole in the piston crown of No. 16 cylinder; hole in the piston was caused by overheating of the crown; one injured.

Three accidents; three injured.

SOUTHERN PACIFIC—LINES WEST:

**October 14, 1947, unit 6000-A, Indio, Calif. Cab step was too narrow (3½ inches from outer edge of step to side of cab) to provide proper footing; one injured.

May 15, 1948, unit 6105-C, Indio, Calif. Passageway in unit was obstructed by a rerailling frog; rerailling equipment not secured in proper place; one injured.

June 25, 1948, unit 1304, Portland, Ore. Footboard at the rear end of unit extended 3½ inches beyond the outer edge of the bottom step to rear platform. Employee's foot was struck by the protruding footboard when he attempted to step from the moving unit; one injured.

Three accidents; three injured.

UNION PACIFIC RAILROAD:

January 30, 1948, unit 902-B, Korty, Nebr. Wheel of unit failed, resulting in derailment of passenger train; wheel had been subjected to excessive braking heat and rapid cooling, thereby bringing about the development of thermal cracks which progressed until the rim and plate burst; seven injured.

March 21, 1948, unit 1369, near Ogden, Utah. Battery fuse in high voltage cabinet burned out; "The battery is charging too fast and burns out fuse 106" was reported on March 14. Employee was burned by an electric flash while attempting to replace the fuse, apparently due to accidentally contacting the metal bottom ends of the ground relay resistors with one end of the knife-type fuse; one injured.

Two accidents; eight injured.

VIRGINIAN RAILWAY:

October 23, 1947, unit 30, Roanoke, Va. Pole change-over switch flashed; one injured.

February 1, 1948, unit 1, Clarks Gap, W. Va. Vertical handhold at front corner of cab became disconnected at top end by pulling off bolt account of the nut being missing; no means provided to prevent the nut from working off; one injured.

June 18, 1948, unit 4, Celco, Va. Injured by flash due to transmission line surges when manually closing circuit breaker while electrical storm was in progress; one injured.

Three accidents; three injured.

TABLE XII.—Number of steam locomotives inspected,

Table with multiple columns representing different railroad regions and a long list of locomotive parts. The 'Number of defects' row at the bottom shows a total of 545 defects across 10 categories.

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

Table with multiple columns representing different railroad regions and a long list of locomotive parts. The 'Number of defects' row at the bottom shows a total of 38,855 defects across 10 categories.