

INTERSTATE COMMERCE COMMISSION

THIRTY-SECOND ANNUAL REPORT

OF THE

DIRECTOR

BUREAU OF LOCOMOTIVE INSPECTION

TO THE

INTERSTATE COMMERCE COMMISSION

FISCAL YEAR ENDED
JUNE 30, 1943



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1943

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington, D. C. - Price 10 cents

ANNUAL REPORT OF THE DIRECTOR BUREAU OF LOCOMOTIVE INSPECTION

OCTOBER 1, 1943.

To the Interstate Commerce Commission:

In compliance with section 7 of the act of February 17, 1911, as amended, the Thirty-second Annual Report of the Director of the Bureau of Locomotive Inspection, covering the work of the Bureau during the fiscal year ended June 30, 1943, 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—					
	1943	1942	1941	1940	1939	1938
Number of locomotives for which reports were filed.....	43,064	42,951	43,236	44,274	45,965	47,397
Number inspected.....	116,647	113,451	105,675	102,164	105,606	105,186
Number found defective.....	11,901	10,970	9,570	8,565	9,099	11,050
Percentage inspected found defective.....	10	10	9	8	9	11
Number ordered out of service.....	487	474	560	487	468	679
Number of defects found.....	51,350	44,928	37,691	32,677	33,490	42,214

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

	Year ended June 30—					
	1943	1942	1941	1940	1939	1938
Number of accidents.....	319	222	153	164	152	208
Percent increase or decrease from previous year.....	↑ 43.7	↑ 45.1	6.7	↑ 7.9	26.9	20.9
Number of persons killed.....	27	34	15	18	15	7
Percent increase or decrease from previous year.....	20.6	↑ 126.7	16.7	↑ 20.0	↑ 114.3	72.0
Number of persons injured.....	373	227	182	225	164	216
Percent increase or decrease from previous year.....	↑ 64.3	↑ 24.7	19.1	↑ 37.2	24.1	23.7

↑ Increase.

TABLE III.—Accidents and casualties caused by failure of some part or appurtenance of the steam locomotive boiler¹

	Year ended June 30—							
	1943	1942	1941	1940	1939	1938	1915	1912
Number of accidents.....	129	81	43	67	52	59	424	856
Number of persons killed.....	25	30	12	16	15	5	13	91
Number of persons injured.....	173	83	64	110	55	59	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—									
	1943		1942		1941		1940		1939	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....	11	109	10	79	5	41	5	70	4	46
Firemen.....	10	143	12	73	5	68	6	49	6	66
Brakemen.....	4	47	4	32	3	21	4	24	2	18
Conductors.....		8		7		8	1	4		5
Switchmen.....		12		5		6		4		6
Roundhouse and shop employees:										
Boilermakers.....		4		2		4		1		1
Machinists.....		3		5		1		3		2
Foremen.....				1		2				
Inspectors.....				1		2				
Watchmen.....	1	3				1		2		1
Boiler washers.....										
Hostlers.....		1		4		3		2		1
Other roundhouse and shop employees.....		4		3		3		1		2
Other employees.....		11		2		3		9		1
Nonemployees.....	1	28		9		18		44		14
Total.....	27	373	34	227	15	182	18	225	15	164

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

	Year ended June 30—					
	1943	1942	1941	1940	1939	1938
Number of locomotive units for which reports were filed.....	4,351	3,957	3,389	2,987	2,716	2,555
Number inspected.....	6,847	6,728	5,558	4,974	4,581	4,024
Number found defective.....	298	358	319	298	260	274
Percentage inspected found defective.....	4.4	5	6	6	6	7
Number ordered out of service.....	6	12	21	16	14	9
Total number of defects found.....	849	928	905	766	696	769

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

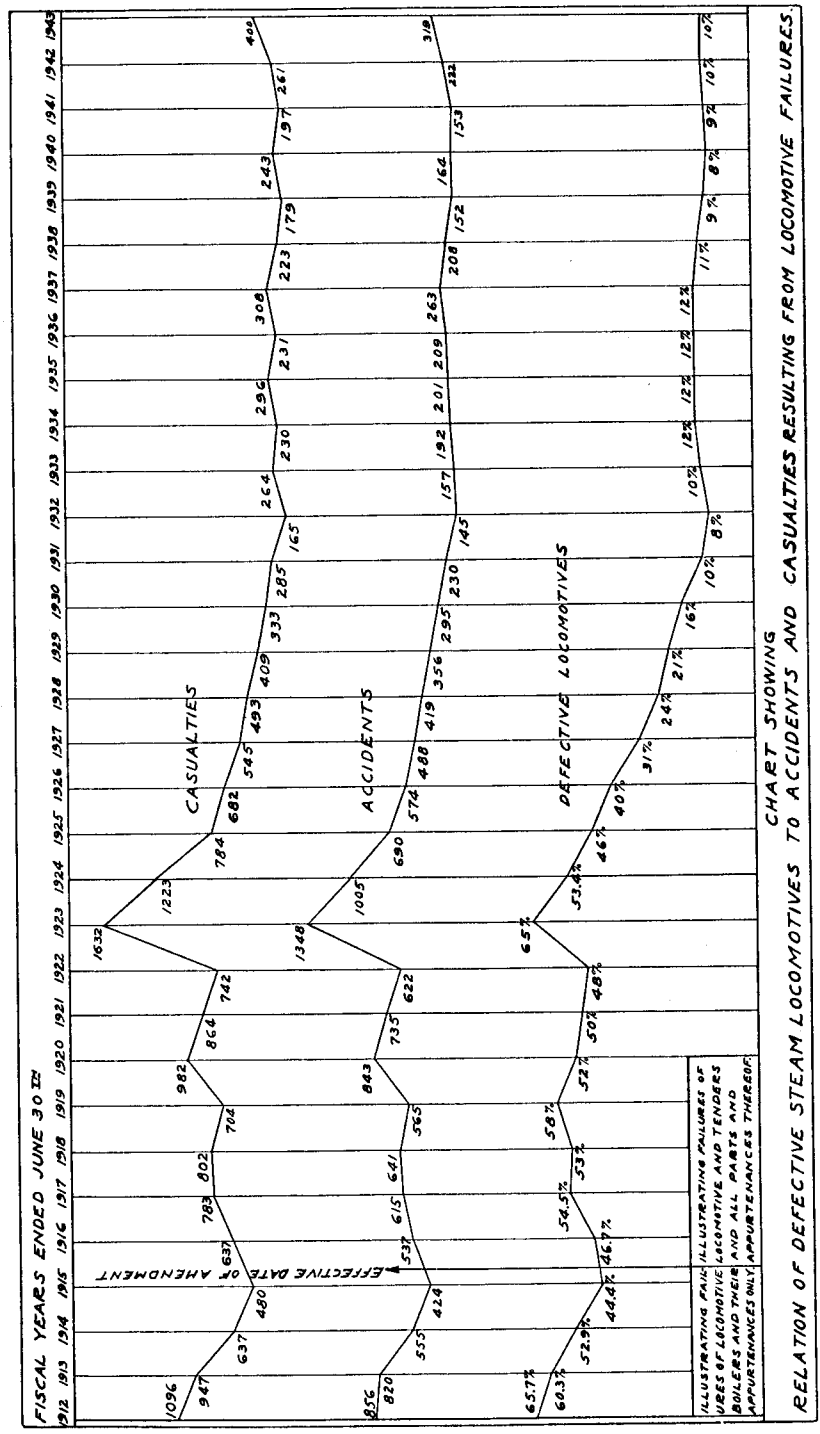
	Year ended June 30—				
	1943	1942	1941	1940	1939
Number of accidents.....	15	9	11	7	5
Number of persons killed.....					
Number of persons injured.....	18	9	11	7	5

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

	Year ended June 30—									
	1943		1942		1941		1940		1939	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers.....		3		5		1		2		3
Firemen.....		9		2		5		2		1
Brakemen.....		1		1		1				1
Conductors.....		1				1		1		
Switchmen.....		1		1				1		
Maintenance employees.....		2				2		1		
Other employees.....		1								
Nonemployees.....						1				
Total.....		18		9		11		7		5

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—														
	1943			1942			1941			1940			1939		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Air reservoirs				1											
Aprons	1		1						1			1	1		1
Arch tubes				1											
Ashpan blowers	1		1	1		1									
Axles	1		1	1		1		4				6			15
Blow-off cocks	2		8	2		8			2		2	2			3
Boiler checks		1	7	3		3		4	1	5		2			3
Boiler explosions:															
A. Shell explosions															
B. Crown sheet; low water; no contributory causes found	19	22	48	8	18	11	7	6	27	7	12	13	4	5	7
C. Crown sheet; low water; contributory causes or defects found	4		6	5	5	7	4	5	2	1		2	2	7	4
D. Miscellaneous firebox failures	2	2	2	2	2	2									
Brakes and brake rigging	11		13	4	1	3	5		6	1		1	5		5
Couplers	3		3	3		3	1		1	10		12	1		1
Crank pins, collars, etc.	6	1	9	1		1	2		2	6	2	5	1		1
Crossheads and guides	2		2						2	2		2	2		2
Cylinder cocks and rigging	4		4	1		1			2	2		2	2		2
Cylinder heads and steam chests	5		5	1		1			1	1		1			
Dome caps															
Draft appliances	1		1	1		2	1		1	1		33	2	1	1
Draw gear	1		1				1		1	1					
Fire doors, levers, etc.	5		5	6		6	7	7	2	2		2	2		2
Flues	5		10	3	1	2	5	6	9	11		8	8		9
Flue pockets															
Footboards	4		4	5		5	2		2	1		1	3		3
Gage cocks			1	1		1									
Grease cups	2		3	3		3	1		1	2		2	1		5
Grate shakers	18		18	12		12	4		4	1		1	5		5
Handholds	18		18	10		10	11		11	8		8	8		8
Headlights and brackets	4		4	1		1			3	3		3	1		1
Injectors and connections (not including injector steam pipes)	7		7	4		4	3		3	6		6	2		2
Injector steam pipes	2		2	2		2	2		2	1		1	1		1
Lubricators and connections	7		7	5		5	3		3	2		2	1		1
Lubricator glasses				1		1			1	1		1			1
Patch bolts															
Pistons and piston rods	1		1	1		1	1		2	1		1	2		2
Plugs, arch tube and washout	2		3	3	1	5	1		2						
Plugs in firebox sheets															
Reversing gear	14		14	19		19	11		12	12		12	13		13
Rivets															
Rods, main and side	7		10	4		5	3	2	2	1		1	4		5
Safety valves															
Sanders	2		2	2		2	2		2	4		4	3		3
Side bearings															
Springs and spring rigging	7		8	2		2	6		6	2		4	3		4
Squirt hose	16		16	7	1	6	3		3	3		3	6		6
Staybolts	4		4	2		2	1		1	1		1	3		3
Steam piping and blowers	9		15	6	1	5	2		2	7		8	6		6
Steam valves	9		10	5	1	4	4		4	2		2	1		1
Studs	1		1	1		1	1		1	1		1	1		1
Superheater tubes	4		5	2		2	2		2	3		4	1		1
Throttle glands															
Throttle leaking	1		1												
Throttle rigging	4		4	4		4	4		5	2			1		1
Trucks, leading, trailing, or tender	3		4	11	3	11	3		5	5		16	2		2
Valve gear, eccentrics and rods	3		3	3		4	4		4	1		1	4		4
Water glasses	11		11	7		7			6	6		6	3		3
Water-glass fittings	2		2	1		2	1		1	1		1	1		1
Wheels	70	1	69	48		50	42		43	40		40	35		35
Miscellaneous															
Total	319	27	373	222	34	227	153	15	182	164	18	225	152	15	164



RELATION OF DEFECTIVE STEAM LOCOMOTIVES TO ACCIDENTS AND CASUALTIES RESULTING FROM LOCOMOTIVE FAILURES
CHART SHOWING
ILLUSTRATING FAILURES OF LOCOMOTIVE AND TENDER BOILERS AND THEIR PARTS AND APPURTENANCES

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—														
	1943			1942			1941			1940			1939		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Brakes and brake rigging	1	1					1	1	1	1					
Carburetors															
Couplers	1	1	1	1											
Crank pins and connecting rods															
Fires: due to overflowing or leakage of fuel, crank case explosions, back firing, etc.	3	5	3	3	4	4	2	2	2	1					1
Generators and starting devices	1	1													
Insulation			1	1				2	2						
Pantographs and trolleys	1	1	1	1											
Short circuits	3	4					1	1	1	1					1
Miscellaneous	5	5	3	3	5	5	1	1	1	3					3
Total	15	18	9	9	11	11	7	7	7	5					5

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

Parts defective, inoperative or missing, or in violation of rules	Year ended June 30—					
	1943	1942	1941	1940	1939	1938
1 Air compressors	968	829	684	567	518	689
2 Arch tubes	50	27	31	20	28	66
3 Ashpans and mechanism	71	80	67	37	67	72
4 Axles	15	2	5	3	2	13
5 Blow-off cocks	291	238	205	191	204	226
6 Boiler checks	503	393	313	288	279	301
7 Boiler shell	377	290	271	266	272	331
8 Brake equipment	2,661	2,382	1,945	1,506	1,577	2,044
9 Cabs, cab windows, and curtains	1,102	1,163	1,087	1,078	943	1,226
10 Cab aprons and decks	390	335	307	277	260	326
11 Cab cards	142	131	97	101	92	109
12 Coupling and uncoupling devices	66	70	74	53	60	73
13 Crossheads, guides, pistons, and piston rods	1,961	1,273	858	815	739	905
14 Crown bolts	66	75	97	54	47	59
15 Cylinders, saddles, and steam chests	1,395	1,514	1,332	1,320	1,232	1,645
16 Cylinder cocks and rigging	430	521	438	447	418	585
17 Domes and dome caps	196	112	94	78	90	109
18 Draft gear	599	651	620	508	450	740
19 Draw gear	469	369	347	306	360	479
20 Driving boxes, shoes, wedges, pedestals, and braces	2,053	1,743	1,348	1,243	1,330	1,688
21 Firebox sheets	303	255	224	191	238	244
22 Flues	215	178	150	147	165	159
23 Frames, tail pieces, and braces, locomotive	894	869	893	665	708	1,001
24 Frames, tender	86	86	83	78	71	131
25 Gages and gage fittings, air	191	193	183	132	155	230
26 Gages and gage fittings, steam	316	263	236	211	226	279
27 Gage cocks	584	497	373	400	361	451
28 Grate shakers and fire doors	492	491	430	273	252	403
29 Handholds	483	378	433	333	340	405
30 Injectors, inoperative	68	47	39	30	26	26
31 Injectors and connections	2,637	2,220	1,882	1,330	1,457	1,784
32 Inspections and tests not made as required	9,037	8,186	7,215	6,218	6,645	8,204
33 Lateral motion	700	498	357	313	243	325
34 Lights, cab and classification	184	131	50	49	50	48
35 Lights, headlight	184	218	190	180	177	257
36 Lubricators and shields	292	234	196	185	200	212
37 Mud rings	256	244	187	213	248	203
38 Packing nuts	669	689	508	418	408	448
39 Packing, piston rod and valve stem	724	738	675	669	739	691
40 Pilots and pilot beams	194	188	142	140	104	154
41 Plugs and studs	259	173	156	156	179	238
42 Reversing gear	452	411	387	320	317	404
43 Rods, main and side, crank pins, and collars	2,798	1,986	1,565	1,199	1,293	1,669

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

Parts defective, inoperative or missing, or in violation of rules	Year ended June 30—					
	1943	1942	1941	1940	1939	1938
44 Safety valves	74	67	68	61	97	125
45 Sanders	642	738	490	415	432	536
46 Springs and spring rigging	3,583	3,349	2,597	2,174	2,340	2,901
47 Squirt hose	92	67	62	50	75	94
48 Stay bolts	367	272	239	227	181	211
49 Stay bolts, broken	247	274	198	271	288	380
50 Steam pipes	414	290	385	255	285	410
51 Steam valves	159	150	110	106	115	141
52 Steps	729	594	555	449	490	631
53 Tanks and tank valves	1,321	1,150	952	768	837	955
54 Telltale holes	78	79	59	95	58	67
55 Throttle and throttle rigging	887	786	688	647	638	685
56 Trucks, engine and trailing	1,020	833	636	598	628	762
57 Trucks, tender	900	786	773	705	665	907
58 Valve motion	998	779	590	506	554	722
59 Washout plugs	685	569	445	478	487	626
60 Train-control equipment	9	7	1	2	5	11
61 Water glasses, fittings, and shields	1,454	1,133	788	753	690	915
62 Wheels	728	664	536	554	466	577
63 Miscellaneous—Signal appliances, badge plates, brakes (hand)	1,142	970	785	564	610	684
Total number of defects	51,350	44,928	37,691	32,677	33,490	42,214
Locomotives reported	43,064	42,951	43,236	44,274	45,965	47,397
Locomotives inspected	116,647	113,451	105,675	102,164	105,606	105,186
Locomotives defective	11,901	10,970	9,570	8,565	9,099	11,050
Percentage of inspected found defective	10	10	9	8	9	11
Locomotives ordered out of service	487	474	560	487	468	679

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—					
	1943	1942	1941	1940	1939	1938
Air compressors	7	13	22	8	14	6
Axles, truck and driving	6	5	5	1	1	5
Batteries	2	1	6	1	1	1
Boilers	1	5	4	10	6	6
Brake equipment	62	86	69	50	50	74
Cabs and cab windows	33	27	45	22	36	25
Cab cards	17	20	24	13	18	11
Cab floors, aprons, and deck plates	31	10	14	17	13	8
Clutches	2	1				
Controllers, relays, circuit breakers, magnet valves, and switch groups	9	12	7	16	13	7
Coupling and uncoupling devices	1	5	2	6	4	4
Current-collecting apparatus	1	1	3	1	5	8
Draft gear	15	19	15	31	17	23
Draw gear	2	3	3	2	4	3
Driving boxes, shoes, and wedges	25	16	36	29	52	16
Frames or frame braces	7	5	1	12	9	37
Fuel system	32	81	62	51	35	47
Gages or fittings, air	3	8	3	1	6	11
Gages or fittings, steam	1			2		
Gears and pinions	4	4	2	1	2	2
Handholds	19	14	12	6	8	13
Inspections and tests not made as required	223	274	243	207	185	204
Insulation and safety devices	4	3	4	2	4	13
Internal-combustion engine defects, parts and appliances	50	62	54	35	32	26
Jack shafts	2	1	3	7	6	1
Jumpers and cable connectors	3	1			1	1
Lateral motion, wheels	10		4	5	1	
Lights, cab and classification	1	5	2	1	3	2
Lights, headlight	2	1	1	3	4	4
Meters, volt and ampere	3	2		4	2	2
Motors and generators	14	16	16	12	19	18
Pilots and pilot beams	4	10	12	10	6	1
Plugs and studs						
Quills	9	6		4	7	6

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—					
	1943	1942	1941	1940	1939	1938
Rods, main, side, and drive shafts		2	4	2	2	2
Sanders	41	57	56	34	28	37
Springs and spring rigging, driving and truck	18	35	58	50	16	43
Steam pipes	1		1	4		5
Steps, footboards, etc.	25	21	35	22	18	23
Switches, hand-operated, and fuses	2	2	2	3	5	7
Transformers, resistors, and rheostats	3	3	3	1	1	3
Trucks	22	28	30	43	33	40
Water tanks	4	1	1			
Water glasses, fittings, and shields	2	5	1	1	1	3
Warning signal appliances	3	3	4		1	3
Wheels	107	43	28	22	16	11
Miscellaneous	16	14	8	15	10	7
Total number of defects	849	926	905	766	696	769
Locomotive units reported	4,351	3,957	3,389	2,987	2,716	2,555
Locomotive units inspected	6,847	6,728	5,558	4,974	4,681	4,024
Locomotive units defective	298	358	319	298	260	274
Percentage inspected found defective	4.4	5	6	6	6	7
Locomotive units ordered out of service	6	12	21	16	14	9

INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF LOCOMOTIVES

All accidents reported to the Bureau as required by the law and rules were carefully investigated and appropriate action taken to prevent 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 nineteen accidents occurred in connection with steam locomotives resulting in 27 deaths and 373 injuries. This represents an increase of 97 accidents, a decrease of 7 in the number of persons killed, and an increase of 146 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. 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 the same as in the next preceding year. Four hundred and eighty-seven locomotives were ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe; this is an increase of 13 locomotives as compared with the next preceding year.

Detailed results of our inspections of steam locomotives of each railroad are shown in table XII, and a comparison of the condition of locomotives of each railroad over a period of years is shown in table XIII.

EXPLOSIONS AND OTHER BOILER ACCIDENTS

Twenty-five boiler explosions occurred in the fiscal year, in which 24 persons were killed and 56 injured. There was an increase of 12 accidents, an increase of 1 person killed, and an increase of 36 persons injured from explosions as compared with the preceding year.

One of these accidents, in which 2 persons were killed and 22 injured, was primarily caused by a collision in which the locomotive was derailed and came to rest leaning to the right and with the front end down an embankment. This position caused parts of the firebox to be bared of water which resulted in overheating. The explosion occurred about 10 minutes following the derailment after the engineer, who had previously alighted on the ground, had returned to the locomotive in an apparent attempt to take steps to prevent the overheating of the exposed areas of the firebox.

In one instance, in which two persons were killed and one injured, parts of all the firebox sheets were overheated due to foaming of the boiler water.

In another accident, in which one person was injured, the explosion was caused by the failure of a fusion welded joint in a crown sheet patch.

The remaining 22 accidents, in which 20 persons were killed and 32 injured, were caused by overheated crown sheets due to low water.

The serious results of boiler explosions are well known to railroad men and explosions have been materially reduced since the inception of the Boiler Inspection Act; however, there has been an increase in such accidents in the past 3 years with consequent increased loss of life and injuries and destruction of equipment. Increased vigilance of all concerned is necessary to overcome and reverse this trend.

Many locomotives are equipped with protective devices such as syphons, multiple drop or fusible plugs, and low-water alarms, all of which have no doubt prevented boiler explosions or minimized the severity thereof. Carriers that are continuing to make applications of devices of this character are making a distinct contribution to the conservation of human resources and equipment.

Boiler and appurtenance accidents other than explosions resulted in the death of one person and injuries to 117 persons; this is a decrease of 6 deaths and an increase of 52 injuries as compared with the preceding year.

EXTENSION OF TIME FOR REMOVAL OF FLUES

One thousand and sixty-seven applications were filed for extensions of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 49 of these cases the condition of the locomotives was such that extensions could not properly be granted. Eighteen were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Forty-eight extensions were granted after defects disclosed by our investigations were required to be repaired. Twenty-five applications were canceled for various reasons. Nine hundred and twenty-seven applications were granted for the full period requested.

LOCOMOTIVES PROPELLED BY POWER OTHER THAN STEAM

There was an increase of six in the number of accidents occurring in connection with locomotives other than steam and an increase of nine in the number of persons injured as compared with the preceding year. No deaths occurred in either year.

During the year, 4.4 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 0.6 percent compared with the results obtained in the preceding year. Six locomotives were ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe; this represents a decrease of six locomotives compared with the next preceding year.

SPECIFICATION CARDS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 501 specification cards and 6,273 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, 432 specifications and 110 alteration reports were filed for locomotive units and 69 specifications and 97 alteration reports were filed for boilers mounted

on locomotives other than steam. These were checked and analyzed and corrective measures taken with respect to discrepancies found.

SPECIAL WORK

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

APPEALS

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

ACCIDENT PREVENTION

The condition of locomotives in use at the beginning of the upturn in railroad traffic was as good as ever recorded which in turn resulted in the highest degree of safety of locomotive operation ever attained. Increasing traffic required the placing in use of a large number of old and practically obsolete locomotives which had been in dead storage for periods ranging up to 10 years or more. These locomotives were repaired and placed in reasonably serviceable condition for the character of service for which they were designed but, lacking many modern features, they were not capable of rendering the performance found necessary under present circumstances without unusual precautions being exercised in inspections and the application of repairs to various parts much more frequently than is required for more modern locomotives. This condition and the increasing intensive use of all locomotives, coupled with the shortages of manpower and suitable material with which to make prompt and substantial repairs, has resulted in wear taking place faster than it can be restored and in turn often results in neglect to repair what may appear at the time to be an insignificant defect to an unimportant part, the failure of which, however, may start a chain of events leading up to delay in traffic and loss of life or limb.

Increase of manpower employed on locomotive maintenance will not within itself be of much assistance in solving the maintenance problem unless a reasonable proportion of this increase is skilled in the various crafts involved and sufficiently experienced to be able to exercise good judgment; in other words, there is a practical limit to which skilled labor can be diluted if benefit from the efforts exerted is to be obtained.

Inability to obtain a sufficient number of new locomotives and scarcity of suitable material and new parts with which to make substantial repairs to existing locomotives results in attempts to get the last possible mile out of all parts in which wear or deterioration has developed. This condition contributes to increase in breakdowns, delays, and accidents and has the further effect of diverting skilled labor to reclamation of used parts that would otherwise be discarded and replaced with new parts which would remain in serviceable condition longer, and which in many instances would cost less in manhours for preparation and application.

It is apparent that the supply of new locomotives for domestic railroads will not be sufficient to fill the current and prospective needs, and in view of this it is of paramount importance in the continued functioning of the railroads, in the expeditious production of new locomotives that can be wholly depended upon to perform their intended service, and in the interest of safety, that changes in design of the component parts thereof, materials, construction methods, processes, and established practices of the builders and the railroads be held to a minimum until the cessation of the war.

The exigencies of railroad service are such that all employees responsible for train movement are under constant pressure, some of which is self-imposed because of the nature of their training, to avoid train delays with consequent disruption in the orderly flow of traffic. It is inherent in the nature of the service that the motive is always present to keep trains moving not only to prevent train delays but also to avoid possible criticism or discipline for failure to do so. This condition is accentuated under present conditions because all involved realize that speed is the essence of today's production and delivery. As a consequence trains are at times kept moving until a major failure occurs instead of stopping and investigating any untoward indications which may momentarily appear to be of secondary importance. No considerable number of accidents of this character occur on any one railroad; however, considering the railroads as a whole, they are not uncommon. Many of these accidents would undoubtedly be avoided if the urge to keep trains moving was not temporarily permitted to take precedence over the usually recognized fact that undue haste often makes great waste.

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, 1943, 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.]

ALABAMA, TENNESSEE & NORTHERN RAILROAD:

October 13, 1943, locomotive 28, near York, Ala. Main crank pin broke due to old fracture which extended through approximately 66 percent of cross-sectional area; one injured.

One accident; one injured.

ALTON RAILROAD:

February 7, 1943, locomotive 4367, Mazonia, Ill. Water-crane spout hook bent while being used to return water spout to locked position, causing employee to fall; one injured.

*April 28, 1943, locomotive 2986, Normal, Ill. Bell ringer was inoperative account of crossbar on bell frame having loosened and turned out of position; bell was reported on April 27, 28, and 29; one injured.

*June 29, 1943, locomotive 2968, Bloomington, Ill. Boiler check stuck open; one injured.

Three accidents; three injured.

ALTON & SOUTHERN RAILROAD:

*June 21, 1943, locomotive 24, East St. Louis, Ill. Improperly balanced throttle kicked open from built up steam pressure; one injured.

One accident; one injured.

ATCHISON, TOPEKA & SANTA FE RAILWAY:

July 11, 1942, locomotive 1693, Los Angeles, Calif. Lubricating oil discharged on the running board from a broken cylinder oil pipe caused employee to lose his footing and fall to the ground; one injured.

November 14, 1942, locomotive 3856, Oro Grande, Calif. Front plate of the spark-arrester box dropped out of position and into the arrester, causing back draft; the five bolts for securing each end of spark arrester plate were missing; one injured.

November 19, 1942, locomotive 1340, Bakersfield, Calif. Squirt hose burst, due to being badly worn; one injured.

November 26, 1942, locomotive 1631, near Elkins, N. Mex. Crown-sheet failure caused by overheating due to low water; one killed, two injured.

November 27, 1942, locomotive 4077, Gibbs, Mo. Lugs slipped off grate-shaker post; grate shaker had excessive side motion; one injured.

*December 3, 1942, locomotive 3732, Dalies, N. Mex. Front cab window was loose and would not stay closed; one injured.

*December 5, 1942, locomotive 2551, Amarillo, Tex. Cylinder head blew out; one injured.

*January 1, 1943, locomotive 3119, Torrance, Calif. Top of tank behind fuel space was obstructed by a pinch bar; one injured.

*February 3, 1943, locomotive 3236, Barstow, Calif. Hinge of ventilator in cab roof fell and struck employee, due to breakage of the bolts which secured the hinge; one injured.

**February 20, 1943, locomotive 3271, Joliet, Ill. Feed water heater condensate pipe union became disconnected; one injured.

February 28, 1943, locomotive 1690, Woodford, Calif. Water-crane hook slipped from crane, causing employee to fall from top of tender to the ground; hook was bent and distorted; one injured.

March 2, 1943, locomotive 3115, Enid, Okla. Cotter key for securing the extension operating rod to injector starting valve worked out of position, due to key not being properly spread. Employee fell from running board after making repairs to the cotter key and his foot was run over by the locomotive; running board was obstructed by blow-off cock bell crank top arm which extended up through it and by blow-off cock extension operating rod, its outside width being only 4½ inches for a distance of 34 inches; one injured.

March 3, 1943, locomotive 3525, near Chino, Ariz. Employee's foot was pierced by a nail in a loose board in cab; board had broken from foot rest; one injured.

March 9, 1943, locomotive 3163, Emporia, Kans. Discharge pipe blew out of air compressor, causing sudden stop of the train; threads in elbow stud union were badly stripped; one injured.

*March 28, 1943, locomotive 1789, Cadiz, Calif. Steam heating pipe on locomotive came loose; one injured.

**April 4, 1943, locomotive 3849, Caliente, Calif. Smokestack smoke deflector was inoperative account of bumper block not being in proper position; one injured.

April 18, 1943, locomotive 3238, Grants, N. Mex. Mechanically operated fire door closed unexpectedly, due to defective operating mechanism; hole for pin in fulcrum lever and slot in tread hanger were worn, causing tread to hang low and provide insufficient clearance between the tread and the deck of the locomotive; hanger bolt was loose, permitting operating tread to swing out of position; one injured.

May 16, 1943, locomotive 3716, Adamana, Ariz. Injured while attempting to lock steam grate shaker lever in neutral position; end of plunger for holding shaker lever in neutral position was worn off too short to make contact and hold lever in position; one injured.

May 29, 1943, locomotive 3814, Grants, N. Mex. Injured while shaking the grates; power grate shaker was reported inoperative on May 20, 21, 22, 23, 25, 26, 27 (twice), 28 (twice), 29 (twice), 30 (twice), and 31, and June 1, 2 (twice), 3 (twice), 4, 5 (twice), and 6 (twice); one injured.

*May 31, 1943, locomotive 3864, Victorville, Calif. Employee fell due to stepping on a loose pipe on top of tender; the loose pipe was part of the tender handrail which was broken; one injured.

*June 9, 1943, locomotive 3766, Yucca, Ariz. Main rod broke, due to old defect; one injured.

June 14, 1943, locomotive 3915, Williams, Ariz. Fuel oil on top of the rear of tender caused employee to slip and fall; one injured.

*June 21, 1943, locomotive 3839, Woodford, Calif. Oil on top of tender water tank; one injured.

*June 21, 1943, locomotive 1627, Muroc, Calif. Oil on top of tender water tank; one injured.

*June 23, 1943, locomotive 3229, Newberry, Calif. Oil on step leading to tender water tank; one injured.

*June 25, 1943, locomotive 3229, Audley, Ariz. Oil on top of tender water tank; one injured.

*June 29, 1943, locomotive 4110, Medill, Mo. Insufficient clearance between shaker bar and cab floor; one injured.

Twenty-seven accidents; 1 killed, 28 injured.

ATLANTA, BIRMINGHAM & COAST RAILROAD:

August 13, 1942, locomotive 112, Fitzgerald, Ga. Brakes on locomotive were defective, causing locomotive to collide with a cut of cars; one injured.

One accident; one injured.

ATLANTIC COAST LINE RAILROAD:

**March 4, 1943, locomotive (D. L. & W.) 1404, Trilby, Fla. Employee's foot caught on a protruding bolt head in running board, causing him to lose his balance and fall to the ground; running board was secured to bracket with square head machine bolts which protruded above running board; one injured.

March 6, 1943, locomotive 826, Jarrett, Va. Insufficient clearance between grate-shaker bar and oil-tray skirt; one injured.

March 6, 1943, locomotive 1740, Florence, S. C. Main driving axle broke, due to a progressive fracture which extended through approximately 75 percent of cross-sectional area; one injured.

June 13, 1943, locomotive 1636, South Rocky Mount, N. C. Nail protruded in upright position from hinge at the back of brakeman's seat box in cab; one injured.

*June 17, 1943, locomotive 1519, Stony Creek, Va. A piece of spring was thrown from tender truck and struck a passenger; one injured.

Five accidents; five injured.

BALTIMORE & OHIO RAILROAD:

July 2, 1942, locomotive 5094, McKees Rocks, Pa. Headlight step gave way, due to lug of step bracket being broken and head missing from the rivet which attached step to the remaining lug; one injured.

September 13, 1942, locomotive 1223, near Ravenna, Ohio. Crown-sheet failure caused by overheating due to low water; two injured.

September 19, 1942, locomotive 4240, Listie, Pa. Crown-sheet failure caused by overheating due to low water; two killed, three injured.

October 2, 1942, locomotive 6195, Fallston, Pa. Cylinder-head casing was thrown from rapidly moving locomotive and struck a track employee; stud which secured the casing lost out due to improper application; stud holes in casing and cylinder head were oversize for the stud used, and hole in cylinder head was reduced to ⅝ inch in depth, due to part of a broken stud having been left in it, and was improperly threaded; one injured.

January 20, 1943, locomotive 4621, Woodstock, Md. Crown-sheet failure caused by overheating due to low water; three killed.

March 24, 1943, locomotive 774, Rochester, N. Y. Top pin worked out of driver brake beam hanger, allowing brake beam to fall to the rail and be run over; bushing in top of hanger was worn thin, allowing safety key to shear off and pin to work out; evidently the bushing was defective when the locomotive was given class 3 repairs on March 3; one injured.

Six accidents; five killed, eight injured.

BOSTON & MAINE RAILROAD:

December 20, 1942, locomotive 303, Boston, Mass. Ice formed in distributing valve; one injured.

**January 25, 1943, locomotive 1480, East Lynn, Mass. Ashpan slide securing device shaft was bent and binding on draw bar casting; one injured.

Two accidents; two injured.

BURLINGTON-ROCK ISLAND RAILROAD:

March 10, 1943, locomotive (C. R. I. & P.) 2609, Singleton, Tex. Blow-off cock stuck open due to foreign substance having lodged under valve seat; when attempt was made to close the valve by force, the handle of extension rod struck front cab wall, resulting in injury to employee's hand; extension rod was approximately 11½ feet long and apparently flexed to such extent when forced that handle contacted cab wall in advance of full closure of the valve; one injured.

One accident; one injured.

CENTRAL OF GEORGIA RAILWAY:

*June 15, 1943, locomotive 704, Leeds, Ala. Spring hanger broke; one injured.

*June 24, 1943, locomotive 707, Vandiver, Ala. Main equalizer hanger broke; one injured.

Two accidents; two injured.

CENTRAL RAILROAD OF NEW JERSEY:

October 2, 1942, locomotive 929, Lockport, Pa. Crown stay blew out; stay broke at old fracture near wrapper sheet; stay not properly screwed into crown sheet and threads on stay and in stay hole were badly deteriorated; one injured.

One accident; one injured.

CHICAGO & EASTERN ILLINOIS RAILROAD:

August 30, 1942, locomotive 1014, near Clinton, Ind. Main crank pin broke while locomotive was running about 73 miles per hour, resulting in derailment of the locomotive, tender, and all cars of passenger train; failure occurred through old fracture in fillet which could have been detected by proper inspection; four injured.

One accident; four injured.

CHICAGO & NORTH WESTERN RAILWAY:

August 12, 1942, locomotive 2503, Green Bay, Wis. Employee fell while ascending from running board after adjusting the bell; one injured.

October 1, 1942, locomotive 2449, Northfield, Ill. Power reverse gear piston packing nut leaking; one injured.

October 29, 1942, locomotive (C. St. P. M. & O.) 53, Sioux City, Iowa. Seat was insecurely attached to cab floor; one injured.

November 7, 1942, locomotive 2301, Odanah, Wis. Driving-wheel tire came off wheel center, causing side rod to break; a defective condition in the air-brake mechanism permitted a sufficient accumulation of pressure in locomotive brake cylinders to cause brake shoes to bind on driving-wheel tires, causing the tires to heat and loosen; one injured.

*December 1, 1942, locomotive 4003, Clinton, Iowa. Main throttle valve leaking; one injured.

December 10, 1942, locomotive 1743, Tyler, Minn. Employee's shoe caught edge of cab apron, causing him to lose his footing; edges of apron did not lay on cab floor, due to apron having been sprung by being heavily hammered on center; one injured.

December 19, 1942, locomotive 1316, Chicago, Ill. Injured while attempting to operate manually operated reverse gear; one injured.

January 6, 1943, locomotive 1706, Council Bluffs, Iowa. Washout plug blew out of boiler back head; attempted to tighten under pressure; plug had been cross-threaded in boiler sheet; one injured.

January 11, 1943, locomotive 2581, Elroy, Wis. Injured while shaking grates to grates being obstructed by clinkers; locomotive had a dirty and badly smoldered fire when enginehouse force assigned it to the engine crew; one injured.

January 29, 1943, locomotive 3012, Bertram, Iowa. Superheater flue failed at safe-end weld; overheated in welding; safe end was only 0.105 inch in thickness while the flue was 0.155 inch thick adjacent to the weld; two injured.

February 10, 1943, locomotive 2378, Broadmoor, Ill. Blower steam line became disconnected in smoke box; union nut was cracked and threads in union nut and on sleeve were stripped; one injured.

March 7, 1943, locomotive 378, Nelson, Ill. Employee fell from running board, due to vision obscured by steam issuing from cylinder cocks; front-end steps not in proper alignment with running board step; 28-inch gap in handrail rendered handrail insufficient for safety; one injured.

Twelve accidents; 13 injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

January 7, 1943, locomotive 2811, Westmont, Ill. Blower pipe disconnected at front end, causing back draft; one injured.

January 27, 1943, locomotive 500, Chicago, Ill. Insufficient clearance between cab handhold and corner of tender deck when on sharp curve; one injured.

January 27, 1943, locomotive 800, Kansas City, Mo. Insufficient clearance between cab handhold and side ladder on tender when on curve; one injured.

January 28, 1943, locomotive 2954, Quincy, Ill. Insufficient clearance between cab handhold and cab apron when on curve; one injured.

June 19, 1943, locomotive 5629, Kewanee, Ill. Boiler check valve stuck open; hot water hot-water pump piston follower was badly worn, permitting rapid packing wear, and a piece of the packing lodged under boiler check valve seat; one injured.

Five accidents; five injured.

CHICAGO GREAT WESTERN RAILWAY:

October 20, 1942, locomotive 758, Durango, Iowa. Injector steam ram packing was leaking; wrench applied to tighten packing nut was forced off nut due to coming in contact with blower pipe, causing employee to fall from running board; one injured.

February 2, 1943, locomotive 606, St. Paul, Minn. Injured while attempting to open cab roof ventilator; no extensions on ventilator operating rigging or other provision made to enable the rigging to be operated safely; one injured.

May 21, 1943, locomotive 758, Fort Dodge, Iowa. Mechanically operated door stuck in open position, due to excessively worn parts and air adjusting valve being out of proper adjustment; fire door reported defective and sticking on May 13; one injured.

June 5, 1943, locomotive 874, Stockton, Ill. Blow-off cock opened unexpectedly when reverse lever was moved, due to blow-off cock rigging fouling reverse lever;

insufficient clearance around blow-off cock handle and no locking or other security device provided; one injured.

Four accidents; four injured.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

July 11, 1942, locomotive 1355, Chicago, Ill. Fell from running board while attempting to oil air pump which was running dry and groaning; one injured.

**October 18, 1942, locomotive 134, (place not shown). Main pin broke due to a progressive fracture which extended through approximately 60 percent of cross-sectional area; one injured.

February 20, 1943, locomotive 1525, Milwaukee, Wis. Pipe connecting oil cup for power reverse gear to air supply pipe became disconnected while attempting to remove oil cup filling plug; pipe was loose at threads at T connection in air supply pipe; one injured.

**April 27, 1943, locomotive 224, Bird Island, Minn. Coupler knuckle dropped out of drawbar due to knuckle pin being missing; one injured.

**April 28, 1943, locomotive 172, Lone Rock, Wis. Shaker bar slipped off grate-shaker post, due to improper fit; one injured.

Five accidents; five injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY:

July 18, 1942, locomotive 1766, Jones Mill, Ark. Bell rope became wrapped around bell crank and was so tight that bell could not turn over when bell ringer was operated; one injured.

July 21, 1942, locomotive 5015, Rush Springs, Okla. Integral engine truck box and frame broke through old fracture at the back top corner of right front journal box and the broken frame dropped down and struck the bride rod of a switch, resulting in the derailment of the locomotive and 15 cars in the train; right front truck wheel had numerous shelled out spots and wheel was out of round $\frac{3}{16}$ inch and left front engine truck wheel was out of round $\frac{1}{16}$ inch; two injured.

*August 11, 1942, locomotive 2586, Geneseo, Ill. Knuckle of tender drawbar broke through pinhole; old flaw in knuckle; one injured.

**December 26, 1942, locomotive 3016, Howe, Okla. Vertical cab handhold fouled step at front corner of tender; one injured.

*January 24, 1943, locomotive 4036, Cambridge, Iowa. Leak at lubricator pipe connection to air reversing valve; threads on lubricator pipe were stripped; one injured.

**February 9, 1943, locomotive 2140, near Red Oak, Okla. Bolts supporting the front end of left bottom guide broke and worked out of holes, permitting front end of guide to drop away from guide block; one injured.

April 26, 1943, locomotive 831, between Haileyville, Okla., and Booneville, Ark. Manually operated reverse lever became unlatched and moved to full forward position several times en route; reverse lever latch, quadrant, and latch guide were badly worn; valve gear parts were worn, causing excessive lost motion in reversing gear; reversing gear and/or valve gear were reported on April 5, 15, 19, 21, 23, 27, 30, and May 1 and 3 (two times); one injured.

May 14, 1943, locomotive 2640, near Union, Mo. Crown-sheet failure caused by overheating due to low water; two killed, one injured.

Eight accidents; two killed, nine injured.

COLUMBUS & GREENVILLE RAILWAY:

July 16, 1942, locomotive 172, Mhoons Valley, Miss. Side rod broke, due to old fracture, and broken rod struck and bent running-board bracket, pulling two supporting studs from the boiler which permitted steam and hot water to escape and be deflected back into the cab; two injured.

One accident; two injured.

DELAWARE & HUDSON RAILROAD:

August 14, 1942, locomotive 813, Maryland, N. Y. Crown-sheet failure caused by overheating due to low water; prisms of the lower four bull's eyes of water glass were badly worn or distorted, making it difficult to note the absence of water in this part of the glass from the engineer's position in the cab, especially so with the low intensity of light emitted by the water-glass lamp, the light slit or aperture of which was covered with yellow paper which had been fastened on the inside of the lamp cage; one injured.

November 5, 1942, locomotive 1610, Binghamton, N. Y. Cast-iron cylinder head blew out of high-pressure cylinder; thickness of cylinder head had been reduced to $\frac{3}{16}$ inch less than carrier's standard at joint to cylinder; one injured.

December 25, 1942, locomotive 1023, Wilkes-Barre, Pa. Insufficient clearance between vertical handhold on cab at gangway and metal side wall of a cab weather protection; one injured.

April 24, 1943, locomotive 1093, Burdicks, N. Y. Flue failed at defective safe end weld; one injured.

Four accidents; four injured.

DELAWARE, LACKAWANNA & WESTERN RAILROAD:

October 15, 1942, locomotive 1619, Paradise Tank, Pa. Steam pipe between superheater header and front-end throttle burst; steam-pipe wall was of uneven thickness and was unduly thinned at the point of failure; four injured.

*June 17, 1943, locomotive 1260, Whitney Point, N. Y. Side rod failed; one injured.

June 27, 1943, locomotive 1238, Binghamton, N. Y. Arm rest at cab window gave way; arm rest was insecurely attached to cab; one injured.

Three accidents; six injured.

DENVER & RIO GRANDE WESTERN RAILROAD:

August 18, 1942, locomotive 1700, Fox Junction, Colo. Cylinder cock stuck open, apparently caused by a foreign substance having lodged under seat of cylinder cock valve; one injured.

**September 5, 1942, locomotive 3504, Helper, Utah. Insufficient clearance between grate-shaker bar and cab back wall brace; improperly fitted shaker post pins permitted excessive lateral movement of shaker bar; one injured.

**October 8, 1942, locomotive 497, Grays, Colo. Coupler pocket pin on rear of tender broke through old fracture; one injured.

**October 19, 1942, locomotive 1160, Sunnyside, Utah. Cast-iron pipe cap on blow-off cock nipple broke due to old fracture; one injured.

December 23, 1942, locomotive 1203, near Minturn, Colo. Locomotive ran away on a descending grade, due to the failure of the air pressure; air compressor stopped due to particles of metal from bottom cavity in compressor piston valve cylinder head dropping into the ports of piston valve bushing; cylinder head had been badly damaged, apparently by use of a hammer; air reverse operating valve body had a piece containing the rear stop lug broken out and missing; "Air compressor operates slow and sluggish and does not make sufficient air" was reported on December 20; one injured.

**January 2, 1943, locomotive 3401, Moffat Tunnel, Colo. Locomotive stalled in tunnel account of low steam pressure; low pressure steam chest was cracked and blower did not operate properly; one injured.

**January 29, 1943, locomotive (C. & S.) 906, Colorado Springs, Colo. Employee fell from gangway step due to accumulation of ice on step caused by leak from squirt hose; squirt-hose valve seat was badly worn; one injured.

January 31, 1943, locomotive 1506, Salt Lake City, Utah. Air compressor stopped, apparently because of lack of lubrication; while attempting to see that the auxiliary shut-off valve in the steam pipe near the compressor was open the bonnet unscrewed and blew out; flange of bonnet was bent, resulting in imperfect seat on valve body; one injured.

February 5, 1943, locomotive (D. M. & I. R.) 224, Clay, Colo. Locomotive became uncontrollable while running light on a descending grade and continued without control for several miles and then derailed on a curve due to excessive speed; discharge pipe from left compressor broke off at threads at union connecting the pipe to the grid radiator, due to a progressive fatigue crack, resulting in the loss of the air pressure with consequent failure of the brakes and the air-operated reversing gear; two injured.

**February 16, 1943, locomotive 1520, Trinidad, Colo. Sticky paint on pilot beam handhold; one injured.

February 25, 1943, locomotive 1193, Manti, Utah. Main fountain valve bonnet blew out; threads on bonnet and fountain valve were badly worn; one injured.

**March 23, 1943, locomotive 3350, Midvale, Utah. Employee's finger was caught in unguarded Street stoker mechanism; one injured.

**March 29, 1943, locomotive 1203, Price, Utah. Leaky gasket in hose connection to auxiliary water car; one injured.

**April 29, 1943, locomotive 3604, near Plain, Colo. Locomotive stalled while caboose and helper locomotive were in a tunnel and heat, smoke, and gas in the

tunnel resulted in injury of an employee who was in the caboose. Train stalled account of front locomotive slipping badly due to the auxiliary devices governor sticking which reduced the air pressure and interfered with the operation of stack hood, sanders, and reverse lever; one injured.

**May 30, 1943, locomotive 1504, Thistle, Utah. Employee tripped on water-spout hook which was lying on top of tender and fell to the ground; tender not equipped with hanger or other device on which hook could be kept when not in use; one injured.

**June 10, 1943, locomotive 1027, Funston, Colo. Injured by a splinter on coal gate; one injured.

**June 15, 1943, locomotive 1000, Alamosa, Colo. Injured while attempting to level the grates; connecting rod was bowed about 3 inches in the middle; one injured.

Seventeen accidents; 18 injured.

DETROIT & MACKINAC RAILWAY:

*February 3, 1943, locomotive 136, Oscoda, Mich. Eccentric crank and eccentric rod broke, resulting in cylinder head being knocked out; old defect or fracture in eccentric crank at the point of failure; one injured.

One accident; one injured.

DULUTH, SOUTH SHORE & ATLANTIC RAILWAY:

*April 28, 1943, locomotive 1053, Trout Creek, Mich. Engine truck swing center hanger pin worked out; one injured.

One accident; one injured.

ERIE RAILROAD:

July 20, 1942, locomotive 4220, Mansfield, Ohio. Fusion-welded seam of crown-sheet patch failed for approximately 50 inches; one injured.

August 25, 1942, locomotive 3154, Chicago, Ill. Lubricator oil pipe to right cylinder terminal check broke; one injured.

**August 27, 1942, locomotive 4205, Marion, Ohio. Crown stay blew out while being calked under pressure; stay broke through old fracture which extended through approximately 80 percent of cross-sectional area; threads of crown-sheet end of the stay were worn smooth and stay head had been heavily calked; one injured.

August 29, 1942, locomotive 2960, Randolph, N. Y. Blow-off cock at left back corner was difficult to operate due to insufficient leverage; "Left boiler blow-off valve will not open" was reported on August 22; one injured.

December 25, 1942, locomotive 3121, near Griffith, Ind. Steel bar lodged in stoker elevator and forced casing door violently open while employee was engaged in loosening door; one injured.

March 1, 1943, locomotive (B. & L. E.) 520, Ferrona, Pa. Employee fell from tender while attempting to pull water crane spout around with fire hook; water-crane hook had fallen from tender en route; bracket for carrying hook was improperly located; one injured.

**March 11, 1943, locomotive 3179, Randolph, N. Y. Grate-shaker bar slipped off post due to post being too short and grate shaker casting arms did not allow shaker bar to properly fit on post; grate carrier bars were binding on grate frames and grates were difficult to move; one injured.

April 19, 1943, locomotive 3021, Rivare, Ind. Employee stepped on a lump of coal on top of tender, causing him to fall and break his leg; approximately 150 to 200 pounds of coal was scattered on tender back of fuel space; one injured.

Eight accidents; eight injured.

FLORIDA EAST COAST RAILWAY:

December 12, 1942, locomotive 815, Melbourne, Fla. Blow-off cock leaking; one injured.

April 23, 1943, locomotive 424, Wabasso, Fla. Side rod broke, due to an old fracture, and back portion of the broken rod swung around and punched a hole in outside throat sheet; one injured.

Two accidents; two injured.

FORT WORTH & DENVER CITY RAILWAY:

July 25, 1942, locomotive 501, near Turkey, Tex. Turret valve bonnet blew out, due to improper fit; diameter of bonnet was 0.08 inch less than diameter of fit in turret and bonnet had 12 threads per inch while bonnet hole had 14 threads per inch; two injured.

One accident; two injured.

GRAND TRUNK WESTERN RAILWAY:

March 28, 1943, locomotive 7478, Battle Creek, Mich. Lubricator throttle bonnet nut broke off, allowing valve to blow out in the cab; bonnet nut was light in construction and had been cracked and distorted; "Bad leak in main steam valve where seat screws into valve" was reported on March 27; one injured.
One accident; one injured.

GREAT NORTHERN RAILWAY:

August 22, 1942, locomotive 2117, Mammoth, Calif. Driving box running hot, apparently caused by use of improper type of grease; "Change all driving box grease cellars" was reported on all daily inspection reports since July 22; driving journal was rough; one injured.

November 28, 1942, locomotive 1718, Nihill, Mont. Wrist pin came out of right crosshead; wrist-pin nut lost off; one injured.

**December 19, 1942, locomotive 831, Allouez, Wis. Air hose between locomotive and tender burst due to being badly deteriorated; cab foot warmer drain pipe discharged on the hose near the point of failure; one injured.

**January 18, 1943, locomotive 3239, Collins, Mont. Improperly fitted nut on front end of piston rod stripped threads, permitting piston spider and bull ring to work off taper fit and knock out front cylinder head; dowel for securing the nut on piston rod had been sheared off; one injured.

January 23, 1943, locomotive 3225, near Osseo, Minn. Crown-sheet failure caused by overheating due to low water; three killed.

February 6, 1943, locomotive 3310, Tunis, Mont. Field coil to headlight generator burned out; one injured.

March 31, 1943, locomotive 2030, Palermo, N. Dak. Driving box ran hot; one injured.

April 1, 1943, locomotive 3239, near Shelby, Mont. Padding on cab arm rest was worn away; one injured.

Eight accidents; three killed, seven injured.

GULF COAST LINES:

August 7, 1942, locomotive (N. O. T. & M.) 943, Houston, Tex. Gangway sill step was loose, causing employee to fall; one of the two bolts used to secure sill step angle iron to tender end sill was missing and the other bolt, 1/2 inch in diameter, was loose in the 3/4-inch bolt hole; one injured.

One accident; one injured.

GULF, COLORADO & SANTA FE RAILWAY:

**July 4, 1942, locomotive (A. T. & S. F.) 1385, near Dant, Tex. Squirt valve worked open; valve stem gland insufficiently packed; one injured.

May 22, 1943, locomotive (A. T. & S. F.) 1260, Cleburne, Tex. Boiler check stuck open; employee fell when attempting to return to cab through side window; side of cab was not equipped with step or stirrup and horizontal handhold; one injured.

Two accidents; two injured.

GULF, MOBILE & OHIO RAILROAD:

June 27, 1943, locomotive 207, Union, Miss. Squirt hose burst; hose had been burned; one injured.

One accident; one injured.

HOUSTON BELT & TERMINAL RAILWAY:

**May 1, 1943, locomotive (A. T. & S. F.) 731, Houston, Tex. Water glass broke; one injured.

One accident; one injured.

ILLINOIS CENTRAL RAILROAD:

**August 1, 1942, locomotive 2450, Markham, Ill. Employee was burned by hot water and steam when steam-heat pipe was disconnected at rear of tender; main stop valve at cab fountain and the pressure regulating valve in steam-heat pipe were leaking and the automatic drain valve was stopped up; one injured.

**August 1, 1942, locomotive 3616, Markham, Ill. Squirt-hose valve opened due to collar nut for holding bonnet to body of valve working loose; one injured.

**August 4, 1942, locomotive 253, Centralia, Ill. Water glass broke; one injured.

August 27, 1942, locomotive 1367, Curve, Tenn. Crown-sheet failure caused by overheating due to low water; two injured.

**September 25, 1942, locomotive 1533, Norfield, Miss. Blower pipe cap worked off fitting at smoke box; one injured.

**September 30, 1942, locomotive 752, Clarksdale, Miss. Tubular water glass burst; excessive openings at top and bottom of water-glass guard; one injured.

**November 3, 1942, locomotive 956, Valley Park, Miss. Water glass broke, breaking glass panel in water-glass shield; one injured.

**December 4, 1942, locomotive 2520, Gilman, Ill. Center section of manhole cover was missing, permitting employee to step into manhole; one injured.

*January 1, 1943, locomotive 263, Memphis, Tenn. Water glass burst; one injured.

**February 20, 1943, locomotive 3565, Nonconah, Tenn. Water glass burst; excessive openings at top and bottom of water-glass guard; one injured.

**April 15, 1943, locomotive 324, Jackson, Miss. Insufficient clearance between cab handhold and apron of tender; handhold not applied in accordance with company's standard; one injured.

**May 12, 1943, locomotive 250, Baton Rouge, La. Handwheel of auxiliary throttle valve to front air compressor came off valve stem, causing employee to lose his balance and fall from running board; threaded section of valve stem with the nut which secured handwheel was broken off and missing and improper repairs had been made which permitted the handwheel to slip off with ease; one injured.

**May 15, 1943, locomotive 1358, Lambert, Miss. Blow-off cock operating rod became unlatched and moved to closed position, catching employee's foot between stop pin on the rod and cab floor; one injured.

Thirteen accidents; 14 injured.

KANSAS CITY SOUTHERN RAILWAY:

*December 22, 1942, locomotive 1020, Shreveport, La. Grate-shaker bar slipped off lever account of shaker bar pin being missing; one injured.

*June 11, 1943, locomotive 3654, Lake Charles, La. Water glass burst; one injured.

Two accidents; two injured.

KANSAS CITY TERMINAL RAILWAY:

November 16, 1942, locomotive 28, Kansas City, Mo. Right steam chest relief valve cap, valve seat, and guide stem blew out; cap was cross-threaded and not sufficiently entered into body of relief valve; threads on cap and in cap fit were defective; "Right relief valve cap loose" was reported on October 23; one injured.

One accident; one injured.

LEHIGH VALLEY RAILROAD:

December 21, 1942, locomotive 3183, Geneva, N. Y. Crown-sheet failure caused by overheating due to low water; one injured.

One accident; one injured.

LOUISVILLE & NASHVILLE RAILROAD:

July 9, 1942, locomotive 1231, Harold, Fla. Crown-sheet failure caused by overheating due to low water; three injured.

July 12, 1942, locomotive 1902, Spring Lake, Ky. Injector steam pipe collar broke off through old defect; collar was not properly applied, as brazing extended only about one-half its length; "Steam pipe to injector leaking at union at injector outside of cab" was reported on July 11; one injured.

**July 23, 1942, locomotive 1823, South Tunnel, Tenn. Emergency application of the brakes caused by service port in slide valve of vent valve on tender being stopped up with scale; one injured.

**August 6, 1942, locomotive 1209, Myrtlewood, Ala. Ashpan slides stuck in closed position; "Ashpan lever hard to open and close" was reported on August 4; one injured.

November 2, 1942, locomotive 209, Trenton, Ky. Manually operated reverse lever became unlatched from quadrant and moved forward unexpectedly; back bolt in right valve rod crosshead gib worked out and caught in combination lever, jerking the reserve lever from near center of quadrant to forward stop; one injured.

November 21, 1942, locomotive 238, Patio, Ky. Lubricator pipe to air compressor broke off inside of the cab; emergency repairs were made en route by plugging the pipe with a piece of a flagstaff which soon blew out, resulting in the injury of an employee; old defect extended through approximately 33 percent of cross-sectional area of the pipe at the point of failure; one injured.

**November 22, 1942, locomotive 1052, Cottondale, Fla. Employee's hand was injured on a piece of copper pipe which was being used to hold door of supply locker, located on leg of feed water tank, closed; chain for securing the regular lock pin was broken and the lock pin was missing; one injured.

December 2, 1942, locomotive 210, Medora, Ky. Crown-sheet failure caused by overheating due to low water; two killed.

**January 28, 1943, locomotive 1785, Highland Park, Ky. Stoker became inoperative; 11 cap screws worked out of stoker gear housing, causing stoker clutch lever to vibrate badly; one injured.

June 3, 1943, locomotive 1510, Tennega, Tenn. Boiler check was held off its seat by a battered piece of pipe, evidently a part of broken squirt pipe which was removed from T in delivery pipe and left in delivery pipe when repairs were made; one injured.

June 18, 1943, locomotive 1857, Rocky Hill, Ky. Pin lost out of front end of reach rod to ashpan dump, permitting reach rod to drop down and catch in road bed; one injured.

**June 20, 1943, locomotive 1325, Hugo, Ga. Valve chamber relief valve stem was broken; one injured.

Twelve accidents; 2 killed, 13 injured.

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

September 25, 1942, locomotive 2407, Wheeler, Wis. Manually operated reverse gear was difficult to operate, due to tumbling shaft binding in right bearing; one injured.

**October 15, 1942, locomotive 1024, Enderlin, N. Dak. Employee's hand was injured by a sharp and protruding nail which was being used in place of a cotter key in the pin securing fire-door handle; one injured.

November 4, 1942, locomotive 713, Foxholm, N. Dak. Manually operated reverse lever became unlatched from quadrant and moved forward unexpectedly; one injured.

Three accidents; three injured.

MISSOURI-KANSAS-TEXAS RAILROAD:

*August 21, 1942, locomotive 849, Parsons, Kans. Chain for securing tender sand-dome cover failed, permitting the cover to fall from tender; one injured.

September 15, 1942, locomotive 769, Denison, Tex. Water glass burst; one injured.

*September 19, 1942, locomotive 60, Parsons, Kans. Insufficient clearance between cab handhold and tender deck when on a curve; one injured.

*September 27, 1942, locomotive 881, Smithville, Tex. Employee was burned by an uncovered steam-heat pipe on tender which extended to brakeman's cabin; one injured.

November 21, 1942, locomotive 753, near Hewitt, Tex. Boiler explosion caused by overheating of the firebox sheets due to the condition of the boiler water; two killed, one injured.

*December 8, 1942, locomotive 105, Ray, Tex. Cylinder cock blew out; one injured.

March 10, 1943, locomotive 32, Dallas, Tex. Water glass burst; one injured.

*March 23, 1943, locomotive 373, Holland, Tex. Hole in planking of engine deck; one injured.

Eight accidents; two killed, eight injured.

MISSOURI PACIFIC RAILROAD:

**September 7, 1942, locomotive 1320, Memphis, Tenn. Operating handle of injector steam valve broke off; one injured.

December 4, 1942, locomotive 1317, Cherry Valley, Ark. Flue sheet, flues, and crown sheet failed, caused by overheating due to low water; one injured.

*December 18, 1942, locomotive 21, Pittsburg, Kans. Employee was burned by hot water from steam-heat pipe at rear of tender; locomotive engineer had previously reported that steam-heat valve would not shut off tight; one injured.

April 12, 1943, locomotive (T. & P.) 375, Lake Charles, La. Squirt-hose valve worked open and hose whipped around, discharging hot water in the cab; valve packing nut was loose. Apparently the squirt-hose valve had been used as a foot rest; the normal position of the hose was on the cab deck, no means were provided to hold it while not in use; one injured.

Four accidents; four injured.

MONONGAHELA RAILWAY:

**March 29, 1943, locomotive 181, Brownsville, Pa. Insufficient clearance between cab vertical handhold at gangway and corner of tender deck while on a sharp curve; one injured.

One accident; one injured.

NASHVILLE, CHATTANOOGA & ST. LOUIS RAILWAY:

September 29, 1942, locomotive 620, Bruceton, Tenn. Feed water pump and heater did not operate properly due to check valves in pump being held open by pieces of a broken brass nut; one injured.

October 10, 1942, locomotive 504, Nashville, Tenn. Superheater flue failed at defective safe end weld; one injured.

January 17, 1943, locomotive 251, Gleason, Tenn. Superheater flue broke off at defective safe end weld; one injured.

January 17, 1943, locomotive 405, Neely, Tenn. Crown-sheet failure caused by overheating due to low water; three injured.

January 24, 1943, locomotive 391, Ralston, Tenn. Petticoat pipe came off two of the three bolts which secured it to the base of smoke stack and swung to one side, causing back draft; petticoat pipe and supporting bolts were badly worn; one injured.

Five accidents; seven injured.

NEW YORK CENTRAL SYSTEM:

July 16, 1942, locomotive 2374, North Toledo, Ohio. Shaker-bar socket caught on opening in deck plate, account of shaker post being improperly offset; one injured.

**September 12, 1942, locomotive 2796, near Himrods Junction, N. Y. Tender coupler broke through pinhole; metal defective; one injured.

October 19, 1942, locomotive 2312, Lawrenceburg Junction, Ind. Lubricator steam supply pipe tail piece broke at collar and steam pipe pulled from connection; brass tail piece was not properly brazed to copper steam pipe; "Union on steam pipe to left lubricator leaks" was reported on October 17; one injured.

**November 20, 1942, locomotive (B. & A.) 1439, Chester, Mass. Hand-wheel of Precision type reversing gear spun rapidly, catching employee's hand; valve gear radius bar trunnion bolt, which was not properly secured in place, worked out and fouled the bell crank which caused the gear to jam, then the bolt bent and permitted the gear to spin; one injured.

**November 21, 1942, locomotive 7906, Williamsport, Pa. Cab ventilator cover stuck at ends and was difficult to open; one injured.

December 9, 1942, locomotive 2839, Cleveland, Ohio. Flue burst due to having been reduced in thickness by cinder cutting; two injured.

December 10, 1942, locomotive 4674, Watertown, N. Y. Injector did not operate properly; one injured.

December 16, 1942, locomotive 1950, Petersburg, Ind. Boiler check stuck open; one injured.

December 18, 1942, locomotive 2535, Geneva, N. Y. Handwheel of Precision type reversing gear spun rapidly out of control and handle on the wheel struck employee's arm; two nuts worked loose on the balance spring rod which allowed washer cup to drop out of place and foul spring housing casting, causing undue strain on spring which, when released after passing over center, caused the hand-wheel to spin violently; one injured.

February 9, 1943, locomotive 2969, Amsterdam, N. Y. A 3½-inch flue failed near back flue sheet, due to being reduced in thickness by cinder cutting; three injured.

March 7, 1943, locomotive 2176, Carson, Ohio. Employee fell from gangway steps, due to steps and handholds being frosted over account of excessive steam coming from under the cab and deck; union in condensate line was leaking, condensate line drain valve was open, and ashpan washout line was cracked; condensate line valve was frozen in open position while in the enginehouse and was not closed before departure, and ashpan washout line was cracked due to having been frozen while in the enginehouse; one injured.

*March 12, 1943, locomotive 2235, Cleveland, Ohio. Boiler check was leaking; one injured.

March 14, 1943, locomotive 2876, Utica, N. Y. A 3½-inch flue failed near back flue sheet, due to being reduced in thickness by cinder cutting; three injured.

March 19, 1943, locomotive 5442, Sandusky, Ohio. Section of a broken trailing truck spring leaf was thrown from a rapidly moving locomotive and struck an employee who was standing near the track; one injured.

*March 21, 1943, locomotive 4412, Chicago, Ill. Insufficient clearance between cab handhold at gangway and tender step when on curve; one injured.

April 18, 1943, locomotive 1823, Norwood, N. Y. Employee was burned by hot water which was discharged from injector overflow pipe due to leaky boiler check and injector steam valve; boiler check and/or injector were reported leaking on March 22, April 3, 8, 9, 16, and 17; one injured.

**April 28, 1943, locomotive 3004, Selkirk, N. Y. Tender filling hole cover fell shut and protruding locking bar struck employee's foot. When open the cover contacted vertical stops which prevented cover from being in any position other than that of practical unbalance; one injured.

May 14, 1943, locomotive 5242, near North Germantown, N. Y. Main steam pipe in front end failed, causing back draft through firebox; steam-pipe wall had been previously fractured, due to stress set up by a tapered oil atomizer plug having been forced into a tapped hole in steam pipe wall; two injured.

June 3, 1943, locomotive 3023, Wesleyville, Pa. Train stopped suddenly due to application of the automatic train control, caused by insufficient turbo-generator voltage; governor sleeve stuck on shaft due to scale formation and caused turbine to operate at insufficient speed; similar stops were made on the previous trip and "Generator not working" was reported at end of previous trip; one injured.

June 26, 1943, locomotive 2266, St. Francisville, Ill. Cast-iron steam pipe in front end burst; three injured.

June 29, 1943, locomotive 2806, Cleveland, Ohio. A 3½-inch flue failed near back flue sheet due to being reduced in thickness by cinder cutting; one injured.

Twenty-one accidents; 29 injured.

NEW YORK DOCK RAILWAY:

*June 18, 1943, locomotive 40, Fulton Terminal, N. Y. Water glass broke; one injured.

One accident; one injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 30, 1942, locomotive 278, Taunton, Mass. Reverse lever moved unexpectedly to front end of quadrant and struck employee's foot which was braced on a reducing valve; valves were out of square and had been so reported repeatedly during the 30 days preceding the accident; no foot brace provided near reverse lever; one injured.

September 8, 1942, locomotive 373, Waterford, Conn. Employee's foot was caught between reverse lever and reducing valve while he was operating manually operated reversing gear; no stop at front end of quadrant and no foot rest provided which could be used when operating reverse lever; one injured.

September 19, 1942, locomotive 3348, Cedar Hill, Conn. Cylinder cock stuck open; one injured.

December 1, 1942, locomotive 1326, Berlin, Conn. Eccentric rod broke through old fracture which extended over approximately 75 percent of cross-sectional area; one injured.

January 21, 1943, locomotive 402, Waterbury, Conn. Grate-shaker rod became disconnected; split key was missing from shaker-bar pin, allowing the pin to work out; one injured.

February 25, 1943, locomotive 391, Walpole, Mass. Injured while handling manually operated reversing gear; one injured.

**May 31, 1943, locomotive 1378, Cedar Hill, Conn. Broken flexible staybolt blew out of boiler after the cap had been removed while the boiler was under pressure; one injured.

Seven accidents; seven injured.

NEW YORK, ONTARIO & WESTERN RAILWAY:

*March 4, 1943, locomotive 459, Fallsburgh, N. Y. Main steam pipe broke off in front end; walls of steam pipe were not uniform in thickness due to the core having shifted or been misplaced; initial failure occurred where pipe wall was approximately ⅝ inch in thickness and through a large blowhole and a groove made across it when attempt was made to bronze weld the blowhole; only a small part of the welding applied had ever adhered to the pipe; one injured.

One accident; one injured.

NORFOLK & WESTERN RAILWAY:

July 7, 1942, locomotive 1204, Nolan, W. Va. Boiler explosion caused by overheating of firebox sheets due to absence of water on parts of the sheets because of the position of the locomotive which was derailed by collision; 2 killed, 22 injured.

*September 9, 1942, locomotive 1474, Pageton, W. Va. Hole worn through sand pipe; one injured.

**March 4, 1943, locomotive 124, Waynesboro, Va. Stoker failed due to stoker engine thrust bearing being broken and a compaction of frozen fine coal in stoker trough which caused excessive load on stoker engine; stoker was reported on February 4, 5, 6, and 21; one injured.

**May 3, 1943, locomotive 128, Hagerstown, Md. Nipple blew out of air blower hose; one injured.

Four accidents; 2 killed, 25 injured.

NORTHWESTERN PACIFIC RAILROAD:

*November 27, 1942, locomotive (S. P.) 2339, Willits, Calif. Insufficient clearance between bottom end of vertical handhold and bottom gangway step when on curve; one injured.

One accident; one injured.

PENNSYLVANIA RAILROAD:

July 25, 1942, locomotive 7481, Ashtabula, Ohio. Insufficient clearance between cab gangway handhold and tender gangway step casting when on sharp curve; one injured.

August 17, 1942, locomotive 4149, Ridley Park, Pa. Grease-cup cap at back end of main rod worked off due to defective threads; cap could be inserted in bushing to within ¼ inch of shouldered joint without thread engagement, and was apparently known to be defective when applied just prior to the trip on which the accident occurred; one injured.

September 5, 1942, locomotive 1433, near Seymour, Ind. End cover of turbo-generator was thrown from rapidly moving locomotive; lug at front end of the hinged portion of cover broke through old fracture, hinge pin lost out, and thumb screw for securing the bottom of cover did not hold; half of the wall surrounding hole in the hinge lug on generator body was broken out and the remainder cracked; one injured.

September 5, 1942, locomotive 6742, Columbia, Pa. Handwheel came off stem of squirt hose valve while hose was being used; handwheel was loose on valve stem; one injured.

November 14, 1942, locomotive 520, near Cresson, Pa. Crown-sheet failure caused by overheating due to low water; three killed, two injured.

November 17, 1942, locomotive 5708, Newark, N. J. Bell ringer was inoperative; bell-ringer piston and cylinder were worn; one injured.

December 5, 1942, locomotive 4188, near New Brunswick, N. J. Crown-sheet failure caused by overheating due to low water; two injured.

*December 10, 1942, locomotive 1489, Philadelphia Road, Ohio. Driving journal became overheated; one injured.

**December 22, 1942, locomotive 6936, Enola, Pa. Employee fell into open manhole on tender water tank; manhole-cover latch was missing; one injured.

January 7, 1943, locomotive 3772, Plymouth, Ind. Boiler check stuck open; boiler check was reported defective on January 4, 5 (twice), 6, and 7 (prior to the accident); one killed.

January 10, 1943, locomotive 4400, Williamsport, Pa. Failure of air pressure, caused by leaks at train pipe nipple at distributing valve and at main reservoir supply pipe union to rotary valve of power reversing gear; nipple in train pipe was fractured; nipple was out of alignment with distributing valve; one end of union of pressure supply pipe was fractured and threads were stripped; union was also out of alignment; driving box wedges and rods had been repeatedly reported, which condition aggravated the strains due to improper alignment; "Supply pipe leaks at air reverse rotary" was reported at end of the previous trip; one injured.

February 10, 1943, locomotive 3879, Valparaiso, Ind. Superheater flue failed due to corrosion and the presence of scale which caused overheating at the point of the failure; one injured.

February 11, 1943, locomotive 818, Marietta, Pa. Back end of left main rod dropped down on ties, caused by the failure of improper and defective keying of the back end brasses; "Key back end of right and left main rod brasses" was reported on February 10; one injured.

February 24, 1943, locomotive 5138, Northumberland, Pa. Abrupt offset in cab vertical handhold at gangway caused employee to lose hold on the handhold and fall to the ground; one injured.

February 28, 1943, locomotive 5468, near Shreve, Ohio. Headlight bulb shattered; one injured.

**March 7, 1943, locomotive 6859, Atwood, Ind. Grate became disconnected; hole was burned in left back section of grates and grate shaker rod to left front section of grates was burned off; one injured.

March 20, 1943, locomotive 5476, Middlepoint, Ohio. Main crank pin broke flush with face of wheel center hub, due to old fractures which extended through approximately 65 percent of cross-sectional area; fillet where the fractures occurred was roughly cut; one injured.

**April 1, 1943, locomotive 9104, Columbus, Ohio. Handrail on side of cab broke through old fractures in bends at both ends, causing employee to fall from running board; one injured.

April 7, 1943, locomotive 3771, Montgomery, Pa. Engine truck bearing overheated; a piece of the outside face of oil cellar was broken out and imbedded in the sponging, badly scoring the journal; cellar cover plate was not proper fit and the sponging was dry; truck boxes were reported running hot on March 9, 11, and 30; one injured.

*April 14, 1943, locomotive 507, Jersey City, N. J. Oil on tender deck caused employee to slip and fall; one injured.

*April 22, 1943, locomotive 5442, Conesville, Ohio. Piece of spring from tender entered coach and struck passenger; one injured.

May 5, 1943, locomotive 1449, Grapeville, Pa. Driving spring hanger broke and gib from bottom end of hanger was thrown from the locomotive and struck a person who was standing on station platform; one injured.

May 10, 1943, locomotive 6800, Pittsburgh, Pa. Broken leaves in right No. 1 tender truck spring released the weight on the wheel, resulting in derailment of the locomotive, tender, and seven cars of the train; two injured.

June 12, 1943, locomotive 8014, Everson, Pa. Squirt valve leaking, due to valve seat being cut; one injured.

**June 16, 1943, locomotive 6858, between Philadelphia and Enola, Pa. Stoker valve stem packing was leaking; one injured.

June 22, 1943, locomotive 6769, Frazeyburg, Ohio. Grease cup cap was thrown from butt end of main rod and struck two trackmen; cap was too small to properly engage threads in rod grease cavity; two injured.

Twenty-six accidents; 4 killed, 29 injured.

PENNSYLVANIA-READING SEASHORE LINES:

February 26, 1943, locomotive (P. R. R.) 1766, Glassboro, N. J. Smoke-box door sagged and did not open properly due to a badly worn hinge; one injured.

One accident; one injured.

PITTSBURGH & LAKE ERIE RAILROAD:

**March 13, 1943, locomotive 7296, near Youngstown, Ohio. Folding cab seat collapsed, causing employee to fall; screws came out of the support for the diagonal seat brace; one injured.

One accident; one injured.

PITTSBURGH & WEST VIRGINIA RAILWAY:

November 27, 1942, locomotive 1103, Horning, Pa. Crank pin broke through old fracture inside wheel fit; one injured.

One accident; one injured.

PORT TERMINAL RAILROAD ASSOCIATION:

*June 2, 1943, locomotive (M. P.) 357, Houston, Tex. Bell cord broke; one injured.

One accident; one injured.

RAPID CITY, BLACK HILLS & WESTERN RAILROAD:

July 1, 1942, locomotive 15, Water Tank, S. Dak. Crown-sheet failure caused by overheating due to low water; both injector feed pipe strainers were found partially stopped up with parts of birds' nests and the strainers around tank wells were not fastened in any manner and were not effective in preventing foreign matter from reaching the feed pipe strainers; one injured.

One accident; one injured.

READING COMPANY:

July 10, 1942, locomotive 1305, Reading, Pa. Manually operated reverse lever swung back suddenly and struck employee's hand; no stop provided at forward end of reverse-lever quadrant, permitting lever to travel beyond the teeth on quadrant and not be latched when moved to full forward position; one injured.

One accident; one injured.

RUTLAND RAILROAD:

July 8, 1942, locomotive 84, Alburgh, Vt. Nuts on stud securing right injector starting valve to side of boiler were loose; employee slipped from running board while going to tighten the nuts; one injured.

One accident; one injured.

ST. LOUIS-SAN FRANCISCO RAILWAY:

October 19, 1942, locomotive 4507, St. Louis, Mo. Feed water heater pump did not operate properly due to heater valve being open; handwheels of heater valve and headlight generator throttle were almost touching and quite easily confused, which apparently resulted in the opening of heater throttle when attempting to start the generator; one injured.

**February 8, 1943, locomotive 1244, Birmingham, Ala. Adjusting rod to clear vision window was disconnected; one injured.

Two accidents; two injured.

SEABOARD AIR LINE RAILWAY:

September 12, 1942, locomotive 367, Monroe, N. C. Boiler check valve stuck open, due to accumulation of scale in barrel of check body; "Left boiler check hangs up bad" was reported on September 12, before the locomotive was dispatched on this trip; one injured.

September 23, 1942, locomotive 2493, Parsons, Ala. Blow-off cock valve stuck open; one injured.

October 13, 1942, locomotive 249, near Hoffman, N. C. Crown-sheet failure caused by overheating due to low water; two killed, one injured.

October 27, 1942, locomotive 224, Withla, Fla. Main crank pin broke through old fracture at wheel hub; main rods and/or wedges were reported pounding on October 16, 18, 23, and 26; valves were reported not square on October 11, 14, 16 (twice), 17, 23, and 26; one killed, one injured.

November 7, 1942, locomotive 201, Live Oak, Fla. Grate-shaker bar slipped off lever; shaker bar was not carrier's standard; one injured.

December 22, 1942, locomotive 607, Rutherford, Ala. Headlight bulb and socket worked out of holder; thumb screw provided for securing holder in the adjuster was not properly tightened; one injured.

**January 5, 1943, locomotive 201, Jacksonville, Fla. Oil on shaker bar; oil leaked or spilled from cans containing extra supply of lubricating oil which were being carried on cab floor; one injured.

**March 12, 1943, locomotive 820, Hialeah, Fla. Throttle lever hard to operate; one injured.

**May 14, 1943, locomotive 217, Jacksonville, Fla. Mechanically operated fire door overtraveled when opened and struck and broke water-glass drain pipe; one injured.

June 2, 1943, locomotive 252, Jordans, N. C. Defective squirt hose; attempt had been made to repair the worn hose by wrapping it with friction tape and the tape failed, allowing hot water to escape; one injured.

June 3, 1943, locomotive 224, near Okeechobee, Fla. Crown-sheet failure caused by overheating due to low water; lamp for left water glass obstructed the fireman's view of the water glass from his seat in the cab; two injured.

**June 26, 1943, locomotive 217, Sebring, Fla. Squirt hose pipe broke; one injured.

Twelve accidents; 3 killed, 13 injured.

SOUTH BUFFALO RAILWAY:

May 4, 1943, locomotive 26, Lackawanna, N. Y. Bonnet in dome blow-off valve blew out, due to improper fit; blow-off valve body was worn and bonnet union nut was too large for body, causing threads to strip; one injured.

One accident; one injured.

SOUTHERN RAILWAY:

August 25, 1942, locomotive 1348, Alexandria, Va. Steam-heat valve leaking; one injured.

December 3, 1942, locomotive 4552, Huntingburg, Ind. Ice formed in distributing valve; one injured.

December 11, 1942, locomotive 4879, near Brown Summit, N. C. Crown-sheet failure caused by overheating due to low water; feed water pump inoperative, broken reversing valve rod in one side of pump and water-piston packing missing in opposite side of pump; two injured.

December 18, 1942, locomotive 6593, Picayune, Miss. Ashpan blower nozzle became disconnected from pipe in ashpan; threads badly worn in blower nozzle and on end of nipple which screwed into nozzle; one injured.

January 3, 1943, locomotive 6627, near Collinsville, Ala. Crown-sheet failure caused by overheating due to low water; one killed, two injured.

February 17, 1943, locomotive 1586, Mobile, Ala. Grate-shaker fulcrum arm became disconnected at lower end of operating shaft, due to connecting nut working off; threads on end of shaft were not of sufficient length to engage the standard nut and no means were provided for securing nut in place; one injured.

*February 28, 1943, locomotive 6906, Hillsdale, Miss. Side-rod collar broke, permitting front end of side rod to come off crank pin; one injured.

**May 4, 1943, locomotive 1298, Brevard, N. C. Insufficient clearance between tender deck and cab gangway handhold when on a sharp curve; one injured.

May 24, 1943, locomotive 616, New Orleans, La. Squirt hose burst; one injured.

**June 22, 1943, locomotive 728, South Point, La. Grate-shaker bar slipped off lever due to improper fit; inside of shaker-bar socket and top edges of shaker levers were burred, preventing bar from slipping down to proper seat on levers; one injured.

Ten accidents; 1 killed, 12 injured.

SOUTHERN PACIFIC—LINES EAST:

August 24, 1942, locomotive (T. & N. O.) 920, near Wendell, Tex. Board missing from engine deck; one injured.

October 31, 1942, locomotive (T. & N. O.) 895, Kaufman, Tex. Handrail was loose at connection to pilot beam; stud for securing handrail was broken; one injured.

**November 2, 1942, locomotive (T. & N. O.) 377, Orange, Tex. Manually operated reversing gear was difficult to operate account of reversing arm fouling the top of right front spring hanger; "Rocker arm rubbing R. F. spring hanger" was reported on November 1 and "Reach rod chafing top of spring hanger, unable to reverse engine at times" was reported on November 3, showing that proper repairs were not made to the defect reported before the accident; one injured.

**November 21, 1942, locomotive (T. & N. O.) 633, Midland, La. Insufficient clearance between steam whistle shaft lever and power reversing gear steam valve extension rod; one injured.

November 30, 1942, locomotive (T. & N. O.) 918, Longfellow, Tex. Employee slipped on tender fuel-oil tank, due to oil on top of the tank adjacent to the oil measuring rod; one injured.

December 28, 1942, locomotive (T. & N. O.) 392, San Antonio, Tex. Gas explosion in oil-fired firebox; one injured.

December 29, 1942, locomotive (T. & N. O.) 916, Alpine, Tex. Feed water pump failed; pump became steam-bound due to defective boiler check; pump was reported on November 22, 26, 29, and December 2, 20, 23, and 30; one injured.

March 16, 1943, locomotive (T. & N. O.) 514, West Port Arthur, Tex. Insufficient clearance between vertical gangway handhold on cab and top gangway step when on curve; one injured.

June 16, 1943, locomotive (T. & N. O.) 985, Chispa, Tex. Driving-wheel tire broke, due to a progressive fracture; one injured.

Nine accidents; nine injured.

SOUTHERN PACIFIC—LINES WEST:

**September 4, 1942, locomotive 4139, Armet, Ore. Main throttle was difficult to operate; cam shaft fork for raising No. 8 throttle valve was broken off; one injured.

**September 12, 1942, locomotive 2809, between Grass Lake, Calif., and Klamath Falls, Ore. Rough-riding locomotive; rods and boxes were reported pounding on August 19, September 1, 2 (twice), 3, 7, and 12 (twice after the accident); one injured.

September 26, 1942, locomotive 2800, Roseville, Calif. Filling hole cover of tender fuel-oil tank was not properly tightened, permitting fuel oil to be sprayed on the right-of-way and into the cab where it became ignited; nut missing from one of the three bolts for securing filling hole cover; one killed.

October 22, 1942, locomotive 4180, Roseville, Calif. Hole in squirt hose; one injured.

**November 2, 1942, locomotive 1214, Yuma, Ariz. Cover plate missing from drawbar pinhole in cab deck; one injured.

**November 13, 1942, locomotive 2586, Klamath Falls, Ore. Stiffening board was torn from one side of cab back drop curtain; one injured.

December 1, 1942, locomotive 2648, Yuma, Ariz. Reflex water glass burst; one injured.

December 16, 1942, locomotive 1784, Porterville, Calif. Injector steam-pipe spanner nut came off injector; spanner nut was cracked and too large for proper fit and threads were distorted; spanner nut bore evidence of a chisel and hammer having been used to tighten it; one injured.

*January 6, 1943, locomotive 2424, Dixon, Calif. Cab storm window broke; one injured.

*March 12, 1943, locomotive 4312, Indio, Calif. Squirt-hose valve worked open; one injured.

*June 10, 1943, locomotive 2650, Eugene, Ore. Grease on locomotive step caused employee to fall to the ground; one injured.

Eleven accidents; 1 killed, 10 injured.

SPOKANE, PORTLAND & SEATTLE RAILWAY:

November 8, 1942, locomotive (G. C. & W. R.) 1, Astoria, Ore. Crown-sheet failure caused by overheating due to low water; one killed.

One accident; one killed.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS:

July 30, 1942, locomotive 152, St. Louis, Mo. Squirt hose burst; hose deteriorated; one injured.

One accident; one injured.

TEXAS & PACIFIC RAILWAY:

August 27, 1942, locomotive 638, Fort Hancock, Tex. Blow-off cock stuck open; excessive play between the valve disk carrier and disk carrier shaft together with worn lugs on disk carrier permitted the operating arm to overtravel and stop on center, eliminating all leverage, and prevented blow-off cock from being closed from the cab with the operating mechanism; one injured.

January 1, 1943, locomotive 624, Annetta, Tex. Employee slipped due to oil on top of tender water tank; apparently the oil leaked from around loose rivets in anchor lugs at back end of the fuel oil tank; one injured.

Two accidents; two injured.

UNION RAILROAD:

April 25, 1943, locomotive 128, Rankin, Pa. Squirt hose badly deteriorated; one injured.

One accident; one injured.

UNION PACIFIC RAILROAD:

August 31, 1942, locomotive 3911, near Ridge, Wyo. Main rod broke, due to an old fracture, and rear portion of the rod struck and punched a hole in inside throat sheet; pounds in rods and driving boxes had been reported 12 times in the 30 days preceding the accident; three injured.

**October 6, 1942, locomotive 256, Cheyenne, Wyo. Foot pedal of manually operated fire door was broken; one injured.

October 30, 1942, locomotive (L. A. & S. L.) 6070, Emmett, Idaho. Crown-sheet failure caused by overheating due to low water; one injured.

November 28, 1942, locomotive 3220, Mosier, Ore. Tie-up rope on one side of cab curtain was missing, allowing curtain to drop unexpectedly when one side was released; one injured.

**March 11, 1943, locomotive 5070, Latimer, Utah. Injector water valve stem stuck open; one injured.

May 11, 1943, locomotive 7866, Portland, Ore. Washout plug blew out of boiler back head, due to not having been properly tightened; attempted to tighten the leaking plug while under pressure; two injured.

Six accidents; nine injured.

WABASH RAILROAD:

August 22, 1942, locomotive 2906, Blakesley, Ohio. Link block pin worked out, due to taper keys securing it to radius rod shearing off; pin had been loose and working in radius rod fits for some time; one injured.

**November 2, 1942, locomotives 2815 and 2917, Fort Wayne, Ind. Air-hose coupling parted between the locomotives, causing sudden stop; air hose did not have sufficient length when locomotives were coupled pilot to pilot to remain coupled when slack was taken up; two injured.

January 27, 1943, locomotive 614, Manhattan, Ill. Throttle lever suddenly flew back, striking employee; throttle lever latch spring was too weak to properly seat latch teeth in quadrant; one injured.

**February 13, 1943, locomotive 2321, Decatur, Ill. Headlight generator failed, due to open coil in armature; one injured.

Four accidents; five injured.

WESTERN PACIFIC RAILROAD:

August 6, 1942, locomotive 329, Red Rock, Calif. Feed water pump did not operate properly; tubes in heater header were leaking excessively and trap in condensate line did not prevent overheating of the feed water which caused the pump to become steambound; "Water pump stops often and hard to start. Examine condensate trap for this trouble. Pack water ends to both water pumps" was reported on July 24; one injured.

October 27, 1942, locomotive 155, Oakland, Calif. Insufficient clearance between handle of manually operated reversing gear and back rest of seat box in cab; one injured.

**October 29, 1942, locomotive 33, Oroville, Calif. Tender tool box door hinges broke, permitting the door to fall on employee's foot; door was insufficiently supported by two lightweight strap hinges, both of which showed old fractures; one injured.

Three accidents; three injured.

WHEELING & LAKE ERIE RAILWAY:

June 27, 1943, locomotive 6011, Jewett, Ohio. Injector operating valve stem broke through collar at valve end, then overtraveled and broke off at back end and was thrown through cab window; one injured.

One accident; one injured.

ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1943, 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:

**July 3, 1942, unit 12-A, near San Bernardino, Calif. Crank-case explosion occurred in No. 1 engine of Diesel-electric unit due to a scored piston and scored and cracked cylinder liner; one injured.

**October 23, 1942, unit 111-A, Fields, Ariz. Motor series contactor overheated and fused due to heavy load; one injured.

**October 26, 1942, unit 2357, (place not shown). Insufficient clearance between brake head and sand pipe; one injured.

Three accidents; three injured.

ATLANTIC COAST LINE RAILROAD:

December 18, 1942, unit 506, near Wilder, S. C. Crank-case explosion occurred in No. 1 engine of Diesel-electric unit due to an overheated piston and connecting rod; one injured.

One accident; one injured.

CHICAGO & NORTH WESTERN RAILWAY:

**January 21, 1943, unit 5007-A, Milwaukee, Wis. Handle disconnected from door to engine-room compartment of Diesel-electric unit; one injured.

April 7, 1943, unit 1002, Chicago, Ill. Runway in engine room was badly worn and the diamond-shaped depressions, which were formed by the beading, were filled with oily dirt, making the runway very slippery; one injured.

Two accidents; two injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY:

August 7, 1942, unit 630, Cedar Rapids, Iowa. Crank-case explosion occurred in No. 1 engine of Diesel-electric unit, caused by a broken piston head; three injured.

June 21, 1943, unit 621, near El Reno, Okla. Radiator hose of No. 2 engine of Diesel-electric unit burst, due to being badly deteriorated; one injured.

Two accidents; four injured.

LONG ISLAND RAILROAD:

August 12, 1942, unit 342-B, Corona, N. Y. Flash occurred in cab of electric unit while attempt was being made to smother or brush burning insulation without deenergizing the current-carrying parts; two injured.

One accident; two injured.

NEW YORK CENTRAL RAILROAD:

**May 15, 1943, unit 633, Detroit, Mich. Independent brake valve cap was broken; one injured.

One accident; one injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

August 23, 1942, unit 0305, Darien, Conn. Burned by flash from switch group; "Examine AC switch groups" was reported on August 22; one injured.

One accident; one injured.

PENNSYLVANIA RAILROAD:

**August 25, 1942, unit 4790, Odenton, Md. Headlight glass dropped out; one injured.

March 10, 1943, unit 4781, Baltimore, Md. Coupler broke through pivot pinhole, resulting in emergency application of the brakes; old fractures extended through approximately 65 percent of cross-sectional area of coupler shank at the point of the failure; one injured.

*April 21, 1943, unit 4662, Hellam, Pa. No. 1 fan switch caught fire; one injured.

Three accidents; three injured.

SPOKANE, PORTLAND & SEATTLE RAILWAY:

*February 23, 1943, unit 60, Albany, Oreg. Trolley pole pulled out of socket, due to the clamp for holding pole in socket not having been properly tightened; one injured.

One accident; one injured.

TABLE XII.—Number of steam locomotives inspected,

	Chicago, Pacific	Rock Island & Chicago, St. Paul, Minneapolis & Omaha	Chicago, West Pullman & Southern	Cincinnati Union Terminal	Clinchfield	Colorado & Southern	Colorado & Wyoming	Columbus & Greenville	Conemaugh & Black Lick	Copper Range	Cumberland & Pennsylvania	Davenport, Rock Island & North Western	Delaware & Hudson	Delaware, Lackawanna & Western
1 Air compressors	71	5	1		2	3							2	8
2 Arch tubes	1													
3 Ashpans and mechanism	1				2	1								
4 Axles	6													
5 Blow-off cocks	69													
6 Boiler checks	46	2			1							3	1	
7 Boiler shell	18											2	1	
8 Brake equipment	181	17	1		19	4	1	1		1		4	25	
9 Cabs, cab windows, and curtains	97	1			5	6						11	6	
10 Cab aprons and decks	22	1			3	1	1						1	
11 Cab cards	3		2										2	
12 Coupling and uncoupling devices	1												1	
13 Crossheads, guides, pistons, and piston rods	206	2			9	8	1						2	16
14 Crown bolts	5		1											
15 Cylinders, saddles, and steam chests	121	2			12	6	1	2		1			15	6
16 Cylinder cocks and rigging	28		2		12	2								
17 Domes and dome caps	11						1						1	9
18 Draft gear	41	2	3		1	5						5	3	
19 Draw gear	27	1			3	3						1	3	
20 Driving boxes, shoes, wedges, pedestals, and braces	204	8			11	15						3	20	
21 Firebox sheets	57				1								3	
22 Flues	15													
23 Frames, tail pieces, and braces, locomotive	38	2			11	8							2	
24 Frames, tender	2				1									
25 Gages and gage fittings, air	16	1											4	1
26 Gages and gage fittings, steam	39	1			1	1	2					4	2	2
27 Gage cocks	51				1	1						3	2	
28 Grate shakers and fire doors	55	1	1		1	4						4	6	
29 Handholds	18	1			1	3							8	
30 Injectors, inoperative	3													
31 Injectors and connections	192	6			8	13						18	19	
32 Inspections and tests not made as required	428	37	5		35	39	5	1			2	48	90	
33 Lateral motion	70				6	5							4	1
34 Lights, cab and classification	5	1											2	
35 Lights, headlight	14				2	2							6	1
36 Lubricators and shields	54				1								1	
37 Mud rings	29				1								1	
38 Packing nuts	58	1			2	10	2					3	4	
39 Packing, piston rod and valve stem	49	1	1		2	5				1			21	
40 Pilots and pilot beams	12				2	2							2	
41 Plugs and studs	23												1	3
42 Reversing gear	44	3			1	5							1	3
43 Rods, main and side, crank pins, and collars	167	10			18	20	1					5	27	
44 Safety valves	4													
45 Sanders	44	2			1	6							7	7
46 Springs and spring rigging	291	13	1		22	16							14	30
47 Squirt hose	2				1									
48 Stay bolts	36												3	1
49 Stay bolts, broken	5		4			2								
50 Steam pipes	22					1								6
51 Steam valves	11	1												2
52 Steps	143	7			3	4							3	2
53 Tanks and tank valves	123	7			3	6	2						3	24
54 Telltale bores	3	1	1											
55 Throttle and throttle rigging	69	5			1	2	1						8	11
56 Trucks, engine and trailing	66	1			11	5							3	4
57 Trucks, tender	29	4			19	3							2	4
58 Valve motion	75	2			12	2	1						3	6
59 Washout plugs	78	1			2	2							2	3
60 Train-control equipment														
61 Water glasses, fittings, and shields	146	8	2		1								9	12
62 Wheels	39	1				7							4	6
63 Miscellaneous—Signal appliances, badge plates, brakes (hand)	83	2			13	2							5	7
Number of defects	3,758	155	25		239	245	22	4		8			197	437
Locomotives reported	754	243	13	14	77	91	21	27	32	11	11	10	370	363
Locomotives inspected	2,990	788	37	8	228	264	8	29	58	14	14	31	1,360	1,240
Locomotives defective	737	41	7		50	46	5	1					52	119
Percentage of inspected found defective	25	5	19		22	17	17	1.7					3.8	10
Locomotives ordered out of service	42				3	5	1							2

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

	Denver & Rio Grande	Denver & Salt Lake	Detroit & Mackinac	Detroit & Toledo Shore Line	Detroit Terminal	Detroit, Toledo & Ironton	Donora Southern	Duluth, Missabe & Iron Range	Duluth, South Shore & Atlantic	Elgin, Joliet & Eastern	Erie	Florida East Coast	Fort Worth & Denver City	Georgia & Florida	Georgia	Grand Trunk Western	Great Northern	Green Bay & Western	Gulf Coast Lines	Gulf, Colorado & Santa Fe	Gulf, Mobile & Ohio	Harbor Belt Line	Houston Belt & Terminal	Illinois Central
10	10			3		1			4	7	11	2	3	3		1	7				20	2	3	1
11	1										1						1				1			2
12											7						4				3			3
13	3										3						9				5			4
14	22		2	3	3	2	1		2	7	1						14			1	3			5
15	11										6						36			1	2			3
16	7										4						6				2			7
17	2										1						23				2			3
18	2										3						4				3			9
19	24	2	1						1	7	26	5	2	4	1	2	14				10			10
20	27	2	1								3						36			1	15			26
21	1										4						6				2			8
22	7										1						23				2			7
23	2										3						4				2			3
24	24	2	1								26	5	2	4	1	2	14				3			9
25	27	2	1								3						6				2			10
26	1										64		3				14				1			14
27	1										25						15				2			11
28	7										4						2				6			16
29	3										16						1				1			4
30	47								1	27	10	2	5	1		1	5				5			13
31	2										7						8				1			18
32	10										7						7				3			19
33	2										10	2	12	4			20		1		7			20
34	1										3	6	1	1			1				1			4
35	17										1						19		2		6			22
36	3										7						1				1			10
37	12										3						3				3			24
38	2										9		2				1				1			25
39	17										3	1	2				8				5			4

TABLE XII.—Number of steam locomotives inspected,

Table with columns for locomotive parts (Air compressors, Arch tubes, Ashpans, etc.) and rows for various regions (Nevada Northern, New York, etc.). Includes a summary row for 'Number of defects' and 'Locomotives reported'.

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

Table with columns for locomotive parts (Northwestern Pacific, Pacific Electric, Patasco & Back Rivers, etc.) and rows for various regions (Reading, Richmond, etc.). Includes a summary row for 'Number of defects' and 'Locomotives reported'.

TABLE XII.—Number of steam locomotives inspected,

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

Parts defective, inoperative or missing, or in violation of the rules	South Buffalo	Southern Pacific, lines east	Southern Pacific, lines west	Southern Pacific of Mexico	Southern	Spokane International	Spokane, Portland & Seattle	Steelton & Highspire	Tennessee Central
Air compressors		1	20		13		10		2
Arch tubes					2				
Ashpans and mechanism			1		1				
Axles									
Blow-off cocks			10		6		1		2
Boiler checks			17		15		5		1
Boiler shell			30		8		22		
Brake equipment		2	52		56		1	13	
Cabs, cab windows, and curtains		1	20		14		13	2	1
Cab aprons and decks		2	8		7		3		
Cab cards		1	6		2				
Coupling and uncoupling devices			1		1		1		
Crossheads, guides, pistons, and piston rods		1	90		26		8		4
Crown bolts		1	6		2				
Cylinders, saddles, and steam chests			94		27		2	3	7
Cylinder cocks and rigging		2	6		5		2	1	
Domes and dome caps			1						
Draft gear			22		16		6		
Draw gear		1	7		5				1
Driving boxes, shoes, wedges, pedestals, and braces		5	49		43		4		2
Firebox sheets			11		8		11		
Flues		2	9		8		7	1	
Frames, tail pieces, and braces, locomotive			39		23		11		2
Frames, tender			3		6				
Gages and gage fittings, air		2	11		4		1		
Gages and gage fittings, steam		1	12		2		2		
Gage cocks		4	22		11		2		4
Grate shakers and fire doors			9		6		4		
Handholds			6		11		2		
Injectors, inoperative		1	9		5				
Injectors and connections		7	124		40	2	17		9
Inspections and tests not made as required		1	17	407	161	5	100	7	17
Lateral motion			5		1		3		8
Lights, cab and classification			15		5		1		
Lights, headlight		1	8		14		4		
Lubricators and shields			10						
Mud rings		1	6		2		2		2
Packing nuts			36		11		2		2
Packing, piston rod and valve stem		1	24		8			2	1
Pilots and pilot beams			3		2				2
Plugs and studs		3	16		2		1		
Reversing gear		1	7		7		3		2
Rods, main and side, crank pins, and collars		1	88		29		12	1	12
Safety valves			2						
Sanders		1	22		7	1	16		
Springs and spring rigging		2	57		42		29		16
Squirt hose			8		2		2		
Stay bolts			24		6		1		1
Stay bolts, broken			7				52		
Steam pipes			14		3	1	2	1	2
Steam valves					2		1		
Steps		2	8		8	2	1		3
Tanks and tank valves		1	53		18		9		4
Telltale holes			5				2		
Throttle and throttle rigging		1	26		13		10	3	1
Trucks, engine and trailing		1	24		24		1		1
Trucks, tender			34		14				4
Valve motion		2	8		17		1		2
Washout plugs			15		9		2		3
Train-control equipment									
Water glasses, fittings, and shields		2	156		30		8		6
Wheels		7	25		8	2	8		3
Miscellaneous—Signal appliances, badge plates, brakes (hand)		3	19		29		6		2
Number of defects	10	78	1,847		840	13	421	24	138
Locomotives reported	28	464	1,517	19	1,537	12	101	13	34
Locomotives inspected	30	831	3,665		3,318	19	257	27	160
Locomotives defective	3	20	552		210	5	103	7	37
Percentage of inspected found defective	10	2.4	15		6	26	40	26	23
Locomotives ordered out of service		1	11		6		3		5

	Tennessee Coal, Iron & Terminal R. R. Assn. of St. Louis	Texas & Pacific	Texas Pacific—Missouri Pacific Terminal of New Orleans	Toledo, Peoria & Western	Toledo Terminal	Toronto, Buffalo & Hamilton	Union Pacific	Union	Upper Merion & Plymouth	Utah	Virginian	Wabash	Washington Terminal	Western Maryland	Western Pacific	Wheeling & Lake Erie	Roads with less than 10, and industrial locomotives	Total defects
							36	3	1		8	2	12	1	2		57	968
							3	1									1	50
							3	1									4	71
							3	1									4	15
							17	1									8	291
							43	1	2								16	503
							18				4						10	377
							78	3	2		23	9	7	2	4	1	171	2,661
							13	13	4		1	3	1	4	6	1	64	1,102
							35				2						22	390
							5				2						28	142
							5				1						9	66
							39	1	3		8	18	7		13		49	1,961
							2										5	66
							38	1									67	1,395
							14				10	7	2	2	1	3	34	430
							35				2	2	1				67	1,395
							6										7	196
							21	1	2		2	2					76	599
							12				4	1	1	1			40	469
							35				9	16					20	2,053
							4				3	3	1	2	2	1	14	303
							5				1						26	215
							46				4	5	1	2		3	32	894
							3				1						3	86
							15				2			2			19	191
							26				6		1				40	584
							1				1	1					27	492
							18				3	1	1				73	483
							4										4	66
							3				6	1					141	2,637
							4				13	7	15		2	7	477	9,037
							26				41	46	25	11	50	18	32	700
							4				2	8					3	184
							3				2						2	184
							11				5		3				1	9
							12				2	2					9	292
							8				3						12	256
							22				3	5	3				56	669
							12				2	4	1	2	1		77	724
							23				9	4	1				22	194
							1				3						11	259
							3				1						2	452
							17				3		1				162	2,798
							35				9	15	8	11	2	4	5	74
							8						3	3			34	642
							16				1	3	3				119	3,583
							119				5	8	3	1	7	4	9	92
							10				5	1	1				10	367
							1				1						62	247
							11				1		3				11	414
							2					2	4				6	159
							13				1	3	2	3	3		94	729
							48				1	5	4	3	2	3	56	1,321
							1				1						10	78
							19				1		2	3	1		52	887
							26				13						57	1,020
							6						3				85	900
							16				15					29	1	998
							13				3		4			3	37	685
							29				1	5	4		11		17	9
							47				5	1					99	1,454
							15				3	1					110	728
							60				1		2				31	1,142
																		63
	25	63					1,633	106	109		320	200	126	43	175	58	2,866	51,350
	49	101	279				13	1,446	122	10	12	103	379	24	228	170	1,631	43,064
	17	159	634				5	4,218	123	67	29	243	1,211	56	773	444	396	2,897
	4	28						420	15	29		59	60	26	13	55	18	645
	24	18						10	12	43		24	5	46	1.7	12	4.5	22
	2	2						6	4	4		5	1					45

TABLE XIII.—Summary of comparison of the percentage of steam locomotives inspected and found defective, with the number ordered out of service for the years ended June 30, on roads reporting on 10 or more locomotives

Road	Percentage inspected defective 1							Ordered out of service						
	1943	1942	1931	1929	1927	1925	1923	1943	1942	1931	1929	1927	1925	1923
Alabama, Tennessee & Northern	3.3	6	14	47	42	56	38	0	0	1	12	1	5	0
Albany & Southern	63	57						2	2					
Albany & Southern	9	3.9	0	31	26	69	0	0	0	0	0	0	0	0
Albany & Southern	28	10	8	0	3	14	35	75	1	0	0	3	5	9
Albany & Southern	0	0	0	9	25	71	97	0	0	0	0	2	15	24
Albany & Southern	12	10	8	14	24	32	49	12	8	9	14	40	30	84
Albany & Southern	36	53						0	2					
Albany & Southern	4.6	5	4	6	9	23	27	0	0	0	0	1	4	1
Albany & Southern	6	4.5	4.3	27	40	54	78	1	0	0	2	8	12	6
Albany & Southern	19	40						0	2					
Albany & Southern	10	12	6	10	16	100		0	1	0	1	0	0	
Albany & Southern	14	10	14	10	30	35	58	11	9	7	2	4	15	45
Albany & Southern	8	6	4.4	16	39	52	62	17	15	11	27	104	113	153
Albany & Southern	1	3.3	5	31	43	28	50	0	0	1	1	3	1	6
Albany & Southern	0	2.9	4.3	35	54	51	66	0	0	0	4	5	4	6
Albany & Southern	4.6	3.7	12	22	21	63	43	0	0	1	6	1	1	2
Albany & Southern	15	13	13	16	23	36	67	4	1	6	3	13	23	191
Albany & Southern	0	6	47	16				0	0	0	0			
Albany & Southern	0	2.6						0	0	0	0			
Albany & Southern	13	13	37	34	50	50	84	0	1	5	7	30	24	4
Albany & Southern	16	15	25	32	44	56	76	0	0	2	1	4	0	5
Albany & Southern	13	21						0	0	0				
Albany & Southern	9	9	20	19	30	37	33	3	3	10	5	10	8	10
Albany & Southern	6	4.6	13	42	38	47	77	0	2	14	20	46	139	
Albany & Southern	18	19	11	12	11	27	47	2	2	1	1	1	2	4
Albany & Southern	36	28	16	28	58	63	68	7	5	1	2	2	2	1
Albany & Southern	3.1	3	9	17	28	49	68	1	0	5	5	26	29	58
Albany & Southern	8	4.4	12	28	38	64	75	0	1	3	3	25	31	77
Albany & Southern	4.8	2.9	0	14	83			0	0	0	0	29		
Albany & Southern	18	25	7	12	19	35	67	14	47	5	8	18	29	193
Albany & Southern	0	3.5	25	43	22	86	67	0	0	0	3	0	2	0
Albany & Southern	6	6	6	14	21	46	60	5	6	4	18	39	185	176
Albany & Southern	2.9	4.7	26	11	20	40	52	1	1	23	2	0	10	20
Albany & Southern	7	9	11	26	29	45	57	0	1	2	14	7	13	
Albany & Southern	7	9	4.5	9	13	27	48	4	7	2	5	9	12	58
Albany & Southern	10	0	0	5	6	70	62	0	0	0	0	0	5	0
Albany & Southern	25	21	11	17	29	55	76	42	15	17	13	49	124	367
Albany & Southern	5	14	9	17	30	46	70	0	1	2	6	12	20	54
Albany & Southern	19	6	7	47	53	100	58	0	0	0	5	1	7	0
Albany & Southern	0	10						0	0	0				
Albany & Southern	22	33	9	38	25	76	68	3	13	1	5	0	1	10
Albany & Southern	17	25	8	43	40	76	81	5	4	2	10	4	52	71
Albany & Southern	0	7	0	21	27	15	14	0	0	0	1	3	2	0
Albany & Southern	17	28	17	25	21	26	44	1	3	1	0	0	0	0
Albany & Southern	1.7	4.4	16	58	0	0	0	0	0	0	2	0	0	0
Albany & Southern	0	0	18	28	84	59	75	0	0	1	1	7	7	0
Albany & Southern	14	8	12	29	13	20	25	0	0	0	1	0	0	0
Albany & Southern	0	10						0	0	0				
Albany & Southern	3.8	6	2.7	2.6	9	24	62	0	0	0	0	1	2	52
Albany & Southern	10	10	11	21	22	36	62	2	13	3	17	4	3	47
Albany & Southern	10	2.4	10	36	54	58	92	2	0	7	32	88	72	174
Albany & Southern	3.2	0	0	19	44	68	93	0	0	0	2	7	39	8
Albany & Southern	38	23	41	33	36	82	26	0	0	0	0	2	0	0
Albany & Southern	9	5	0	8	33	51	78	0	0	0	0	1	5	3
Albany & Southern	37	21	18	31	46	72	76	0	0	0	1	0	7	0
Albany & Southern	1.4	1.7	3.8	5	15	28	29	0	0	0	0	3	4	7
Albany & Southern	11	24	5	0	0	0	0	0	0	0	0	0	0	0
Albany & Southern	4	0	4.2	1	12	37	74	0	0	0	0	0	1	2
Albany & Southern	5	16	10	24	29	35	69	0	0	1	4	2	5	3
Albany & Southern	10	10	7	4.7	13	68	50	2	0	0	0	1	58	1
Albany & Southern	9	8	13	45	30	39	70	12	6	17	137	41	26	100
Albany & Southern	14	10	1.4	7	21	22	22	1	1	0	0	0	0	0
Albany & Southern	19	23	5	13	23	36	27	1	1	2	2	3	8	4
Albany & Southern	30	15	57	47	55	62	46	2	2	5	2	2	3	1
Albany & Southern	4	3.7	1.1	11	12	34	28	2	2	0	3	0	2	5
Albany & Southern	2.9	4	7	28				0	2	0	4			26
Albany & Southern	11	13	8	31	33	46	76	5	7	5	42	27	31	262
Albany & Southern	1.2	3.6	13	45	47	67	59	0	0	2	1	1	9	0
Albany & Southern	1.7	3.5	1	7	58	59	70	0	1	0	0	15	26	7
Albany & Southern	10	6	7	19	47	45		3	1	3	6	31	32	
Albany & Southern	21	16						2	6					
Albany & Southern	7							0						
Albany & Southern	29	3.1	1.4	8				2	0	0	0			
Albany & Southern	2.8	2.9	12	10	14	30	43	0	1	22	14	35	30	48

fractional percentages not shown unless percent defective is less than 5, otherwise nearest whole number.

TABLE XIII.—Summary of comparison of the percentage of steam locomotives inspected and found defective, with the number ordered out of service for the years ended June 30, on roads reporting on 10 or more locomotives—Continued

Road	Percentage inspected defective 1							Ordered out of service						
	1943	1942	1931	1929	1927	1925	1923	1943	1942	1931	1929	1927	1925	1923
Illinois Terminal	0	0	32	29	40	12		0	0	4	1	0	0	
Indiana Harbor Belt	3.4	3.2	0	1	14	52	68	1	0	0	0	0	18	4
Indianapolis Union	5	0	14	13	30	26	36	0	0	1	0	4	0	2
International-Great Northern	2.4	1.4	7	5	27	29	66	0	1	1	0	11	9	16
Interstate	31	26	42	60	83	94	78	7	2	1	4	6	6	3
Jacksonville Terminal	0	0	0	50	0			0	0	0	0	0	0	
Kansas City Southern	16	14	1.9	8	26	52	92	4	5	0	1	12	11	121
Kansas City Terminal	19	17	0	24	24	80	88	0	1	0	0	0	2	3
Kansas, Oklahoma & Gulf	18	9	1.3	1	43	50	0	0	0	0	1		1	0
Kentucky & Indiana Terminal	0	0	3.7	8	6	0	79	0	0	0	0	1	0	10
Lake Superior & Ishpeming	0	0	17	52	39	46	59	0	0	1	7	1	2	3
Lake Superior Terminal & Transfer	22	4.3	0	10	21	44	67	0	1	0	0	0	1	2
Lake Terminal	8	2.1	10	56	20	50	0	0	0	1	1	0	0	0
Lehigh & Hudson River	6	1.4	14	25	20	14	60	0	0	0	1	0	1	0
Lehigh & New England	8	6	12	21	26	65	70	0	0	0	4	2	5	10
Lehigh Valley	11	12	10	39	26	36	71	1	4	8	42	14	26	219
Long Island	3.7	1.8	10	59	48	35	66	0	0	0	2	3	1	0
Louisiana & Arkansas	9	4.2	15					0	1	3				
Louisville & Nashville	10	8	9	33	41	57	68	8	10	6	32	54	94	136
McCloud River	0	0	0	29	25	63	46	0	0	0	0	0	0	0
McKeessport Connecting	0	0						0	0					
Macon, Dublin & Savannah	5	10						0	0					
Maine Central	11	7	12	27	42	41	68	2	1	4	1	6	14	15
Maryland & Pennsylvania	11	23	24	42	50	85	58	0	1	0	3	3	4	4
Midland Terminal	0	2.6						0	0					
Midland Valley	11	12	0	1	42	40	72	0	0	0	0	1	2	0
Minneapolis & St. Louis	2.9	9	7	9	17	35	57	0	4	2	1	7	6	49
Minn., St. Paul & S. S. Marie	4.4	12	6	14	13	25	60	0	2	0	5	2	4	14
Minnesota Transfer	26	44	31	32	71	67	97	0	0	1	0	8	1	35
Mississippi Central	0	10	12	14	32	32	59	0	0	0	1	2	4	3
Missouri & Arkansas	62	50	68	72	92	91	100	5	2	8	8	17	12	22
Missouri-Illinois	2.3	0	0					0	0	0				
Missouri-Kansas-Texas	6	6	6	1	13	42	91	1	2	0	0	6	22	286
Missouri Pacific	6	4.2	3.5	9	20	59	89	4	3	2	6	24	131	393
Monongahela Connecting	6	22	29	31	53	43	14	0	0	1	3	5	0	0
Monongahela	0	2.7	0	8	16	9	0	0	0	0	0	1	1	0
Montour	0	1.8	0	0	0	0	0	0	1	0	0	0	0	0
Nashville, Chattanooga & St														

ANNUAL REPORT OF THE DIRECTOR

TABLE XIII.—Summary of comparison of the percentage of steam locomotives inspected and found defective, with the number ordered out of service for the years ended June 30, on roads reporting on 10 or more locomotives—Continued

Road	Percentage inspected defective ¹							Ordered out of service						
	1943	1942	1931	1929	1927	1925	1923	1943	1942	1931	1929	1927	1925	1923
Southern Pacific, lines west.....	15	13	11	24	27	33	38	11	17	13	47	50	51	24
Southern Pacific of Mexico.....	0	0	0	30	100	100	---	0	0	2	3	1	---	---
Southern.....	6	7	9	12	24	36	59	6	16	15	13	38	56	177
Spookane International.....	26	24	9	13	28	0	37	0	0	0	0	0	0	2
Spookane, Portland & Seattle.....	40	21	22	22	33	32	60	3	2	1	1	2	4	13
Steelton & Highspire.....	26	17	19	24	48	---	---	0	0	1	0	2	---	---
Tennessee Central.....	23	29	14	47	65	74	89	5	6	0	14	40	23	63
Tennessee Coal, Iron & Railroad.....	24	47	7	38	67	40	50	2	0	0	0	0	0	0
Terminal R. R. Assn. of St. Louis.....	18	22	32	41	44	62	76	2	2	4	0	3	1	6
Texas & Pacific.....	0	.6	0	1	12	16	62	0	0	0	1	3	1	91
Texas Pacific-Missouri Pacific of N. O.....	14	23	0	4	10	57	83	0	0	0	0	0	2	0
Colorado, Peoria & Western.....	4.3	9	25	65	88	87	93	0	0	2	4	7	2	4
Colorado Terminal.....	0	0	5	45	35	3	41	0	0	0	0	0	0	3
Coronto, Hamilton & Buffalo.....	0	0	0	0	0	---	---	0	0	0	0	0	---	---
Union Pacific.....	10	11	9	17	20	30	41	6	10	2	8	17	19	26
Union.....	12	20	11	9	29	80	10	4	3	1	2	0	0	2
Upper Merion & Plymouth.....	43	39	28	60	62	---	---	4	6	0	7	8	---	---
Utah.....	0	0	0	11	4	26	19	0	0	0	0	0	0	0
Virginian.....	24	40	17	22	50	58	75	5	11	1	0	2	5	45
Wabash.....	5	2.5	0	1.5	6	47	82	1	3	0	1	2	21	89
Washington Terminal.....	46	18	0	10	43	40	89	0	0	0	0	1	1	2
Western Maryland.....	1.7	.5	13	26	42	54	76	0	0	1	3	13	22	90
Western Pacific.....	12	8	16	25	19	36	37	0	0	5	9	1	13	9
Wheeling & Lake Erie.....	4.5	4.6	8	42	55	67	74	0	0	1	7	10	20	31
Less than 10, discontinued roads, and industrial locomotives.....	22	23	32	40	51	56	56	45	69	279	415	759	826	639
All roads.....	10	10	10	21	31	46	65	487	474	688	1,487	2,535	3,637	7,075

NOTE.—Omitted statistics not comparable, due to consolidations, separations, changes in corporate identity, carrier not in existence in year shown, less than 10 locomotives, etc.