INTERSTATE COMMERCE COMMISSION

THIRTIETH ANNUAL REPORT

OF THE

DIRECTOR BUREAU OF LOCOMOTIVE INSPECTION

TO THE

INTERSTATE COMMERCE COMMISSION

FISCAL YEAR ENDED JUNE 30, 1941



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1941

ANNUAL REPORT OF THE DIRECTOR BUREAU OF LOCOMOTIVE INSPECTION

OCTOBER 1, 1941.

To the Interstate Commerce Commission:

In compliance with section 7 of the act of February 17, 1911, as amended, the Thirtieth Annual Report of the Director of the Bureau of Locomotive Inspection, covering the work of the Bureau during the fiscal year ended June 30, 1941, 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 Statistics under the Accident Reports Act of May 1910 and not reported to this Bureau in accordance with 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—									
	1941	1940	1939	1938	1937	1936				
Number of locomotives for which reports were filed. Number inspected. Number found defective. Percentage inspected found defective. Number ordered out of service. Number of defects found.	43, 236 105, 675 9, 570 9 560 37, 691	44, 274 102, 164 8, 565 8 487 32, 677	45, 965 105, 606 9, 099 9 468 33, 490	47, 397 105, 186 11, 050 11 679 42, 214	48, 025 100, 033 12, 402 12 934 49, 746	49, 322 97, 329 11, 526 12 852 47, 453				

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

	Year ended June 30-								
	1941	1940	1939	1938	1937	1936			
Number of accidents. Percent increase or decrease from previous year. Number of persons killed Percent increase or decrease from previous year. Number of persons injured. Percent increase or decrease from previous year.	153 6. 7 15 16. 7 182 19. 1	164 17.9 18 120.0 225 137.2	152 26. 9 15 114. 3 164 24. 1	208 20. 9 7 72. 0 216 23. 7	263 ¹ 25. 8 25 ¹ 52. 2 283 ¹ 31. 6	209 1 4. 0 16 44. 8 218 19. 8			

¹ Increase.

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

	Year ended June 30—										
	1941	1940	1939	1938	1937	1936	1915	1912			
Number of accidents Number of persons killed Number of persons injured	43 12 64	67 16 110	52 15 55	59 5 59	63 19 73	75 10 80	424 13 467	856 91 1,005			

¹ The original act applied only to the locomotive boiler.

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

				Ye	ar endec	1 June 3	0—			
	19	41	19	40	19	39	19	138	1937	
	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured
Members of train crews: Engineers Firemen Brakemen Conductors Switchmen. Roundhouse and shop employees: Boilermakers Machinists Foremen Inspectors Watchmen. Boiler washers Hostlers Other roundhouse and shop employees. Other employees.	1	41 68 21 8 6	1	70 49 24 4 4 3 3 3 1	1	46 66 18 5 6 1 2 1	3 2	70 80 31 6 6 7 2 1 1 1 6	2	106 78 30 18 10 2 2 2 1
Nonemployees	15	182	18	225	15	164	7	216	25	28

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

	Year ended June 30—								
	1941	1940	1939	1938	1937	1936			
Number of locomotive units for which reports were filed. Number inspected. Number found defective	3, 389 5, 558 319 6 21 905	2, 987 4, 974 298 6 16 766	2,716 4,581 260 6 14 696	2, 555 4, 024 274 7 9 769	2, 416 3, 615 328 9 24 991	2, 361 3, 118 252 8 11 674			

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

		Year e	ended Ju	ne 30—	
·	1941	1940	1939	1938	1937
Number of accidents.	11	7	5	4	12
Number of persons killed	11	7	5	4	14

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

				Y	ear ende	d June 3	0-			
	19	941 19		1940		1939		938	1937	
	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured
Members of train crews: EngineersFiremen		1 5		2 2		3		3		,
Brakemen Conductors Switchmen		1		1 1		i		1		
Maintenance employees_ Other employees Nonemployees		1		1						
Total		11		7		5		4		1

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

						Yea	reno	led J	une	30—					
Part or appurtenance which caused		1941			1940			1939			1938			1937	
accident	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Air reservoirs Aprons Arch tubes. Ashpan blowers				1		1	1		1	3		3	3		<u>3</u>
Axles Blow-off cocks Boiler checks Boiler explosions: A. Shell explosions	4	1	5	5 2		5 2	6 2 3		13 2 3	2 5 5		6 5 5	2 2 1	2	1 2 1
B. Crown sheet; low water; no contributory causes found. C. Crown sheet; low water; contributory causes or defects	7	6	27	7	12	13	4	5	7	5	5	3	5	9	2
D. Miscellaneous firebox	4	5	2	1		2	2	7	4			- -	3	4	6 3
Brakes and brake rigging	5 1 2		6 1 2	1 10 6 2 2	2	1 12 5 2 2	5 1 1 2		5 1 1 2	6 4 5 2	1 1	7 4 4 2	14 10 6 3 3	2	17 11 7 2 3
Dome caps Draft appliances Draw gear	1 1 7 5		1 1 7 6	1 2 9		33 2 11	2 2 8	1 	1 2 9	1 4 3		1 4 3	1 4 4		1 4 4
Flues Flue pockets Footboards Gage cocks	2		2	1		1	3		<u>-</u> 3	6		7	2		2
Grease cups Grate shakers Handholds Headlights and brackets Injectors and connections (not in-	1 4 11		1 4 11	2 1 8 3		2 1 8 3	1 5 8 1		1 5 8 1	7 1		7 1	1 6 10 5		1 6 10 5
cluding injector steam pipes) Injector steam pipes Lubricators and connections Lubricator glasses	3		3	6 1 2 1		6 1 2 1	2 1 1	1	2 1	2 2 3		2 3 3	5 4 4		5 4
Patch bolts Pistons and piston rods. Plugs, arch tube and washout Plugs in firebox sheets Reversing gear	1 1 1		2 2 12	1 12		1 12	2 13		2 13	3 1		3 1 1 12	3 1 34	2 1	33
Rivets Rods, main and side Safety valves Sanders Side bearings	3	2	2	1 4		1 4	4		5			5	5 1 6		
Side bearings Springs and spring rigging Squirt hose Stay bolts Steam piping and blowers	6 3 1 2		6 3 1	2 3 3	1 2	4 3 4	3 6 3	1	4 6 2	4 7 2 7		4 7 2 7	4 5 1		15 1 1 1
Steam valves Studs Superheater tubes Throttle glands	2 2		2 4 2	7 2 1 3		8 2 1 4	6 1 1 1		6 1 1 1	1		1	6 4 1 1 1		1
Throttle leaking Throttle rigging Trucks, leading, trailing, or tender Valve gear, eccentrics and rods Water glasses	4 3 4		5 5 4	2 1 6		16 1 6	1 2 4 3		1 2 4 3 2	1 2 5 4 8		1 2 5 4 8	5 5 5 5		
Water-glass fittings Wheels Miscellaneous	2 42	1	1 43	1 40	 1	1 40	2 1 35		2 1 35	1 66		3 68	2 65	1	6
Total	153	15	182	164	18	225	152	15	164	208	7	216	263	25	283

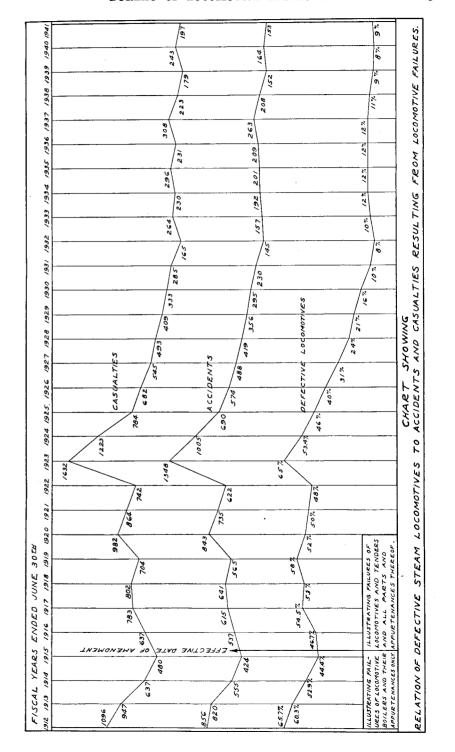


Table IX.—Accidents and casualties resulting from failures of locomotives other than steam, and their appurtenances

	Year ended June 30—														
Part or appurtenance which caused	1941			1940		1939			1938			1937			
accident	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Brakes and brake rigging Carburetors Couplers Crank pins and connecting rods	1		1	1		1							1 3 1		1 3 1
Fires: due to overflowing or leakage of fuel, crank case explosions, back firing, etc. Generators and starting devices	4		4	2		2	1		1	2 1		2 1	1		1
Pantographs and trolleys Short circuits Miscellaneous	5		5	1 1		1	1 3		1 3	1		1	2 2 1		2 2 3
Total	11		11	7		7	5		5	4		4	12		14

	Parts defective, inoperative or missing, or in		Ye	ar ended	June 30	_	
	violation of rules	1941	1940	1939	1938	1937	1936
1.	Air compressors	684	567	518	689	766	740
2.	Arch tubes	31	20	28	66	105	74
o.	Ashpans and mechanism	67	37	67	72	80	79
4.	Axles	5	3	. 2	13	10	13
5.	Blow-off cocks	205	191	204	226	199	236
<u>6</u> .	Boiler checks	313	288	279	301	382	356
7.	Boiler shell	271	2 66	272	331	347	383
8.	Brake equipment.	1,945	1,506	1,577	2,044	2, 322	2, 480
. 9.	Cabs, cab windows, and curtains	1, 087	1,078	943	1, 226	1,807	1,638
10.	Cab aprons and decks	307	277	260	326	466	450
	Cab cards	97	101	92	109	145	166
12.	Coupling and uncoupling devices	74	53	60	73	74	65
13.	Crossheads, guides, pistons, and piston rods	858	815	739	905	1,160	1,056
14.	Crown bolts	97	54	47	59	76	63
10.	Cylinders, saddles, and steam chests	1, 332	1,320	1, 232	1,645	2, 206	1,717
17	Cylinder cocks and rigging	438	447	418	585	729	605
10	Domes and dome caps	94	78	.90	109	101	114
10.	Draft gear	620	508	450	740	522	513
30.	Draw gear	347	306	360	479	560	451
21	Firebox sheets	1,348	1, 243	1,330	1,688	1,637	1,712
22.	Flues	224	191	238	244	371	295
	Frames, tail pieces, and braces, locomotive	150 863	147 665	165 708	159	225	178
24.	Frames, tender.	83	78	708	1,001 131	1,053 120	997
25	Gages and gage fittings, air	183	132	155	230	261	257
26.	Gages and gage fittings, steam	236	211	226	230 279	324	350
27.	Gage cocks	373	400	361	451	538	579
28.	Grate shakers and fire doors	430	273	252	403	470	400
29.	Handholds	433	333	349	405	510	502
30.	injectors, inoperative	39	30	26	26	38	40
δI,	injectors and connections	1, 882	1,330	1, 457	1, 784	2, 020	2,085
32.	Inspections and tests not made as required	7, 215	6, 218	6, 645	8, 204	9, 638	9,005
33,	Lateral motion	357	313	243	325	446	404
34.	Lights, cab and classification	50	49	50	48	90	78
35.	Lights, headlight	190	180	177	257	313	251
36.	Lubricators and shields	196	185	200	212	254	255
31.	Mud rings	187	213	248	203	272	237
აგ.	Packing nuts	508	418	408	448	· 487	508
39.	Packing, Diston rod and valve stem	675	660	739	913	1, 393	1, 133
40.		142	140	104	154	133	178
41.	Plugs and studs.	156	156	179	238	238	236
43	Reversing gear	387	320	317	404	492 2, 348	463 2 003
χυ.	Rods, main and side, crank pins, and collars Safety valves	1, 565 68	1,199 61	1, 293 97	1,669 125	132	2,093 125

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—									
	1941	1940	1939	1938	1937	1936					
E Condors	490	415	432	536	655	678					
5. Sanders	2, 597	2, 174	2, 340	2, 901	3, 172	3,008					
7. Squirt hose	62	50	75	94	133	134					
8 Stay bolts	_ 239	227	181	211	276	279					
9. Stay bolts, broken	_ 198	271	. 258	380	542	520					
0. Steam pipes	_ 385	255	285	410	446	526					
il. Steam valves	_ 110	106	115	141	165	227					
9 Ctone	555	449	490	631	678	615					
3. Tanks and tank valves	952	768	837	955	1,009	877					
4 Telltale holes	_ 59	95	58	67	79	127					
5. Throttle and throttle rigging	688	647	638	685	909	760					
6. Trucks, engine and trailing	_ 636	598	628	762	785	861					
7. Trucks, tender	_ 773	705	665	907	1,018	1, 108					
8. Valve motion	_ 580	506	554	722	798	824					
9. Washout plugs	_ 445	478	487	626	598	714					
O Train-control equipment	. 1	2	5	11	12	€					
1. Water glasses, fittings, and shields	_ 788	753	690	915	1,049	1,118					
2 Wheels	_ 0.00	554	466	577	803	790					
3. Miscellaneous—Signal appliances, badge plates,			i .	Į.	i						
brakes (hand)	785	564	610	684	759	608					
Total number of defects	37, 691	32, 677	33, 490	42, 214	49, 746	47, 453					
ocomotives reported	43 236	44, 274	45,965	47, 397	48, 025	49, 322					
Locomotives inspected	105 675	102, 164	105, 606	105, 186	100, 033	97, 329					
Locomotives defective	9, 570	8, 565	9,099	11,050	12, 402	11, 526					
Percentage inspected found defective		8	9,033	11,000	12, 402	12,020					
Locomotives ordered out of service	560	487	468	679	934	852					

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

Parts defective, inoperative or missing, or in violation		Y	ear ende	l June 30	-	
of rules	1941	1940	1939	1938	1937	1936
Air compressors	22	8	14	6	6	2
Axles, truck and driving			-î	5	4	6
Batteries		1	î	ĭ	4	,
Boilers		10	6	6	5	- 5
Brake equipment		50	50	74	97	66
Cabs and cab windows	45	22	36	25	51	30
Cab cards		13	18	11	25	50
Cab floors, aprons, and deck plates	14	17	13	8	17	10
Controllers, relays, circuit breakers, magnet valves,	1.1	11	10			10
and switch around	7	16	13	7	8	
and switch groups. Coupling and uncoupling devices.	2	6	4	4	3	
Coupling and uncoupling devices	3	1	5	8	4	16
Current-collecting apparatus		31	17	23	28	24
Draft gear		2	4	3	1 1	1 1
Draw gear		29	52	16	14	5
Driving boxes, shoes, and wedges	30	12	9	37	5	15
Frames or frame braces		51	35	47	152	44
Fuel system	3		- 35 6	11	102	6
Gages or fittings, air	3	1	0	11	1	
Gages or fittings, steam Gears and pinions.		2				
Gears and pinions	2	1	2	2	2]
Handholds.	12	6	. 8	13	11	8
Inspections and tests not made as required	243	207	185	204	237	186
Insulation and safety devices	4	2	4	13	13	20
Internal-combustion engine defects, parts and appli-		1	1			
ances	54	35	32	26	50	23
Jack shafts	3	7	6	1		1
Jumpers and cable connectors		[1	1	2	
Lateral motion, wheels	4	- 5	1		1	2
Lights, cab and classification	2	1	3	2	5	6
Lights, headlight	1	3	4	4	11	4
Meters, volt and ampere		4	2	2	1	2
Motors and generators	16	12	19	18	10	14
Pilots and pilot beams	12	10	6	1	7	6
Plugs and studs					1	
Quills		4	7	6	3	
Rods, main, side, and drive shafts	4	2	2	2	23	2
Sanders	. 56	34	28	37	52	25

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		Y	ear endec	l June 30	_	
of rules	1941	1940	1939	1938	1937	1936
Springs and spring rigging, driving and truck. Steam pipes Steps, footboards, etc. Switches, hand-operated, and fuses. Transformers, resistors, and rheostats. Trucks Water tanks Water glasses, fittings, and shields. Warning signal appliances. Wheels	4	50 4 22 3 1 43 1 22 15	16 18 5 1 33 1 1 1 16 10	43 5 23 7 3 40	36 1 13 2 41 1 1 2 21 20	29 2 2 42 42 1 26 39
Miscellaneous Total number of defects	905	766	696	769	991	674
Locomotive units reported Locomotive units inspected Locomotive units defective Percentage inspected found defective Locomotive units ordered out of service	319	2, 987 4, 974 298 6 16	2,716 4,581 260 6 14	2, 555 4, 024 274 7 9	2, 416 3, 615 328 9 24	2, 361 3, 118 252 8

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

One hundred and fifty-three accidents occurred in connection with steam locomotives, resulting in 15 deaths and 182 injuries. This represents a decrease of 11 accidents, a decrease of 3 in the number of persons killed, and a decrease of 43 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 are made in accordance with the requirements of the law and rules, many accidents will be avoided.

During the year 9 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 represents an increase of 1 percent compared with the results obtained in the preceding year. There was an increase of 15 percent in the number of locomotives ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe.

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

All of the 11 explosions that occurred in the fiscal year, in which 11 persons were killed and 29 injured, were caused by overheating of the crown sheets due to low water. There was a reduction of 1 in the number of persons killed and an increase of 14 in the number of persons injured from this cause as compared with the preceding year.

Four of the explosions were particularly violent; 1 of these accidents occurred while the locomotive was hauling a passenger train at an estimated speed of 50 to 55 miles per hour. Two employees were killed and 1 employee and 5 Pullman employees were injured. The force of the explosion tore the boiler from the running gear and hurled it forward 330 feet where it struck the track, rebounded and again struck the track and came to rest on its right side, in reverse position, near the east side of the track. The running gear, tender, and first 4 cars were derailed where the boiler first struck, and the track was torn up from this point for a distance of 350 feet. Parts of the wreckage were scattered in various directions up to 725 feet from the point of explosion. In another accident, in which no fatalities occurred but in which 10 employees and 3 nonemployees were injured, the explosion occurred about 38 minutes after arrival at a station while the locomotive and empty passenger train were being moved, together with another locomotive and its empty passenger train, from the final terminal station for the passenger train to the vard and enginehouse. The force of the explosion tore the boiler from the running gear and hurled it upward and partly over the other locomotive to which it was coupled. In its descent the boiler struck the back edge of the cab of the other locomotive and landed on top of the tender and a baggage car immediately to the rear, then rolled to the ground and came to rest upside down on the adjacent tracks about 154 feet from the point of explosion. Three employees were killed in another explosion while the locomotive was hauling a freight train at an estimated speed of 8 miles per hour. The force of the explosion tore the firebox casing sheets and mud ring, together with stays, braces, and various appurtenances, from the cylindrical part of the boiler. These parts were hurled forward 347 feet and came to rest on the track, where they

were struck by the front or low-pressure engine which had become separated from the rear frame due to breakage of the articulated casting. The cylindrical part of the boiler was torn from the rear engine, the running gear of which stopped 72 feet from the point of explosion. This part of the boiler, with torn firebox sheets attached to the inside throat sheet, was hurled forward 196 feet, where it alighted on the track, then skidded and came to rest on the north side of the track, 235 feet from the point of explosion, with attached parts of the firebox sheets extending across the track. In another explosion, in which 4 employees were killed and 1 nonemployee was injured, the force of the explosion tore the boiler from the running gear and it alighted on the outer rail of an adjacent siding, then rolled to the left and came to rest in an upright position 107 feet ahead and 40 feet to the left of the point of explosion. Parts of the back end or firebox casing sheets were blown off, and the part of the crown sheet to the rear of the combustion chamber, with the entire right firebox side sheet, a major portion of the left side sheet, and 2 small portions of the door sheet were blown out and ahead 491 feet and came to rest on the main track, where these parts were struck by the running gear. Parts of the wreckage were blown for various distances up to 562 feet from the point of the explosion.

Two employees were killed and nine employees were injured in the remaining seven accidents in which the explosions were less violent than those described in the foregoing paragraph.

Boiler and appurtenance accidents other than explosions resulted in the death of 1 person and injuries to 35 persons; this is a reduction of 3 deaths and 60 injuries as compared with the preceding year.

BOILER-FEEDING AND WATER-LEVEL-INDICATING DEVICES

Our investigations of two of the explosions, some results of which are shown in plates 10 and 12, revealed serious neglect in not maintaining the boiler-feeding devices in condition to perform their intended function. Repeated reports of impairment of capacity of these devices had been made over considerable periods of time prior to the explosions. All of these reports were signed for purporting to show that work had been done on the parts reported but later reports showed that the defective conditions continued until the explosions occurred. Repeated reports on the same defective condition should be sufficient warning that proper repairs had not been made and demonstrate the necessity of making such inspections and tests after reports of defective conditions, and after repairs have been attempted, that will definitely show whether or not the purpose of the repairs has been accomplished.

Serious neglect is also evident in some instances in the matter of maintaining water-level-indicating devices in good condition, which

includes thorough cleaning of gage cocks, water glass cocks, and water-column connections each time the boilers are washed, or more frequently if needed to prevent stoppages or partial stoppages of the water and steam passages, inspections and repairs sufficiently often and thorough to insure that these devices operate and indicate as intended, and the condition and proper placement of water glass lamps. Special attention is directed to plates 13, 14, 15, and 16 which show conditions conducive to false water-level indications and overheating of crown sheets found by our inspectors in the past fiscal year.

EXTENSION OF TIME FOR REMOVAL OF FLUES

One thousand one hundred and eighty-two applications were filed for extensions of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 98 of these cases the condition of the locomotives was such that extensions could not properly be granted. Nineteen were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Seventy-two extensions were granted after defects disclosed by our investigations were required to be repaired. Twenty-nine applications were canceled for various reasons. Nine hundred and sixty-four applications were granted for the full period requested.

LOCOMOTIVES PROPELLED BY POWER OTHER THAN STEAM

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

During the year 6 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 percentage is the same as in the preceding year. There was an increase of five in the number of locomotives ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe.

SPECIFICATION CARDS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 225 specification cards and 6,786 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, 447 specifications and 39 alteration reports were filed for locomotive units and 100 specifications and 91 alteration reports were filed for boilers mounted on locomotives other than steam. These were checked and analyzed and corrective measures were taken with respect to discrepancies found.

LEGAL

Based upon investigations made by the Bureau, 1 case of violation of the rules and instructions for inspection and testing of steam locomotives and tenders and their appurtenances, comprising 17 counts, was transmitted to a United States attorney for prosecution. This case is now pending in the district court.

APPEALS

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

LOCOMOTIVES AND ACCIDENT PREVENTION

The purpose of the Locomotive Inspection Act is to promote the safety of employees and travelers upon railroads; the act makes it unlawful for any railroad to use or permit use on its line of any locomotive unless said locomotive and all parts and appurtenances thereof are in proper condition and safe to operate without unnecessary peril to life or limb, and provides for a general safety standard through the promulgation of rules and instructions for inspection and testing. It has been found that these rules and instructions reduce the hazards of locomotive operation in practically direct proportion to the degree of compliance.

The original act became effective July 1, 1911, and to and including 1915 it applied only to boilers and their appurtenances; during that period there was a steady and substantial improvement in the condition of these parts. An amendment, effective early in the fiscal year ended June 30, 1916, extended the provisions of the act to include the entire locomotive and thereafter the scope of the work of the Bureau was very considerably broadened. About this time the volume of traffic increased with resultant tendency on the part of the railroads to neglect inspections and short-cut repairs, which in turn caused an increase in the number of defective locomotives with corresponding increase in the number of accidents and casualties. The percentage of locomotives inspected by our inspectors which were found defective in the year ended June 30, 1917, was 54.5, and thereafter, until after the fiscal year ended June 30, 1923, in which 65 percent of the locomotives

inspected by our inspectors were found defective, it was not possible to effect improvement due to absence of sufficient appropriations to further the work of the Bureau.

Vast strides have been made in improving the general condition of locomotives since 1924 due to increased funds available to the Bureau and a realization on the part of the railroads that more effective use can be made of locomotives maintained in condition to comply with the established rules and instructions. The percentage of locomotives found defective in the fiscal year ended June 30, 1940, reached a low of 8 percent, and this percentage increased to 9 percent in the fiscal vear ended June 30, 1941. This represents 1 percent recession in the condition in the fiscal year ended June 30, 1941, as compared with the preceding year. There was a material increase in the total number of defects found and reported by our inspectors as compared with the preceding year, and there was an increase of 15 percent in the number of steam locomotives ordered withheld from service because of the presence of defects that rendered the locomotives unsafe. Under ordinary conditions these results need not necessarily be particularly alarming since some variations can be expected from year to year; however, under present circumstances special significance is necessarily attached thereto because of the shortage of material and skilled labor. All possible measures should be taken to increase the thoroughness of inspections and to apply timely and substantial repairs to all parts upon which there is any doubt as to safety and dependable performance.

The practice, still too often indulged in, of applying temporary repairs in the hope that the locomotive will make a successful trip and that more adequate repairs may be applied thereafter when the time is most convenient, has been productive of many failures on the line of road; these failures, in addition to increasing the peril to life and limb of employees and others and increasing the ultimate cost of repairs, result in delay to the train involved and frequently affect the orderly movement of other trains. Avoidance of failures of locomotives on the line of road is an essential component of satisfactory railroad performance and it is therefore essential that the practice of applying temporary repairs of the character indicated be reduced to the absolute minimum.

Before a locomotive is started on any trip it should be known that all parts and appurtenances are in safe and suitable condition for service rather than to assume, as is sometimes done, that if the locomotive arrived under its own power it can go out again. All parts to which repairs have been made, the condition or capacity of which may not be determinable by visual inspection, such as air compressors, injectors, and feed water pumps, should be appropriately tested for the output required under service conditions in addition to the usual examinations

made when a locomotive is being prepared for service, since mere observation that these parts "work" when a locomotive is at the terminal is not sufficient to determine whether or not their capacity has been restored. In investigations of accidents we sometimes find reports on the defect that caused the accident repeated many times until failure eventually occurred, together with signatures on the reports indicating that the reported work had been done, or at least that repairs to the reported defects had been attempted each time a report was made. This is proof that the safe repairs required to secure dependable operation of the locomotive had not been made and that labor and time had been wasted.

ANNUAL REPORT OF THE DIRECTOR

Complexity of the various appurtenances installed on modern locomotives, coupled with the placing in service of a large number of older locomotives which have been out of service for periods ranging up to 10 years or more, many of which are practically obsolete and therefore not well adapted to the giving of satisfactory performance under present conditions, and the intensive use of all locomotives now in service necessitate increased vigilance on the part of all concerned to effectuate the purpose of the act and to comply with the proclamation of the President, dated August 18, 1941. This proclamation calls upon the National Safety Council to mobilize its nation-wide resources in leading a concerted and intensified campaign against accidents, and also calls upon every citizen, in public or private capacity, to enlist in this campaign and do his part in preventing wastage of human and material resources of the nation through accidents.

Continuous improvements have been made in design and construction of locomotives since the inception of the use of steam power on railroads and improvements will continue, in some measure, in new production during the emergency. All of the outstanding improvements in locomotive design and construction, as with practically all other mechanisms, have been brought about by the process of evolution rather than revolution. All have gone through periods of trial and adjustment, and many have been materially changed from the original conception before satisfactory performance could be obtained.

It therefore cannot be expected that major changes in design, construction methods, or practices will produce any appreciable beneficial effect in time to ease the current and prospective general situation. On the contrary, attempts to produce such changes, due to the accompanying necessary variation in established practices of the builders and the railroads, the necessity for close observation and supervision over the trial periods, and the changes in or the transfer of skill that may be required of the builders' employees and the railroads' maintenance forces, would delay production of locomotives, absorb manpower that could well be used for immediate and more

important purposes, and result in delays to repairs because of interruptions in the established orderly work of the maintenance forces. In the absence of certainty that the merits of any major changes in design and methods of construction that may be proposed would warrant immediate and widespread adoption irrespective of the effects on production and the skilled labor situation, efforts to build and use locomotives involving designs and constructions that have not fully justified themselves through general use should, for the common good, be held in abevance until the cessation of the emergency.

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.

15

ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES AND TENDERS AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1941, BY ROADS

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

ALTON RAILROAD:

*August 4, 1940, locomotive 4399, Mexico, Mo. Employee was cut by a piece of wire which was being used to hold tender-cabin door open; one injured. One accident; one injured.

ATCHISON, TOPEKA & SANTA FE RAILWAY:

August 10, 1940, locomotive 728, Antioch, Calif. Crown-sheet failure caused

by overheating due to low water; one injured.

November 26, 1940, locomotive 3766, Bond, N. Mex. Left main pin and back end of main rod overheated and the brass lost out, causing the eccentric crank arm to work off main pin and resulting in damage to the valve gear; pound on left side of locomotive was reported on November 25; one injured.

December 22, 1940, locomotive 3845, Hinkley, Calif. Employee slipped and fell. caused by having oil on his shoes due to having stepped into waste oil on top

of fuel-oil tank; one injured.

January 11, 1941, locomotive 1663, Barstow, Calif. Water-crane hook slipped out of crane handle, causing employee to lose his balance and fall from top of tender; hook was smeared with fuel oil and design of hook permitted it to become disengaged easily; one injured.

May 15, 1941, locomotive 1373, Cadiz, Calif. Top of tender behind fuel space was obstructed by a buffer plate which was stored there, causing employee to

lose his footing and fall; one injured. Five accidents; five injured.

ATLANTA, BIRMINGHAM & COAST RAILROAD:

April 25. 1941, locomotive 120, Birmingham, Ala. Lubricator filler plug broke

off while being tightened; one injured.

*May 26, 1941, locomotive 106, Manchester, Ga. Main brake hanger pin broke off inside casting, allowing brake-beam hanger to drop down on rails; one injured.

Two accidents; two injured.

ATLANTIC COAST LINE RAILROAD:

July 10, 1940, locomotive 467, near Barnwell, S. C. Spring rigging became disconnected back of left front driver spring due to spring hanger pin having worked out; head of hanger pin had been worn away by chafing against the front driver tire; spring hanger was reported on June 16, 24 (two times), and 29 and July 7; one injured.

October 10, 1940, locomotive 1669, Hobgood, N. C. Driving-spring hanger broke through old fractures which extended through approximately 50 percent

of cross-sectional area; one injured.

Two accidents; two injured. BALTIMORE & OHIO RAILROAD:

August 17, 1940, locomotive 5141, Washington, D. C. Squirt hose leaking; hose had previously been burned and was defective when applied to this locomotive shortly before the accident; one injured.

November 11, 1940, locomotive 4520, Mount Vernon, Ohio. Tender water-

spout hook bent in service; hook was deteriorated; one injured.

November 17, 1940, locomotive 4446, La Paz Junction, Ind. Handrail above Vanderbilt-type tender failed at both ends, causing employee to fall from running board; handrail was badly deteriorated and reduced in thickness at front-end break and break at back end occurred through old fracture; one injured. November 24, 1940, locomotive 339, Cincinnati, Ohio. Power reversing gear

inoperative due to nut stripped and cotter key sheared on end of slide valve stem

inside of valve chest; one injured.

February 28, 1941, locomotive 2442, Chicago, Ill. Injector overflow valve stuck in closed position, due to valve, bonnet, and guide being improperly assembled; one injured.

Five accidents; five injured.

BOSTON & MAINE RAILROAD:

**October 11, 1940, locomotive 4022, Mechanicville, N. Y. Boiler check blew off stop valve when attempt was made to tighten the joint while under steam pressure; stop valve was not in proper alinement with check valve and threads on stop valve and in flange on the stop-valve side of the joint were worn and deteriorated: the bore of the flange was enlarged approximately 1/16 inch in diameter due to cracks from the bore; one injured.

November 6, 1940, locomotive 4020, Mechanicville, N. Y. Drain cock to hydrostatic lubricator broke while being tightened with a wrench to stop an oil

leak; one injured.

December 23, 1940, locomotive 1008, Beverly, Mass. Coal on top of tank behind fuel space caused employee to slip and sprain his ankle; one injured.

March 17, 1941, locomotive 3630, Potter Place, N. H. Manually operated reverse lever difficult to operate: reversing gear reported on March 5 and 6: one injured.

June 29, 1941, locomotive 3670, Waltham, Mass. Insufficient clearance between reverse lever-latch guide bolt and ell at brake-valve connection; one injured.

Five accidents; five injured.

CENTRAL RAILROAD OF NEW JERSEY:

**March 31, 1941, locomotive 831, Jersey City, N. J. Bottom cap blew out of steam heat pressure regulator valve body, due to fracture at bottom rim of valve body; lower part of fracture was old break; one injured. One accident; one injured.

CHICAGO & EASTERN ILLINOIS RAILROAD:

**August 30, 1940, locomotive 1012, near Momence, Ill. Glass in cab window shattered: cut by flying glass; one injured.

One accident: one injured.

CHICAGO & NORTH WESTERN RAILWAY:

August 12, 1940, locomotive 2526, near Blodgett, Ill. Trailing truck spring hanger broke through old fracture and a part of the broken hanger struck and cut the brake pipe hose on the first car of the passenger train, resulting in emergency application of the brakes; one injured.

August 29, 1940, locomotive (C. M. St. P. & P.) 912, Iron River, Mich. Insufficient clearance between manually operated reverse lever and back wall of cab;

one injured.

October 5, 1940, locomotive 2902, Chicago, Ill. Gas explosion in firebox resulted in the fireman being burned; safety lugs on fire-door frame were worn, allowing excessive opening between fire door and frame; cover plate of inspection hole in fire door was stuck in open position; one injured.

*November 18, 1940, locomotive 2629, Chicago, Ill. Insufficient clearance between locomotive handhold at gangway and tender deck when on a curve;

December 10, 1940, locomotive 1561, Keesus, Wis. Manually operated reverse lever unexpectedly moved to full forward position, resulting in back draft through

the open firebox door; one injured.

December 17, 1940, locomotive 3024, DeKalb, Ill. Employee's clothing caught on handle of tank feed pipe valve, causing him to fall from gangway step; extension stem and handle of tank valve projected too far outside of tender side wall: one injured.

December 28, 1940, locomotive 2169, Milwaukee, Wis. Piece of wire attached to cab-hood curtain caused injury to employee's eye; one injured.

April 7, 1941, locomotive (C. St. P. M. & O.) 366, Tigerton, Wis. Wire pro-

truded from seat-box cushion; one injured.

June 30, 1941, locomotive 1767, near Cavour, S. Dak. Crown-sheet failure caused by overheating due to low water; one injured. Nine accidents; nine injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

*July 4, 1940, locomotive 5622, Savanna, Ill. Insufficient clearance between tender buffer plate and handhold at gangway when on a curve; one injured. One accident: one injured.

CHICAGO GREAT WESTERN RAILWAY:

**December 1, 1940, locomotive 856, Fredericksburg, Iowa. Nos. 1 and 3 grate rocker bars and 26 units of grates were burned out. Engineer fell from gangway while attempting to make emergency repairs; one injured. One accident; one injured.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

January 5, 1941, locomotive 387, Freeport, Ill. Mechanically operated fire door closed unexpectedly, catching fireman's hand, due to operating lever slipping off air operating valve piston extension; operating-lever fulcrum pin, pin hole,

and stationary fulcrum jaws were badly worn; one injured.

March 4, 1941, locomotive 379, Miles City, Mont. Undesired emergency application of brakes, caused by fractured train line at rear of tender; coupler yoke key was longer than standard and end of key had fouled and bent the train line at point of fracture; opening in bottom of cast-steel end sill was not properly located to permit application of retaining pin to standard-length coupler yoke key; two

April 24, 1941, locomotive 105, Sturtevant, Wis. Flue failed at defective safe

end weld; one injured.

Three accidents; four injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY:

**July 31, 1940, locomotive 887, Rome, Ill. Undesired movement of manually operated reverse lever to full forward position, caused by defective valve gear; one injured.

One accident; one injured.

DELAWARE AND HUDSON RAILROAD:

July 16, 1940, locomotive 1116, near Wells Bridge, N. Y. Backfire caused by displacement of extension smokestack in front end, due to three of the six support-

ing bolts losing out; one injured.

**March 7, 1941, locomotive 1013, Hudson, Pa. Derailment of tender and three cars, caused by front engine-truck frame being in contact with swing bolster which prevented free side swing of the truck and caused truck wheels to derail on a curve; truck swing link pins and bushings were worn, due to lack of lubrication, and long pins through lower ends of swing links and bolster were bent downward which allowed the truck frame to contact swing bolster; work reports indicated that truck frame and bolster had been fouling for some time; one injured.

Two accidents; two injured.

Delaware, Lackawanna & Western Railroad:

December 8, 1940, locomotive 1615, Corning, N. Y. Hexagon nut was thrown against clear-vision window, breaking the glass and injuring the fireman's eye; apparently this nut had worked off bolt in footboard brace; one injured.

*January 8, 1941, locomotive 992, Haynes, N. Y. Tender axle broke; four

January 9, 1941, locomotive 203, Scranton, Pa. Insufficient clearance between

locomotive and tender when on a curve; one injured.

**April 24, 1941, locomotive 1402, near Dalton, Pa. Employee's hand was cut on a sharp end of a cotter pin which protruded beyond the side of nut on fire-door hand-lever fulcrum stud; one injured.

Four accidents; seven injured.

DENVER & RIO GRANDE WESTERN RAILROAD:

**October 22, 1940, locomotive 771, Salida, Colo. Coal on tender behind fuel

space; one injured.

January 30, 1941, locomotive 1605, Green River, Utah. Power reversing gear was difficult to operate due to insufficient lubrication; reversing gear reported very difficult to operate on January 23 and 26; one injured.

February 4, 1941, locomotive 1804, Denver, Colo. Crown-sheet failure caused

by overheating due to low water; 13 injured.

Three accidents; 15 injured.

DETROIT, TOLEDO & IRONTON RAILROAD:

**February 20, 1941, locomotive 703, Rosewood, Ohio. Approximately onehalf of the rim of right front engine-truck wheel broke off, causing locomotive to derail and turn over on its side; failure occurred through old crack in the plate near rim fillet which progressed circumferentially and turned into and outwardly through the rim; three injured.

One accident; three injured.

DULUTH. MISSABE & IRON RANGE RAILWAY:

*September 9, 1940, locomotive 1311, Brimson, Minn. Bell cord broke: one injured.

One accident; one injured.

ERIE RAILROAD:

September 13, 1940, locomotive 3308, Pymatuning, Pa. Coal board fell from rack and struck employee's foot; coal boards were below standard length; wing sheets to which rack castings were attached were bent outward at the top and flanges on rack castings were too short; one injured.

December 9, 1940, locomotive 3132, Overbrook, N. J. Oil cup on high-pressure air cylinder of air compressor broke off at threaded portion while attempts were being made to remove the oil-cup cap; corners of the boss on oil-cup cap were so badly worn that cap could not be removed with the usual wrench; one injured.

*December 13, 1940, locomotive 2936, Akron, Ohio. Coal board fell out of

bracket; one injured.

*March 21, 1941, locomotive 3095, Pittston, Pa. Wedge from draw gear between locomotive and tender fell out due to the bolt through wedge which fastened the chain being broken off and the bolt through wedge and wedge casting sheared off; one injured.

Four accidents; four injured.

FLORIDA EAST COAST RAILWAY:

October 25, 1940, locomotive 802, near New Smyrna Beach, Fla. Combustionchamber crown-sheet failure caused by overheating due to low water; two killed, six injured.

One accident: two killed, six injured.

FORT WORTH & DENVER CITY RAILWAY:

October 26, 1940, locomotive 454, Amarillo, Tex. Extension operating rod to air-compressor steam throttle became disconnected due to the cotter key which secured the rod to valve yoke bending and working out; one injured.

One accident; one injured.

GRAND TRUNK WESTERN RAILWAY:

*September 12, 1940, locomotive 7485, Detroit, Mich. Insufficient clearance between gangway handhold on locomotive and tender deck when on a curve; one injured.

One accident; one injured.

GREAT NORTHERN RAILWAY:

July 2, 1940, locomotive 1359, Fergus Falls, Minn, Handhold at locomotive gangway gave way due to nuts coming off bolt which secured top end of handhold; one injured.

July 30, 1940, locomotive 3091, near Herman, Minn. Manually operated reverse lever jerked to front end of quadrant, and while being moved to original position it suddenly jerked to rear of quadrant; reversing gear defective and had

ANNUAL REPORT OF THE DIRECTOR

been reported on July 2 (two times), July 14 (two times), and July 29; one injured.

**September 18, 1940, locomotive 2033, Ray, N. Dak. Driving box ran hot; driving box had been overheated and blocked previously on this trip, but the blocking had worked out of position; driving-box journal was badly grooved and roughened due to having previously been cut; hot driving boxes and grease cellars had been reported repeatedly; one injured.

Three accidents; three injured.

GULF. MOBILE & OHIO RAILROAD:

April 11, 1941, locomotive 59, Louisville, Miss. Locomotive derailed, caused by right front driving-wheel tire slipping on wheel lcenter; tire loosened and slipped 1% inches inward on wheel center due to insufficient shrinkage; one killed. One accident; one killed.

ILLINOIS CENTRAL RAILROAD:

**December 23, 1940, locomotive 1432, Travalac, Ind. Main crank pin broke through old fracture which extended through approximately 60 percent of crosssectional area; one injured.

**April 10, 1941, locomotive 1630, Whaley, Miss. Bell ringer became in-

operative; one injured.

**May 28, 1941, locomotive 738, La Salle, Ill. Air bell ringer inoperative; bell ringer reported on May 21, 22, 24, and 28 (prior to accident); one injured.

* June 9, 1941, locomotive 8000, Futrell, Ky. Branch pipe from main reservoir pipe to air brake control valve chamber broke off at tee in main reservoir pipe, causing undesired application of brakes; one injured. Four accidents; four injured.

INDIANA HARBOR BELT RAILROAD:

*August 15, 1940, locomotive 400, Riverdale, Ill. Brake adjusting rod broke off brake piston; one injured. One accident; one injured.

KANSAS CITY SOUTHERN RAILWAY:

August 11, 1940, locomotive 480, Anacoco, La. Eccentric crank failed through old fracture which extended through approximately 75 percent of cross-sectional area; one injured.

*February 15, 1941, locomotive 902, Lanagan, Mo. Driving box saddle broke;

two injured.

April 5, 1941, locomotive 903, Sallisaw, Okla. Two small flues broke off at safe end welds; overheated in welding; fire door was warped, permitting steam and hot water to enter the cab freely; one injured.

Three accidents; four injured.

LEHIGH VALLEY RAILROAD:

July 13, 1940, locomotive 3172, Luzerne, Pa. Blower valve stem threads stripped; threads badly worn; one injured.

August 24, 1940, locomotive 3205, Jersey City, N. J. Fire hose burst; hose weakened by chafing; one injured.

Two accidents; two injured.

LONG ISLAND RAILROAD:

*May 26, 1941, locomotive 37, Holbrook, N. Y. Whistle chain was caught on boiler; one injured.

One accident; one injured.

LOUISIANA & NORTH WEST RAILROAD:

February 21, 1941, locomotive 23, Homer, La. Crown-sheet failure caused by overheating due to low water; bottom water-glass cock was found in closed position; one killed.

One accident; one killed.

LOUISVILLE & NASHVILLE RAILROAD:

August 2, 1940, locomotive 1912, near Butler, Ky. Crown-sheet failure caused

by overheating due to low water; two injured.

August 22, 1940, locomotive 46, Paris, Ky. Collision, caused by inability to close throttle; throttle lever was not connected to the proper fulcrum pinhole, resulting in binding on quadrant; teeth at front end of quadrant were worn: one injured.

August 30, 1940, locomotive 1881, Crestwood, Ky. Driving-spring hanger broke through old fracture on each side near bottom of gib seat, permitting the front end of locomotive to drop and cause derailment of the locomotive and 14 cars: one injured.

October 8, 1940, locomotive 2055, North Birmingham, Ala. Handle of aircompressor throttle came off valve stem while being used, causing employee to fall from running board; handle retaining nut was missing; one injured.

**November 16, 1940, locomotive 1368, Stewart, Tenn. Eccentric rod broke;

one injured.

December 9, 1940, locomotive 2212, Berry, Ky. Globe valve in steam line to cab radiator leaking; one injured.

*January 18, 1941, locomotive 1266, Mount Pleasant, Tenn. Clamps on smoke-

box door were loose; one injured.

January 23, 1941, locomotive 2060, Boyles, Ala. Locomotive moved out of control when throttle became latched open and could not be closed by hand; throttle lever latch lifter had excessive lost motion and throttle quadrant was out of alinement: two injured.

**May 1, 1941, locomotive 168, Flomaton, Ala. Manually operated reversing gear difficult to operate; oil pipe to left valve was cracked through collar at connec-

tion to lubricator, allowing oil to leak out; one injured.

May 11, 1941, locomotive 2079, East St. Louis, Ill. Key at back end of left main-rod brass was missing; two setscrews for holding the key in place were loose; "Lined brass back end of L. M. rod" was reported on May 8; one injured.

Ten accidents; 12 injured.

MACON, DUBLIN & SAVANNAH RAILROAD:

June 17, 1941, locomotive 46, Franklinton, Ga. Whistle cord broke; one injured. One accident; one injured.

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

**October 21, 1940, locomotive 341, Superior, Wis. Valve-stem packing failed; one injured.

February 8, 1941, locomotive 4020, Medina Junction, Wis. Insufficient clear-

ance between ashpan operating lever and ashpan; one injured.

June 29, 1941, locomotive 4001, Minneapolis, Minn. Cab handhold at gangway fouled corner of tender deck when locomotive was backed on a sharp curve; one

Three accidents; three injured.

MISSOURI PACIFIC RAILROAD:

*September 17, 1940, locomotive 1494, Witherspoon, Ark. Window pane fell from cab window; one injured.

*December 21, 1940, locomotive 1516, Osawatomie, Kans. Fell from running board while making adjustment of check valve; one injured.

Two accidents; two injured.

NEW YORK CENTRAL RAILROAD:

October 19, 1940, locomotive 6701, Weehawken, N. J. Sliding sash of cab window fell out of frame due to improper fit; top and bottom of window frame were loose, permitting excessive vertical play between sash and frame grooves, and metal

strip forming inner side of frame bottom groove was too low; one injured.
October 20, 1940, locomotive 5258, North Frankfort, N. Y. Pilot-beam bolt broke and threaded portion with nuts attached was thrown through front cab window of the fast-moving locomotive; bolt had been loose and turning in bolt hole; pilot bolts were reported loose on September 20, 24, October 2, 4, 5, 14, 16, and 17; one injured.

November 28, 1940, locomotive 2794, Mina, Ohio. Grate rod failed at weld;

one injured.

December 13, 1940, locomotive 5370, Herkimer, N. Y. Cab and water-scoop heater valve broke off at turret end of adapter due to old fracture which extended approximately 75 percent of cross-sectional area of adapter; attempted to tighten valve while under steam pressure; one injured.

March 31, 1941, locomotive 4535, Chicago, Ill. Boiler check stuck open due to accumulations of scale; "Left boiler check leaking" was reported on March 14 and

22: three injured.

April 9, 1941, locomotive 5401, Pendleton, Ind. Part of a broken tender truck spring leaf on leading locomotive was thrown through cab window of the second locomotive; spring leaf apparently had been broken for some time; one injured. Six accidents; eight injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 17, 1940, locomotive 3231, Cedar Hill, Conn. Firebox door closed unexpectedly, catching employee's hand; right section of butterfly-type fire door was stuck on bottom of stoker distributor elbow, preventing the door from being latched properly; "Right firebox door striking elevator and sticks" was reported on June 7, and the fire door was rubbing on the elbow when the locomotive was inspected on July 31; one injured.

**September 17, 1940, locomotive 3560, Cedar Hill, Conn. Boiler-check flange joint failed while being tightened under pressure; steel flange was distorted and threads on brass boiler-check casting that engaged the threads on flange were worn and stripped; the construction and assembly of the joint were such as to permit undue stress on the threads on check casting when flange bolts were tightened; one killed.

*November 22, 1940, locomotive 3333, Meriden, Conn. Eccentric blade broke:

one injured.

*November 30, 1940, locomotive 3605, New Haven, Conn. Insufficient clearance between cab handhold at gangway and tender deck when on a curve; one

March 11, 1941, locomotive 3507, Reads, Conn. Right sander was stopped up: employee fell from running board while attempting to remove sander clean-out plug; square on end of clean-out plug was not high enough to hold wrench properly;

Five accidents; one killed, four injured.

NORFOLK & WESTERN RAILWAY:

December 16, 1940, locomotive 410, Pulaski, Va. Throttle lever latch moved to wide-open position when unlatched; one injured.

One accident: one injured.

NORTHERN PACIFIC RAILWAY:

December 18, 1940, locomotive 2238, Three Forks, Mont. Side rod broke and section of the broken rod swung around and punched holes in outside and inside throat sheets; the break occurred at a dressed-out indentation in the top flange which had been previously cut by a tire that came off the wheel center; sander nozzles were stopped up; sanders had been reported repeatedly; two killed,

One accident: two killed.

PENNSYLVANIA RAILROAD:

July 4, 1940, locomotive 4697, Mingo Junction, Ohio. Crown-sheet failure caused by overheating due to low water; feed water heater and pump was erratic in operation and at times did not supply rated capacity to the boiler; feed water heater and pump was reported 13 times in the 30 days preceding the accident; one killed, one injured.

*July 21, 1940, locomotive 6828, Creighton, Pa. Steam-heat connector on tender became disconnected at elbow, fell to the track and lodged in heel of switch,

causing derailment of car; one injured.

September 5, 1940, locomotive 3868, Emsworth, Pa. Collar broke off brakepipe union under tender; ends of brake pipe not properly lined up, placing undue strain on the union; brake-pipe union was reported leaking on August 20 and 28 and September 1, 2, and 5; one injured.

*October 8, 1940, locomotive 8912, Logansport, Ind. Insufficient clearance between gangway step and cab handhold when on a sharp curve; one injured.

October 25, 1940, locomotive 4043, Fort Wayne, Ind. Air compressor stopped: compressor governor did not function properly due to a leaky pin valve; pin valve and seat were cut and there was an accumulation of foreign matter in the diaphragm chamber, particles of which were large enough to lodge under the valve and hold it open; one injured.

January 1, 1941, locomotive 3729, Bodine, Pa. Flue failed at defective safe end weld; mechanically operated fire door did not close fully when released; one

injured.

March 10, 1941, locomotive 6793, Altamont, Ill. While employee was attempting to move stoker conveyor trough slide plate his foot slipped into an 18-inch opening at the front end of the trough and was caught by the conveyor screw and crusher; front slide plate was stuck fast under shovel sheet, ahead of the opening in the trough which it was designed to close, by solidified coal dust and foreign matter: one injured.

May 3, 1941, locomotive 3517, Altoona, Pa. Slide at bottom of coal gate dropped down and struck employee's foot; pin for holding coal-gate slide up and chain to which pin was attached were missing; chain not properly secured to

coal gate; one injured.

*May 2, 1941, locomotive 6854, East Altoona, Pa. Bonnet of lubricator shut-

off valve came off; one injured.

May 9, 1941, locomotive 4512, Mount Vernon, Ohio. Sanders inoperative: foreign matter in the sand; one injured. Ten accidents: 1 killed, 10 injured.

PITTSBURGH & LAKE ERIE RAILROAD:

**March 27, 1941, locomotive 9011, Youngstown, Ohio. Insufficient clearance between cab handhold at gangway and tender deck when on a curve; one injured. One accident: one injured.

READING COMPANY:

May 17, 1941, locomotive 1094, Allentown, Pa. Tender cistern anchor bolt at water leg broke during impact; cross-section of the broken bolt showed 80 percent old fracture: one injured.

One accident: one injured.

St. Louis Southwestern Railway:

*July 18, 1940, locomotive 567, Dawson, Tex. Bell cord became tangled; one

One accident; one injured.

SEABOARD AIR LINE RAILWAY:

January 5, 1941, locomotive 855, Houston, Fla. Manually operated reverse lever jerked to full forward position, catching employee's foot between lever and boiler head; one injured.

February 18, 1941, locomotive 515, Henderson, N. C. Fire-door hand lever broke through fracture at the point of a previous break which had been repaired

by fusion welding; one injured.

March 26, 1941, locomotive 448, Raleigh, N. C. Coupler knuckle pin broke;

one injured.

March 30, 1941, locomotive 855, Olustee, Fla. Reverse lever jerked to full forward position when unlatched, catching employee's foot between lever and foot rest; "Can't hook this engine up where she should be worked account of kick-

ing back" was reported on March 23; two injured.

June 8, 1941, locomotive 417, Winter Haven, Fla. Squirt-hose valve worked open or was accidently opened; valve opened easily and operating handle was elliptical in shape and was located in an exposed position where it was subject to liability of opening if contacted by a person using the gangway; one injured.

Five accidents; six injured.

SOUTHERN RAILWAY:

**August 16, 1940, locomotive 1219, Haylow, Ga. Section of tender coal board broke off, causing employee to fall; coal board was too wide for its supporting pocket; one injured.

August 18, 1940, locomotive 6615, Meridian, Miss. Uneven surface of walkway on top of feed water tank caused employee to sprain his ankle; one of the two boards in walkway was sagged downward 1% inches below the other board, due to insufficient support; one injured.

ANNUAL REPORT OF THE DIRECTOR

**September 2, 1940, locomotive 5011, Asheville, N. C. Grate shaker bar slipped off shaker post; excessive lost motion in grate shaker rigging; one injured. January 5, 1941, locomotive 6355, Stearns, Ky. Grate shaker bar slipped off shaker post; top of the shaker post was too close to opening in the deck to permit shaker bar to slip onto post properly; one injured.

Four accidents; four injured.

SOUTHERN PACIFIC-LINES EAST:

**June 2, 1941, locomotive (T. & N. O.) 919, El Paso, Tex. Broken radial crown stay blew out of wrapper sheet while being calked with an air hammer while the boiler was under pressure; stay broke through a 50 percent old fracture near firebox sheet; outer end of stay had a tapered head, 11/4 inches at the small diameter, while the stay hole in wrapper sheet was tapped for a straight-end stay, 1% inches in diameter, the stay entered wrapper sheet at an acute angle and there was no thread engagement between the stay and wrapper sheet when the stay was applied; one injured.

One accident; one injured.

SOUTHERN PACIFIC-LINES WEST:

July 27, 1940, locomotive 3753, Battle Mountain, Nev. Main pin broke through old fracture which extended through approximately 75 percent of crosssectional area; one injured.

**August 5, 1940, locomotive 3806, Gallinas, N. Mex. Gangway handhold

broke in the bend near top fastening to cab; one injured.

**August 23, 1940, locomotive 2950, Wendling, Oreg. Manually operated reverse lever slipped out of quadrant and struck employee; lever was reported loose in quadrant on August 22 and 25; one injured.

September 6, 1940, locomotive 3275, near Lomo, Calif. Piston rod broke through old fracture at front end of key way, inside crosshead fit, knocking out front cylinder head; piston rod was a poor fit in crosshead; rod had not been ground

in as required by the carrier's standard practice; two injured.

October 26, 1940, locomotive 3669, Valery, Nev. Packing gland of power-reversing cylinder worked out, causing the locomotive to reverse itself; the

threaded gland was loose in cylinder; one injured.

January 20, 1941, locomotive 5012, San Gabriel, Calif. Superheater unit broke off at ball joint where attached to superheater header; unit had been over-

heated at the time ball joint was applied; one injured.

**February 6, 1941, locomotive 5011, Willcox, Ariz. Throttle rod was fouling in opening in sand dome which made it difficult to operate throttle properly and control the slack, resulting in rough starting of the train; throttle reported on

February 2, 5, 6, 14, March 2, 14, and 16; one injured.

*February 6, 1941, locomotive 4029, Cruzatte, Oreg. Fire went out and train stalled in a tunnel; cut-out valve for oil-supply pipe closed and shut off fuel-oil supply to the firebox; pipe through which the operating cable passed from cab roof down through the floor had rusted in two and pipe shifted and shortened the cable; one injured.

May 3, 1941, locomotive 4199, Cooper, Calif. Crown-sheet failure caused by

overheating due to low water; four killed, one injured.

June 26, 1941, locomotive 3411, Douglas, Ariz. Bonnet blew out of injector operating valve; threads on bonnet were worn, bonnet fit in valve was oversize, and blown-out bonnet could be inserted to bonnet joint without thread engagement. A new bonnet inserted to bonnet joint was 1/2 inch loose; one injured.

Ten accidents; 4 killed, 11 injured.

SPOKANE, PORTLAND & SEATTLE RAILWAY:

*July 5, 1940, locomotive 3120, Metolius, Oreg. Driving-spring hanger broke; one injured.

One accident; one injured.

STEELTON & HIGHSPIRE RAILROAD:

November 9, 1940, locomotive 28, Steelton, Pa. Crown-sheet failure caused by overheating due to low water; right boiler check shut-off valve opening and right check body opening into the boiler were greatly restricted by mud and scale: right tank valve was out of the well and inoperative due to a large rag being wound around valve stem which obstructed the opening; one injured.

One accident; one injured.

TEXAS & PACIFIC RAILWAY:

May 15, 1941, locomotive 471, Fort Worth, Tex. Steam-heat connection on front of locomotive dropped down and caught in switch frog, bending footboard down and throwing employee, who was riding footboard, to the ground; loop in bottom of supporting coil spring on the flexible metallic conduit connection was worn through and evidently the additional safety hanger provided for this conduit was not in use at time of the accident; one injured.

May 29, 1941, locomotive 300, near Iatan, Tex. Crown-sheet failure caused

by overheating due to low water; three injured.

Two accidents; four injured.

UNION PACIFIC RAILROAD:

July 22, 1940, locomotive (O. S. L.) 2562, Minidoka, Idaho. Arch tube plug blew out of throat sheet, due to not having been properly tightened; attempted

to tighten while under steam pressure; two injured.

July 23, 1940, locomotive (O. S. L.) 2003, Alexander, Idaho. Superheater flue broke off near back flue sheet, due to excessive grooving on the water side; flues reported leaking on June 12, 26, and 27 and July 3, and on July 6 the boiler foreman reported "I recommend engine be removed from service account bad flues"; one injured.

**November 21, 1940, locomotive 9036, Lawrence, Kans. Stoker failed due to a piece of wire being wedged between screw and housing of elevator; one injured.

March 1, 1941, locomotive 9027, Big Springs, Nebr. Steam pipe to hydrostatic lubricator pulled out of collar at valve connection on cab turret; failure occurred in the brazing around edge of collar; brazing did not extend into the collar: collar had not been belled at bottom or tapered at top for receiving spelter metal during the brazing operation in accordance with standard practice; one injured.

April 26, 1941, locomotive (O. S. L.) 598, Budge, Idaho. Locomotive derailed and turned over, caused by driving wheel tires heating from brake-shoe friction and slipping on wheel centers which kinked and broke track rail under the loco-

motive; one injured.

May 14, 1941, locomotive (L. A. & S. L.) 6012, Milford, Utah. Combination pilot dropped and fouled pavement of highway crossing, bending footboard under; inside hanger of No. 1 driver spring was broken and equalizer pin had pulled out of the outside hanger; head of the equalizer pin was broken off; inside hanger failed through about two-thirds old fracture and one-third badly crystallized metal; one injured.

*May 18, 1941, locomotive 4470, Ogden, Utah. Edge of footboard was warped, causing employee's foot to slip when he attempted to board engine;

one injured.

June 14, 1941, locomotive (O. S. L.) 602, Ontario, Oreg. Employee fell from running board while attempting to adjust injector which was not supplying a normal quantity of water; one injured.

Eight accidents; nine injured.

VIRGINIAN RAILWAY:

August 8, 1940, locomotive 706, Besoco, W. Va. Marker bracket became disconnected from pilot beam, due to nut on supporting bolt working off: one

April 1, 1941, locomotive 800, near Stewartsville, Va. Crown-sheet failure caused by overheating due to low water; capacity of left injector was reduced due to a worn and pitted steam nozzle; injectors reported 22 times during the 60 days preceding the accident, 10 of these reports stating that the left injector would not pick up all the water or similar defects; three killed.

Two accidents; three killed, one injured.

WABASH RAILWAY:

February 12, 1941, locomotive 517, Adrian, Mich. Fireman's shovel struck on partly opened mechanically operated fire door; cap screw pin had worked out of left lower guide roller of horizontal fire door and caught on operating lever, preventing the left segment of fire door from opening properly; roller cap screw pin was loose in threads due to having been improperly applied; one injured.

**March 22, 1941, locomotive 665, Decatur, Ill. Mechanically operated

ANNUAL REPORT OF THE DIRECTOR

fire door was inoperative; connection pin between the operating cylinder piston rod and union link had been removed to facilitate operation of fire door when the locomotive was without air pressure and the pin had not been replaced before the locomotive was set out for service; one injured.

Two accidents; two injured.

WASHINGTON TERMINAL COMPANY:

March 12, 1941, locomotive 26, Washington, D. C. Flue broke off at back flue sheet due to being reduced in thickness; outside of flue was deteriorated and interior of flue was badly cinder-cut; one injured.

April 4, 1941, locomotive 33, Washington, D. C. Flue failed near back flue sheet due to being reduced in thickness; flue had been heavily prossered and was badly cinder-cut internally and wasted away externally at the point of failure; two injured.

Two accidents; three injured.

WESTERN PACIFIC RAILROAD:

*June 3, 1941, locomotive 174, between Timpie and Ellerbeck, Utah. Brick. from front arch brick wall fell into firebox; pool of oil which formed between fallen arch brick and burner exploded when brick was being removed; one injured. One accident; one injured.

WHEELING & LAKE ERIE RAILWAY:

**August 9, 1940, locomotive 4311, Mingo Junction, Ohio. Insufficient clearance between vertical handhold at gangway and tender deck when on curve; 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, 1941, BY ROADS

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

*April 25, 1941, unit M-110, St. Joseph, Mo. Employee's shoe caught under loose edge of linoleum cab-floor covering, causing him to fall; one injured. One accident; one injured.

BALTIMORE & OHIO RAILROAD:

May 20, 1941, unit 59-A, near Wellsboro, Ind. Explosion and fire occurred in crank case of Diesel-electric unit caused by an overheated piston; misalinement of the piston-cooling oil tube and the funnel on the piston resulted in interference which broke the oil tube and prevented the cooling oil from being discharged on the piston; one injured.

One accident; one injured.

CHICAGO & NORTH WESTERN RAILWAY:

*November 19, 1940, unit 901, Chicago, Ill. Injured while replacing ventilator fan belt on pulley in engine compartment; one injured. One accident; one injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

July 31, 1940, unit 9909, near Ethlyn, Mo. Crank-case explosion occurred in No. 1 engine, caused by overheated bearing; lubricating oil lines stopped up with bits of rags; one injured.

April 9, 1941, unit 9911-B, Neponset, Ill. Engine-room ceiling plate fell from

its position, striking employee; one injured.

Two accidents: two injured.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

January 3, 1941, unit E-1, Rockdale, Wash. Explosion occurred in firebox of heater boiler; pressure in oil standpipe dropped to zero, apparently allowing the fire to go out and oil to drip into firebox. When pressure in standpipe was suddenly increased the oil struck the hot side brick and ignited the oil and gas in the firebox; slight leak in heater pipe inside oil-pressure standpipe; excessive openings in cover plate for oil-burner pipe permitted the fire to come out of firebox freely: one injured.

One accident; one injured.

CLEVELAND UNION TERMINAL COMPANY:

**February 16, 1941, unit 209, Cleveland, Ohio. Train-line air hose at rear of locomotive broke, causing emergency application of the brakes; one injured. One accident: one injured.

GREAT NORTHERN RAILWAY:

July 24, 1940, unit 2303, near Kalispell, Mont. Derailment of gas-electric motor car, caused by failure of rivets of motor nose-support bracket and failure of auxiliary hanger; one injured.

One accident; one injured.

INTERNATIONAL-GREAT NORTHERN RAILROAD:

**December 20, 1940, unit (N. O. T. & M.) 502, near Kirk, Tex. Main gasoline engine backfired into carburetor, caused by intake valve in left back cylinder not seating. Failure of intake valve was caused by bearing metal having melted out of left back connecting-rod bearing on crank shaft, allowing piston to strike the intake valve and bend the valve rocker arm; one injured.

One accident; one injured.

MISSOURI PACIFIC RAILROAD:

**May 12, 1941, unit 802, Sedalia, Mo. Injured while attempting to crank Diesel-electric locomotive by hand; electric starting device inoperative due to weak batteries; one injured.

One accident; one injured.

SEABOARD AIR LINE RAILWAY:

March 25, 1941, units 3008 and 3014, Wolfolk, Fla. Burned by hot water which escaped from steam-heat hose between the two units when attempt was made to disconnect the hose; one injured.

One accident; one injured.

Table XII.—Number of steam locomotives inspected,

		T.,	T.,	Т	1	!		Τ	7	1			_	
	Parts defective, inoperative or missing, or in violation of the rules	Akron, Canton & Youngstown	Alabama, Tennessee & Northern	Aliquippa & Southern	Alton & Southern	Alton	Ann Arbor	Atchison, Topeka &	Atlanta & St. Andrews Bay	Atlanta & West Point	Atlanta, Birmingham & Coast	Atlantic & East Carolina	Atlantic & Yadkin	Atlantic Coast Line
1	Air compressors	1	1				i		_					
2	1 Aren Limes	1	1			1]	30	- -					7
3						il		3					[]	
4	Axies	l												3
5 6	Blow-off cocks			[23					[]	
7	Boiler checks Boiler shell					4		. 5				1		1 1 3 45
8	Brake equipment			-:		1		11				ļ		3
9	Cabs, cab windows, and curtains			2	- <u>;</u>	1		51 12			6	:	1	
10	Cab aprons and decks				1	*		4				1	1 1	8
11	Boiler shell Brake equipment. Cabs, cab windows, and curtains. Cab aprons and decks Cab cards. Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown boits Cylinders, saddles, and steam chests. Cylinder cocks and rigging. Domes and dome caps. Draft gear Dray gear Driving boxes, shoes, wedges, pedestals, and braces Firebox sheets. Firebox sheets.				. [2						5
12 13	Coupling and uncoupling devices]							2		
14	Crown bolts				1	4		28				$ \tilde{2}$		14
15	Cylinders saddles and steem cheets				.			3						
16	Cylinder cocks and rigging					1].		28					5	18
17	Domes and dome caps				-	-		26 2					1	- 1
18	Draft gear		1	2	-	·i ·		8			<u>2</u>			.1
19	Draw gear			1				10			1	3 2		11 8
20	Driving boxes, shoes, wedges, pedestals, and					- [1	-		٥
21	Firehox sheets			.	-			93			2		2	14
$\overline{22}$	Flues			-		-		5						1
2 3	Frames, tail pieces, and braces, locomotive			-	-	·		13 6						1
24	Frames, tender			-		-		- 1			3			5
25 00	Gages and gage fittings, air							7					1.	3
26 27	Gaga goeks			1 .		1 _		15	1	. .				2
28	Grate shakers and fire doors			-	-			25		1				2 11
29	Handholds.			-	-	2 -		12			. 1	1		3
3 0	Firebox sheets Flues Frames, tail pieces, and braces, locomotive Frames, tender Gages and gage fittings, air Gages and gage fittings, steam Gage cocks Grate shakers and fire doors Handholds Injectors, inoperative				1	5		11	1 .		1	2	1	6
31	Injectors, inoperative Injectors and connections Inspections and tests not made as required Lateral motion Lights, cab and classification Lights, headlight		_i		il	3		61	-				-	
32 33	Inspections and tests not made as required	2	7	5	9	22	î	248			10	1 4	- 7	33 100
34	Lateral motion	2] _	-	3 _		10			1			1
35	Lights headlight			- -	- -			3	· -			1	-	
36	Lubricators and shields			- -	- -	-		14		· - [·				1
37	Lights, cab and classification Lights, headlight Lubricators and shields Mud rings Packing nuts Packing, piston rod and valve stem Pilots and pilot beams. Plugs and studs		-	- -	11-			20 10	1/.			1		
38	Packing nuts				1	9		50				1		2
3 9 40	Packing, piston rod and valve stem				1 _			20			1		-	5
41	Plugs and studs		-	- -				4						4
42	Reversing gear			- -	-[19	-		.	.	[2
43	Rods, main and side, crank pins, and collars			1-	ī -				-			1		
44	Rods, main and side, crank pins, and collars. Safety valves.			1	1	1		2			-		1	19
45 46					-["	5	[20] ·				13
47	Souirt hore	-	-	-	1	5	2	130		-::[3	4	ī	29
48	Stay bolts		-	- -	-			_0 -		-		-1	-	2
49	Stay bolts Stay bolts, broken Steam pines		-		- - :			10	-]-	-	-	-	1
50	Steam pipes Steam valves			_ -	1:	:-		<u>3</u> 2	-	[-	i -			3
51	Steam valves				-						_ 1 -	-	-	
52 53	Tanks and tank valves		1 -		-			15	-		1		1	2
54				1 2	2			36 _			2	2	1	22
55	Throttle and throttle rigging	1 -		- -;	:1			3 -		-	-	-		
56	Throttle and throttle rigging Trucks, engine and trailing			1.		ا	-	$\frac{16}{22}$			1 -	-	-	10
57 58			1	2	.	1		29	ī[.		1	i -	-[14 28
59	Washout plugs	-	-	-	.	-	-	24			2		i	6
60	Train-control equipment	-		-1			-	31 _					-	ĭ
61	Waler glasses, fiftings and chields	-	-	il			-	- ₁₃ -				: -	-	
62	W Reels					1		10	11		2	2 -	-	6
63		- 1-				1	1	10	1		4	1 -	-	2
	places, brakes (nand)	-	:	۱		4	-	48 _			1	1	1	7
- }	Number of defects	 -	14		-	-	-		-	-	-	-	- -	
	,	5	14 20	23	9	1	3 1,	434	7		57	34 20	ا (د	497
	Locomotives reported Locomotives inspected Locomotives defective	24	11 23	15	16	5 4	3 1,	487	11	45	71	12 1	===	850
	Locomotives defective	62	19 42	34	36	7 12	6 4.	120			236	30 39	31.	652 430
- 1	Percentage inspected found defeative	3. 2	71.5	1 9	1 2	81	1	381	2		17	7 23 1	1	118
	Locomotives ordered out of service	3. 2 1	37 12	$ ^{26}$	1	8 .	8	8	17		7	23 1	4	8
			'	·		ا	-'	- d1	11		T,	1	.1	5

found defective, and ordered from service, etc.

Baltimore & Ohlo, lines east	Baltimore & Ohio, lines west	Bangor & Aroostook	Belt Ry. of Chicago	Bessemer & Lake Erie	Boston & Maine	Camas Prairie	Cambria & Indiana	Canadian National	Canadian Pacific	Carolina & Northwestern	Central of Georgia	Central R. R. of New Jersey	Central Vermont	Charleston & Western Carolina	Chesapeake & Ohio	Chicago & Eastern Illi- nois	Chicago & Illinois Mid- land	Chicago & North West- ern	Chicago & Western Indi- ana	Chicago, Burlington &	Chicago Great Western	Chicago, Indianapolis & Louisville	Chicago, Milwaukee, St. Paul & Pacific
42 1 4 10 9 71 55 14 2 1 26 3 66 18	17 4 3 3 15 22 12 3 7 1 27 1 26 8	1	2	2 1 2 1 1 1 1 1 3	9 1 4 3 18 18 2 11 11 2 2 1 1 3			3 9 4 1 1 1	1 4 7 2 4	1	2 1 8 7 2 2 1 1 2 1 1 1 1 1 6 1	1 3 8 1 4	1 14 14 14 	8 1 1 1 12 4 1 7 5 2 2 1	4 1 1 1 1 7 7 6 6 1 1 2 2 4 1 1 1 2 2	1 3	1	39 2 15 13 11 22 184 58 18 9 8 68 3 32 51 9 9	1 2	23 2 1 1 9 14 59 5 12 1 7 2 22 22 20 10 11	2 1 2 1 2 2 2 2 2 2	1 	9 1 2 6 5 46 19 4 2 1 17 3 17 3
43 6 9 7 9 6 12 13 79 316	15 2 14 2 1 3 6 6 11 	1	1 2 4	1 1 1 13	13 7 1 2 1 1 1 27 97 4			12 1 1 2 5 22 1	1 1 8 26 2	4	12 	1 3 2 1 5 1 1 1 37	8 1 1 1 1 1 1 9 37 6	17 1 17 3 5 2 31 1	1 1 1 2 1 1 43 3		1	102 16 6 100 10 6 14 42 44 2 92 542 30	1	30 4 1 12 7 4 6 5 12 5 2 42 144 5	1 1 5 6 23 2	19 2 13 4 3 5 4 9 56 6	52 143
7 2 11 7 24 21 26 1 13 13 37 3 10 123 1 6 7 124 20 69	5 1 4 17 14 2 2 15 15 3 10 60	4	3	3	3 2 1 1 2 3 9 2 30 2 30			1 5	11 15 11 22 55	2	3 2 2 7 3 14 1 2	2 4 2 10 33 3		4	1 10 16 6 1 9 13	2	1	14 10 22 20 43 13 9 38 139 . 2 38 222 1 7		3 7 14 9 3 5 38 7 26 1 6 2	1 1 1 2 3 6 8 1 1	17	3 3 5 32 2 16 53
20 69 30 30 16 27 11 29 9	1 2 24 14 19 6 13 4		2 9	2 1 4 1 1 2 2 2	11 11 11 54 88 66 11			1 9 10 3 1	1 6 6 1 3 4 1	1	-	1 7 2 3	2 2 2 6 1 8	1 1 7 1 3 4 2	2 2	1		26 23 76 3 588 80 45 48 8 30 26	1 1 2 	5 2 8 14 15 20 23 17 6 10	3 2 3	1 8 9 10 7	2 9 25 8 14 20 17 3
1, 510			32		346	- -		108	104	-	-					-	·	2, 680	i		109		
2, 027 3, 376 374 11 21	9	63 115 5 4. 3	50 10 20	13	1076 116 11	38	18	21	180 28	30 4 13	238 519 54 10	369 1,004 57	59 308 41 13	38 105 34 32	811 2001 53 2. 6	157 388 3 18 3 4. 6	24 62 2	1, 214 3, 653 724	19 27 5 19	989 3, 100 183	159 426 28	110 321 72	1, 116 3, 235 209 6

Table XII.—Number of steam locomotives inspected,

_	TABL	1E1 2	X11.	14.	amo	<i></i>	n a	ecu.	m	wee	moi	ve	8 2.	nsp	ectea,
	Parts defective, inoperative or missing, or in violation of the rules	Chicago River & Indiana	Chicago, Rock Island	Chicago, St. Paul, Minneapolis & Omaha	Chicago, West Pull- man & Southern	Cincinnati Union Ter-	Clinchfield	Colorado & Southern	Colorado & Wyoming	Columbus & Greenville	Conemaugh & Black Lick	Copper Range	Cumberland & Penn-	Delaware & Hudson	Delaware, Lackawanna & Western
1	Air compressors		41	${12}$		1	. 6	3 7		- 2	1	_		-	5
2	Arch tubes Ashpahs and mechanism		l												1. 4
3	Ashpans and mechanism		1					.							
4														.	
5	Blow-off cocks Boiler checks Boiler shell		24				1							. 1	1
6 7	Boiler checks		12				1 3				1			4	3
8	Brake equipment		195				12]]		
9	Brake equipment Cabs, cab windows, and curtains		125				15			8	2			19	
10	Uan aprons and decks	l	14			1 1	10						4	19	5
11	Cab cards		2	1			2		1						9
12	Coupling and uncoupling devices	l	2				1		l						
1 3	Crossheads, guides, pistons, and piston		79	9		1	14	2		ī	3	· 		4	12
14	rods. Crown bolts				١ ,		Ι.					i		١.	
15	Cylinders, saddles, and steam chests		8 46	1 7	2		27			16			12	2	
16	Cylinder cocks and rigging		12							10			6		40
17	Domes and dome caps		3	, ,			1			10			'	'	8 7
18	Domes and dome caps Draft gear		27				ī				2		1	21	16
19	Draw gear		22							1					3
20	Driving boxes, shoes, wedges, pedestals, and braces.		100	3			26	1		3		~ ~		5	23
21	Firebox sheets		18	1	1		2		ĺ	3	1			i	
22	Flues		102	1	1		2			1			-		2
23	Frames, tail pieces, and braces, locomo-		44	11			12			î					i
	tive.						i								-
24 25	Frames, tender		4				3			2					
26	Gages and gage fittings, air		12	1						1				2	4
27	Gage cocks		25 13	1 5			3			9				6	3
28	Grate shakers and fire doors		28	4			5			1				3 5	7
29	Handholds		18	-			8			3				3	
30	Injectors inonerative		4												
31	Injectors and connections Inspections and tests not made as required. Lateral motion	1	72	9			19	2	1	10			1		30
32 33	Lateral motion	1	339	64		2			3				5		
34	Lights, cab and classification		21 2				1			3 2				5 2	10
35	Lights, cab and classification Lights, headlight Lubricators and shields		10	1			2			ĩ		~ - [~	2
36	Lubricators and shields		17	ī			2		1					5	ī
37 38	Mud rings		11	1			1				1				1
39	Packing nuts Packing, piston rod and valve stem		27 19	10 2			2	;	1	9				1	
40	Pilots and pilot beams		3	7			19	1		6			10	3	23 2
41	Plugs and studs		6	l il			2			ĩ		1			3
42	Reversing gear Rods, main and side, crank pins, and		30	2			2	1		1	1			3	6
43	collars.		54	7			28	4	3	3	6	[1	8	70
44	Safety valves	i	3	,	ļ									6	ايا
45	Sanders		47	2			5			1				ט	5 2
46	Springs and spring rigging		188	$2\tilde{1}$			27			7	2		2	23	84
47	Squirt hose. Stay bolts.		2	1											
49			18				5		2			[1	3
50	Stay bolts, broken Steam pipes Steam valves		20				7		-		1			4	6
51	Steam valves.		7											- 2	ĭ
.52			18	2			12				2			11	15
53 54	Tanks and tank valves		53	6			10	1	1	5	1			3	19
-55	Throttle and throttle rigging	[5 46	8			2	ī					ĩ		11
56	Trucks, engine and trailing		38	9			ĩ	- 1		2			1	7 2	19
57	Trucks, tender	1	19	3			1 3	13	2	5				11	îĭ
58 59	Valve motion		53	7	- 1		8	1			2			1	5
60	Washout plugs Train-control equipment		15	9			8			1				3	17
61	Waler Plasses, fillings, and shields		55	4			8	ĩ	ī	8	-			11	13
62	Wheels Miscellaneous—Signal appliances, badge		18							3	11	-	3	2	9
63	Miscellaneous—Signal appliances, badge		32	1			20	1		5	î.			6	19
	plates, brakes (hand). Number of defects		1 070	007			200	45	-	100		- -	4.5	070	77.0
l		3	1, 978	287	3	4	390	45	10	165	54	-	45	273	756
	Locomotives reported	35	808	246	12	12	78	86	21	29	29 1		11	370	414
	Locomotives inspected	36	2, 729	750	22	11	227	295	69	65	69 1		23	987	1, 357
1	Locomotives defective	6	445	81	3	2	53	8	4	26		-	7	58	180
ł	Locomotives ordered out of service	0	16 22	11	14	18	23	2. 7	o	40 8	13	-	30	6	13 18
						'	01	:	1	01	<i>o</i>	-	<u>.</u>	-	10

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

Denver & Kio Grande Western	Denver & Salt Lake	Detroit & Mackinac	Detroit & Toledo Shore Line	Detroit Terminal	Detroit, Toledo & Ironton	Donora Southern	Duluth, Missabe & Iron Range	Duluth, South Shore	Elgin, Jolict & 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	High Point, Thomas-	Houston Belt & Ter- minal	Huntingdon & Broad Top Mountain	Illinois Central
å	ă	ă	Ğ —		A ——	Á I	Ω ——	<u> </u>			<u> </u>	뜨 	- G	<u>.</u>	-3 -3		_	9			=	 	= _	3
		1		5		I			2	10														
1									2							₁								
					ĩ					12 11			1			5				<u>ō</u>				1 4
- -			- -	1						8	1 1 5	1			1	$\frac{3}{11}$			3				ī	5
				3		1	1	1	2 1	8 38 21 10	5	2	5	1		25	l-,		1	6			5	12
				2			2		1	21 10	1	1			1	11 6	1	2	1	1				11
	- ^			1			1												î	$\hat{2}$				
						1					;				1	1 8				₅				9
				2		2			3	16	1				1	۰			*					"
		~ -								1						2			<u>-</u>					1
3						- 7	3	1	1	51 6					1	31 3			6	3			1	6
4										1														
				5		4				7 1	3	<u>-</u>	5		₁	6 5		1	3	3				8
						1			4	8	3	16			6	19			10	1			1	1
				Ĭ.			1									1		1						9
- -		1		1						3	2	2				4		1						
1		!				1			2	20		2				15		ī	2	4			1	5
									1	1						1								
								2		4	2					1			2	5				1
				- ;						4						5								1
				1		1	1	1	4	3 3	5		2		1	4 7 7	1		<u>-</u> 1					7
-				2					3	11	5 6		2		7	7				4				7 2
1				- 5				<u>ī</u>	5	34	<u>-</u> 6	10	6		<u>-</u>	22			5	<u>.</u>			2	15
3		3		20	2	9	6	3	14	113	18	16			20	147	2	4	20	60			4	67
									4	10		4	2			5								1
									₁	3 2		- -				10			1	1				1
		۔ اِ		- <u>-</u>						10					2	10 5 3 1	1	1						
		2		1			1		1	18					2	3				<u>-</u>				₁
							1		1	18 7					ĩ	2	1		1	3			2	
				2					1	2	1		1			İ		~						1
					1	1-2			1	4	11	i			1	2 8 24	1		1	5				1
1						. 2			7	43		ŧ	4		1	24		2	1 6	6				16
	١.											8						ļ			1			
		ĺ		[-]		-				12 55	4	1 3				25 25	5		ĩ					9
				۱		1		1	9	55	2	2	6		9	25			12	9				16
				j					i	3	1		1			7	1							3
				-;			2																	
		[[1			2	$\begin{vmatrix} 7\\2 \end{vmatrix}$		j	Īī			10	<u>'</u>		2					1
		3		2		4			2	2 5 19	6	1	2		3 2	8	3			3				9
				Ľ	` - -	1				19	2	1 2	4		2	14				3				4
				3		1			6	13					8	4	1			$\begin{vmatrix} 3 \\ 7 \end{vmatrix}$			ii	5
				1-2					6 7 5	13 17 11	15 15	3	3		3	4 8 13	3		4	1				5 3 1 8
ĩ				ĺí	1	1.5	1	1		112					2	13			3	3			. 1	y 8
		1							1						6	È	5		i		2			13
		1		1-2	<u>i</u>	il			2	13					₁					6				
1				1		(1	14			i	1	2	1 7	1	l		1				1 11
	.!	<u> </u>					1			21					2	20)		4					1 4
16		14		79	4	51	23	11	96	709	99	85	60	1	98	555	10	14	95	199)		22	294
328	=	==	-	=		- -								- - -	i==		- -	-	!			-		
882	169	16	1 56	8	156	17	173	82	$\begin{vmatrix} 228 \\ 312 \end{vmatrix}$	801 1,997	119 185	60 166	7 27 3 77	47	$\frac{232}{548}$	1.919	$\frac{23}{981}$	86	(1) 2 351	166 504	6 10 1 15		3 11 3 29	1, 368 3, 187
4	ш	1 3	·I	100	1. 3	11 11	\ c	•	24	1, 997 184 9	23	2	16	j	25 4. 6	1, 919 176	3 8	1. 7	25	64	L	.]	.] 4	4 82
				144			l 4. €												7 7				. 14	

¹ Atchison, Topeka & Santa Fe. 425146—41——3

Table XII.—Number of steam locomotives inspected,

	Parts defective, inoperative or missing, or in violation of the rules	Illinois Terminal	Indiana Harbor Belt Line	Indianapolis Union	International-Great North- ern	Interstate	Jacksonville Terminal	Kansas City Southern	Kansas City Terminal	Kansas, Oklahoma & Gulf	Kentucky & Indiana Ter-	Lake Superior & Ishperning	Lake Superior Term. & Transfer	Lake Terminal
1	Air compressors				2	, ,	l		1					
3	Arch tubes Ashpans and mechanism													
4 5	AxlesBlow-off cocks		1											
6	Boiler checks	. 1	l] 1		ī				
7 8	Boiler shell Brake equipment		l		6			$\begin{vmatrix} 3 \\ 17 \end{vmatrix}$						
9 10	Cabs, cab windows, and curtains.	.	1		9			13	2					
11	Cab aprons and decks Cab cards	.	2		2				1					
12 13	Cross heads guides pistons and piston rada		<u>ĩ</u>		_i	5				;				
14	Crown bolts Cylinders, saddles, and steam chests							1						
15 16	Cylinders, saddles, and steam chests				11	6 5								
17 18	Domes and dome caps	1												
19	Draft gear Draw gear	1			<u>-</u>	2		2	_ī		1			
20	Driving boxes, shocs, wedges, pedestals, and braces	4			10	-	1	-	_					
21	Firebox sheets				12 1			44						
22 23	Flues Frames, tail pieces, and braces, locomotive	t			1 13	4		41	3					
24 25														
26	Gages and gage fittings, air Gages and gage fittings, steam				1			5	2					
27 28	Gage cocks. Grate shakers and fire doors.					1		2						
29	Handholds					ī		5		1				
30 31	Injectors, inoperative		เวเ		8			4	<u>ī</u>					
32	Inspections and tests not made as required	ĩ	5		25			56		4	2		- 1	
33 34	Lights, can and classification	1 1				1		2						
35 36	Lights, headlight Lubricators and shields	1 1						1		1				
37	Mud rings							2 2	î					
38 39	Packing nuts Packing, piston rod and valve stem	1 1			5	1		1 9						Į
40	Phots and phot beams	1			1			4	<u>-</u> ī					
$\frac{41}{42}$	Plugs and studs. Reversing gear	1			5 2			1 3						
43 44	Rods, main and side, crank pins, and collarsSafety valves	3	1		7	13		20	4					
45	Sanders	l!			1 1			1 2						
46	Springs and spring rigging		1		4	5		26						
48	Stay bolts.	ا ـ ـ ـ ا		[$-\tilde{2}$						
49 50	Stay bolts, broken			-	2			<u>ī</u>						
51 52	Steam valves Steps				[1						
53	Tanks and tank valves		- 1		1	4		47	1				-	
54 55	Telltale holes Throttle and throttle rigging				[Ī		1						
56	Trucks, engine and trailing		i.		3 2 3	<u>2</u>		3 4					-	
57 58	Trucks, tender				3 5	<u>-</u> 2		$\frac{6}{2}$	1					
59 60	Washout plugs Train-control equipment					[-	
61	Water glasses, fittings, and shields				3	<u>i</u>		<u>-</u> 2	2		1			
62	Wheels Miscellaneous—Signal appliances, badge plates,		- 1			-		19	ĩ					
	brakes (hand)		1		2	1		5	1	2				
	Number of defects	-8	20		144	72	[366	58	15	4		3 .	
	Locomotives reported	22		== =			:	==	:					
	Locomotives inspected	35	165	11 27	446	12 34	15 31	442	17 48	16 44	26 17	32 53		17 40
-	Percentage inspected found defective	2.9	5		32 7	12 35		75 17	13 27	4.5	12 12			- 1
	Locomotives ordered out of service		11.		2	4		7	i	<u></u>				

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

Lehigh & Hudson River	Lengn & New England	Lehigh Valley	Long Island	Louisiana & Arkansas	Louisville & Nashville	McCloud River	McKeesport Connecting	Macon, Dublin & Savan- nah	Maine Central	Maryland & Pennsylvania	Midland Valley	Minneapolis & St. Louis	Minneapolis, St. Paul &	Minnesota Transfer	Mississippi Central	Missouri & Arkansas	Missouri-Illinois	Missouri-Kansas-Texas	Missouri Pacific	Monongahela Connecting	Monongahela	Montour	Nashville, Chattanooga & St. Louis	Nevada Northern	Newburgh & South Shore	New Orleans Public Belt	New York Central	
1	2 2 1	7 1 1 2 2 1 1 12 11 1 1 2 5 5	1 1	1	6 1 4 - 3 20 6 1		1	1	5 1 2 4	1	1	3 1 6 3	2 3 3 9 1 1 2 4	2	1	7 2 1 11 3 1 2 3 11	i	1 2 6 1 2 11	10 1 5 13 20 5 3 3	3	2	I	9 1 5 4 3 20 6 3 20			1	29 1 16 42 14 38 92 28 4 36 2 56 18	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1	3 1 2	1 16 1 15 2 3 2 2 4 3	2	1 2 1 1	21 7 6 5 13 1			1	6 1 3 6 7 6 2 1 2 1 2	1		1	2 1 3 6 1 2 2	2		2 5 31 2 1 7		3 1 38 2 1 6	3 3 15 	3	1	2	1 2 3 8 5 3 18			1	18 19 15 15 47 4 4 45 2 6 9 8	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4 20 1	6 3 6 13 72 2 2 2		2 1 5 1	123 55 23 84 60 1		1	2	1 2 38 38 1 34	1 5		1 1 2 22 1 1	2 2 43 1	1	1 3	1 1 3 29 1 1 1 6	3	1 4 45 2 1 1 1	23 90 4	6	2 7	3	11 1 1 23 40 5 4		1	1	8 10 17 1 90 461 39 2 2 2 8 6 42 24	27 28 29 30 31 32 33 34 35 36 37 38 40 41 42 43 44 45 46
3	1 1 3 2	2 5 5 5 29 1 4		1 1 1 2	21 21 21 4		2	1	3 5	1		8	33 11 11 99 266	2	2	11 11 11 11 11 11 11 11 11 11 11 11 11	 	1 5 16 26 2 2 3	29 13 28	3	3		3 17 17 41 41			2	4 31 27 57 5 44 156 17	40 41 42 43 44 45 46 47 48 49 50 51 52 53
1	1 2 1 3 3	5 12 7 5 8 3 9		2	144	3		1	2 4 1 3		1	2		3 1	1			51 55 77 11 52 22 5	1: i	55	1		10	2		1	36 44 52 25 46 25 23	54 55 56 57 58 59 60 61
15 17 58 4 7	45 280	I 80	93 143	28	889 2, 074 118	= = 9 13 4,10	3 10	10	1 1 2 1 4 1 5 1 5 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6	16	13 49 1	94 231 28	280 820 3 60	8 14 0 14 6 19 7 11	18	20 3 1 3 3 3 3 4	8 1	1 63 8 7	89 2, 39	5 20 = = 8 2	2 51 3 93	1 23 5 53	358 2 196 3 623 3 8	= 16 33 4	3 1 2 2	4 13 9 18 1 1	3, 152 $6, 592$	

Table XII.—Number of steam locomotives inspected,

-							•								,
-	Parts defective, inoperative or missing, or in violation of the rules	New York, Chicago &	New York, New Haven	New York, Ontario & Western	New York, Susquehanna & Western	Norfolk & Portsmouth	Norfolk & Western	Norfolk Southern	Northern Pacific	Northern Pacific Termi-	Northwestern Pacific	Patapsco & Back Rivers	Pennsylvania	Pennsylvania-Reading Seashore Lines	Peoria & Pekin Union
12 3 3 4 5 6 6 7 8 9 100 112 133 115 16 6 17 18 9 12 22 22 24 5 22 26 27 33 33 33 34 5 5 5 14 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Arch tubes Ashpans and mechanism Axles Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cah aprons and decks Cab cards Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts Cylinders, saddles, and steam chests Cylinders cocks and rigging Domes and dome caps Draft gear Draw gear Driving boxes, shoes, wedges, pedestals, and braces. Firebox sheets Flues Frames, tail pieces, and braces, locomotive. Frames, tender Gages and gage fittings, air Gages and gage fittings, steam Gage cocks Grate shakers and fire doors Handholds Injectors and connections Inspections and tests not made as required Lateral motion Lights, cab and classification Lights, headlight Lubricators and shields Mud rings Packing nuts Packing, piston rod and valve stem Pilots and pilot beams Pilus and pilot beams Pilus and stude. Reversing gear Rods, main and side, crank pins, and collars Safety valves Sanders Springs and spring rigging Squirt hose Stay bolts Stay bolts Stay bolts Stay bolts Stay bolts Steam valves Steps Tanks and tank valves Telltale holes Throttle and throttle rigging	1 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	1	1 1 1 3 3 4 4 2 1 1 1 6 6 3 2 3 2 2 2 2 1 1 2 2 2 1 1 1 1 1 1 1 1		22 48 24 8 8 5 1 1 1 6 6 6 1 1 2 1 2 1 1 1 1 1 1 1 1 1	13 11 11 11 11 11 14	10 11 11 11 12 23	3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	67 55 8 8 45 55 153 766 100 1 1 2 2 5 112 1 16 6 6 7 1 1 18 1 18 1 18 1 18 1 18 1	1	
57 58 59 60 61 62 63	Trucks, engine and trailing Trucks, tender Valve motion Washout plugs. Train-control equipment Water glasses, fittings, and shields Wheels Miscellaneous—Signal appliances, badge plates, brakes (hand). Number of defects	4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4 11 6 5 2 10	2 1	1	6 12 4 8	1 1 2	12 13 3 11 13 2 4		5	-	34	-	ī
	Locomotives reported Locomotives inspected Locomotives defective Percentage inspected found defective Locomotives ordered out of service	303	519	211 110 358 56 16 2	99 31 17 31 26 1	21	561 1393 1 97	51 46 1	166	14 d 28 d	= = 5	3 25 7 42 2 88 1 57 1	='= 13 52 70	78 1 70 1 2,	

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

fou	na	dej —	ec						-	1		<u>,</u>	_		_	 re	1 10	1	1		Lie	1	Lo	1	_
Pere Marquette	Philadelphia, Bethlehem & New England	Pittsburgh & Lake Erie	Pittsburg & Shawmut	Pittsburgh & West Virginia	Pittsburg, Shawmut & Northern	Quebec Central	Reading	Richmond, Fredericks- burg & Potomac	River Terminal	Rutland	St. Louis-San Francisco	St. Louis Southwestern	Savannah & Atlanta	Scaboard Air Line	South Buffalo	Southern Pacific, lines east	Southern Pacific, lines west	Southern Pacific of Mexico	Southern	Spokane International	Spokane, Portland &	Steelton & Highspire	Tennessee, Alabama & Georgia	Tennessee Central	
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	100 3 1 1 1 1 3 3 1 1 3 4 1 1 3 3 4 1 1 1 1	2 2 1 1 1 1 2 2 3 18 1 1 1 2 2 1 1 2 1 1 2 1 1 1 2 1 1 1 1	77	77 33 11	33 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	1	1 1 1 2 2 1 1 3 3 2 2 1 1 1 1 1 1 1 1 1	1 1 2 2 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1	2 2 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3	2 1 2 1 1 S 1 1 2 1 5 5 1 1 1 4 4 9 9 9 3 5 5 4 1 2 2 1 2 2 5 5 4 1 2 2 1 2 5 5 4 1 2 2 1 5 5 1 2 1 2 5 5 4 1 2 2 1 5 5 1 2 1 2 5 5 5 1 2 1 2 5 5 1 2 1 2	3 3 1 1 2 2 3 3 3 2 2 2 2 2 3 3 3 5 1 1 5 5 8 8 1 1 9 9 2 2 3 3 3 2 2 2 2 2 3 3 3 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3		99 110 100 88 11 99 1332 166 22 44 11 55 44 44 22 266 70 99 15 33 34 41 17 71 44 22 99 41 11 33 99 22 55 11		2 1 1 1 2 2 2 3 1 1 1 1 1 1 1 1 1 1 1 1	11 144 44 77 15 14 64 88 8	11 1 1 1 1 1 1 1 1 1 1 5 5 4 4 1 1 1 1 1	2 9 9 23 39 14 4 5 54 11 47 7 3 4 4 4 3 3 3 11 11 11 11 11 12 9 4 3 3 11 14 10 2 2 2 2 6 6 6 3 3 12 2 9 9 19 11 11		1 1 1 2 2 1 1 4 6 6 6 2 2 4 4 4 4 6 6 6 6 6 6 6 6 6 6		1 1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		1 2 3 4 5 6 7 8 9 10 1 1 2 3 1 4 5 16 7 8 9 10 1 1 2 2 12 1 4 4 1 1 1 1 1 1 1 1 1 1 1
3 2	8 2 1	<u>-</u> 5		2 1 7		 	9 17 7	2	5	7 1 7	2 5	3		8 3 7	5	<u>i</u>	44 20 5	4	19 10 26		1	1	1		$\frac{61}{62}$
54	108	68	27 =	66	17	3	381	50	76	306	184	174	11	450	13	39	825	109	934		50	17	22	122	
272 439 15 3. 4	89 35 39	235 341 21 6	37 3	28 68 15 22 2	16 42 4 10	$^{20}_{\ 6}_{\ 1}$	613 1. 813 106 6	80 101 14 14 14	$ \begin{array}{c} 15 \\ 36 \\ 22 \\ 61 \end{array} $	63 312 58 19 2	576 1. 707	190 702 46 7	48	520 1, 256 91 7 9	32 5 16		1, 411 3, 030 295 10 12	25 14 11 79 7	1, 535 3, 187 231 7	10 17	94 295 16 5	36 7 19	11 16 4 25	31	

Table XII.—Number of steam locomotives inspected,

_						
	Parts defective, inoperative or missing, or in violation of the rules	Tennessee Coal, Iron & R. R.	Terminal R. R. Assn. of St. Louis	Pacific	Texas-Mexican	Texas Pacific-Missouri Pacific of New Or- leans
1 2 2 3 4 4 5 6 6 7 8 9 9 101 12 3 14 4 15 6 6 17 7 18 19 0 22 12 22 32 42 52 62 7 28 29 0 31 2 23 33 4 4 4 5 6 4 7 8 4 9 5 0 10 12 2 2 3 2 4 5 5 5 6 6 1 6 6 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Air compressors Arch tubes Ashpans and mechanism Axles Blow-off cocks Boiler checks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab aprons and decks Coupling and uncoupling devices Corown boils Cylinders, sardles, pistons, and piston rods Crown boils Cylinder cocks and rigging Domes and dome caps Draft gear Draw gear Draw gear Draw gear Driving boxes, shoes, wedges, pedestals, and braces Ficebox sheets Flues Frames, tail pieces, and braces, locomotive Frames, tender Gages and gage fittings, air Gages and gage fittings, siteam Gage cocks Grate shakers and fire doors Handholds Injectors, inoperative Injectors and connections Inspections and tests not made as required Lateral motion Lights, eab and classification Lights, headlight Lubricators and shields Mud rings Packing, piston rod and valve stem Pilots and pilot beams Pilots and pilots beams Pilots and pilots beams Pilots and pilots beams Pilots and	1 1 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	2 2 1 2 2 2 3 3 6 49 1 1 1 4 4 1 1 4 4 1 1 2 1 1 4 1 1 1 1 1		Texas	1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1
~	Number of defects	16	126	9		1 15
- 1	Locomotives reported					
	Locomotives inspected Locomotives defective Percentage inspected found defective Locomotives ordered out of service	49 22 5 23	102 246 55 22 4	306 551 5 .9	17 11	12 18 3 17
			4			

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

found	aejec	uve,	ana o	1 401 00	<i>J. o.</i> .		rce, e								
Toledo, Peoria & Wes- tern	Toledo Terminal	Toronto, Hamilton & Buffalo	Union Pacific	Union Railroad	Upper Merion & Ply- mouth	Utah	Virginian	Wabash	Washington Terminal	Western Maryland	Western Pacific	Wheeling & Lake Erie	Roads with less than 10, and industrial locomotives	Total defects	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		411 188 227 233 100 432 448 249 100 32 333 155 87 7 148 221 60 6 6 6 7 6 7 7 168 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	5 1 1 10 4 1 2 2 2 2 2 2 2 2 2 18 19 11 1 5 5 10 4 9 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 3 2 8 1 1 4 4 3 3 2 8 1 1 1 1 1 2 2 8 6 3 3 6 6 3 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1		16 3 3 16 31 1 6 6 2 5 5 101 18 1 7 7 6 6 1 1 1 3 3 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1	1 1 2 2 19 1 1 1 2 2 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 3 1 1 1 1 1 3 3	5 1 1 4 1 5 4 2 2 2 2 1 1 10 1 1 2 2 2 1 1 1 2 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 7 7 2 2 7 7 2 2 1 1 9 2 6 1 1 1 1 1 3 3 1 1 1 1 1 1 1 1 1 1 1 1	73 4 4 4 4 10 19 12 242 167 42 242 2 87 73 33 32 22 2 87 73 18 35 11 29 15 50 25 79 9 12 28 75 89 9 12 26 60 35 171 8 42 157 9 12 60 60 44 120 32 13 80 78 84 34 34 34 34 34 37	684 317 67 67 57 205 58 313 1,945 1,987 307 74 858 97 7,32 438 94 424 150 863 83 183 234 1,33 234 1,33 235 347 1,33 236 373 397 785 863 873 1,882 7,215 508 675 142 156 387 1,565 68 487 1,565 597 62 2239 1986 387 1,565 597 688 687 688 689 689 689 689 689 689 689	1 2 3 4 4 5 6 7 7 8 9 9 10 11 12 13 14 4 15 16 6 17 18 19 20 21 12 22 3 24 25 26 27 28 29 30 31 32 33 34 35 36 6 37 38 39 40 41 4 4 4 5 4 6 6 7 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
18 25	20 38 4 11	13 3 	1, 412 4, 199 541 13 17	123 129 30 23 4	10 99 36 36 36 11	14 15	103 270 116 43 13	417 1,005 23 2.3 2.3	21 15 5 33	231 742 14 1.9	165 519 52 10	168 401 27 7 3	1, 736 3, 267 695 21 105	43, 236 105, 675 9, 570 9 560	

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								Ordered out of service							
	1941	1940	1931	1929	1927	1925	1923	1941	1940	1931	1929	1927	1925	1923		
kron, Canton & Youngstown	3. 2	1.7	14	47	42	56	38	1	0	1	12	1	5			
Alabama, Tennessee & Northern		2.8	- <u>-</u>	31	<u></u>	<u>6</u> 9		0	<u>ō</u>			<u>0</u>				
Ilton & Southern	26	19				~		0	Ō		0		0.	(
Alton	8	6 1.9	0	3	14 25	35 71	75 97	3	1	0	3	5	.9	29		
tchison, Topeka & Santa Fe	9	10	8	14	24	32	49	0 8	0 2	9	0 14	2 40	15 30	24 84		
tlanta & St. Andrews Baytlanta & West Point.	17	9	4	6				1	0							
tlanta, Birmingham & Coast 1	7	1.3 4.1	4.3		40	23 54	27 78	0 1	0	0	0	8	12			
tlantic & East Carolina	23	17						1	ō							
tlantic & Yadkin tlantic Coast Line	8	9	6 14	$\begin{vmatrix} 10 \\ 10 \end{vmatrix}$	16 30	$\frac{100}{35}$	58	0 5	0 11	0	1 2	0	0 15	4.5		
Ralto & Objo lines east 2	11	13	4.1	15	30	52	62	21	48	7 3	10	32	113	153		
salto. & Ohio, lines west 3 sangor & Aroostook selt Railroad of Chicago	9	6	4.7 5	17 31	49 43	<u>2</u> 8	50	13	12	8	17	72	- <i></i>			
Belt Railroad of Chicago	20	5	4.3		54	51	66	- ค่	0	1	1 4	3 5	1 4	(
cssemer & Lake Erie	8		12	22	21	63	43	3	1	1	6	1	1	2		
oston & Maine	11	10 3. 1	13 47	16 16	23	36	67	3 0	3	6	3	13	23	191		
amas Prairie ambria & Indiana anadian National	ŏ	10						0	ő							
anadian National 4	13		37	34	50	50	84	2	0	5	7	30	24	4		
anadian Pacific arolina & Northwestern	13	19 15	25	32	44	56	76	0	3	2	1	4	0	5		
		12		19	30	37	33	2	7	10	5	10	8	10		
entral of Georgia entral Railroad of New Jersey entral Vermont	6	8 3. 6		42 12	38 11	47 27	77 47	1	Ò	2	14	20	46	139		
harleston & Wastern Carolina	20 1			28	58	63	68	3	0	1	1 2	$\frac{1}{2}$	2 2	4		
hesapeake & Ohio 5	2.6	5	9	17	28	49	68	10	3 2	5	5	26	29	58		
hicago & Eastern Hinnoishicago & Illinois Midland	3.2	4.4 0	$\begin{bmatrix} 12 \\ 0 \end{bmatrix}$	28 14	38 83	64	75	0	0	3	3	25 29	31	77		
hesapeake & Ohio 5 hicago & Eastern Illinois hicago & Illinois Midland hicago & North Western	20	13	7	12	19	35	67	27	12	5	8	18	29	193		
hicago & Western Indiana hicago, Burlington & Quincy	19	28 3.8	25	43 14	22 21	86 46	67	1	1			0	2	0		
hicago Great Western	7			11	20	40	60 52	3	5 1	23	18 2	39	185 10	176 20		
meago, menanapons & Louisville	22			26	29	45	57	14	6	1	2	14	7	13		
hicago, Milwaukee, St. Paul & Pacific	6	7	4.5	9	13	27	48	0	2	2	5	9	12	*0		
hicago River & Indiana	6	o l	0	5	0	70	62	0	ő	0	0	0	5	58 0		
hicago, Rock Island & Pacific	16	18	11	17	29	55	76	22	33	17	13	49	124	367		
hicago, St. Paul, Minneapolis & Omaha	11 :	11	9	17	30	46	70	2	1	2	6	12	20	5.4		
hicago, West Pullman & Southern	4	4.5		47		100	58	ő	ō	ő	5	1	7	54 0		
incinnati Union Terminal		6			- 5-	- 50		0	0 -			-		==		
plorado & Southern	2. 7	17		38 43	25 40	76 76	68 81	8	2	1 2	5 10	0	$\frac{1}{52}$	10 71		
olorado & W voming	6	19	0	21	27	15	14	0	õ	õ	1	3	2	6		
olumbus & Greenville	9 9			25 58	21	26	44	8	2	1	0	0	0	0		
opper Range	0			28	84	59	75	0	1	0	1	7	7 -	<u>-</u>		
umberland & Pennsylvania	0 2		12	29	13	20	25	0 1 2 18	0	0	1	0	0	ŏ		
laware Lackawanna & Wostorn 1	2 11			2. 6 21	$\frac{9}{22}$	24 36	$\frac{62}{62}$	12	0	0	0 17	1	2	52		
enver & Rio Grande Western	3, 5 1	1.61	0 3	36	54	58	92	0	o	3 7 0	32	88	72	47 174		
enver & Sait Lake	0	1. 9	0 1	9	44	68	93	0	0	ö	2	7	39	8		
etroit & Mackinac 1	9 1			8	36 33	82 51	26 78	0	0	0	0	0	2	0		
etroit & Mackinger etroit & Teledo Shore Line 2	4 1	4 1		ů	46	72	76	ő	ŏ	ŏ	0 1	1	5 7	3 0		
stront, roledo & fronton	1. 31			5	15	28	29	0	0	0	0	3	4	7		
onora Southern 2 Iluth, Missahe & Iron Range	$\begin{array}{c c} 1 & 1 \\ 4 & 6 \end{array}$			0	0 12	37	0 74	2	1 1	0	0	0	1	0		
ıluth, Missabe & Iron Range ıluth, S. Shore & Atlantic gin, Joliet & Eastern	7	1.41	0 2	4	29	35	69	ô	ō	1	4	2	5	3		
gin, Joliet & Eastern	8	7	. 7	4. 7	13	68	50	1	2 7	0	0	1	58	1		
orida East Coast 1	2		3 4 1.4	5 7	30 21	39 22	70 22	10	7	17 0	137	41 0	26 0	100		
rt Worth & Denver City	3 2	1	5 1	3	23	36	27	2	3	5	ž	3		4		
		6 5		7	55	62	46	1	0	5	2	2	8	1		
UISIG	1. 3	1. 6	$\frac{1.1}{7}$		12	34	28 61	0	0	0	3	0	2	5 26		
and Trunk Western 6							341	-1		O.			1			
and Trunk Western 6eat Northern	9 1	0	8 3		33	46	76	3	4	5	42	27	31	262		
and Trunk Western 6 cat Northern een Bay & Western	9 1	0 4. 7 1	3 4	5	47	67	59	1 3 1	0	5	1	1	9	0		
orgia & Florida 2 orgia and Trunk Western 6 cat Northern 6 cen Bay & Western 1 if Coast Lines 1 if, Colorado & Santa Fe 7 lf, Mobile & Ohio 8 1	9 1 6 1 7 1	0 4. 7 1 1 1	3 4	5	33 47 58 47			3 1 0 1		5 2 0 3						

See footnotes at end of table.

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

	Percentage inspected defective								Ordered out of service							
Road	1941	1940	1931	1929	1927	1925	1923	1941	1940	1931	1929	1927	1925	1923		
High Point, Thomasville & Denton Houston Belt & Terminal	0	8						0	0							
Houston Belt & Terminal	0 14	0 12	1.4 0	8 36	44	78	67	0	0	0	0					
Huntingdon & Broad Top Mt	2.6		12	10	14	30	43	ĭ	3	22		35	30	4		
Illinois Central	2. 9		32	29	40	12		0	3 0	4	1	0	ő			
r_ :: Tranhan Palt	3	10	0	1	14	52	68	1	0	0	0	. 0		4		
	0	0	14 7	13	30	26 29	36	0	0	1	0	4 11	0	,:		
International-Great Northern	7 25	$\frac{3.3}{31}$	42	5 60	27 83	94	66 78	2 4	0	1 1	0 4	6	9	16		
Interstate Jacksonville Terminal	0	0		50	0			Ô	2 0	Ô	Ō	ŏ				
er Cit- C-114 hours	17	12	1. 9	8	26	52	92	0 7 1	5	0	1	12	11	121		
Kansas City Southern. Kansas City Terminal Kansas, Oklahoma & Gulf Kentucky & Indiana Terminal	27	23		24	24	80	88	1	1	0	0	0	2	3		
Kansas, Oklahoma & Gulf	4.5	0	1 3. 3	$\begin{bmatrix} 1 \\ 8 \end{bmatrix}$		43 0	50 79	0	0	0	1 0	;	1 0	10		
Lake Superior & Ishpeming	0		17. 7	52	39	46	59	ő	ő	1	7	1	2	10		
Lake Superior Terminal & Transfer	2.9	12	0	10	21	44	67	0	1	0	0	0	2 1	2		
Laka Tarminal	0			56	20	50	0	0	0	1 0	1	0	0	0		
Lehigh & Hudson River	7			25	20 26	14	60	0	0	0	1	0 2	1 5	10		
Lehigh & Hudson River Lehigh & New England Lehigh Valley	8 8			21 39	26	65 36	70 71	3	4	8	4 42	14	26	219		
	2	3. 1	10	59	48	35	66	3	ő	Ö	2	3	ĩ	10		
Louisiana & Arkansas	6	2.5						- 01	1	3						
Louisville & Nashville	6	6		33	41	57	68	6	10	6	32	54	94	136		
McCloud River	0	0	0	29	25	63	46	0	0	U)	U	U	٧	0		
McKeesport Connecting	6	·						ŏ	۷							
Macon, Dublin & Savannah Maine Central ¹⁰	1Ŏ			27	42	41	68	- 1	0	4	1	6	14	15		
Maryland & Pennsylvania	30			42	50	85	58 72	1	0	0	3	3	4	4		
	$\frac{2}{12}$	3.1	0	1 9	42 17	40	72	0	0	0	0	1 7	2	0		
Minneapolis, St. Paul & Sault Ste.	12	18	'	9	14	35	57	۷	۰	2	1	- '	6	49		
Marie	7	10		14	13	25	60	1	2	0	5	2	4	14		
Minnesota Transfer	11	18		32	71	67	97	0	0	1	0	2 8 2	1	35		
Mississippi Central	10	2. 4 40		14	32	32	59	9	0	0	1 8		4	3		
Missouri & Arkansas	48 1.8	3.5	68 0	72	92	91	100	0	$\frac{1}{0}$	8	8	17	12	22		
	7	5	. 6	1	13	42	91	2	ŏ	ŏ	0	6	22	286		
Missouri Pacific	4.7	2. 9	3.5	9	20	59	89	4	6	2	6	24	131	393		
Mononganela Connecting	26			31	53	43	14	2 4 1 0	0	1	3	5	0	0		
Mononga hela Montour	6	3.6	0	8	16	9	0	0	$\frac{1}{2}$	0	0	1 0	1 0	0		
Nashville, Chattanooga & St. Louis Nevada Northern	13			37	34	74	77	5	11	14	15	17	37	46		
Nevada Northern	0	0	0	0	44	25	0	5	0	0	0	1	0	Ó		
Newburgh & South Shore New Orleans Public Belt New York Control	3. 4 6	2.3	4	0	52	92	100	0	0	0	0	1	21	$\frac{2}{2}$		
New York Central 11	8			13 14	5 25	28 43	57 60	33	0 17	8	1 6	0 19	27 27	78		
New York, Chicago & St. Louis	1.4			24	31	48	70	0	i	10	30	14	47	36		
New York New Hayan & Hartford	9	12	14	12	23	39	73	0	2	2	0	5	12	131		
New York, Ontario & Western		19	36	38	36	44	71	2	2	3	16	10	6	7		
Norfolk & Portsmouth Bolt	26 15	íi	6	23	44	48	$\hat{5}\tilde{3}$	1	ô	<u>ō</u>	<u>ō</u>	<u>-</u>	_i	<u>ī</u>		
Norfolk & Western Norfolk Southern Northorn Posific	7	- i		23	42	49	78	4	3	2	9	24	24	163		
Norfolk Southern	12	2.9	16	24	45	45	57	01	0	3	2	4	5	10		
Not therm Facility	10			13	29	37	61	0	5	22	6	50	28	113		
NOTIDWESIETH Pacific 1:	0 19			12	22	12	32	0	0	0	0	0	0	0		
	3.1	3. 6 0	8	$\frac{1}{50}$	6 47	6 44	57 60	0	0	Ö	0	0	0	12 1		
	6			33	44	61	76	32	29	33	153	335	573	687		
Pennsylvania-Reading Seashore Lines						-	- 1		- 1	- 1						
Peoria & Pekin Union	2.9	8	40	14	23	31		6	0	ō						
	3.4	2.8		21	38	57	54 83	0	ő	3	8	14	21	68		
r madeiphia, Bethlehem & New		0	- -		00	٠.	00	}	Ů	ျ	٥	11		00		
	39		21	65	74	76	67	7	4	1	16	14	2	2		
Pittsburgh & Lake Erie Pittsburg & Shawmut	6 8	5	1.9		12	10	27	0	0	0	0	0	0	10		
		10 33	4 32	57	39	47 0	52 33	U	4	0	30	8	0	2 0		
Libbourg, onswinit & Northorn	10 /	20	3.6	8	25	53	86	0 2 0	1	0	1.	2	8	0		
Rooding	17 [25	0	100				0	0	0	0					
Richmond, Fredericksburg & Poto-	6	6	13	33	42	48	59	0	1	5	31	22	26	12		
maeRiver Terminal	14	13	14	18	30	43	58	1	0	0	1	1	2	3		
River Terminal	81	65		71	43	70	0	5		0	1 5	i	0	ő		
	J.															
Rutland St. Louis-San Francisco St. Louis Southwestern	19	4.8	6	6 14	12 22	44 49	54 88	5 2 2 2	8 1 0	0	5 0 7 2	12	3 65	1 346		

See footnotes at end of table.

Table XIII.—Summary of comparison of the percentage of steam locomotives in-spected 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	Per	cent	age in	aspec	eted o	lefec	tive	Ordered out of service							
Load	1941	1940	1931	1929	1927	1925	1923	1941	1940	1931	1929	1927	1925	1923	
Savannah & Atlanta Seahoard Air Line South Buffalo Southern Pacific, lines east Southern Pacific, lines west Southern Pacific of Mexico Southern Pacific of Mexico Southern Spokane International Spokane, Portland & Seattle Steelton & Highspire Tennessee, Alabama & Georgia Tennessee Central Tennessee Coal, Iron & Railroad Terminal R. R. Assn. of St. Louis Texas & Pacific Texas Pacific Texas Pacific Missouri Pacific of New Orleans	7 16 1.5 10 79 7 0 5 19 25 23 23 22 0	3. 5 9 1. 1 7 54 6 12 6 14 7 23 50 15 2	39	24 30 12 13 22 24 47 38 41 1	67 56 29 13 27 100 24 28 33 48 	74 40 62 16 33	55 0 47 38 59 37 60 89 50 76	7 12 0 1 0 4 0 4 0 4 0 0	0 0 4 5 15 0 0 0 1 3 1 6 1	13 0 15 0 1 1 1 1 0 0 4 0 0	24 0 3 47 2 13 0 1 0 0 1 0 0	0 3 3 1	0 1 1 0	63 0 691	
New Orleans Toledo, Peoria & Western Toledo Terminal Toronto, Hamilton & Buffalo Union Pacific 12 Union Upper Merion & Plymouth Utah Virginian Wabash Washington Terminal Western Maryland Western Maryland Western Pacific Wheeling & Lake Erie Less than 10, discontinued roads, and industrial locomotives	0 11 0 13 23 36 0 43 2. 3 33 1. 9	0 4.6 0 9 16 33 0 38 2.2 12 2.3 3.6	25 5 0 9 11 28 0 17 0 0	4 65 45 0 17 9 60 11 22 1. 5 10 26 25 42 40	88 35 0 20 29 62 4 50	30 80 26	93 41 41 10 75 82 89 76 37 74		0 0 0 16 1 4 0 8 2 1 1 2	0 2 1 0 0 1 0 0 1 5	4 0 0 8 2 7 0 0 1 0 3 9 7	0 7 0 0 17 0 8 0 2 2 2 1 13 10	2 2 0 19 0 5 21 1 22 13 20 826	2 0 45 89 2 90 9	
All roads	9	8	10	21	31	46	65	560	487	688	1, 490	2, 539	3, 637	7, 078	

1 Atlanta, Birmingbam & Atlantic prior to 1927.
2 Includes Buffalo & Susquehanna and Buffalo, Rochester & Pittsburgh, 1933-41.
3 Statistics prior to 1927 included in Baltimore & Ohio, lines east.
4 Includes Grand Trunk Western, 1925-27.
5 Includes former Hocking Valley, 1931-41.
6 Included in Canadian National, 1925-27.
7 Included in Atchison, Topeka & Santa Fe, 1923.
8 Includes New Orleans Great Northern, 1935-41. Includes Mobile & Ohio and Gulf, Mobile & Northern, 1941.

* Includes New Orients Great Frontiers, 122 1. 1941.

* Includes Alabama & Vicksburg, Gulf & Ship Island, Vicksburg, Shreveport & Pacific, and Yazoo & Mississippi Valley, 1927-41.

10 Includes Portland Terminal, 1932-41.

11 Includes Boston & Albany, Cleveland, Cincinnati, Chicago & St. Louis, Michigan Central, New York Central, lines west, and Peoria & Eastern, 1937-41.

12 Includes Los Angeles & Salt Lake, Oregon Short Line, Oregon-Washington R. R. & Navigation, and St. Joseph & Grand Island, last 6 months 1936-41.

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.

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

ILLUSTRATIONS OF LOCOMOTIVE BOILER EXPLOSIONS OR CROWN SHEET FAILURES AND LOCOMOTIVE DEFECTS