INTERSTATE COMMERCE COMMISSION

TWENTY-NINTH ANNUAL REPORT

OF THE

DIRECTOR BUREAU OF LOCOMOTIVE INSPECTION

TO THE

INTERSTATE COMMERCE COMMISSION

FISCAL YEAR ENDED JUNE 30, 1940



UNITED STATES GOVERNMENT PRINTING OFFICE WASHINGTON: 1940

ANNUAL REPORT OF THE DIRECTOR BUREAU OF LOCOMOTIVE INSPECTION

OCTOBER 1, 1940.

To the Interstate Commerce Commission:

In compliance with section 7 of the act of February 17, 1911, as amended, the Twenty-ninth Annual Report of the Director of the Bureau of Locomotive Inspection, covering the work of the Bureau during the fiscal year ended June 30, 1940, 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 the requirements.

The tables showing the number of accidents, the number of persons killed, and the number of persons injured have been arranged to permit comparison with previous years as far as consistent. These tables also show the number of locomotives inspected, the number and percentage of those inspected found defective, the number for which written notices for repairs were issued in accordance with section 6 of the law, and the total number of defects found and reported. The data contained therein cover all defects on all parts and appurtenances of locomotives found and reported by our inspectors, arranged by railroads.

Summaries and tables show separately accidents and other data in connection with steam locomotives and tenders and their appurtenances and accidents and other data in connection with locomotives other than steam.

In addition to the accidents shown in the tables and otherwise referred to in this report two accidents resulting in injuries to four employees were reported to the Bureau, by widely separated railroads, which were caused by explosions of torpedoes carried in metal containers attached to the backboards inside of the locomotive cabs. These accidents and two other explosions from the same cause on one of the railroads involved, in which no injuries occurred, do not come within the scope of the locomotive inspection law but are mentioned here to emphasize the necessity of smooth surface containers and keeping them thoroughly clean and having the explosives properly

placed therein and packaged in such a manner that the contents will not leak out. Deterioration of the explosive material due to exposure accompanied by the excessive heat that is often present in cabs creates a condition such that ignition is liable to take place by friction due to vibration of the locomotive while in motion. Explosions of this character jeopardize the safety of employees in the cab and indirectly other employees and travelers upon railroads and the general public. All practicable precautions should be taken to reduce the hazard to the minimum.

Table I.—Reports and inspections—Steam locomotives

		Υe	ar ended	June 30	-	
	1940	1939	1938	1937	1936	1935
Number of locomotives for which reports were filed	44, 274 102, 164 8, 565 8 487 32, 677		105, 186	48, 025 100, 033 12, 402 12 934 49, 746	49, 322 97, 329 11, 526 12 852 47, 453	51, 283 94, 151 11, 071 12 921 44, 491

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

		Ye	ar ended	June 30	-	
	1940	1939	1938	1937	1936	1935
Number of accidents	164 17.9 18 120.0 225 137.2	152 26. 9 15 1114. 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 44.8 215 19.5	201 1 4. 7 29 1 314. 3 267 1 19. 7

¹ Increase.

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

			Ye	ar ended	June 30	-		
	1940	1939	1938	1937	1936	1935	1915	1912
Number of accidents Number of persons killed Number of persons injured	67 16 110	52 15 55	59 5 59	63 19 73	75 10 80	68 24 119	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

				Yes	ar ended	June 3	0			
	194	0	193	9	193	8	193	7	193	6
	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured
Members of train crews: Engineers	5 6 4 1	70 49 24 4 4	4 6 2	46 66 18 5 6	3 2	70 80 31 6 7	8 5 3 1	106 78 30 18 10	4 6 3	78 72 28 13
ployees: Boilermakers Machinists Foremen			1	1 2		2 1 1	2	2 2		
Inspectors Watchmen Boiler washers				1	2	<u>-</u> -	1	1	1	
Hostlers Other roundhouse and		2		1		6		9		
shop employees Other employees Nonemployees	1	1 20 44	2	2 2 14		1 3 7	1 4	3 14 10	2	
Total	18	225	15	164	7	216	25	283	16	21

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

	Year ended June 30—									
	1940	1939	1938	1937	1936	1935				
Number of locomotive units for which reports were	2, 987	2, 716	2, 555	2, 416	2, 361	1, 911				
Number inspected	4, 974 298	4, 581 260	4,024 274	3, 615 328	3, 118 252	1,620				
Percentage inspected found defective	6	6	7	9	8	9				
Number ordered out of service	16 766	14 696	9 769	24 991	11 674	449				

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

		Year e	nded Ju	ne 30	
	1940	1939	1938	1937	1936
Number of accidents	7	5	4	12	9
Number of persons killed Number of persons injured.	7	5	4	14	9

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

				Yea	ar ended	June 30	0—			
	194	0	193	9	193	8	193	7	193	6
	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured
Members of train crews: Engineers		2 2 1 1		3 1 1		3		7 2 2		
Inspectors. Other roundhouse and shop employees. Other employees. Nonemployees.								3		
Total		7		5		4		14		

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

						Yea	r en	ied J	une 3	30					
, bisk sweed		1940			1939			1938			1937			1936	
Part or appurtenance which caused accident	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Air reservoirs Aprons Arch tubes	1		1	1		1	3		3	3		3	1 1 1		1
Ashpan blowers Axles Blow-off cocks Boiler checks	5		5 2	6 2 3		13 2 3	2 5 5		6 5 5	2 2 1	2	1 2 1	4 3		4 3
Boiler explosions: A. Shell explosions. B. Crown sheet; low water; no contributory causes found C. Crown sheet; low water; con-	- 1 4	12	13	4	5	7	5	5	3	5	9	2 2	6	8	5
found found D. Miscellaneous firebox fail-	1		2	2	7	4		-	-	3	4	6 3	2		3
ures Brakes and brake rigging Couplers Crank pins, collars, etc Crossheads and guides Cylinder cocks and rigging	10	2		1 1 2		511122	4 5	1		14 10 6	2	11 7	13 8 4 1	2	13 11 4
Cylinder heads and steam chests_ Dome caps_ Draft appliances_ Draw ge ir_	. 1		33	2]	. 1		1			1 4			i
Fire doors, levers, etcFlues Flue pockets Footboards Gage cocks			11	8	3	9	3 - 6	3	. 3	2		2	- 1 3 1		7 1 3 1
Grease cups Grease cups Handholds Headlights and brackets	-	2		L j (i 5 8 1		1 5 8 1	7	7	10	3	10	7	3	1 7 8

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

						Yea	r end	led J	une 3	30					
		1940			1939			1938			1937			1936	
Part or appurtenance which caused accident	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Injectors and connections (not in- cluding injector steam pipes) Injector steam pipes Lubricators and connections Lubricator glasses	6 1 2 1		6 1 2 1	2 1 1	1	2	2 3		2 3 3	5 4 4		5 5 4	4 2		4
Patch bolts Pistons and piston rods Plugs, arch tube and washout Plugs in firebox sheets	1		1	13		2 13	3 1		3 1	3 1	2	3	1 1 19		19
Reversing gear			1 4	4		- ŝ ŝ	5		5	5 1 6		5 1 6	1 4 1 2	1	
Side bearings Springs and spring rigging Squirt hose Stay bolts Steam piping and blowers Steam valves	3	1 2	4 3 4 8 2	3 6 3 6	1	6 2 6 1	4 7 2 7 4		4 7 2 7 4	4 5 1 6 4		12 5 1 10 4	6 4 1 7 3	1 1	
Studs Superheater tubes Throttle glands Throttle leaking Throttle rigging	1 3 		1 4 	1 1 1		1 1 1	1 1 2		1 1 2	1 1 1 1 5			1 1		
Trucks, leading, trailing, or tender	1 6		16 1 6	2 4 3 2 1		2 4 3 2	5 4 8		5 4 8	5 5 5		6 5 6	1 5 17 2 5	2	1
Wheels Miscellaneous Total Total	164	1 18	40 225	35 152	15	35 164	66 208	7	68 216	65 263	25	65 283	46 209	16	21

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

						Yea	r en	ded J	une	30-					
		1940			1939			1938			1937			1936	
Part or appurtenance which caused accident	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
Carburetors Couplers Crank pins and connecting rods Fires: due to overflowing or leakage of fuel, or back firing Generators Insulation Pantographs and trolleys Short circuits Miscellaneous Total	2 2 1 2		2 2 1 2	1 1 3 5		1 1 - 3 5	4		4	1 3 1 1 1 1 2 2 1 1 12		1 3 1 1 1 1 2 2 3 14	4 9		4 4 9

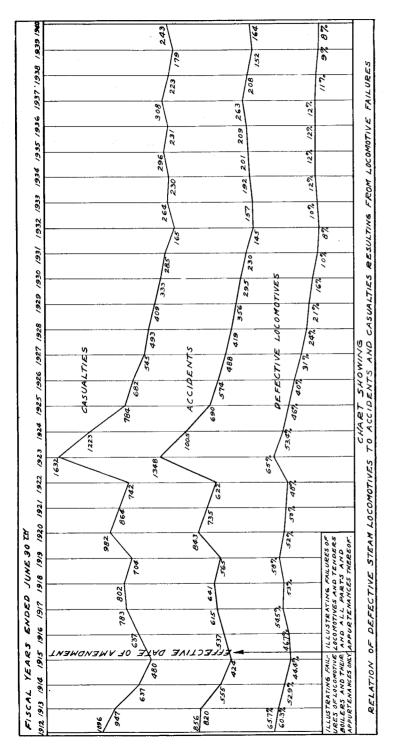


Table X.—Number of steam locomotives reported, inspected, found defective, and ordered from service

	Parts defective, inoperative or missing, or in		Ye	ar ended	June 30	-	
	violation of rules	1940	1939	1938	1937	1936	1935
1. 2.	Air compressors	567			766	740	
3.	Areh tubes Ashpans and mechanism	- 20 - 37			105	74	
4.	Axles	3			80	13	94
5.	Blow-off cocks	. 191	204		199	236	283
6.	Boiler checks			301	382	356	413
7. 8	Boiler shell	266	272		317	383	396
9.	Brake equipment Cabs, cab windows, and curtains	1,506 1,078		2,044 1,226	2, 322 1, 807	2, 480 1, 638	
10.	Cab aprons and decks	277	260	326	466	450	1, 273 368
11.	Cab cards		92	109	145	166	142
12. 13.	Coupling and uncoupling devices	. 53	60		74	65	. 73
14.	Crossheads, guides, pistons, and piston rods Crown bolts		739	905	1, 160	1,056	1,086
15.	Cylinders, saddles, and steam chests	1,320	1, 232	59 1,645	2, 206	1,717	75 1, 547
16.	Cylinder cocks and rigging.	447	418	585	729	605	627
17.	Domes and dome caps Draft gear	78	90	109	101	114	94
			450	740	522	513	423
20.	Driving boxes, shoes, wedges, pedestals, and braces.	306 1,243	360 1, 330	1 479	560	451	414
21.	Firebox sheets	191	238	1, 688 244	1,637 371	1, 712 295	1. 573 343
22.	Flues	147	165	159	225	178	173
23.	Frames, tail pieces, and braces, locomotive	665	708	1,001	1,053	997	1,006
24. 25.	Frames, tender	78	71	131	120	113	124
	Gages and gage fittings, air	132 211	155	230	261	257	275
27.	Gage cocks	400	226 361	279 451	324 538	350 579	320
28.	Grate snakers and nre doors	273	252	403	470	400	480 394
29.	Handholds	333	349	405	510	502	464
30. 31.	Injectors, inoperative	30	26	26	38	40	39
32	Inspections and tests not made as required.	1,330 6,218	1,457	1,784	2,020	2,085	2, 035
33.	Lateral motion	313	6, 645 243	8, 204 325	9, 638 446	9, 005 404	8, 344 389
34.	Lights, cad and classification	49	50	48	90	78	81
35.	Lights, headlight	180	177	257	313	251	257
36. 37	Lubricators and shields	185	200	212	254	255	191
38.	Mud rings Packing nuts	213 418	248 408	203	272	237	241
39.	Packing, piston rod and valve stem	660	739	448 913	487 1, 393	508 1, 133	527 906
40.	Pilots and pilot beams	140	104	154	133	178	152
41.	Plugs and studs	156	179	238	238	236	167
42. 43.	Reversing gear	320	317	404	492	463	414
44.	Rods, main and side, crank pins, and collars	1, 199 61	1, 293 97	1,669	2,348	2, 093	1,826
45.	Sanders	415	432	125 536	132 655	125 678	100 779
46.	Springs and spring rigging	2, 174	2, 340	2,901	3, 172	3,008	2,765
47.	Squirt hose	50	75	94	133	134	113
48. 49.	Stay bolts.	227	181	211	276	279	240
50.	Stay bolts, broken Steam pipes	271 255	258 285	380	542	520	512
DI.	steam valves	106	115	410 141	446 165	526 227	463
52.	Steps	449	490	631	678	615	212 640
53. '	Tanks and tank valves	768	837	955	1,009	877	913
04.	rentate notes	95	58	67	79	127	102
56. 1	Phrottle and throttle rigging Prucks, engine and trailing	647 598	638 628	685	909	760	733
01.	rucks, tender	705	665	762 907	785 1, 018	861 1, 108	811 1, 120
OK 14	varve monon	506	554	722	798	824	799
ə9 .	wasnout plugs	478	487	626	598	714	679
61.	Frain-control equipment	2	5	11	12	6	4
	Water glasses, fittings, and shields Wheels	753	690	915	1,049	1, 118	951
63.	Miscellaneous—Signal appliances, badge plates, l	554	466	577	803	790	697
	brakes (hand)	564	610	684	759	608	563
	Total number of defects	32, 677	33, 490	42, 214	49, 746	47, 453	44, 491
T.00							====
Loca	omotives reported	44, 274	45, 965	47, 397	48, 025	49, 322	51, 283
	omotives defective	102, 164	105, 606	105, 186	100, 033	97, 329	94, 151
TOCK							
Perc	entage of inspected found defective omotives ordered out of service	8, 565 8	9,099	11, 050 11	12, 402 12	11, 526 12	$11,071 \\ 12$

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

		Yea	r ended J	une 30—		
Parts defective, inoperative or missing, or in violation of rules	1940	1939	1938	1937	1936	1935
	8	14	6	6	2	5
Air compressors		1	5	4	6	1
Arles, truck and driving Batteries	1	1	1	4 _		7
Boilers	10	6	6	5	5	3
Brake equipment	50	50	74	97	66	46
Cabs and cab windows	22	36	25	51	30	33
	13	18	11	25	10	6
	17	13	8	17	10	v
				8 .		
	16	13	7	3		
	6	4	8	4	16	3
	1	5	23	28	24	21
	31	17 4	3	1	1	
	2	52	16	14	5	5
	29 12	9	37	5	15	4
	51	35	47	152	44	15
	1	6	ii l	1	6	4
	2	"				
		2	2	2		
		8	13	11	8	3
		185	204	237	186	124
Inspections or tests not made as required.	2	4	13	13	20	15
Insulation and safety devices	-	_		1		
Insulation and salety devices defects, parts and appli-	35	32	26	50	23	4
ances Jack shafts	7	6	1		1	
Jack shafts		1	1	2		
Lateral motion, wheels	5	1		1	2 6	ī
		3	2	. 5	4	2
		4	4	11	2	-
		2	2	10	14	5
		19	18	7	6	5
Dillete and pilot beams		6	1	i	,	1
		7	6	3		
Onills	4	2	2	23	2	10
Plugs and studs Quills Rods, main, side, and drive shafts	34	28	37	52	$2\bar{5}$	21
		16	43	36	29	20
			5	1	2	
		18	23	13		
		5	7	2	2	2
			3			1
			40	41	42	46
		1		1		
Water tanks	1	1	3		. 4	6
Water tanks. Water glasses, fittings, and shields. Warning signal appliances.		_ 1		2	1	6
Wheels	22	16	11	21	26	
Wheels	15	10	7	20	39	20
Miscellaneous		_			674	449
Total number of defects	766	696	769	991	0/4	776
			0 577	2 418	2, 361	1, 911
Locomotive units reported	2, 987			2, 416 3, 615	3, 118	
				3, 613		
				328		
Locomotive units ordered out of service	16	3 14	. 1	1 24	1 **	1 .

INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF LOCO-MOTIVES

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 our 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 sixty-four accidents occurred in connection with steam locomotives, resulting in 18 deaths and 225 injuries. This represents an increase of 12 accidents, an increase of 3 in the number of persons killed, and an increase of 61 in the number of persons injured, compared with the previous year.

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

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

During the year 8 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 a reduction of 1 percent compared with the results obtained in the previous year. There was an increase of 19 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 8 explosions that occurred in the fiscal year, in which 12 persons were killed and 15 injured, were caused by overheating of the crown sheets due to low water.

Five of the explosions were particularly violent; in one of these accidents, which caused the death of three employees, the boiler was torn from the running gear and hurled forward; the smoke-box end of the boiler struck the track 286 feet ahead of the point of explosion, the boiler bounded ahead 60 feet and landed on the track on its back head, then bounded forward 115 feet and rolled forward 34 feet, and came to rest 495 feet from the point of the explosion. In another accident, in which two employees were killed and four employees and four passengers were injured, the force of the explosion lifted the boiler from the running gear, after which it fell back on the running gear and was carried about 500 feet from the point of explosion, where

the running gear overturned. Two employees were killed and one employee was injured in another explosion in which the boiler was torn from the running gear and hurled forward 265 feet, where it struck on the front end, then bounded 75 feet forward and came to rest 340 feet from the point of explosion. Two employees were killed and one employee was fatally injured in an accident in which the boiler was torn from the running gear and alighted 125 feet forward and then bounded forward and alighted and came to rest 237 feet ahead of the point of explosion. In another instance, in which two employees were killed, the boiler was torn from the running gear and first struck the ground on its back head 104 feet forward from the point of explosion, then bounded 296 feet further, again struck on the back head and bounded and struck on the smoke-box end 122 feet forward and again bounded and struck on the back head 30 feet further, where it fell across the rails and was struck by the moving running gear and moved ahead and to the south of the track, 668 feet from the point of explosion. The running gear and train continued onward and came to a stop 1,133 feet from the point of explosion with the engine truck wheels derailed.

The explosions in the three remaining accidents were less violent than those described in the foregoing. In one of these accidents, in which two employees were injured, the crown sheet and parts of the door and side sheets were blown down, but the boiler did not leave the frame. Difficulty had been experienced in supplying the boiler with water over a distance of approximately 30 miles, and the steam pressure was down to between 80 and 100 pounds at the time of the explosion. Investigation disclosed that defects in connection with the injectors had been reported nine times in the 2 months next previous to the date of accident, the left boiler check was found to be leaking, the stem was broken off the blow-back check valve in the feed line to left injector, the common outlet used from the tender tank to the feed pipes of right and left injectors resulted in the breaking and blowing back of either injector when the other injector was shut off or broken, the telltale or alarm pipe of the left injector was flattened and closed making it difficult to determine whether the left injector was operating or blowing steam back into the tender tank, and the water in the tank was found to have been heated to a higher temper-one employee was killed and one employee injured, the crown sheet pulled from 72 stays and pocketed 5% inches; in another instance, in which two employees were injured, the crown sheet pulled from 32 stays and pocketed 2% inches.

Boiler and appurtenance accidents other than explosions resulted in the death of 4 persons and injuries to 95 persons.

EXTENSION OF TIME FOR REMOVAL OF FLUES

One thousand one hundred and twenty-seven applications were filed for extensions of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 85 of these cases the condition of the locomotives was such that extensions could not properly be granted. Thirty-five were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Forty-seven extensions were granted after defects disclosed by our investigations were required to be repaired. Twenty-seven applications were canceled for various reasons. Nine hundred and thirty-three applications were granted for the full periods requested.

LOCOMOTIVES PROPELLED BY POWER OTHER THAN STEAM

There was an increase of 2 in the number of accidents occurring in connection with locomotives other than steam and an increase of 2 in the number of persons injured as compared with the previous 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 previous year. There was an increase of 2 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, 187 specification cards and 4,449 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, 335 specifications and 103 alteration reports were filed for locomotive units and 87 specifications and 35 alteration reports were filed for boilers mounted on locomotives other than steam. These were checked and analyzed and corrective measures taken with respect to discrepancies found.

SPECIAL WORK

At the direction of the Chairman of the Commission, in response to a request from the National Resources Planning Board, a survey was made to ascertain the condition and usefulness of the locomotives reported stored serviceable by the Car Service Division of the Association of American Railroads, and what proportion of the number of locomotives reported by that source as in or awaiting shop would be repaired in the usual course of events and what proportion would be repaired only in an emergency. This work involved examination of each locomotive by our inspectors and required 652 man days.

AMENDMENT TO THE LAW

The act approved April 22, 1940, further amending the locomotive inspection law, changed the title of the Chief Inspector to Director, and the title of each of the two Assistant Chief Inspectors to Assistant Director.

APPEALS

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

ACKNOWLEDGMENT

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

JOHN M. HALL, Director.

ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES AND TENDERS AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1940, 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 18, 1939, locomotive 4362, Mazonia, Ill. Water crane hook slipped from water spout; hook was not company's standard; one injured.

One accident; one injured.

ALTON & SOUTHERN RAILROAD:

**March 25, 1940, locomotive 13, East St. Louis, Ill. Blow-off cock stuck open, due to valve stem having been fouled by blow-off pipe; nut on union in blow-off cock pipe worked loose, permitting this loose section of pipe to swing around and strike stem of blow-off cock valve, bending it and holding the valve open; blow-off cock pipe not properly clamped; one injured.

One accident; one injured.

ATCHISON, TOPEKA & SANTA FE RAILWAY:

July 1, 1939, locomotive 2130, San Diego, Calif. Employee's clothing caught on rear end handhold, which extended beyond the supporting bracket, causing him to fall; one injured.

July 29, 1939, locomotive 3429, Rothville, Mo. Draft hopper dropped off draft pan of oil-burning locomotive, due to the failure of the rivets and bolts securing it, and fell to the track, resulting in derailment of 4 cars of the passenger train; draft hopper was not adequately secured to the draft pan; 33 injured.

September 17, 1939, locomotive 4000, Frontenac, Kans. Fuel oil supply to burner failed, caused by intake screen on oil tank heater being obstructed by sludge; two injured.

**March 8, 1940, locomotive 4081, Ethel, Mo. Locomotive booster was inoperative from the cab; one injured.

March 11, 1940, locomotive 1246, Fresno, Calif. Burned by hot water when squirt hose valve was accidentally opened; valve located near right front corner of fireman's seat how where likely to be struck by employee's feet; one injured.

of fireman's seat box where likely to be struck by employee's feet; one injured.

May 6, 1940, locomotive 4083, Marceline, Mo. Half section of pawl casing wearing plate flew out of left stoker elevator, striking employee; one of the cap screws which held wearing plate retaining ring was broken, permitting the ring to drop and section of wearing plate to fly out; wearing plate ring inadequately secured; one injured.

Six accidents; 39 injured.

ATLANTIC COAST LINE RAILROAD:

April 17, 1940, locomotive 1515, Burroughs, Ga. Steam pipe in front end of locomotive broke off near the flange for top joint which connects to superheater header; walls of steam pipe at point of failure varied from %6 inch to ½6 inch in thickness; one injured.

One accident; one injured.

BALTIMORE & OHIO RAILROAD:

July 4, 1939, locomotive 4442, Baltimore, Md. Crown sheet failure caused by overheating due to low water; stem broken off blow-back check valve in feed line to left injector allowing check valve to drop out of place; left boiler check leaking; common outlet used from the tender tank to the feed pipes of right and left injectors resulted in the breaking and blowing back of either injector when the other injector was shut off or broken; left annunciator or alarm pipe flattened and closed near discharge end made it difficult to determine whether or not the

left injector was operating or blowing steam back into the tender tank; water in tank was heated to a higher temperature than the injectors would handle: two

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September 14, 1939, locomotive 2918, Old Portage, Ohio. Two leading locomotives broke away from locomotive 2918, resulting in emergency application of the brakes; pivoted pilot coupler pocket pin on locomotive 2918 was broken, permitting coupler to work out of line; pin was of insufficient strength for the service in which it was used; elongation of holes in pivoted coupler shank and coupler pocket and loose bushing in coupler pocket hole allowed excessive lost motion of coupler shank in coupling pocket; one injured.

January 26, 1940, locomotive 7305, Mountain Lake Park, Md. Flue broke off at defective safe end weld; overheated in welding and reduced to 1/16 inch in

thickness: two injured.

March 3, 1940, locomotive 7311, near Swanton, Md. Drain valve blew out of centrifugal dirt collector, causing emergency application of the brakes: drain valve engaged only two threads in fitting in dirt collector, the remaining threads in fitting being entirely wasted away; one injured.

**March 15, 1940, locomotive 3107, Foxburg, Pa. Driving wheel tire became dislocated, due to improper fit on wheel center; wheel center was out of round, the bore of the tire was tapered, eccentric to the tread, out of round, and too large

for the wheel center; one injured.

**March 17, 1940, locomotive €25, Cumberland, Md. Employee was burned while attempting to close lubricator drain valve; handle of drain valve was missing, necessitating the use of a wrench to close the valve, and employee was using wrench with one hand and holding a torch in the other hand when escaping oil became ignited, setting cab curtains and interior of the cab on fire; one injured.

*May 22, 1940, locomotive 7133, Tunnelton, W. Va. Locomotive stalled due

to wheels slipping; sand pipe stopped up; one injured.

Seven accidents; nine injured.

BOSTON & MAINE RAILROAD:

September 26, 1939, locomotive 4024, Mascoma, N. H. Precision type power reversing gear hand wheel spun out of control when unlocked; counterbalance spring had been adjusted and new bushing applied to valve gear prior to federal examination: one injured.

September 29, 1939, locomotive 1391, Cambridge, Mass. Reverse lever latch stuck and did not hold lever in position on quadrant; reverse lever latch bolt loose and turned in lever, preventing free movement of the latch; one injured.

November 9, 1939, locomotive 290, Boston, Mass. Sliding iron plate, used in place of a front cab window, fell from its position; plate not applied in accordance

with the company's standard practice; one injured.

**January 9, 1940, locomotive (B. M.) 10, Berlin, N. H. Steam valve bonnet blew out of injector; threads on bonnet badly worn; a leak at the joint was reported about five hours before the accident; one injured.

March 26, 1940, locomotive 4006, Mascoma, N. H. Insufficient clearance between cab seat box and extension handle of feed water heater drain valve: one injured.

March 30, 1940, locomotive 1444, Forbes, Mass. Insufficient clearance between reverse lever and air pipe at front end of quadrant; one injured.

Six accidents; six injured.

BURLINGTON-ROCK ISLAND RAILROAD:

**September 3, 1939, locomotive (C. R. I. & P.) 2313, Seabrook, Tex. Left trailer wheel journal and bearing became overheated and hose used to cool the trailer box, and which was connected into the injector delivery pipe, blew off

trailer-box connection, due to not being properly applied; one injured.

April 30, 1940, locomotive (F. W. & D. C.) 410, near Dobbin, Tex. Boiler jacket inside of cab was loose and excessive openings in the jacket around reverse lever bracket, main throttle bracket, and main fountain permitted asbestos lagging to sift and fly about in the cab when the locomotive was in motion; one injured.

Two accidents; two injured.

CENTRAL RAILROAD OF NEW JERSEY:

November 13, 1939, locomotive 934, Franklin Junction, Pa. Grate shaker bar slipped off lever due to improper fit; shaker bar had a long socket while shaker lever had a short end for engaging the bar; shaker lever was worn excessively and shouldered; one injured.

One accident; one injured.

CHESAPEAKE & OHIO RAILWAY:

September 3, 1939, locomotive 2302, Crane, Va. Stoker hook became disconnected from sliding plate, causing employee to fall: hook slightly worn and bent: one injured.

September 14, 1939, locomotive 3036, Fostoria, Ohio. Hook slipped out of opening in stoker slide, causing employee to fall backward; hook openings in

stoker slides too large; one injured.

*March 11, 1940, locomotive 2348, Toledo, Ohio. Handhold on locomotive

fouled tender step when on curve; one injured.

**May 28, 1940, locomotive 1125, Nelsonville, Ohio. Blow-off cock discharge pipe pulled out of Barco flexible joint between blow-off cock and muffler: threads on piping and in the joint were deteriorated; one injured.

Four accidents; four injured.

CHICAGO & EASTERN ILLINOIS RAILWAY:

January 4, 1940, locomotive 1930, Whittington, Ill. Crown sheet failure caused by overheating due to low water; three killed.

One accident; three killed.

CHICAGO & NORTH WESTERN RAILWAY:

October 12, 1939, locomotive 2123, Chicago, Ill. Free end of emergency whistle rope which was attached to the back wall of cab near the roof broke while being used as an aid in getting off left cab seat, causing employee to fall to the deck; rope was deteriorated; one injured.

June 28, 1940, locomotive 1627, Rockfield, Wis. Handrail attached to bottom of headlight bracket broke off, causing employee to fall to the ground; handrail had been broken at one end for some time prior to the accident and the other end had an old fracture which extended approximately 33 percent through crosssectional area; one injured.

Two accidents: two injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

*December 26, 1939, locomotive 5607, East Winona, Wis. Tender coal slide hook straightened out while being used, causing employee to fall backward against the firebox door; one injured.

February 8, 1940, locomotive 4956, near Diamond Bluff, Wis. Main crank pin broke through old fracture which extended through approximately 80 percent

of cross-sectional area; one injured.

March 29, 1940, locomotive 6311, Liberty, Mo. Whistle bell worked loose: one injured.

April 20, 1940, locomotive 4990, Galesburg, Ill. Burned by hot water which gushed from steam heat pipe; intermediate steam heat valve leaking due to valve disc and seat being badly cut; this valve was located in cab and was not "extra heavy"; one injured.

Four accidents; four injured.

CHICAGO GREAT WESTERN RAILROAD:

September 15, 1939, locomotive 881, Valeria, Iowa. Employee was injured when he attempted to close injector delivery pipe drain valve while en route; one injured.

One accident; one injured.

CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY:

*February 20, 1940, locomotive 227, Monon, Ind. Sand pipe not in proper alinement with the rail: one injured.

One accident; one injured.

CHICAGO, MILWAUKEE, St. PAUL & PACIFIC RAILROAD:

**December 4, 1939, locomotive 230, Sturtevant, Wis. Loop handle, which had been fusion welded on arm of locking pin of retractible coupler at front end of locomotive, broke off through the welds; one weld showed complete old fracture and the other about 50 percent old fracture through the points of failure; one

February 4, 1940, locomotive 1036, near New Lisbon, Wis. Crown sheet failure caused by overheating due to low water; two killed, one injured.

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April 18, 1940, locomotive 712, Milwaukee, Wis. Steam gage light bulb burned out due to excessive voltage; generator governor stuck, permitting generator to run too fast; one injured.

**May 23, 1940, locomotive 566, Council Bluffs, Iowa. Bell ringer did not

operate properly due to being out of adjustment; one injured.

Four accidents: two killed, four injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY:

July 7, 1939, locomotive 903, near Fruitland, Kans. Reverse lever jerked from employee's control and moved rapidly to extreme forward position; various pins and bushings of valve gear were worn; one injured.

October 17, 1939, locomotive 1994, Howe, Okla. Employee was burned when squirt pipe drain valve was accidentally opened; when drain valve was in closed position, the handle was so located that it was likely to be moved by the enginemen in the performance of their regular duties; valve was easily opened due to valve stem packing not being properly drawn up with packing nut; one injured.

December 16, 1939, locomotive 2101, Council Bluffs, Iowa. Operating lever

links of left injector steam valve broke; one injured.

December 25, 1939, locomotive 841, near Choctaw, Okla. Crown sheet failure caused by overheating due to low water; two killed.

**February 1, 1940, locomotive 956, Eldon, Iowa. Employee mistook a bent washout tag on front of pilot for a step and fell heavily; jacket iron tag was bent into shape of a step and so located as to be easily mistaken for a step; one injured.

February 6, 1940, locomotive 4012, Neola, Iowa. Cross-compound air compressor would not maintain sufficient pressure to operate the brakes on a threecar train; locomotive was equipped with an additional 91/2-inch compressor which was ineffective due to a stuck open discharge valve; one injured.

February 19, 1940, locomotive 2643, Herington, Kans. Improperly applied throat brace staybolt blew out of inside throat sheet when attempt was made to stop leakage at the staybolt while the boiler was under steam pressure; threads on staybolt covered with rust and scale and had appearance of never having been threaded into the sheet or sleeve of the brace; threads in staybolt hole in throat sheet were very poor and bottom inside of brace sleeve had a deposit of mud;

**April 23, 1940, locomotive 2709, Garber, Okla. Oil leaking from around

stem of oil tank valve; one injured.

**June 28, 1940, locomotive 5020, Optima, Okla. Blow-off cock was leaking and when employee attempted to close blow-off cock valve with operating lever his hand was caught between the lever and booster idling valve handle; blow-off cock operating lever fulcrum casting was not properly secured to cab floor, permitting operating lever to have excessive play; one injured.

Nine accidents; two killed, nine injured.

COLUMBUS & GREENVILLE RAILWAY:

November 11, 1939, locomotive 215, Columbus, Miss. Indicator glass of lubricator oil reservoir blew out; threads worn in body of lubricator, permitting follower nut, gasket, and indicator glass to blow out; one injured.

**June 19, 1940, locomotive 55, Columbus, Miss. Air-operated bell ringer

was inoperative; one injured.

Two accidents; two injured.

DELAWARE, LACKAWANNA & WESTERN RAILROAD:

June 19, 1940, locomotive 222, Jersey City, N. J. Vertical handhold on locomotive at gangway came in contact with the step casting supporting front end of tender deck while locomotive was on a curve; one injured.

One accident; one injured.

DENVER & RIO GRANDE WESTERN RAILROAD:

*September 14, 1939, locomotive 781, Delta, Colo. Tender and three cars of passenger train derailed, caused by defective tender spring; back outside top section of left front tender spring was broken and two leaves in middle section of the three-section semi-elliptical spring were broken; three injured.

September 15, 1939, locomotive 3601, Gypsum, Colo. Superheater flue broke

off at defective safe end weld; one injured.

April 30, 1940, locomotive 3409, near Crescent, Colo. Mechanically operated smoke stack cover became inoperative due to the operating air cylinder being insufficiently lubricated; one injured.

Three accidents; five injured.

ELGIN. JOLIET & EASTERN RAILWAY:

April 17, 1940, locomotive 120, Gary, Ind. Blow-off cock leaking at valve seat: blow-off cock had excessive lost motion due to valve yoke and operating stem being worn; one injured.

One accident; one injured.

ERIE RAILROAD:

November 24, 1939, locomotive 2945, Kennedy, N. Y. A piece of babbitt was thrown from crosshead shoe and struck a track employee; slots in face of crosshead shoe were % inch deep while carrier's print provided they should be % inch deen: crosshead not properly tinned and babbitt failed to adhere to the shoe:

February 4, 1940, locomotive 3311, Wadsworth, Ohio. Main crank pin broke through old fracture damaging reversing gear which caused reverse gear wheel

to spin and injure engineer's wrist; one injured.

March 31, 1940, locomotive 3324, Narrowsburg, N. Y. Piston rod nut and piston head worked off piston rod due to threads in nut being badly stripped. Nut, piston head and front cylinder head, which was knocked off, were thrown from the moving locomotive and rolled down the embankment where the piston head crashed into a dwelling and resulted in injury to an occupant; one injured.

June 14, 1940, locomotive 2937, near Youngstown, Ohio. Stoker elevator pawl shifter would not hold securely in neutral position; catch pins too short and recesses badly worn; one injured.

Four accidents: four injured.

FLORIDA EAST COAST RAILWAY:

*June 21, 1940, locomotive 812, Lake Worth, Fla. Bell cord became tangled on line; one injured.

One accident: one injured.

FORT WORTH & DENVER CITY RAILWAY:

September 7, 1939, locomotive 313, Childress, Tex. Boiler check stuck open; one injured.

One accident; one injured.

GRAND TRUNK WESTERN RAILROAD:

*November 19, 1939, locomotive 3708, Holly, Mich. Blow-off valve stuck open: one injured.

One accident: one injured.

GULF, COLORADO & SANTA FE RAILWAY:

July 20, 1939, locomotive (A. T. & S. F.) 2068, Beaumont, Tex. Air compressor oil cup bracket was loose on pump; one injured.

One accident; one injured.

ILLINOIS CENTRAL RAILROAD:

**February 16, 1940, locomotive 778, Freeport, Ill. Water glass broke: waterglass guard did not provide adequate protection to permit water-glass cocks to be_closed safely; one injured.

February 26, 1940, locomotive 738, Champaign, Ill. Water glass burst, breaking glass panel in water-glass shield; bottom water-glass cock not in proper alinement permitting bottom water-glass packing nut to foul on water glass; one

February 28, 1940, locomotive 3739, New Orleans, La. Insufficient clearance between cab apron and cab running board, permitting employee's foot to be caught when locomotive dropped in low place in the track; one injured.

**March 12, 1940, locomotive 3511, East St. Louis, Ill. Insufficient clearance between cab gangway handhold and corner of tender sill when on sharp curve; one injured.

**March 18, 1940, locomotive 328, Council Bluffs, Iowa. Left rear sander was stopped up; sanders reported on March 15, 16 (two times), 21, and 23; one injured. **April 26, 1940, locomotive 3547, Clinton, Ill. Cylinder cocks inoperative from the cab; stop bolt missing from cylinder cock slide rod and slide rod badly bent; one injured.

**May 5, 1940, locomotive 1177, Chicago, Ill. Employee was burned by steam which was escaping from around the packing nut and stem of fountain valve while attempting to operate the air compressor throttle which was difficult to

open due to stem packing being dry and hard; one injured.

**May 6, 1940, locomotive 1244, Russum, Miss. Spring hanger became disconnected; bottom spring hanger pin missing; one injured.

Eight accidents: eight injured.

INTERNATIONAL-GREAT NORTHERN RAILROAD:

October 15, 1939, locomotive 1104, near Aldine, Tex. Sand sifted from defective sand box on tender deck; bolt holes for securing sand box were worn % inch larger than the bolts and sand box was corroded and badly worn under the brace, having a crack 4 inches long at this place; one injured.

One accident; one injured.

LOUISVILLE & NASHVILLE RAILROAD:

**July 15, 1939, locomotive 1287, Buck Lodge, Tenn. Reverse lever very

hard to operate; one injured.

**August 28, 1939, locomotive 228, Rockfield, Ky. Bolt lost out of reverse lever latch handle, permitting the lever to unlatch and move forward with great force; bolt was undersize and nut on bolt not properly tightened; one injured.

December 13, 1939, locomotive 1255, near Marvel, Ala. Guide yoke broke through old fracture which extended through approximately 77 percent of cross-

sectional area; one injured.

- January 6, 1940, locomotive 1421, near Pryse, Ky. Crown sheet failure caused

by overheating due to low water; two injured.

**February 6, 1940, locomotive 1775, Coplay, Ky. Coupler knuckle at front of locomotive 1775 broke and the locomotive separated from leading locomotive, resulting in emergency application of the brakes; one injured.

**May 3, 1940, locomotive 2403, Cincinnati, Ohio. Tender deck 2% inches

higher than deck on locomotive; one injured.

Six accidents; seven injured.

MAINE CENTRAL RAILROAD:

*November 9, 1939, locomotive (B. & M.) 3716, Burnham Junction, Maine. Ashpan levers dropped to the track; one injured.

One accident: one injured.

MARINETTE, TOMAHAWK & WESTERN RAILROAD:

**December 23, 1939, locomotive 250, Bradley, Wis. Insufficient clearance between reverse lever and a foot brace which had been applied to cab floor; one injured.

One accident; one injured.

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

January 23, 1940, locomotive 328, Manitowoc, Wis. Smokebox handhole cover not properly secured; both locking lugs on the cover for engaging in lugs in handhole casting had been broken off; one injured.

One accident; one injured.

MISSOURI & ARKANSAS RAILWAY:

*August 3, 1939, locomotive 49, Harrison, Ark. Struck switch lamp while looking for source of water leak which was found to be due to undesired opening of a valve in injector delivery pipe; one injured.

One accident; one injured.

MISSOURI PACIFIC RAILROAD:

*December 16, 1939, locomotive 6409, Almont, Ark. Main pin broke at wheel center, due to old fracture; one injured.

*March 1, 1940, locomotive 9782, St. Louis, Mo. Boiler check stuck open,

due to foreign substance having lodged in it; one injured.
*March 31, 1940, locomotive 6607, Washington, Mo. Generator of locomotive lighting system did not generate current due to scale or other sediment having settled on it; one injured.

Three accidents: three injured.

NEW YORK CENTRAL SYSTEM:

July 6, 1939, locomotive 5316, Dayton, Ohio. Flue failed at defective safe end weld; excessive openings at bottom of fire door frame permitted the escaping hot water and steam to enter the cab freely; one injured.

September 4, 1939, locomotive 2777, Hudson, N. Y. Handwheel of Precision type reversing gear spun around out of control, due to end of counterbalance spring rod catching on edge of frame crosstie casting when the locomotive was reversed; counterbalance spring rod bent, counterbalance spring case loose on waist sheet, and adjusting nut loose and backed away from rear counterbalance spring; one injured.

September 30, 1939, locomotive 6624, Rochester, N. Y. Flue failed at back

flue sheet; flue overworked and reduced to paper thickness; one injured.

October 22, 1939, locomotive 2718, South Bend, Ind. Cast-iron steam pipe burst, due to insufficient thickness of one side of pipe wall; excessive openings between the stoker distributor sleeves and draft plates on boiler back head permitted fire and steam to enter the cab freely; one killed, three injured.

November 6, 1939, locomotive (B. & A.) 618, Westfield, Mass. Rear tender truck inside equalizer broke, due to old fracture, and struck the heel of a track frog, resulting in truck frame being broken and the tender truck and all cars

of a passenger train being derailed; 15 injured

February 15, 1940, locomotive 2187, Kenton, Ohio. Locomotive separated from the train due to coupler of car passing over the top of tender coupler; coil springs in friction draft gear on tender were broken, permitting excessive coupler slack; two injured.

February 22, 1940, locomotive 2847, Toledo, Ohio. Flue broke off at defective

safe end weld; one injured.

**March 3, 1940, locomotive 2892, South Schenectady, N. Y. Coupler knuckle at rear of locomotive worked open and the locomotive separated from the train. resulting in emergency application of the brakes; one injured.

March 14, 1940, locomotive 7603, Columbus, Ohio. Insufficient clearance between grate shaker bar and oil can shelf; oil can shelf not company's standard;

one injured.

March 23, 1940, locomotive 1872, Ritchie, Pa. Superheater flue broke off at back flue sheet due to having been excessively thinned by working in attempts to

prevent leakage; two injured.

April 11, 1940, locomotive 2333, Columbus, Ohio. Blower valve difficult to operate from the cab due to valve extension rod fouling on water pump steam pipe: "Blower valve works too hard and will not shut off" was reported on April 10; one injured.

April 13, 1940, locomotive 1360, Alsen, N. Y. Knuckle of coupler at front end

of locomotive broke; one injured.

**May 26, 1940, locomotive 2185, Rockton, Pa. Injector steam ram was difficult to operate: steam ram packing nut was screwed too tight, causing packing nut to grip valve stem; one injured.

Thirteen accidents; 1 killed, 31 injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 27, 1939, locomotive 3506, Danielson, Conn. Stoker conveyor cover slide stuck and then suddenly moved freely while attempt was being made to operate it; one injured.

December 9, 1939, locomotive 3500, Carolina, R. I. Whistle steam pipe joint in front end failed; boss in steam pipe was originally drilled off center and had been improperly repaired; "Fix steam leaks around front end. Cannot see" was reported on December 5; one injured.

January 20, 1940, locomotive 3341, Cedar Hill, Conn. Injector delivery pipe

stopped up with ice; one injured.

March 27, 1940, locomotive 3004, Hyannis, Mass. Flue broke off at back flue sheet, due to having been thinned by excessive working on account of leakage; one injured.

June 26, 1940, locomotive 3331, Putnam, Conn. Feed water pump drain cock leaking due to valve being loose; "Water pump pounds too much" was reported on June 25, and "Drip cock to water pump leaking" was reported on June 26, prior to the accident; one injured.

Five accidents: five injured.

NEW YORK, ONTARIO & WESTERN RAILWAY:

March 1, 1940, locomotive 213, Providence, Pa. Water glass burst and glass panels in water-glass shield broke; shield frame was broken in two places; one injured.

One accident; one injured.

NORFOLK & WESTERN RAILWAY:

**November 7, 1939, locomotive 1206, Portsmouth, Ohio. Headlight failed, resulting in collision of a freight locomotive with a yard locomotive. Headlight failed when the freight train was about 24 miles from Portsmouth and bulb was renewed. The newly applied bulb also failed en route and the locomotive was continued in service without headlight until the collision occurred as the train entered Portsmouth Yard. Headlight was so damaged in the collision that previous condition could not be determined; headlight burned out and/or generator running too fast were reported on October 15, 16, 20, 21, 22, and 24; one injured.

One accident: one injured.

NORFOLK SOUTHERN RAILROAD:

**August 5, 1939, locomotive 538, Wilson, N. C. Step to sand box became disconnected from bracket, causing employee to fall; bolt for securing step to bracket was missing: one injured.

One accident; one injured.

NORTHERN PACIFIC RAILWAY:

**January 16, 1940, locomotive 23, Helena, Mont. Water glass burst; one

**June 12, 1940, locomotive 1840, Avon, Mont. Main driving box ran hot;

one injured.

Two accidents; two injured.

PENNSYLVANIA RAILROAD:

**July 10, 1939, locomotive 3838, near Port Washington, Ohio. Employee in the cab of second locomotive of double-header was struck by foreign object which came through right front cab window glass. Apparently the object was part of grease plug which broke off at end of right crosshead wrist piu on locomotive 3838, the leading locomotive: four inches of the grease plug and the nut were missing; old fracture extended through 95 percent of cross-sectional area of plug at the point of failure; one injured.

July 24, 1939, locomotive 4234, South Charleston, Ohio. Locomotive 4234

became uncoupled from the second locomotive while double-heading and was subsequently struck by the second locomotive; anticreeping device of coupler at

rear of the leading locomotive was worn and defective; one injured.

July 30, 1939, locomotive 6832, Latrobe, Pa. Flue broke off at safe end weld; flue overheated and excessively rolled when safe end was applied; two injured.

**August 21, 1939, locomotive 6934, Millerstown, Pa. Pipe connecting main air reservoirs pulled out of union elbow in front of the right reservoir, causing emergency application of the brakes; threads on pipe and in elbow were stripped and pipe fit in elbow was oversize. "Main reservoir pipe leaks at front end of right main reservoir" was reported on August 9; one injured.

September 29, 1939, locomotive 7628, North Jackson, Ohio. Whistle valve did

not seat properly; one injured.

October 4, 1939, locomotive 6712, Millbrook, Ohio. Precision type reversing gear hand wheel spun rapidly when latch was released and the handle on hand wheel struck employee's wrist; extension broke off valve operating arm due to use of material of doubtful quality which was weakened by machining and reduction of the diameter of the arm in the process of applying a bushing to restore

October 19, 1939, locomotive 4252, Cleveland, Ohio. Boiler feed water pump was inoperative, due to reversing at half stroke; a defective gasket in feed pump between the right auxiliary valve head and valve gear cylinder permitted leakage between steam ports and reversing gear; the small end of reversing valve had little bearing in valve chamber; feed pump was reported on October 1, 2, 3, 4, 7, 10, 13, 14, 17 (two times), 18, and 19. Employee fell from the side of cab while going to give attention to the pump; one killed.

**November 5, 1939, locomotive 6623, Pittsburgh, Pa. Mechanically operated

fire door failed to open wide, due to lack of lubrication; one injured.

November 15, 1939, locomotive 4249, near Oleopolis, Pa. Crown sheet failure caused by overheating due to low water; one killed, one injured.

December 21, 1939, locomotive 6854, Denholm, Pa. Side rod bushing became overheated; one injured.

**December 27, 1939, locomotive 8235, Cincinnati, Ohio. Headlight generator stopped due to governor being out of adjustment; one injured.

January 3, 1940, locomotive 2404, Youngstown, Ohio. Power reversing gear difficult to operate; reversing gear reported on December 28 and January 1 and 3; one injured.

January 6, 1940, locomotive 6586, Youngstown, Ohio. Cab sliding door stop bracket was broken, permitting door to overtravel and catch employee's finger between door handle and cab wall; old fracture extended through approximately 50 percent of cross-sectional area of bracket at point of failure; one injured

January 18, 1940, locomotive 4569, Weirton Junction, W. Va. Flue failed at

defective safe end weld; one injured.

January 22, 1940, locomotive 6994, Valparaiso, Ind. Main crank pin broke through old fracture which extended through approximately 60 percent of crosssectional area; one injured.

February 23, 1940, locomotive 3874, near Maples, Ind. Main crank pin broke, due to old fracture which extended through approximately 70 percent of

cross-sectional area; one killed.

April 22, 1940, locomotive 5476, Fort Wayne, Ind. Side member of ladder at

rear of tender broke through defective weld; one injured.

April 27, 1940, locomotive 6752, Avonmore, Pa. Injured while attempting to operate uncoupling lever on tender; coupler lock lifter top clevis, pin and cotter key were missing; one injured.

**May 24, 1940, locomotive 7286, Bridgeport, Ind. Engine truck cellar dropped on track, rebounded, and broke a crossover pipe on a car in the train,

causing emergency application of the brakes; one injured.

June 6, 1940, locomotive 6726, Trinway, Ohio. Ashpan blower pipe broke off through old fracture in threaded portion where it screwed into the operating valve, and the operating valve, blower hose, and nozzle were thrown from the locomotive; hangers for blower hose and nozzle were loose on ashpan wings; one injured.

*June 12, 1940, locomotive 8670, Dolton, Ill. Insufficient clearance between vertical handhold at gangway and tender sill step when on curve; one injured.

Twenty-one accidents; 3 killed, 20 injured.

PERE MARQUETTE RAILWAY:

August 15, 1939, locomotive 915, Midland, Mich. Right front cylinder head failed by blowing off the studs; one injured.

One accident: one injured.

RUTLAND RAILROAD:

March 22, 1940, locomotive 74, Burlington, Vt. Double-heading locomotives broke apart, causing emergency application of the brakes; knuckle of front coupler of second locomotive opened due to rectangular hole in coupler operating lever just above coupler being too wide, permitting link to turn out of line and assume a position that prevented the lock and lock lifter from dropping into fully closed position; one injured.

One accident; one injured.

St. Louis-San Francisco Railway:

January 19, 1940, locomotive 629, Rogers, Ark. Employee fell from tender footboard; steam from steam heat line was directed toward the footboard, resulting in an accumulation of ice on footboard; one killed.

One accident: one killed.

St. Louis Southwestern Railway:

July 20, 1939, locomotive 509, Pine Bluff, Ark. Water glass burst; one injured. One accident: one injured.

SAN DIEGO & ARIZONA EASTERN RAILWAY:

June 29, 1940, locomotive 27, San Diego, Calif. Eccentric blade broke through old fracture at bolt hole in strap connection; "Right link block cheek strikes link saddle" was reported on June 25, and reversing gear was reported inoperative in back motion on June 23 and 25; one injured.

One accident: one injured.

SEABOARD AIR LINE RAILWAY:

August 31, 1939, locomotive 542, Taylorsville, Ga. Air compressor inoperative, due to broken ring in reversing valve of compressor. "Packing rings broken

on reversing piston in air pump" was reported on August 30; one injured. February 22, 1940, locomotive 419, Tallahassee, Fla. Hand wheel of Precision type reversing gear spun rapidly when the gear was being moved into reverse and handle on wheel struck employee's wrist; bolts for securing spring balance box to waist sheet brace had worked out; one injured.

March 30, 1940, locomotive 380, Hoyt, Fla. Crown sheet failure caused by overheating due to low water; two killed, one injured.

Three accidents; two killed, three injured.

SOUTHERN RAILWAY:

**August 26, 1939, locomotive 6336, near Norwood, Ky. Locomotive not steaming properly; combustion chamber filled with cinders up to and including the fourth row of flues and most of the flues below the superheater flues were stopped up; one large flue and one small flue were leaking and calking edge of flue-sheet combustion-chamber seam was leaking; three of the four bolts missing from diaphragm plate over superheater header, allowing plate to swing out of place; "Clean out flues" was reported on August 3, 6, 7, 9, 12, 24, and 26 (after accident): one injured.

*October 10, 1939, locomotive 4815, Weyburn, Va. Left intermediate driving

box ran hot: one injured.

**November 17, 1939, locomotive 4026, Glenita, Va. Feed pipe from mechanical lubricator to cylinder broke off under cylinder jacket; one injured.

January 8, 1940, locomotive 447, New Bridge, N. C. Sanders inoperative; one

injured.

January 16, 1940, locomotive 4824, Tye River, Va. Superheater flue failed at

safe end weld; overheated in welding; one injured.

March 15, 1940, locomotive 5237, Rollins, N. C. Flue broke off at back flue sheet; flue reduced in thickness at the point of failure by corrosion; one injured.

May 17, 1940, locomotive 6594, Gadsden, Ala. Squirt hose valve leaking; one injured.

Seven accidents; seven injured.

SOUTHERN PACIFIC—LINES EAST

July 6, 1939, locomotive (T. & N. O.) 967, Millican, Tex. Broken radial stay blew out of crown sheet; stay improperly applied in crown sheet and had no holding power; one injured.

August 21, 1939, locomotive (T. & N. O.) 913, Dorso, Tex. Crank pin broke inside hub fit; old fracture extended through approximately 85 percent of cross-

sectional area of pin; one killed, one injured.

January 23, 1940, locomotive (T. & N. O.) 913, Sanderson, Tex. Flames from firebox burst into cab through baffle type fire door when fuel oil line blow back valve was opened; fire door was not equipped with an extension hood or conduit through cab floor, permitting flames to have free access to cab through fire door which had damper adjusted at about a 45 degree angle; one injured.

Three accidents; one killed, three injured.

SOUTHERN PACIFIC—LINES WEST:

*November 8, 1939, locomotive 3690, Hathaway, Calif. Coupler on tender slipped under coupler of car, causing train to part and brakes to go into emergency; tender coupler below the prescribed minimum standard height; two injured.

November 29, 1939, locomotive 3691, El Paso, Tex. Gangway handhold

*January 29, 1940, locomotive 4167, Dorris, Calif. Water cooler fell from its position in cab; pin in hasp which fastened strap holding the cooler to cab wall

worked out; pin badly worn; one injured.

February 10, 1940, locomotive 4356, Lordsburg, N. Mex. Studs at flange joint securing auxiliary steam pipe to superheater header broke, permitting the steam pipe to pull away from header, and the escaping steam blew back through the flues and open firebox door into the cab; studs broke off through old fractures;

*April 26, 1940, locomotive 2449, Tracy, Calif. Employee's foot was caught between an alemite fitting located on reverse lever and the deck of engine; guard

for the fitting did not afford proper protection; one injured.

Five accidents; six injured.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS:

**December 28, 1939, locomotive 328, East St. Louis, Ill. Cab curtain roller rope broke; rope badly worn; one injured.

**January 3, 1940, locomotive 319, East St. Louis, Ill. Fireman's hand injured by a splinter on handle of firing shovel; one injured.

Two accidents; two injured.

TEXAS & PACIFIC RAILWAY:

September 26, 1939, locomotive 712, Preble, Tex. Crown sheet failure caused by overheating due to low water; two killed, eight injured.

November 15, 1939, locomotive 658, near Fort Worth, Tex. Water glass + burst; one injured.

Two accidents; two killed, nine injured.

UNION PACIFIC RAILROAD:

September 21, 1939, locomotive 3644, Laramie, Wyo. Radial stay blew out of crown sheet while being calked under pressure; leakage of firebox stays had been repeatedly reported during the previous month and effective measures were not taken to relieve the condition; one killed, one injured.
February 25, 1940, locomotive (O. W. R. & N.) 732, Spokane, Wash. Flue

broke off near safe end weld; one injured.

April 25, 1940, locomotive 2835, Hiawatha, Kans. Injector steam pipe blew off injector connection due to a defective spanner nut; improper repairs were made the day previous to the accident, and an attempt made to tighten the joint by hammering the nut while the pipe was under pressure; one injured.

Three accidents: one killed, three injured.

WESTERN PACIFIC RAILROAD:

October 15, 1939, locomotive 179, between Oroville and Stockton, Calif. Steam operated cylinder cocks could not be closed by means of the steam valve as designed and the continuous noise of escaping steam from the open cylinder cocks resulted in injury of employee's ear; one injured.

One accident; one injured.

WHEELING & LAKE ERIE RAILWAY:

*June 4, 1940, locomotive 5107, Canton, 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, 1940, BY ROADS

[A star (*) indicates accident taken from records of the Bureau of Statistics of the Interstate Commerce Commission. A double star (**) indicates accident 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:

January 11, 1940, unit (E-M Corp.) 103, Barstow, Calif. Steam heat pipe leaking; one injured.

One accident; one injured.

NEW YORK CENTRAL SYSTEM:

**November 15, 1939, unit 505, New York, N. Y. Handwheel of locomotive hand brake fell off and struck employee's foot; lock nut washer was missing, permitting nut to unscrew; one injured. One accident; one injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

*November 6, 1939, unit 9114, Monument Beach, Mass. Fire occurred in gas-electric unit, caused by nut in gasoline line at bottom of carburetor breaking which permitted gasoline to flow down the side of engine and sparking of switches located on the side wall of cab near the carburetor caused ignition of the gasoline fumes; one injured.

One accident: one injured.

PENNSYLVANIA RAILROAD:

August 4, 1939, units 4753 and 4785, Edge Moor, Del. Flash occurred at transformer tap switch on unit 4753 while examination was being made, caused by defective control circuits on both units; one injured.

One accident; one injured.

Union Pacific Railroad:

May 6, 1940, unit M-35, Leona, Kans. Priming nozzle was fractured and priming valve was open, permitting leakage of gasoline which became ignited; one injured.

One accident; one injured.

VIRGINIAN RAILWAY:

September 24, 1939, unit 31, Price, Va. Lug connecting lead from bus line

to circuit breaker burned off; one injured.

**October 31, 1939, unit 26, Tralee, W. Va.
burned out causing short circuit; one injured.

Two accidents; two injured.

Table XII.—Number of steam locomotives inspected,

	Parts defective, inoperative or missing, or in violation of the rules	Akron, Canton & Youngstown	윱	Alton & Southern	Alton	Ann Arbor		Atlanta & St. Andrews Bay		Atlanta, Birmingham & Coast	Atlantic & East Caro- lina	Atlantic & Yadkin	oast Line	Baltimore & Ohio, lines east
1	Air compressors				1		44						4	34
2	Air compressors Arch tubes Ashpans and mechanism Axles						1.						<u>-</u>	ī
3 4	Axles												<u>ž</u>	1
5 6	Blow-off cocks		'		<u>2</u>		14				3			20
7	Boiler shell				4		1 21			l		11	2 10	11 75
8	Brake equipment	ĩ			1	1	23				1		10	104
10	Cab aprons and decks						12				1		1 3	30
$\begin{array}{c c} 11 \\ 12 \end{array}$	Coupling and uncoupling devices						2						12	2 53
13 14	Asiles Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains. Cab aprons and decks Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts. Cylinder cocks and rigging. Domes and dome caps. Draft gear. Draw gear. Draw gear. Driving boxes, shoes, wedges, pedestals, and		1		2		1 22			2				
15	Cylinders, saddles, and steam chests		1		10		30 26						12	163 46
16 17	Cylinder cocks and rigging						4			1				6
18	Draft gear		2		3	₁	6 2						3	25 24
19 20	Draft gear Draw gear Driving boxes, shoes, wedges, pedestals, and braces. Firebox sheets			2	4						5		8	84
	_braces.	ļ		ĺ			3						1	4
21 22	Flues						13		- -				1 10	52
23 24	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						12					11	1	53 7
25	Gages and gage fittings, air					1	1 8						1	15 21
26 27	Gage cocks						28						6	13
28	Grate Shakers and Bre decire		1	l)	7						7 5	21 9
29 30	Handholds. Injectors, inoperative Injectors and connections. Inspections and tests not made as required. Lateral motion.				;							.	₁₀	89
31 32	Injectors and connections	₁	<u>î</u>	4	15	2	225	<u>î</u>			4		92	369
33	Lateral motion						9 2	1					8	16 2
34 35	Lights, can and classification				1		6						1	8
36	Lights, headight Lubricators and shields Mud rings Packing nuts Packing, piston rod and valve stem Light to the role of the ro				1		12 16						1 5	24
37 38	Packing nuts				1		37			.		.	4 9	26 92
39 40	Packing, piston rod and valve stem			1	1							.		3
41	Pilots and pilot beams Plugs and studs					1	15	1					4	20 18
42 43	Reversing gear Rods, main and side, crank pins, and collars Safety valves		ī	ī		1	31					L	25	73
44	Safety valves Sanders				3	1	13							9 11
45 46	Sanders Springs and spring rigging Squirt hose Stay bolts, Stay bolts, broken Steam pipes Steam valves Steps. Tonks and tank valves		1	1	10		86	3	3	3	3	1	23	235
47 48	Squirt hose			i			12	21					1	13
49	Stay bolts, broken						14	il		.1		-	<u>î</u>	17 18
50 51	Steam valves									-			Î	5
52 53	Steps				1		111	3				3	7 6	89
54	Tanks and tank valves. Telltale holes Throttle and throttle rigging						.] 1	ļ			1	-	2	47
55 56	Trucks engine and trailing	. 1	.		3	3	. 28	ś :			2		15	40
57	Trucks, tender		1			.	. 18	3			1	2	8 7	33 51
58 59	Valve motion Washout plugs				-		i 9.		i		-	-	10	
60	Train-control equipment	-			_i	i	00	2			ī	-	2	
$\frac{61}{62}$	Wheels. MiscellaneousSignal appliances, badge					-	. 12	2		-	i	-	10 9	14
63	Miscellaneous—Signal appliances, badge plates, brakes (hand).			-	-	-	-	-		-	-	-		
	Number of defects		2 3	7 1:	78	3 8	3 1, 26	7	1 :	3 1	5 2	3	373	2, 310
	Locomotives reported	25		2 1:	2 163	3 46	6 1, 55	6 1				2 10		2, 036 3, 499
	Locomotives inspected	55	3 3	5 2: 1 4	1 393 4 24 9 (3 106 4 106	$\begin{bmatrix} 3, 80 \\ 2 & 37 \end{bmatrix}$	5 3		1	9	$\begin{array}{c c} 9 & 22 \\ 5 & \dots \end{array}$	137	463
	Percentage of inspected found defective	1	ت ماء	- la	al -	ola i	9 1		1.					13

found defective, and ordered from service, etc.

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Baltimore & Ohio, lines west	Bangor & Aroostook	Belt Ry. of Chicago	Bessemer & Lake Erie	Boston & Maine	Buffalo Creek	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 In-	Chicago, Burlington & Quincy	Chicago Great Western	Chicago, Indianapolis & Louisville	Chicago, Milwaukee, St. Paul & Pacific	Chicago River & Indiana
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3				2				:				$\frac{4}{2}$		5	2			21	<u>î</u>	1	2 2 3	1	10	
10 14				1 5				1			1	2		1	23	<u>1</u>		13 46	<u>-</u> 2	2 2 1 4 6 4 5 8 11	3 1	1 3	6 17	
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Table XII .- Number of steam locomotives inspected,

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	Parts defective, inoperative or missing, or in violation of the rules	Chicago, Rock Island & Pacific	Chicago, St. Paul, Minn. & Omaha		Cincinnati Union Ter- minal	Clinchfield	Colorado & Southern	Colorado & Wyoming	Columbus & Green-	Conemaugh & Black Lick	Copper Range	Cumberland & Penn-sylvania	Delaware & Hudson	Delaware, Laekawanna & Western	Denver & Rio Grande Western
1	Air compressors	41	4			2	2		1	1				6	2
2	Arch tubes														:
3 4	Ashpans and mechanism	4							2						1
5	AxlesBlow-off cocks	21	ī		1	1	- - -		1					1	
5 6 7	Boiler checks	22					3	1	1				2	3	
	Boiler shell	7				1	3		1	;		1		17	
8	Brake equipment	115 66				8 2	13	3	17 5	1		1	10	19 17	
10	Cabs, cab windows, and curtains Cab aprons and decks	23	3						1				12	3	
11	Cab cards	3	2			1			1					1	
12	Coupling and uncoupling devices						1						2	10	
13	Crossheads, guides, pistons, and piston rods.	57	2			6	7	5	3				1	12	'
14	Crown bolts	 	2									1			
15	Cylinders, saddles, and steam chests	109				5	13		9	1			3	33	4
16 17	Cylinder cocks and rigging	24	1				3		2				_i	8	1
18	Domes and dome caps	19	7					ĩ	i	1			1	12	2
19	Draw gear	15	2						5					3	
20	Driving boxes, shoes, wedges, pedestals,	133				7	16		28				14	12	
21	and braces. Firebox sheets	16				ŀ			9			1		4	
22	Flues	4				$\hat{2}$				1		i			
23	Frames, tail pieces, and braces, locomo-	54				6	4						1	9	5
24	tive.	۱ ا	ĺ,												
25	Frames, tender Gages and gage fittings, air	13	1				i		2						
26	Gages and gage fittings, steam	11				1	3						- 3	8	1
27	Gage cocks	21	2				5	٠.	9					5	1
28 29	Grate shakers and fire doors Handholds	19 19	2			3	3 1	2	<u>-</u> 1]		3	3 8	1
30	Injectors, inoperative	3							1						
31	Injectors and connections	80	5			4	12	1	2				5	26	5
32	Inspections and tests not made as re-	313	61		1	21	19	2	27	3		5	34	110	11
33	quired. Lateral motion	25					l		3			1	3	5	3
34	Lights can and classification	5					3		3				1	I	
35 36	Lights, headlight Lubricators and shields	9 24	2			<u>i</u>	_i		2				2	4	2
37	Mud rings	9				1	. 1							1	
38	Packing nuts	18	3			1	13	7	2						5
39 40	Packing, piston rod and valve stem	26 11		- -		8 2	6		$\frac{2}{6}$	3				11 2	2
41	Pilots and pilot beams Plugs and studs	10	1			2	1		U	:					
42	Reversing gear	25	i			ī					~ -			1	
43 44	Rods, main and side, crank pins, and collars	51	4			11	6	1	12	2			5	$\frac{31}{2}$	2
45	Safety valvesSanders	40	12				2	1	<u>î</u>			1	$\bar{2}$	15	4
46	Springs and spring rigging	170				8	2		10				7	88	1
47	Squirt hose	4	1									- -			
48 49	Stay bolts	8 9	3	4		1		1	4					2	
50	Steam pipes	18				2			5					2	
51	Steam valves	4				1			1.					3	
52 53	Steps	30				6	2	1	8				<u>-</u> 2	2 29	3
54	Tanks and tank valves Telltale holes	53 4	6					1	3					40	
55	Throttle and throttle rigging	46				2	2	1	4			1		7	1
56 57	Trucks, engine and trailing	48				1	3		7				1	23	1
57 58	Trucks, tender Valve motion	38 29				3	2	2	$\frac{21}{2}$				1	9 6	4
59	Washout plugs	22				2						1		14	
60	Train-control equipment								;						
$\frac{61}{62}$	Water glasses, fittings, and shields	76 30				1	3	1	$\frac{1}{2}$			$\frac{2}{1}$		12 5	2 4
63	Wheels Miscellaneous—Signal appliances, badge	46				4			4				1	7	3
	plates, brakes (hand).														
	Number of defects	2, 110	218	4	2	132	170	36	231	14		_17	115	607	76
	Locomotives reported	904			12	79	92	$\overline{\overline{21}}$	30		īī		364	427	
	Locomotives inspected	2, 784	778	22	17	169	300	52	30 27		15	22 5	943	1, 157 167	991 16
	Locomotives defective Percentage of inspected found defective	488 18						10 19	90	3 6		23	$\begin{vmatrix} 35 \\ 3.7 \end{vmatrix}$	14	1.6
	Locomotives ordered out of service	33			l		2		2					4	

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

Denver & Salt Lake	Detroit & Mackinac	. Detroit & Toledo Shore Line	Detroit Terminal	Detroit, Toledo & Ironton	Donora Southern	Duluth, Missabe & Iron Range	Duluth, South Shore & Atlantic	Elgin, Joliet & Eastern	Erie	Florida East Coast	Fort Worth & Denver	Georgia & Florida	Georgia	Grand Trunk Western	Great Northern	Green Bay & Western	Gulf Coast Lines	Gulf, Colorado & Santa Fe	Gulf, Mobile &	High Point, Thomas-	Houston Belt & Ter- minal	Huntingdon & Broad Top Mountein	Illinois Central
	1		1					1	12		4	1		1	10			2	2				8
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									1 4						<u>-</u>								2 1 4 3
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	2							î	12 4		1			- - -	2		;		4				9
	1			2				3	4 15	1	2				19		2	1	5				18
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7	2 19		18	13	33	18	2	2 1 90	535 535	2	132			34		1 -7		151	1	2		i	5
	2	26 50	18 34	13	33		2	90 242	535 535	$\frac{1}{2}$ $\frac{20}{120}$	$\frac{1}{132}$	22 27	 3 	34 234 234	21	 -7 -28	11 89	151	1 2	2 10 13	13 35	 -7 11	5 9 488

1 Atchigan Tanaka & Santa Fa

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 &	Kentucky & Indiana Ter- minal	Lake Superior & Ishpeming	Lake Superior Term. & Trans.	Lake Terminal
1	Air compressors		2	!		1		6						
2	Arch tubes Ashpans and mechanism Axles													
3 4	Ashpans and mechanism													
5	Blow-off cocks						:	.4						
6 7								1					1	
8	Boiler shell. Brake equipment Cabs, cab windows, and curtains Cab aprons and deeks Cab cards.				ĩ	3		1.7	2				2	
9	Cabs, cab windows, and curtains		11			2		9						
10 11	Cab aprons and decks							1						
12	Combing and incombing devices													
13	Crossheads, guides, pistons, and piston rods				1	1]
14 15	Crown bolts		7			4			7					
16	Cylinder cocks and rigging							3					[
17	Domes and dome caps					<u>i</u>		6	<u>i</u>					
18 19	Draw gear													
20	Driving boxes, shoes, wedges, pedestals, and				1	2		6						
21	braces. Firebox sheets	ļ						1						
22	Tal.					1		1						
23	Frames, tail pieces, and braces, locomotive				1	4		8						[
24 25	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.							1						
26	Gages and gage fittings, steam													
27 28	Gage cocks					1 2		$\frac{1}{2}$	2				1	
28	Grate shakers and fire doors. Handholds. Injectors, inoperative Injectors and connections Inspections and tests not made as required. Lateral motion					2		2						
30	Injectors, inoperative													
31	Injectors and connections		10		1 6	2			10				3	
32 33	Lateral motion					1		6						
34	Lights, cab and classification Lights, headlight													
35 36	Lubricators and shields	i						5	4					
37	Mild rings							١	1					
38														
39 40	Packing, piston rod, and valve stem Pilots and pilot beams							1						
41	Plugs and studs				3									
42 43	Reversing gear		<u>-</u>			13		3						
44	Reversing gear Rods, main and side, crank pins, and collars Safety valves												i	
45					1 4			5				- -		
46 47	Springs and spring rigging Squirt hose									İ				
48	Stoy holte		1	I		1 7		2						
49 50	Stay bolts, broken Steam pipes		1		i	7								
51	Steam valves		1					1						
52	Steps							8						
53 54	Tanks and tank valves.				1					i	1			
55	Throttle and throttle rigging					1		3	2				1	
56 57	Trucks, engine and trailing Trucks, tender				2	1			i				1	
58	Valve motion	ļ				3								
59	Washout plugs													
60 61	Train-control equipment Water glasses, fittings, and shields		1			5		3	3					
62	Wheels		ļ ⁷		1			5	1					
63	Miscellaneous—Signal appliances, badge plates, brakes (hand).							1					<u> </u>	
	Number of defects		42	ļ	24	74	-	187	51				10	
		22	117	11	127	12	19	117	21	18	26	32	12	
	Locomotives reported Locomotives inspected	45		11 33	304	42	13	356	43	45			48	41
	Locomotives defective Percentage of inspected found defective		15 10		10 3. 3	13		43 12						
		1	: 10	l	⊥ ບ. ວ	91		1 12	1					

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

Lehigh & Hudson River	Lehigh & New England	Lehigh Valley	Long Island	Louisiana & Arkansas	Louisville & Nashville	McCloud River.	McKeesport Connecting	Maine Central	Maryland & Pennsylvania	Midland Terminal	Midland Valley	Minneapolis & St. Louis	Minneapolis, St. Paul & S. S. Marie	Minnesota Transfer	Mississippi Central	Missouri & Arkansas	Missouri-Illinois	Missouri-Kansas-Texas	Missouri Pacific	Mobile & Ohio	Monongahela Connecting	Monongahela	Montour	Nashville, Chattanooga & St. Louis
1		3 5	1		9			1				2	6			5		5	7	1		1	1	1
					1			1				1	11	:					4				ĩ	3 5
		<u>-</u> -			6							1	3	1				4	8 2	1		1		
6	4 5	10	3	1	11 6			2				11 5	7	<u>A</u>		6 3	1	4 2 2	4 8 2 15 14	3 1 8 3	1 2	2 3		12 5 2 1
4	1	8		2	2								6			1		2	1	3				2
		1 2			1								1			1			1	3				$\begin{vmatrix} 1\\1 \end{vmatrix}$
1	9	5			24						1	1	2			3		4	$\frac{3}{1}$	3			2 1	12
2		13			21				2 3			1	3			3	1		6	2		1	i	14
		1		1	21 8 2 1				3	- 		1	2					2	<u>ī</u>	1	1			2
		3		2								$\frac{2}{1}$	1			4		2	2 2 2	2	1		2	5
<u>i</u>	1 1	<u>ī</u>		3	20			4			1	2	5	2		7		22	2					16
1		4			2			3										2						1
					3							1 3						<u>6</u>	<u>2</u>	1 9			<u>-</u> 2	6 11
	1	2			10								5			1								
<u>î</u>		1 2			<u>-</u>		;						2 4			1		2	1 5	1				1 2
					14			2				3	2	1					5 3 2 3	1			3	5 2
3 1	3	2 2	1		4								3			3				5			3 1 3	1
	1				1 19			1	3			5	7	<u>-</u> 2		4		1	1 11	4	1	2	<u>-</u>	 5
4	20	53 53	1	5	19 75 8			29	7		1	34	65	9	1	22	2	34 3	11 55 1	43	2	4	5	31
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1	1	2			5			1	1			1	1 3			1			<u>ī</u>					4
					2			ī	2			2				3 6			1					10
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					4							1	3						4					1
3		1			6			1				1	1	1		1		1 3	3 8	2				3
				1	21							6	1			3				1				21
;	3 3	15			12			13	·			4	7 22			2		1 15	8 16	6				28
					3								<u>-</u>			i								
		14			7 2				6			2	1			4		2	1	2				3
	1-1	1			4							4				1			3					3
				1	10			2	1			3	2			2			3 2 3 6	1				t
				4	1			1	1			3	4			2 4 2 6 5		1 1	1	1	Ī	I		8
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		1						9	1			2				20				7			2	
 	- 2	3			41			4	1			12	1 5		1			3	4 7	ĩ			1	4
		. 1	_j	₁								4						3	i			1		
- 5	2	10)		4							1	. 1					3	2					14
	-	-	-		5	-						1			- ~ -	_1			1	1		2	2	·i—
	t 88 =(= =		-1		453			84	36		4	129	236	29	2	137	4	133	259	146	9	19	30	296
1	47 1 27	404	96	69	938	13	10	153	11	10	13	109	288	13	18	18	20	314	926	155	26	51	22	191
9	1 27	1 58	ଧ ଶ	II 5	2, 124 125	i	37	424 34	8		1	46	93	9	42	! 27	7 2	886 44	2, 320 68	343 46 13 2	18	110	6	81
17	7 10) (3 3. 1	2, 5	6			8	33		3. 1	18	sl ið	i 18	2 2 3	40	$ 3.\bar{5} $	5	9 9	13	111	3. 6	1 19	13

Table XII.—Number of steam locomotives inspected,

	Parts defective, inoperative or missing, or in violation of the rules	Nevada Northern	Newburgh & South Shore	New Orleans Public Belt	New York Central	New York, Chicago &	New	New	Norfo	Norfolk & Western	Norfolk Southern	Northern Pacific	Northern Pacific Ter-	Northwestern Pacific	Patapsco & Back Rivers
1	Air compressors	I			4		3			1					
2 3.	Ashpans and mechanism Axles Blow-off cocks				1		1								
4 5	Axles				11	<u>i</u>	1	1			¦	3			
6	Boiler checks				20		3	1		7		4			
7	Roiler shell		1		17		2	3		7		8			
8	Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab cards				44		5 17			23		30			
9 10	Cab aprops and decks				15		2			4		4			
11	Cab cards		-		4		6					:			
12	Coupling and uncoupling devices		·		47	1	4	$\frac{1}{4}$		8		7			
13 14	Crown bolts				2					2		3			
15	Cylinders saddles, and steam chests	l	1		86	5	3	4	1	34		4	~		
16	Cylinder cocks and rigging.		4		43 10		1		2	5 2]	
17 18	Domes and dome caps				17	1	6	2		4		5			
19	Draw gear				11	1	3	1		1	1	2			
20	Driving boxes, shoes, wedges, pedestals,	ŀ			23	2	3	1		16		18	1		1 1
21	and braces Firebox sheets				3		5			4		5		1	
22	Flues				3		1	1		4		4			
23	Frames, tail pieces, and braces, locomotive Frames, tender				30		3 2		1	10		14			
24 25	Course and gags fiftings air				7					1		2			
26	Gages and gage fittings, steam				6		1	2		7	1	4			
27	Liage Cocks		-		12	1	1	6		1		5			
28 29	Grate shakers and fire doors Handholds				14 11	1	1	1 2		4 3		5			
30	Injectors, inoperative							-				2			
31	Injectors, inoperative Injectors and connections				49	1	20	9		27		27			
32	Inspections and tests not made as required. Lateral motion		Ŧ		323 18	9	86 5	40 14	5	102		171	2	1	
33	Lights, cab and classification						1	1		6					
35	Lights, cab and classification Lights, headlight				3	- -	2			6		6			
36	Lubricators and shields				13 10		1	4		5		8			
37	Packing nuts				17	3		3		7		1			
39	Packing nuts. Packing, piston rod and valve stem Pilots and pilot beams.				25	2	2			6		2			
40	Pilots and pilot beamsPlugs and studs			•••	12					$\begin{vmatrix} 2\\4 \end{vmatrix}$	i	1			
41 42	Pavarsing gear	5 I			$\tilde{22}$					3	1	3			
43	Rods, main and side, crank pins, and collars. Safety valves		1		49	3	4	2	1	9	1	21		1	
44	Safety valves				2 9	- -			1	$\begin{vmatrix} 1\\3 \end{vmatrix}$		29			
45	Sanders	[130	1	8	6		26		32			
47	Springs and spring rigging Squirt hose						1		;						
48	Stay bolts. Stay bolts, broken Steam pipes				11		2		1	5		3 2			
49 50	Steam pipes				18		1	Î		2		7			
51	Steam valves			٠	4		1	1		1 5					
52 53	Steps Tanks and tank valves				22 28	1	5 5	5		5 5		8			
54	Telltale holes				2					1					
55	Throttle and throttle rigging				27 23		1			1 8	1	5 9			
56 57	Trucks, engine and trailing				23 32	j	5 6	6	6			12			
58	Valve motion				28		2	2	2	2		2	1		
59	Washout plugs				18					6		6	j		
60	Train-control equipment Water glasses, fittings, and shields				38		<u>-</u> 2	8		5	··· <u>·</u> 2	10			
61 62	Wheels				24		3	7	2	4	ĩ	10	1	9	
63	Miscellaneous.—Signal appliances, badge					اء	ا ا	10							
	plates, brakes (hand)				38	2	- 5	10		9		9			
	Number of defects		7.	ļ	1, 498	40	243	185	23	445	11	561	6	11	-
- 1		= 16	17		3, 165	303	533	112	20	560	 55	836	14		10
	Locomotives reported Locomotives inspected	36	44	14	6, 374	995	919	293		1, 225			29	112	53
ľ	Locomotives defective	-	1	-	459	13		55	6	116	$\frac{4}{2.9}$	185	2	$\frac{4}{3.6}$	
1	Perceutage of inspected found defective Locomotives ordered out of service		2.3	-	7 17	1.3	12 2	19 2	11	. 3	£. 9	11 5		J, U	

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

Pennsylvania	Pennsylvania - Reading Seashore Lines	Peoria & Pekin Union	Pere Margnette	Philadelphia. Bethlehem	& New England	Pittshurgh & Lake Eric	Pittsburg & Shawmut	Pittsburgh & West Virginia	Pittsburg, Shawmut & Northern	Quebee Central	Reading	Richmond, Fredericks-	River Terminal	Rutland	St. Louis-San Francisco	St. Louis Southwestern	San Diego & Arizona Eastern	Savannah & Atlanta	Seaboard Air Line	South Buffalo	Southern Pacific, lines east	Southern Pacific, lines west	Southern Pacific of Mexico
57 2 7	1		- -	3		2		1	1		3				4	4		9	4			4	
10 27 39 150 125 15	1			2	7	1 2 2 1	2	1 1 7 1	3		2 3 5 23		1 3 4 2 4 4		2 2 7	3 13 3 1		1	7 6 2		i	1 12 5 27 4	4
54 10 68 8 9 32 17	1			1	2 1 1	2	2	7	1 2 3 1		29 18 1	ļ	2 2 1 10 3 1 8		4 1 11 7 1	3 2		1 5	5 6 4 1	1 1	2	15 11' 24 2	2
108 20 11 14				1	5			8 3 1 3	2		13 2 1 10 2		2 2 2 2 2	2	 3	41 3		11	2 3 1 8		1 1	24 6 6 13	
13 16 49 3€ 11 10 155	1 1				1	ϵ	j			1	1 5 13 9		6		i	1 1		i	3 1	2	2	6 4 7 2 10 1 33	3
473 10 2 14 14	8				22 4	14	4	19	5		15 83 8 1 5 3	14 	29	13	30 1	50 2	1 2	1 13 8	39 2	1	3	146 4	111 2 11 2 2 1 2 1 2 1 2 1 1 2 1 1 1 1
22 18 43 5 13 23 79			2		1 7	3		1			12 5 1 1 5	1 1	1 3	1	1 1 1 2	1 4 2		4	3 3	1		3 1 1 1	11 2
38 151 3 26	1		3 4		6	2 1		1 2 1			9 1 7 20 1	1 3	5 2 6 2	2	8	3 1 11		7 1 4	14 1 11		1 1	10 1 2 30 1 3	4
10 32 17 22 64 5			1		5 2 3	2	1	2 1			4 1 4	1	14 1 6 3	2	2	2 1 2	2		1 5 1		3	9 2 1 3 14	2
80 40 22 37 48	3 1 1		1		1		1 3 1	1 4 24	1.		1 1 7 7 2 21	3 1	15 2	6	2 2 2	3 3 15		1 2 3	4		1	1 7 10 1 3	2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
64 43 73			1		3	2	1	15 2	4 		8 12 8		1 10 1	1	1 2	2 1 3		1	5	1	1 2	15	1 6
569	24	_	44		'_	57 == =		124	27;	2	418	53	164	31	109		5	81	165		25		42
231 868 603 7 29	70 118 9 8	18	$\frac{274}{425}$	1	16 2 71 3 22 31	35: 38, 18, 5, 21,	18 39 4: 10	28 58 19 33	30] - 6 - 20	181	689 767 113 6	13	15 48 31 65 4	72 1 13 . 8	607 , 677 33 2	664		13 51 13 13 25	530 , 302 46 3. 5	31 40 35 7 3 3 9 1.	36 1, 17 2, 8	, 409 , 488 179	27 13 7 54

Table XII.—Number of steam locomotives inspected,

B Brake equipment									
A Art compressors	Terminal R. R. Assn. of St. Louis	& B.	Tennessee Central	Tennessee, Alabama & Georgia	Steelton & Highspire	Spokane, Portland &	Spokane International		or in violation of the rules
Arch tubes			9			1		10	Air compressors
Ashpans and mechanism.									
A ARISS Blow-off cocks 7 1 1 1 1 1 1 1 1 1									Aghners and machanism
A Maries								Ashpans and mechanism	
Blow-off cocks. 7	!			- -		1		. 4	
Boiler checks	_ '		1		1	1		7	
	1		-			9			Deilor chooks
B Brake equipment	1	10							
Cab aprons and decks		10	뷘			1			Droke equipment
Cab aprons and decks	. 3		1		2	i		10	B Drake equipment
Cab aprons and decks	1	. 1			1				O Cabs, cab windows, and curtains
Cab cards	3	ર્વ	1		1			1	O Cab aprons and decks
Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods 28	1	ا	-						
Crown botts Cylinder cocks and rigging Cylinder cocks and cocks Cylinder cocks and cocks Cylinder cocks and cocks Cylinder cocks	-		;1						Coupling and uncoupling devices
Crown botts Cylinder cocks and rigging Cylinder cocks and cocks Cylinder cocks and cocks Cylinder cocks and cocks Cylinder cocks			4			4		28	Coupling and discoupling de and niston rods
Crown botts Cylinder cocks and rigging Cylinder cocks and cocks Cylinder cocks and cocks Cylinder cocks and cocks Cylinder cocks				1					3 Crossneaus, guides, platons, and platon rods.
Cylinders, saddles, and steam chests	2 2	. 2			[36	
Cylinder cocks and rigging	ī								T Carlindone codding and Steam Chesis
Domes and dome caps	-1 -	'							
Drawing boxes, shoes, wedges, pedestals, and braces 38	-							-	Domos and dome cans
Drawing boxes, shoes, wedges, pedestals, and braces 38	-i 2					1			7 Doubt con
Draw gear Draw gear Section	-		2				1	8	8 Drait gear
Firebox sheets Second Se	1 2	1	1					38	9 Draw gear
Firebox sheets Second Se	1		2						n Driving boxes, shoes, wedges, pedestals, and braces
Flues Flue	1	1	1					0	1 Hirehox sheets
22 Frames, tail pieces, and braces, locomotive. 3 2 2 24 Frames, tender. 3 3 2 25 Gages and gage fittings, sir. 2 2 2 26 Gages and gage fittings, steam. 6 3 3 27 Gage cocks. 8 1 1 28 Grate shakers and fire doors. 6			9			- 4		000	
2 2 2 2 2 2 2 2 3 3			0			2		26	Frames tail pieces and braces, locomotive.
2 2 2 2 2 2 2 2 3 3			2					3	Enames, tander
Handmots							3	4 Frames, tender	
Handmots		2				·	2	5 Gages and gage nitings, an	
Handmots 1 1	1	3					6	6 Gages and gage fittings, steam	
Handmots 1				1				7 Gage cocks	
Handmots 9	9		-+				0	Grate shakers and fire doors	
Injectors, inoperative 5 1 1 1 1 3 7 1 1 1 1 1 1 1 1 1	4							6	Handholds
Injectors and connections Start									
Inspections and tests not made as required. 3	. 2					1		33	
Inspections and tests not made as required 3	7 34	7	7		3	14	1		1 Injectors and connections
Lateral motion	1	1	1				_	9	2 Inspections and tests not made as required
Lights, cab and classification	1	İ	1					5	3 Lateral motion
Table Tabl		1	•					1	4 Lights, cab and classification
Table Tabl	1	1						۱ ۱	Lights, headlight
Table Tabl	4	1 1	:			2			c Lubricators and shields
Table Tabl	- 1		ī		1			3	Mud rings
Table Tabl	_ 3		4						Deshing nute
Reversing continuous Reversing continuous	. 2							27	8 Packing nuts
Reversing continuous Reversing continuous			1					7	9 Packing, piston rod and varve stem
Reversing continuous Reversing continuous						1		3	0 Phots and phot beams
Reversing continuous Reversing continuous						3	1	11	1 Plugs and studs
Rods, main and slote, ctains pine, and set	1 2	1	14			1 1			
Safety valves	-	1 1	-1			1 *			
Sanders	-								
Stay bolts, broken	4 6	1	1.4					1 40	5 Sanders
Stay bolts, broken	1 "				, ,	5		40	6 Springs and spring rigging
Stay bolts, broken					~			1 1	7 Squirt hose
Stay bolts, broken	-1 g		3					7	Stay holts
Steps								2	o Stor holts broken
52 Steps. 9 6 53 Tanks and tank valves. 9 6 54 Telltale holes. 14 3 55 Throttle and throttle rigging. 14 3 56 Trucks, engine and trailing. 21 3 77 Trucks, tender. 13 2 78 Valvestion. 18 1	2	2						3	y Diay Duits, Diokon
Steps							1	1 9	0 Steam pipes
Steps	2	9					1	1 14	1 Steam valves
53 Tanks and tank valves	1 4	.l 1	6				1	1 4	
Telltale holes	il		U					8	
55 Throttle and throttle rigging 21 3 56 Trucks, engine and trailing 21 2 57 Trucks, tender 13 2 58 Valva retion 18 1									A Telltale holes
56 Trucks, engine and trailing 2 7 Trucks, tender 13 2 7 Trucks, tender 18 18 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1									Throttle and throttle rigging
56 Trucks, tender 13 2	2							21	Temples angine and trailing
57 Trucks, tender	2	1	2					13	
58 Valve motion 24 10 10			1		l	l		19	7 Trucks, tender
go Washout plugs	3	d	10	1		1		94	8 valve motion
59 Washout plugs			آ ا					1 29	9 Washout plugs
60 Train-control equipment 2		1		0					O Train-control equipment
61 Water glasses, fittings, and shields				2					water glasses, fittings, and shields
61 Water glasses, fittings, and shields 17 17 2 2	1								Wheels
62 Wheels 17 63 Miscellaneous—Signal appliances, badge plates, 15 1 2 2	1	i 1	2	2		1	il	15	Miscellaneous-Signal appliances, hadge plates.
heolica (hond)	-	-		I			.		bestes (bond)
brakes (hand). Number of defeets	16 90	3 4€	108	4	9	44	2	708	Drakes (Hand).
Number of defects	=	:							Number of defects
Locomotives reported 1,542 10 97 14 10 33		3 50	33	10	14	07	10	1 549	
Locomotives reported 1,542 10 97 14 10 33 14 Locomotives inspected 3,383 8 233 22 15 141 102 1 14 3 1 32		14	141		90			2 200	Locomotives reported
Locomotives inspected	7 3	2 7	32				í∣ °	10,000	Locomotives inspected
Locomotives inspected 192 1 14 3 7 23	50 1		23	1 5				192	Locomotives defective
	ĭl ï	şļ ĭi	1 2	i	1 14	1 0		٠	Percentage of inspected found defective
Locomotives ordered out of service 15		· · · · · ·			1		> - <u></u>	. 18	Locomotives ordered out of service

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

Texas & Pacific	Texas-Mexican	Texas Pacific-Mo. Pac. Term. of N. O.	Toledo, Peoria & Western	Toledo Terminal	Toronto, Hamilton &	Union Pacific	Union Railroad	Upper Merion & Plymouth	Utah	Virginian	Wabash	Washington Terminal	Western Maryland	Western Pacific	Wheeling & Lake Erie	Roads with less than 10, and industrial locomotives	Total defects
	1						1			7	2					62	567 20 37 3 191 288
						1										2	37
						5 10	2			i	1	1			2	2 14 25 10 205 119 43 35	191
						9				4						10	266
3						49 56	5 4	7		14 8	2		2	1	$\frac{2}{9}$	119	1,506 1,078
						8				2				1	2	43 35	277 101
						3										14	1, 500 1, 078 277 101 53 815
1						42	4	1		7	2			2		47 3 100	54 1, 320
		1				67 21	ĺ			45 10	2		7	4	5	100 57	1, 320 447
						4 15	<u>-</u>			45 10 1 4 4	ĩ				;	57 2 102	78 508
		1		2		10 81	7 2	<u>î</u>		4	2				4 2 3 3	60	3061
9		2		1	-	81 4		- -		14	2		1 2		3	105 25	1, 243 191
1		;				4		2		1			1	1	<u>î</u>	25 22 27	147 665
- -					- -	64 3 4	<u>2</u> 1	2		1						15	78
						4 19	1			3			1		2	15 17 43 17 72 4	132 211
						12 12	1	2		3			2		2 5 1 2	43	400
		1 1			-	4 11	1	5		$\begin{vmatrix} 2\\2 \end{vmatrix}$		1			2	72	333
<u>-</u> 2						40	9	3		16	<u>-</u>		6	2	4	130	273 333 30 1, 330 6, 218 313
8	2	5				273	11	24		16 76	19	I	6 16	2 13	31 2	130 502 34	6, 218
		1				25 1				8	4	2				4	49 180
1						3				2			1		4	30 5 27 64	180 185
						3				1					į	27	213
						$\frac{9}{32}$	<u>-</u> 2	5		3 10	<u>î</u>	2	$\frac{1}{2}$	1 5	1 4	96	418 660
						10 7				2	1 2			2		29 4	140 156
1						7 8	1			2 1 7 16					5 2	20 176	320 1, 199
						41 7	2	4		16			<u>ī</u>	1		4 1	61
	<u>ī</u>	1 2				16				52		- 	3	$\frac{1}{3}$	2 7	32 176	415 2, 174
	ĺ	- -				70 2 8 3				2 2						8	50
						3		l		2	11					24 63	227 271
 		1				9				2					1	24 13	255 106
	1					12		3		5 1		1		1		13 106	449
						12 29 2		I					1		1	70 27 45	768 95
1 		2				16 18	1	9		5 11	1		2		2 1	45 41	647 598
	2					28	1	2		. 7	î			;	1 2	126	705
						9 20	<u>ī</u>			14 4	1		1	1	3	37 26	506 478
- <i></i> -	<u>ī</u>	<u>î</u>		-		31	5	<u>-</u> 5		<u>-</u> 6					5	96	753
	1					33	<u>2</u>	3		12				4	3	69	554
	(13				9	1		1			25	564
31		28		3		1,312	75 	88		418	70	8	54	46		3, 396	
318 539	17 14		18 13			1, 465 3, 724	124 106	10 72	14 30	103 238	432 991	8	223 766	165 445	161 315	$\begin{vmatrix} 1,777 \\ 3,172 \end{vmatrix}$	44, 274 102, 164
11	4	5	l	4.6		350	1 17	72 24 33		90 38	22	1 12	1 18	16 3, 6	38	684	8, 565

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

	Per	cent	nge i	nspec	eted (lefec	tive	i	0	rdere	d out	of ser	vice	
Road	1940	1939	1931	1929	1927	1925	1923	1940	1939	1931	1929	1927	1925	192
kron, Canton & Youngstown liquippa & Southern liton & Southern	1.7 2.8	1.6	14 0	47 31	42 26	56 69	38	0			12 0	1	5 0	1
Alton & Southern	6 1.9	6	0 0 8	3 9 14	14 25 24	35 71 32	75 97 49	0	0 2	0	0	5 2 40	9 15 30	2 2 8
Alli Arboi Ltchison, Topeka & Santa Fe Ltlanta & St. Andrews Bay Ltlanta & West Point Ltlanta, Birmingham & Coast ¹ Ltlantic & East Carolina	9 1.3	2, 9 0	4 4. 3	6	9	23	27 78	0	0	0	<u>ō</u>	<u>i</u>	4 12	
tlantic & Fast Carolina	17	20	6	10	16 30	- 100		0	0			0 4	0 15	
salto. & Ohio, lines east ²	13 6	9 7 4 5	4. 1 4. 7	15	30 49 43	52	62 50	48 12	13 13	8		32 72 3	113	1:
tlantic & Fast Carolina tlantic & Yadkin tlantic Coast Line salto, & Ohio, lines east 2 salto, & Ohio, lines west 3 sangor & Aroostook Belt Railway of Chicago sessemer & Lake Erie Soston & Maine Wiffalo Creek	5 10 10	19 10 10	4. 3 12 13	35 22 16	54 21 23	51 63 36	66 43 67	0 1 3	$\begin{vmatrix} 0\\2\\2 \end{vmatrix}$	0 1 6	6 3	5 1 13	4 1 23	19
amas Prairie ambria & Indiana	3. 1 10	5	47	0 16	18	50		0 0	0	0	0	30	0 24	
anadian National 4 anadian Pacific arolina & Northwestern	.119	13 9 0 10	37 25 20	34 32 19	50 44 30	56	76	3	0	2	1	4 10	0	
January Control of Corgia Jentral Railroad of New Jersey Jentral Vermont Jharleston & Western Carolina	8 3. 6	9 8 12	13 11 16	12 12 28	38 11 58	47 27	77 47	0	$\frac{1}{1}$	2 1	14 1 2	20 1 2	46 2 2	1
Chicago & Eastern Illinois Chicago & Illinois Midland	4 , 4	6	9 12 0	17 28 14	28 38 83	49 64	68 75	$\begin{vmatrix} 3 \\ 2 \\ 0 \end{vmatrix}$	(0	$\begin{vmatrix} 3 \\ 0 \end{vmatrix}$	3 0	26 25 29	29 31	
Chicago & North Western Chicago & Western Indiana Chicago, Burlington & Quincy Chicago Great Western	$\begin{array}{c c} 13 \\ 28 \\ 3.8 \end{array}$	13 28 4. 7	7 25 6 26	12 43 14 11	19 22 21 20	86 46	67 60	1 5	4	0 4	3 18	18 0 39	29 2 185 10	
Chicago, Indianapolis & Louisville. Chicago, Milwaukee, St. Paul & Pacific	13	6	11	26 5 9	29	45	57 48	6	i 2 I 3	1 2	5	9	7 12	
Chicago River & Indiana	. 18	16	11	5 17	29	55	76	33	40	17	13	1	124	
Omana Chicago, West Pullman & Southern Cincinnati Union Terminal	6	16 14 0	7	17 47	30 53	100	58	} 0) (0	5	1	20 7	ļ
Colorado & Southern	117	16 7 11	9 8 0	38 43 21	25 40 27 21	76	81 14	1 0		0 0	10	3		ĺ
Colorado & Wyoming Columbus & Greenville Conemaugh & Black Lick Copper Range Cumberlan & Pennsylvania	1 13	16 0 29	17 16 18 12	25 58 28 29	84 13	59	₇₈	5 0			$\frac{2}{1}$	0	0 7	
Delaware & Hudson Delaware, Lackawanna & Western.	- 3. i	7 2. 4 16	1 2. 7	7 2. 6 21 36		24	62 62	2 4	11	0 3	0 17 32	1 4 88	$\frac{2}{3}$	
Denver & Rio Grande Western Denver & Salt Lake Detroit & Mackinge Detroit & Toledo Shore Line	- 16	39	1 0	19 33 8	36 36 33	68 6 82 6 51	93 26 78	3 C		0 0	$\begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}$	7 0 1	39 2 5 7	
Detroit Terminal Detroit, Toledo & Ironton	$\begin{bmatrix} 14 \\ 2.9 \\ 17 \end{bmatrix}$	4,6	18 3. 8 5	31 5 0	46 15 0	72 28	76 29	6 0 9 0 0 1		0 0	0 0	0	4	
Ouluth, Missabe & Iron Range Ouluth, South Shore & Atlantic	1.4	1 9	10	21 24 7 4. 7	12 29 13 30	35	69 50	0 2	: 1	$\begin{pmatrix} 1 \\ 0 \end{pmatrix}$	0 0	$\frac{2}{1}$	5 58 26	,
Sign, Jonet & Eastern Frie Florida East Coast. Ort Worth & Denver City. Jeorgia & Florida Jerand Trunk Western 6 Freat Northern.	6 21	11 9	13 1.4 5 57	1 7 13 47	21 23 55	22 3 36	22	2 0		0 2	$\begin{array}{cc} 0 \\ 2 \end{array}$	0	8	
Jeorgia & Florida Jerand Trunk Western 6	1 1.6	1. 3 3. 8	3 1. 1 3 7 8 8	$^{ 11}_{28}$	12	34	28 61	3 0) (). ()	$\frac{3}{4}$	0		İ

Atlanta, Birmingham & Atlantic prior to 1927.
 Includes Buffalo & Susquehanna and Buffalo, Rochester & Pittsburgh, 1933-40.
 Statistics prior to 1927 included in Baltimore & Ohio, lines east.
 Includes Grand Trunk Western, 1925-27.
 Includes former Hocking Valley, 1931-40.
 Included in Canadian National, 1925-27.

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

	Per	cents	ige ii	aspec	ted o	lefec	tive		Oi	rdere	d out	of ser	vice	
Road	1940	1939	1931	1929	1927	1925	1923	1940	1939	1931	1929	1927	1925	192
reen Bay & Western	4. 7	10	13	45	47	67	59	0		2	1	1	ģ	
ulf Coast Lines ulf, Colorado & Santa Fe	1	2.3 10	7	7	58 47	59 45	70	0	$\frac{0}{2}$	0 3	0 6	15 31	26 32	
ulf, Colorado & Santa Fe	27		18	22	23	38	62		ő.	0	1	2	7:	
fulf, Mobile & Northern & Louiston Belt & Terminal Conston Belt & Terminal Control & Broad Top Mts	8	0	10					ō	ŏ		1			
fouston Belt & Terminal	0	1.3		8				0		0	0			
untingdon & Broad Top Mts	12	14		36	44	78	67	0	0	0	3	4	0	
		5 2.9	12	10 29	14 40	30 12	43	3 0	7	22 4	14 1	35	30	4
linois Central linois Terminal ndiana Harber Belt	10	9	0	1	14	52	68	ŏ	ĭ	0	0	ŏ	18	
		Ŏ	14	13	30	26	36	0	Ō	ĭ	0	4	0	
ntornational-Great Northern	1 3, 3	2.4	7	. 5	27	29	66	0	1	1	0	11	9	J
nterstate	0.1	.,,,		60	83	94	78	2	2 0	1	4	6	6	
		9	0	50	0 26	52	92	0 5	3	0	0	12	<u>1</u> 1	1:
Cansas City Southern Cansas City Terminal	123	25		24	24	80	88	1	ı	ŏ	Ô	-0	2	
Tansas, Oklahoma & Gulf	ő	ő	1.3			43	50	0	- 0	0	1		1	
entucky & Indiana Terminal	0	0	3.7	8	6	0		0	0		0	1	0	
ake Superior & Ishpeming	0	5	17	52	39 21	46		0	0		7	0	$\frac{2}{1}$	
ake Superior Terminal & Transfer.	12	10 0	0 10	10	20	44 50	67	1	0	0	0	oi Oi	0	
ake Terminal ehigh & Hudson River	17	15	14	25	20	14	60	ő	0	0	i	ŏ	1	
ehigh & New England	10	13	12	21	26	65	70	0	1	0	4	2	5	
ehigh Valley	6	8		39	26	36	71	4	4	8	42	14	26,	2
ong Island ouisiana & Arkansas	3. 1	4.7	10	59	48	35	66:	0	0	0	2	3	1	
ouisiana & Arkansasouisville & Nashville	2.5	2.3	9	33	41	57	68	1 10	0 6	3	32	54	94	1
IcCloud River	0	0	0	29	25	63	46	0	ő	ő	50	94	37	1.
IcKeesport Connecting	l 0	ŏ						ŏ	ŏ					
Iaine Central 10	8	9	12	27	42	41	68	0	1	4		6	14	
faine Central 10 faryland & Pennsylvania	33	7	24	42	50	85	58	0	0	0	3	3	4	
Iidland Terminal	1.7	4.3		1	42	40	72	0	0		0	<u>i</u>	9	
Inneapolis & St. Louis	18	12	7	9	17	35	57	0	5.			7	6	4
Inneapolis, St. Paul & Sault Ste.	!	i -			- '		٠.							
Marie	10	5	6	14	13	25	60	2	2	0	. 5	2	4	
finnesota Transfer	18	14	31	32	71	67	97	0	0	1	0	8	1,	
Lississippi Central		3 61	12 68	$\begin{vmatrix} 14 \\ 72 \end{vmatrix}$	$\frac{32}{92}$	32 91	. 59 . 100	0 1	0. 6		1 8	17	12	
HISOURI & AFRANSAS HISSOURI-HIINIOIS HISSOURI-KANSAS-TEXAS HISSOURI PACIFIC JONIUS & ONIO	3 5	2	0	12	. 32	91	100	Ô	ő		0	_ ''	12	
Iissouri-Kansas-Texas	5	4. 2	. 6	1	13	42	91	0	1		0	6	22	28
Iissouri Pacific	2.9	3.1	3.5		20	59	89	6	3	2		24	131	39
Iobile & Ohio Ionongahela Connecting	13	18	I I I	14	29 53	38	52	2	2		6	19	11	
Ionongahela	111	5	29	31	16	43 9	14	0	0 1	1 0	0	1	0	
Iontour	12	4	ŏ	0	- 0	0	ŏ	2	i	0	ŏ	0!	ó	
ashville, Chattanooga & St. Louis	13	9	24	37	34	74	77	11	- 1	14	15	17	37	3
ewada Northern ewburgh & South Shore	0	0	0	0	44	25	0.	0	0	0	0	1	.0	
lew Orleans Public Belt	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	4.3	11	0	52 5	92 28	100 57	0	0	0	0	10	$\frac{21}{2}$	
lew York Central II	7	8	10	14	25	43	60	17	27	8	6	19	27	
lew York Chicago & St Louis	1.3		10	24	31	48	70	1	1	10	30	14	47	:
ew York, New Haven & Hartford ew York, Ontario & Western orfolk & Portsmouth Belt	12	11	14	12	23	39	73	$\frac{1}{2}$	1	2	0	5	12	1
ew York, Ontario & Western	19	:19	36	38	36	44	71	2	1	3	16:	10	6	
orfolk & Wostern	11	5	6	23	44	48	53	0	1	0	0	0	1	10
orfolk & Western orfolk Southern orthern Pacific	9 0	 	16	23 24	42 45	49 45	78 57	3 0	13 1	$\frac{2}{3}$	9 2	24	24 5	10
orthern Pacific	11	11	16	13	29	37	61	5	3	22:	6	50	28	1
OLUMETH PACING TERRITORI	1 4	4 3	201	12	22	12	32	0	0	0	0,	0	0	
orthwestern Pacific atapsco & Back Rivers	3.6	1.1	8	1	6	6	57	0	0	0	0	0	0	
		4.8 7	0 10	50 33	47 44	44	60 76	0	0	0	159	335	579	6
annerivania Dandin-Gasakan Timen	1 8	13	10	33	44	61	76	29 0	36 0	33	153	335	573	05
eoria & Pekin Union	18		40	14	23	31	54	ő	0	0	0	0	1	
		4.5		$\hat{2}\hat{1}$	38	57,	83	ŏ,	ŏ,	3	8,	14	21	6
madeipma, Bethlehem & New				_		- 1				i			1	
	31		21	65	74	76	67	4	0	1	16.	14	2	
ittshurgh & Lake E-i-														
ittsburgh & Lake Erie ittsburg & Shawmut ittsburgh & West Virginia	: ð	6	1.9 4	4	12	10 47	27 52	$\frac{2}{0}$	0	0) 0	. 0	0! 0.	0; 0.	1

⁷ Included in Atchison, Topeka & Santa Fe, 1923.
 ⁸ Includes New Orleans Great Northern, 1935-40.
 ⁸ Includes Alabama & Vicksburg, Gulf & Ship Island, Vicksburg, Shreveport & Pacific, and Yazoo & Mississippi Valley, 1927-40.
 ¹⁰ Includes Portland Terminal, 1932-40.
 ¹¹ Includes Boston & Albany, Cleveland, Cincinnati, Chicago & St. Louis, Michigan Central, New York Central, lines west, and Peoria & Eastern, 1937-40.

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

Pittsburg, Shawmut & Northern 20 0 3.6 8 25 53 86 1 0 0 1 2 0 0 0 0 0 0 0 0 0	Road	Percentage inspected defective							Ordered out of service						
Quebec Central		1940	1939	1931	1929	1927	1925	1923	1940	1939	1931	1929	1927	1925	192
Richmond, Fredericksburg & Potomac. 13 18 14 18 30 43 58 0 2 0 1 1 2	Pittsburg, Shawmut & Northern	20				25	53	86					2	0	
Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. Richmond, Fredericksburg & Po- tomac. River Terminal . 4.810 6 6 6 12 44 45 41 0 0 0 1 7 12 65 St. Louis Southwestern. 10 10 8 4 43 22 47 86 1 3 4 2 222 14 San Diego & Arizona Eastern. 4.211 13 38 30 55 44 0 0 0 2 4 3 0 Savannah & Atlanti. 25 5 19 80 67 73 68 4 0 0 0 0 0 2 Savannah & Atlanti. 25 5 19 80 67 73 68 4 0 0 0 0 0 2 Southern Pacific, lines east. 1.1 1.8 3.3 5 133 30 47 0 2 1 3 10 37 Southern Pacific, lines west. 7 10 11 24 27 33 38 4 10 13 47 50 51 Southern Pacific, lines west. 7 10 11 24 27 33 38 4 10 13 47 50 51 Southern Pacific of Mexico. 51 87 0 30 100 100 100 5 5 4 0 2 3 3 1 Southern Pacific of Mexico. 52 87 0 30 100 100 100 5 5 4 0 0 2 3 Spokane International. 12 5 9 13 28 0 37 0 0 0 0 0 0 Spokane International. 12 5 9 13 28 0 37 0 0 0 0 0 0 Spokane, Portland & Seattle. 6 7 22 22 33 32 60 0 0 1 1 2 4 Tennessee Central. 7 9 1 4 47 65 74 89 3 55 0 14 40 23 Tennessee Cosi, Iron & Railroad. 50 9 7 38 67 40 50 1 0 0 0 0 0 0 Terminal R. R. Assn. of St. Louis. 15 21 32 41 47 65 74 89 3 0 0 0 0 0 0 0 Terminal R. R. Assn. of St. Louis. 15 21 32 41 47 68 77 88 3 0 0 0 0 0 0 0 Terminal R. R. Assn. of St. Louis. 16 0 11 9 12 0 0 0 0 0 0 0 Terminal R. R. Assn. of St. Louis. 17 9 10 11 4 62 76 6 1 1 0 1 3 1 Texas Pacific Missouri Pacific of New Orleans. 20 14 27 43 50 33 50 0 1 0 0 0 0 0 0 Terminal R. R. Assn. of St.	Quebec Central	25					7.6							26	1
tomac.	Reading Prodorielzburg & Po-	6	8	13	33	42	40	39		၂ ၁	ا	31	22.	20	-
River Terminal	tomac	13	18	14	18	30	43	58							
Rutland	River Terminal	65	68	0	71	43	70	0	8						
St. Louis Southwestern.															
San Diego & Arizona Eastern	St. Louis-San Francisco	2	2.8	3.9											
Sal Diego & Atlanta															5
Seaboard Air Line														0	
South Buffalo. 9 4 39 23 29 75 0 0 0 8 0 1 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5														22.	2
Southern Pacific, lines east									1 0	1	2				-
Southern Pacific, lines west															2
Southern Paeific of Mexico.	Southern Pacific, lines east										13				2
Southern at the state of the st	Southern Pacific of Morico									14					
Spokane International 12 5 9 13 28 0 37 0 0 0 0 0 0 0 0 0		6											38	56	1
Spokane, Portland & Seattle		19												0	
Steelton & Highspire 14	Spokane Portland & Scattle	ĥ								0	1	1	2	4	
Tennessee Alabama & Georgia 7 9 7 38 67 489 3 5 0 14 40 23 Tennessee Central 23 26 14 47 65 74 89 3 5 0 14 40 23 Tennessee Coal, Iron & Railroad 50 9 7 38 67 40 50 1 0 0 0 0 0 0 Terminal R. R. Assn. of St. Louis 15 21 32 41 44 62 76 6 1 4 0 3 1 Texas Pacific 2 1.4 0 1 12 16 62 1 1 0 1 3 1 Texas Pacific 2 1.4 0 1 12 16 62 1 1 0 1 3 1 Texas Pacific 2 1.4 0 1 12 16 62 1 1 0 1 0 Texas Pacific 3 4 5 0 4 10 57 83 0 0 0 0 0 0 Texas Pacific 3 4 6 0 5 45 35 3 3 41 0 0 0 0 0 0 Toledo, Peoria & Western 4 6 0 5 45 35 3 3 41 0 0 0 0 0 0 Toronto, Hamilton & Buffalo 0 20 0 0 0 0 0 0 0	Steelton & Highspire	14		19	24	48			.] 0			0	2		
Tennessee Central. Tonnessee Cosl, Iron & Railroad. 50 9 7 38 67 40 50 1 0 0 0 0 0 Terminal R. R. Assn. of St. Louis. 15 21 32 41 44 62 76 6 1 4 0 0 3 1 Texas A Pacific. 29 14 27 43 50 33 50 0 1 0 0 1 1 0 Texas Pacific-Missouri Pacific of New Orleans. 29 14 27 43 50 33 50 0 1 0 0 1 1 0 Texas Pacific-Missouri Pacific of New Orleans. 29 14 27 43 50 33 50 0 1 0 0 0 0 0 Terminal R. Assn. of St. Louis. 20 14 27 43 50 33 50 0 1 0 0 0 0 0 Texas Pacific-Missouri Pacific of New Orleans. 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Tennessee, Alabama & Georgia	7	9											=	
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 $^{^{12}}$ Includes Los Angeles & Salt Lake, Oregon Short Line, Oregon-Washington R. R. & Navigation, and St. Joseph & Grand Island, last 6 months 1936–1940.

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

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.