

INTERSTATE COMMERCE COMMISSION

---

SEVENTH ANNUAL REPORT

OF THE

CHIEF INSPECTOR OF LOCOMOTIVE  
BOILERS

TO THE

INTERSTATE COMMERCE COMMISSION

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FOR THE FISCAL YEAR  
ENDED JUNE 30, 1918



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1918

## ANNUAL REPORT OF THE CHIEF INSPECTOR OF LOCOMOTIVE BOILERS.

WASHINGTON, D. C., *October 10, 1918.*

*To the Interstate Commerce Commission:*

In compliance with the statute, the seventh annual report of the Chief Inspector of Locomotive Boilers for the fiscal year ended June 30, 1918, is herewith respectfully submitted.

This report covers the work done under the locomotive-boiler inspection act as amended to apply to the entire locomotive and tender and all their parts and appurtenances.

The data contained herein, therefore, includes all of the defects found on any part or appurtenance of locomotives and tenders; also all of the casualties resulting from failure thereof.

The tables given below show, in concrete form, the number of locomotives inspected, the number and percentage found defective, and the number ordered out of service on account of not meeting the requirements of the law.

They also show the total number of accidents due to failure from any cause of locomotives or tenders and all parts and appurtenances thereof and the number killed and injured thereby.

*Locomotives inspected, number found defective, and number ordered out of service.*

	1918	1917	1916
Number of locomotives inspected.....	41,611	47,542	52,650
Number found defective.....	22,196	25,909	24,685
Percentage found defective.....	53	54.5	47
Number ordered out of service.....	2,125	3,294	1,943

*Number of accidents, number killed, and number injured, by comparison.*

	1918	1917
Number of accidents.....	641	616
Increase over previous year.....	4.1	.....
Number killed.....	46	62
Decrease from previous year.....	25.8	.....
Number injured.....	756	721
Increase over previous year.....	4.8	.....

The following table shows the total number of persons killed and injured by failure of locomotives or tenders, or any part or appurtenance thereof, during the three years ended June 30, 1916-1918, classified according to occupations:

	1918		1917		1916	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Members of train crews:						
Engineers.....	11	245	16	230	11	205
Firemen.....	19	306	21	304	12	225
Brakemen.....	6	62	13	60	9	74
Conductors.....		21	3	14	1	6
Switchmen.....	2	8	1	8		6
Roundhouse and shop employees:						
Boiler makers.....	1	11		11	1	11
Machinists.....		11		8	1	11
Foremen.....	1	4		1	1	3
Inspectors.....	4	4		3		3
Watchmen.....		3		5		8
Boiler washers.....		4		7		10
Hostlers.....		8		6		6
Other roundhouse and shop employees.....	2	19	2	19	1	21
Other employees.....		26	5	22		7
Nonemployees.....		24	1	23	1	3
Total.....	46	756	62	721	38	599

A summary of the accidents and casualties resulting therefrom during the year shows an increase of 4.1 per cent in the number of accidents, with a decrease of 25.8 per cent in the number killed, and an increase of 4.8 per cent in the number injured.

The decrease in the number of locomotives inspected during the year is due to the fact that a substantial percentage of the inspectors of locomotives were engaged in special work during most of the year.

During the months of November and December, 1917, almost all of the inspectors were engaged, at the request of the Interstate Commerce Commission, in checking the congestion at terminals in an effort to see that locomotives were promptly furnished so that the coal movement might be facilitated and the fuel shortage relieved; and during the months of January, February, and March, 1918, were performing similar work at the request of the Director General of Railroads, and this work contributed materially toward breaking the blockade and expediting the movement of coal and other freight.

It is also due in part to the fact that a number of inspectors of locomotives were permanently transferred to the service of the Director General of Railroads because of their general knowledge of equipment and their special training in the work of conducting investigations.

The period covered by this report represents what is admitted to have been the most difficult in the history of American railroads to properly maintain locomotives. This is primarily due to the war conditions which made it necessary to use to their maximum capacity

all locomotives that were serviceable, and to return to service many locomotives that had been out of service for years awaiting disposition and which, in some cases, were put in service without having been thoroughly repaired. Proper maintenance of locomotives was also made difficult by the large number of mechanics that entered military service. The excessive demands for power resulted in the use of many locomotives that were in violation of Federal laws, no doubt, with the thought that the movement of traffic was being expedited thereby, but the results of this practice were clearly demonstrated during the past winter.

These conditions rendered the work of the inspectors exceedingly difficult, and considerable pressure from various sources was brought to bear on them to prevent the enforcement of the law where locomotives were sorely needed. The shortage of power made it necessary in every case for inspectors to exercise the utmost good judgment and discretion in their work in order to avoid any possibility of causing additional congestion which an inflexible enforcement of the law might have brought about. The fact that the enforcement of the locomotive inspection laws during this trying period did not unnecessarily hamper the movement of traffic, but on the contrary the work of the inspectors, in hundreds of instances, facilitated the operation of locomotives and the movement of trains, is evidence not only of the discretion and judgment of inspectors in their enforcement of the law, but also of the wisdom and farsightedness of its framers, because it is generally admitted that the law and the work of the Inspection Bureau was of substantial benefit during the past winter, and when we consider, in addition to this, the fact that the general condition of locomotives has improved during the year, due, in part, to the work of the inspectors, the results become particularly creditable.

During the year 353 applications were filed for extension of time for removal of flues under the provisions of rule 10. Investigation showed 18 of these locomotives in such condition that no extension could properly be granted. Forty-two were in such condition that the full extension requested could not be granted, but an extension for a shorter period was allowed. Thirteen extensions were granted after defects disclosed by our inspectors had been repaired. Sixty-two applications were withdrawn for various reasons, and the remaining 218 were granted for the full period asked for.

It will be noted that the number of applications for extension of time for removal of flues decreased about 50 per cent. This is largely due to the modification of the rule which was recommended to the Commission and approved by them, and indicates that, under the circumstances, the modification was a proper one.

As provided in rule 54, 3,124 specification cards and 8,080 alteration reports were filed.

The importance of promptly filing accurate information concerning alterations to boilers is forcefully illustrated by the cuts on page 59. In this instance, a patch had been applied to a crack in the barrel of a boiler which, instead of correcting the defect, actually weakened the boiler and resulted in a failure which seriously scalded two men in the cab. This was partly due to the fact that the nature of the defect was not fully determined before the application of the patch, and illustrates the importance of carefully observing our recommendation in the sixth annual report concerning the application of patches.

The locomotive headlight case, which has been pending for approximately three years, was finally disposed of June 7, 1918, by the withdrawal by the complainant and at the complainant's cost, of bill in equity No. 226, United States District Court, District of Indiana, *New York Central Railroad Co. v. United States*, in which it was sought to restrain the Interstate Commerce Commission from enforcing its order.

This withdrawal was made after arguments on the bill had been heard by the court and the position of the complainants declared to be unsound. This, it is believed, finally disposes of the question at issue concerning the authority of the Interstate Commerce Commission to establish a standard test for locomotive headlights, and the Locomotive Inspection Bureau to enforce such orders.

In my sixth annual report recommendations were made that locomotives should be equipped with automatic fire doors and that a steam connection to air-operated power reverse gear should be applied. It is not considered necessary to repeat these recommendations at this time for the reason that both recommendations have been adopted by the United States Railroad Administration, and all standard United States locomotives are being so equipped, and it is expected that the recommendation for automatic fire doors will be generally followed on locomotives passing through the shop for general repairs, so far as material and labor are available. The recommendation that a steam connection to air-operated power reverse gears has been adopted by the United States Railroad Administration for old as well as new locomotives.

No formal appeal from the decision of any inspector was filed during the year.

FRANK McMANAMY,  
Chief Inspector.

Accidents and casualties resulting from failures of locomotives and tenders and their appurtenances.

Part or appurtenance which caused accident.	Year ended June 30—								
	1918			1917			1916		
	Acci- dents.	Killed.	In- jured.	Acci- dents.	Killed.	In- jured.	Acci- dents.	Killed.	In- jured.
Air reservoirs.....	5		7	4	1	4	6		9
Aprons.....	5		5	6		6	2		2
Arch tubes.....	9		16	9		15	5	1	7
Ash-pan blowers.....	7		7	7	1	6	4	1	4
Axles.....	4		4	7		11	4	1	4
Blow-off cocks.....	17	1	18	22		23	19		20
Boiler checks.....	13		14	13		13	8		9
Boiler explosions:									
A. Shell explosions.....				1	2	8			
B. Crown sheet; low water; no con- tributory causes found.....	34	15	61	38	30	66	23	7	38
C. Crown sheet; low water; contrib- utory causes or defects found.....	51	17	82	23	15	32	16	13	21
D. Fire box; defective staybolts, crown stays, or sheets.....	5		6	2		2	1		3
E. Fire box; water foaming.....							1		2
Brakes and brake rigging.....	2		2	1		1	4	1	6
Couplers.....	6	2	4	4	1	3	4		7
Crank pins, collars, etc.....	7		9	6	2	4	8		9
Crossheads and guides.....	1		1	1		2	3		4
Cylinder cocks and rigging.....	2		2	1		1	1		1
Cylinder heads and steam chests.....	4		4	6	2	7	1		1
Dome caps.....	1		1				1	1	1
Draft appliances.....	5		5	2		3	1		2
Draw gear.....	11	2	9	15	1	14	22	2	21
Fire doors, levers, etc.....	6		6	5		5	2		2
Flues.....	40		47	50		60	37		46
Flue pockets.....	2		2	2		2	2		2
Footboards.....	7		7	8		8	2		2
Gauge cocks.....	1		1				1		1
Grease cups.....	1		2			3	3		3
Grate shakers.....	39		39	51		51	23		23
Handholds.....	15	1	14	15		15	4	1	3
Headlights and brackets.....	9		10	8	1	7	6		7
Injectors and connections (not includ- ing injector steam pipes).....	23		24	18		19	27		28
Injector steam pipes.....	16		18	16	1	18	11		14
Lubricators and connections.....	12		12	11	1	12	13		13
Lubricator glasses.....	12		12	13		13	11		11
Patch bolts.....	2		3	1		4	2		3
Pistons and piston rods.....	2		2	4		4	5	1	4
Plugs (arch tube and washout).....	14	2	19	8		12	17	2	22
Plugs in fire-box sheets.....	3		3	1		1	3		3
Reversing gear.....	40		40	29		29	38		38
Rivets.....	3		3	4		4	4		4
Rods (main and side).....	18		22	17		20	15	1	16
Safety valves.....	2		2	1		1	1		1
Sanders.....	7		7	1		1	1		1
Side bearings.....	7		7	1		1	1		1
Springs and spring rigging.....	7		7	6		6	8	2	7
Squirt hose.....	47		50	69		70	62	1	61
Staybolts.....	6		8	3		5	1		1
Steam piping and blowers.....	10		11	9	1	13	16		22
Steam valves.....	7		17	6	1	5	10	1	13
Studs.....	12		13	7		11	10	2	8
Superheater tubes.....	3		4				3		4
Throttle glands.....	3		3	2		2	1		1
Throttle leaking.....	2		2	1		1	1		1
Throttle rigging.....	5		5	7	2	10	5	1	4
Trucks, leading, trailing, or tender.....	1		1			18			
Valve gear, eccentrics and rods.....	12		12	10		11	7		7
Water bars.....							1		1
Water glasses.....	20		20	36		37	29		29
Water-glass fittings.....	11	1	10	7		7	7		7
Wheels.....	7	5	5	3		3			
Miscellaneous.....	32		43	14		14	14		16
Total.....	641	46	756	616	62	721	537	38	599

NOTE.—Record for 1916 includes accidents due to failure of locomotive boilers and their appurtenances for the entire year and accidents due to failure of parts of locomotives and tenders covered by the amendment to the law for 9 months and 26 days only.











Tables showing number of locomotives inspected, found defective, and ordered from service; and number and kind of defects—Continued.

Parts defective, inoperative, or missing, or in violation of rules.	Number of locomotives inspected, found defective, and ordered from service										Number and kind of defects																	
	Hocking Valley.	Houston & Texas Central.	Houston, East & West Texas.	Huntingdon & Broad Top Mountain.	Illinois Central.	Illinois Southern.	Illinois Terminal.	Indiana Harbor Belt.	Indianapolis Union.	International & Great Northern.	Interstate.	Jonesboro, Lake City & Eastern.	Kanawha & Michigan.	Kansas City, Clinton & Springfield.	Kansas City, Mexico & Orient.	Kansas City Northwest-ern.	Kansas City Southern.	Kansas City Terminal.	Kentucky & Indiana Terminal.	Lake Erie & Western.	Lake Superior & Ish-eping.	Lake Superior Terminal & Transfer.	Lake Terminal.	Lehigh & Hudson River.	Lehigh & New England.	Lehigh Valley.	Long Island.	Los Angeles & Salt Lake.
1 Air compressors.....	1	2			2				1					1				2		2		3						1
2 Arch tubes.....	3																			2								2
3 Ash pans or mechanism.....																												
4 Axles.....	1				1																							
5 Blow-off cocks.....	2	1																										
6 Boiler checks.....	9	1			9																							
7 Boiler shell.....	7				9																							
8 Brake equipment.....	5	8		5	42																							
9 Cabs or cab windows.....	6			5	4																							
10 Cab aprons or decks.....	5			2	3																							
11 Cab cards.....	1				1																							
12 Coupling or uncoupling devices.....	3				5																							
13 Crossheads, guides, pistons, or piston rods.....	10	3	1		6																							
14 Crown bolts.....	2	1	2	1	4																							
15 Cylinders, saddles, or steam chests.....	52	2			19																							
16 Cylinder cocks or rigging.....	4	2			3																							
17 Domes or dome caps.....	2	1		1	1																							
18 Draft gear.....	2	1			3																							
19 Draw gear.....	13	5			23																							
20 Driving boxes, shoes, wedges, pedestals, or braces.....	8		5		17																							
21 Fire-box sheets.....	9	4	3	2	14																							
22 Flues.....	2	1	1	1	3																							
23 Frames, tail pieces or braces, locomotive.....	1		4		16																							
24 Frames, tender.....	1				5																							
25 Gauges or gauge fittings, air.....	1				5																							
26 Gauges or gauge fittings, steam.....	2				8																							
27 Gauge cocks.....	14	5	1		26																							
28 Grate shakers.....	1				3																							
29 Handholds.....	1				3																							
30 Injectors inoperative.....																												
31 Injectors and connections.....	26	5	4	1	35																							
32 Inspections or tests not made as required.....	47		2		21																							
33 Lateral motion.....	2			2	3																							
34 Lights, cab or classification.....			1	2	3																							
35 Lights, headlights.....					5																							
36 Lubricator or shields.....	2				3																							
37 Mud rings.....	7		1		8																							
38 Packing nuts.....	17	4	1		15																							
39 Packing, piston rod and valve stem.....	15		4		16																							
40 Pilot or pilot beams.....	1		1		1																							
41 Plugs or studs.....	1		4		1																							
42 Reversing gear.....					3																							
43 Rods, main or side, crank pins or collars.....	29	1	2		9																							
44 Safety valves.....	1				3																							
45 Sanders.....	1	1			5																							
46 Springs or spring rigging.....	6	3	1	2	19																							
47 Squirt hose.....	1				7																							
48 Staybolts.....	2				13																							
49 Staybolts broken.....	52	10	6		44																							
50 Steam pipes.....	6	1			2																							
51 Steam valves.....	6	1	1		4																							
52 Steps.....	1				4																							
53 Tanks or tank valves.....	7	4	1		27																							
54 Telltale holes.....	1				7																							
55 Throttle or throttle rigging.....	2				13																							
56 Trucks, engine or trailing.....	1	3	1	1	4																							
57 Trucks, tender.....	3		1	1	4																							
58 Valve motion.....			4	1	36																							
59 Washout plugs.....	14	3			25																							
60 Water bar or combustion flues.....	1		1		1																							
61 Water glass fittings or shield.....	12	1	1		24																							
62 Wheels.....	7	2	2	24	22																							
63 Miscellaneous—signal appliance, badge plates, brakes (hand).....	7	2	2	24	22																							
Number of defects.....	391	76	62	41	591	104		49	62	211	42	5	80	20	187	2	332	4	80	491	....	20	....	23	35	779	294	338
Locomotives reported.....	156	105	15	21	1,607	19	11	76	21	182	10	12	65	12	61	15	180	32	14	149	34	11	22	46	62	1,025	178	176
Locomotives inspected.....	122	91	25	8	785	21	5	32	28	109	10	4	87	16	84	1	162	3	14	154	22	6	6	54	22	274	78	232
Locomotives defective.....	113	36	14	8	238	17	....	20	18	64	6	2	42	8	53	1	91	2	12	102	....	10	....	15	16	164	55	124
Percentage of inspected found defective.....	93	39	56	100	30	87	....	62	64	69	60	50	48	50	63	100	56	67	100	66	....	53	....	28	73	60	70	53
Locomotives ordered out of service.....	5	4	4	2	5	6	....	62	64	15	4	....	2	....	14	....	11	....	3	16	....	....	....	1	....	39	12	11



Tables showing number of locomotives inspected, found defective, and

Parts defective, inoperative, or missing, or in violation of rules.	Morgan's La. & Tex.	Morgantown & Kingwood.	Nash., Chatt. & St. L.	Nevada, Cal. & Oregon.	Nevada Northern.	Ne-burgh & S. Shore.	New Orleans Great Nn.	New York Central East.	New York Central West.	N. Y., Chi. & St. Louis.
1 Air compressors.....			5	4	1		1	1	9	1
2 Arch tubes.....									1	1
3 Ash pans or mechanism.....			1						1	1
4 Axles.....										
5 Blow-off cocks.....			1							
6 Boiler checks.....	1		11		1		1	8	16	
7 Boiler shell.....			8					19	6	
8 Brake equipment.....			5					7	7	1
9 Cabs or cab windows.....	6		43	5		2		10	16	11
10 Cab aprons or decks.....			1	2				10	15	
11 Cab cards.....			3	1				1	1	
12 Coupling or uncoupling devices.....	1		9		1			1	3	
13 Crossheads, guides, pistons, or piston rods.....			4	2				4	6	
14 Crown bolts.....			7	1				7	7	1
15 Cylinders, saddles, or steam chests.....	2		1	4				2	2	
16 Cylinder cocks or rigging.....			6	1				4	8	2
17 Domes or dome caps.....								3	7	2
18 Draft gear.....			2					7	7	
19 Draw gear.....			1					3	3	1
20 Driving boxes, shoes, wedges, pedestals, or braces.....	1		5					10	7	6
21 Fire-box sheets.....			4	1				3	1	4
22 Flues.....	3		4				1	9	9	
23 Frames, tail pieces or braces, locomotive.....	1		4					1	4	
24 Frames, tender.....			18	1		1		2	1	3
25 Gauges or gauge fittings, air.....	1		1		1			2	2	
26 Gauges or gauge fittings, steam.....			1	2				3	3	
27 Gauge cocks.....			1					4	9	2
28 Grate shakers.....	4	1	18		5		2	23	8	3
29 Handholds.....			1					1	3	
30 Injectors inoperative.....			1	8						
31 Injectors and connections.....										
32 Inspections or tests not made as required.....	3		41	2	4			37	27	4
33 Lateral motion.....			14	2	4	1		3	2	3
34 Lights, cab or classification.....			5		1			20	2	1
35 Lights, headlights.....				2						
36 Lubricator or shields.....										
37 Mud rings.....								4	4	
38 Packing nuts.....	3		19	1	3	1		10	3	1
39 Packing, piston rod and valve stem.....			1	1				14	13	1
40 Pilot or pilot beams.....								5	5	2
41 Plugs or studs.....			4					4	2	
42 Reversing gear.....			1					1	5	
43 Rods, main or side, crank pins or collars.....			1	2		2		14	13	9
44 Safety valves.....			1	2				1	1	
45 Sanders.....			2	1				9	1	
46 Springs or spring rigging.....	1		9		1		2	11	13	6
47 Squirt hose.....			3					1	7	
48 Staybolts.....			2	1				4	8	1
49 Staybolts broken.....	2	10	26	2	7		11	1	7	
50 Steam pipes.....			2			11		4	8	1
51 Steam valves.....			2					2	8	1
52 Steps.....			7					2	8	
53 Tanks or tank valves.....			2					2	4	
54 Telltale holes.....			7	1				9	6	
55 Throttle or throttle rigging.....			2	1	1			2	4	1
56 Trucks, engine or trailing.....	1		5					7	3	
57 Trucks, tender.....			3					5	2	1
58 Valve motion.....			13			1		5	5	
59 Washout plugs.....			7					1	1	
60 Water bar or combustion flues.....	1				2			10	37	6
61 Water glass, fittings or shield.....			1					1	1	
62 Wheels.....			9			1		36	15	2
63 Miscellaneous—Signal appliances, badge plates, brakes (hand).....	1	13	4	2		1		13	18	4
Number of defects.....	31	13	349	57	37	6	25	385	377	89
Locomotives reported.....	53	12	268	15	16	23	33	2,371	911	303
Locomotives inspected.....	58	4	291	19	8	5	21	496	249	43
Locomotives defective.....	11	3	121	7	8	1	11	144	115	18
Percentage inspected found defective.....	19	75	41	78	100	20	52	29	46	42
Locomotives ordered from service.....	1		6	3	2		3	2	2	4

ordered from service; and number and kind of defects—Continued.

N. Y., New Haven & Hartford.	N. Y., Ontario & West-ern.	N. Y., Phila. & Norfolk.	N. Y., Susq. & Western.	Norfolk & Portsmouth Belt.	Norfolk & Western.	Norfolk Southern.	Northern Pacific.	Northwestern Pacific.	Ocean Shore.	Ohio River & Western.	Oregon Short Line.	Oreg.-Wash. R. R. & Nav. Co.	Pacific & Arctic.	Pacific Coast of Wash-ington.	Panhandle & Santa Fe.	Pennsylvania Lines West.	Pennsylvania R. R.	Peoria & Pekin Union.	Pere Marquette.
3					11											24	15		2
2																3	2		1
1		1														3	1		4
2																			4
2																			5
2	2	3														57	17		6
19	19	2														47	45		7
18	1	1														23	47	1	8
28	1	5														129	115	7	9
1																85	18		10
4																4	13		11
3																9	2		12
4																12	11	3	13
4																51	143	3	14
45																8	2		15
11																159	51		16
1																60	19		17
2																23	8		18
2																13	4		19
2																146	62	5	20
33																61	16		21
77																29	42	2	22
4																29	20		23
4																65	5		24
28																3	3		25
1																4	6		26
1																55	19		27
3																282	152		28
29																5	1		29
2																1	5		30
2																170	234	2	31
41																100	45		32
8																19	14		33
17																5			34
1																			35
3																			36
37																			37
6																72	31		38
6																140	98		39
6																143	29		40
1																22	12		41
1																13	6		42
3																7	6		43
1																107	156		44
75																21	31		45
1																173	69		46
53																17	7		47
2																10	8		48
5																124	48		49
221																71	39		50
5																12	9		51
14																18	27		52
9																76	35		53
15																12	9		54
1																35	34		55
4																12	31		56
7																21	36		57
21																7	8		58
5																1	1		59
11																115	81		60
16																140	78		61
35																8	3		62
1																7			63
1,011	42	69	58	59	1,156	191	584	12	5	41	798	55	11	37	3,095	2,152	69	374	
1,182	199	46	100	13	987	92	1,341	70	10	14	359	24	11	10	2,366	4,508	35	393	
625	60	37	50	39	655	154	526	37	4	12	339	154	5	15	1,053	1,053	39	290	
299	19	17	19	27	370	75	234	8	3	12	240	41	4	13	695	621	21	112	
48	22	46	38	69	57	49	44	22	75	100	61	27	80	87	66	59	54	39	
61	2				7	1	13	1		1	12			2	47	37	2	13	





Tables showing number of locomotives inspected, etc.—Continued.

Parts defective, inoperative, or missing, or in violation of rules.		Western Maryland.	Western Pacific.	Wheeling & Lake Erie.	Wichita Falls & North-western.	Woodward Iron Co.	Yazoo & Mississippi Valley.	Zanesville & Western.	Roads with less than 10 locomotives.	Total defects.
1	Air compressors.....									
2	Arch tubes.....	3	2	1					13	407
3	Ash pans or mechanism.....			1						121
4	Axles.....								7	107
5	Blow-off cocks.....	3	1				1			15
6	Boiler checks.....	12	3	1					18	794
7	Boiler shell.....	12	3	1			2		30	941
8	Brake equipment.....	29	13	7	1				64	1,432
9	Cabs or cab windows.....	24	13	7		1			162	3,680
10	Cab aprons or decks.....	29	13	7					48	1,373
11	Cab cards.....	2	2	1					41	408
12	Coupling or uncoupling devices.....	3	3	1					63	463
13	Crossheads, guides, pistons, or piston rods.....	11	3	1					53	552
14	Crown bolts.....	1	1				2		30	1,918
15	Cylinders, saddles, or steam chests.....	10	2	4			1		7	507
16	Cylinder cocks or rigging.....	3	1	17	2				56	2,505
17	Domes or dome caps.....	2	2						21	612
18	Draft gear.....	3	2				2	1	12	370
19	Draw gear.....	9	2	1					11	410
20	Driving boxes, shoes, wedges, pedestals, or braces.....	3	3	5		1	1		148	2,712
21	Fire-box sheets.....	8	3	2		4	2		21	1,875
22	Flues.....	9	1	2			1		32	1,045
23	Frames, tailpieces, or braces, locomotive.....	7	1	1					1	38
24	Frames, tender.....						1	1	31	1,627
25	Gauges or gauge fittings, air.....	3	2	1					15	268
26	Gauges or gauge fittings, steam.....	2	4	3			1		5	226
27	Gauge cocks.....	2	4	3					25	989
28	Grate shakers.....	38	9	17	2				100	3,610
29	Handholds.....	1	1						6	43
30	Injectors inoperative.....	1	3	1					29	399
31	Injectors and connections.....								13	129
32	Inspections or tests not made as required.....	43	5	10	4	1		2	212	5,803
33	Lateral motion.....	5	15	1	2	1			182	2,051
34	Lights, cab or classification.....	11	6	1			1		59	1,432
35	Lights, headlights.....								13	208
36	Lubricator or shields.....	2	2						5	58
37	Mud rings.....	6	2	1					50	438
38	Packing nuts.....	12	17	15			1		97	2,946
39	Packing, piston rod and valve stem.....	11	17	8			1		59	1,702
40	Pilot or pilot beams.....	2					1		12	474
41	Plugs or studs.....						1		16	308
42	Reversing gear.....						1		5	244
43	Rods, main or side, crank pins or collars.....	16	9	2					81	4,383
44	Safety valves.....		1				1		8	127
45	Sanders.....	3							21	843
46	Springs or spring rigging.....	8	11	1			1	3	91	3,666
47	Squirt hose.....	35	11	1					23	511
48	Staybolts.....	10	6	1					52	580
49	Staybolts broken.....	21	88	33	2		6	1	535	6,395
50	Steam pipes.....	1	2	3					29	804
51	Steam valves.....	2	1	3					20	589
52	Steps.....	9	9	3			1		59	664
53	Tanks or tank valves.....	12	9	3			1		51	1,891
54	Telltale holes.....	3	9						33	342
55	Throttle or throttle rigging.....	7	2	1					24	787
56	Trucks, engine or trailing.....	4	1	2					23	865
57	Trucks, tender.....	13	6	5			1	3	103	1,331
58	Valve motion.....	1	1	2					2	220
59	Washout plugs.....	5	4	6			3		24	1,888
60	Water bar or combustion flues.....									54
61	Water glass, fittings or shield.....	10	4	7		1			119	2,273
62	Wheels.....	20	2	12			2		276	3,090
63	Miscellaneous—Signal appliances, badge plates, brakes (hand)......					1			9	67
Number of defects.....		475	276	201	13	10	31	19	3,420	78,277
Locomotives reported.....		270	124	188	21	18	40	13	1,952	67,514
Locomotives inspected.....		166	140	48	4	4	55	9	1,489	41,611
Locomotives defective.....		113	68	36	3	2	11	5	819	22,196
Percentage inspected found defective.....		75	49	75	75	50	20	55	55	53
Locomotives ordered from service.....		12	7	3	1		1		123	2,125

ACCIDENTS RESULTING FROM THE FAILURE OF LOCOMOTIVES AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

[A star (\*) indicates accidents taken from records of the accident division of the Interstate Commerce Commission. A complete investigation thereof was impracticable, inasmuch as this division was not apprised thereof until 30 to 90 days subsequent to their occurrence, which was too late to permit a proper investigation.]

ALABAMA & VICKSBURG RAILWAY:

\*November 23, 1917, locomotive 412, Jackson, Miss. Crown sheet failure; 1 injured.

May 7, 1918, locomotive 451, Meridian, Miss. Squirt hose blew off; 1 injured. June 24, 1918, locomotive 451, Bovina, Miss. Piece broken out of smokestack saddle, permitting cinders to pass through; 1 injured.

Three accidents; 3 injured.

ARIZONA EASTERN RAILROAD:

September 3, 1917, locomotive 901, Burns, Ariz. Crown sheet failure; low water; middle gauge cock stopped up; right injector feed pipe strainer partially stopped up, reducing the capacity of injector; 1 injured.

One accident; 1 injured.

ATCHISON, TOPEKA & SANTA FE RAILWAY:

July 9, 1917, locomotive 1869, Fountain, Colo. Top water glass cock broke off flush with sheet while removing cap for the purpose of applying new glass; 1 injured.

July 24, 1917, locomotive 494, near Kiowa, Kans. Boiler check cap blew out; defective threads in check and on cap; 1 injured.

August 30, 1917, locomotive 243, Blackwell, Okla. Coupler on rear of tender gave down while pushing cars in switching service and not coupled, crushing brakeman who was riding on rear footboard; due to one draft rod in top of coupler casting broken, and hole in carrier iron broken out, old break; broken draft rod had been reported to master mechanic's office by telegraph, but repairs had not been made; 1 killed.

October 16, 1917, locomotive 1695, Orsa, Colo. Crown sheet failure; low water; no contributory causes found; 3 killed, 1 injured.

October 28, 1917, locomotive 109, Chanute, Kans. Squirt hose burst; defective hose; 1 injured.

\*December 12, 1917, locomotive 1961, Christie, Cal. Left main pin broke; defective pin; 2 injured.

\*December 30, 1917, locomotive 3136, Noble, Okla. Main rod became disconnected; 1 injured.

January 18, 1918, locomotive 952, near Kennbrook, Cal. Crown sheet failure; low water; injectors would not supply boiler, due to heavy scale in delivery pipes; gauge cock drip stopped up; bottom water glass cock found closed at time of investigation; 1 killed, 1 injured.

March 2, 1918, locomotive 1402, Chicago, Ill. Flue broke at weld; overheated in welding; 1 injured.

March 3, 1918, locomotive 3515, near Willard, N. Mex. Crown sheet failure; low water; water foaming; hole for bottom water glass cock drilled into end of back head brace, and shank of cock did not extend entirely through brace; water glass shield rendered reading of water in glass difficult; sufficient means not provided to properly blow out boiler; 2 killed.

April 24, 1918, locomotive 1152, Pontoonac, Ill. Water glass burst; inefficient shield; cut by flying glass; 1 injured.

May 16, 1918, locomotive 1065, Chillicothe, Ill. Bull's-eye lubricator glass blew out; opening in lubricator too large for packing nut; 1 injured.

May 23, 1918, locomotive 399, Williamsfield, Ill. Squirt hose parted at splice; glass nipple used to connect hose; 1 injured.

Thirteen accidents; 7 killed, 12 injured.

## ATLANTA &amp; WEST POINT RAILROAD AND WESTERN RAILWAY OF ALABAMA:

December 21, 1917, locomotive 142 (Georgia), near Franklin, Ala. Crown sheet failure; low water; crown bolt heads defective and excessively calked, due to having been overheated some time previous; water glass blowoff cock handle missing; 1 injured.

March 9, 1918, locomotive 125 (W. of A.), Grantville, Ga. Quadrant stud blew out; stud screwed into sheet only  $\frac{3}{8}$  inch; 2 injured.  
Two accidents; 3 injured.

## ATLANTIC COAST LINE RAILROAD:

\*July 24, 1917, locomotive 204, Archer, Fla. Middle driving wheel broke off, due to old defect; 2 injured.

September 21, 1917, locomotive 919, near Rital, Fla. Flue broke at weld; defective weld; 1 injured.

\*October 8, 1917, locomotive 1121, Jacksonville, Fla. Spring hanger on locomotive broke; 1 injured.

November 9, 1917, locomotive 970, Walthourville Hill, Ga. Crown sheet failure; low water; right tank valve disconnected and out of place; left tank valve out of socket; right tank hose strainer missing; eight radial stays found broken; 1 injured.

November 25, 1917, locomotive 382, Jesup, Ga. Handhold on locomotive pulled off at one end, permitting engineer to fall; 1 injured.

\*March 25, 1918, locomotive 928, Walthourville, Ga. Injured while shaking grates; shaker bar did not fit properly; 1 injured.

\*May 20, 1918, locomotive 122, Savannah, Ga. Footboard on locomotive broke, causing brakeman to fall; 1 injured.

June 11, 1918, locomotive 942, near High Springs, Fla. Main driving axle broke, due to old fracture; 1 injured.

## BALTIMORE &amp; OHIO RAILROAD:

July 5, 1917, locomotive 2847, Beebe, Ohio. Running board bracket stud blew out, due to being screwed into sheet only three threads, or  $\frac{1}{4}$  inch; 1 injured.

July 7, 1917, locomotive 4254, Lorain, Ohio. Flue broke at back-flue sheet, due to excessive use of prosser; 2 injured.

July 12, 1917, locomotive 2279, Baltimore, Md. Washout cap blew off while attempting to tighten under pressure; cap badly distorted and enlarged by having at numerous and previous times been heavily hammered; 1 killed, 4 injured.

July 13, 1917, locomotive 7036, near Strickers, W. Va. Crown sheet failure; low water; right injector was reported defective five times immediately prior to accident, and was found upon test after accident to not operate properly; 1 injured.

July 15, 1917, locomotive 1668, Demler, Pa. Grate-bearer stud blew out of side sheet; defective threads in sheet, and indication of former leak around stud; 1 injured.

July 17, 1917, locomotive 1278, Narrows, W. Va. Drawbar and safety chains between locomotive and tender broke; old fracture in drawbar, and safety chains badly crystallized; 1 injured.

July 23, 1917, locomotive 852, Brunswick, Md. Washout plug blew out while attempting to tighten under pressure; defective threads; 1 injured.

July 31, 1917, locomotive 2002, Van Vorhis, Pa. Left side rod broke, due to knuckle-joint pin working out; 1 injured.

August 6, 1917, locomotive 1354, Washington, Ohio. Fireman's drop seat in tender fell while being occupied, due to improper construction of leg for holding seat in position; fireman was thrown out of gangway to ground while locomotive was running; 1 injured.

August 10, 1917, locomotive 130, Chillicothe, Ohio. Blow-off cock leaking; repairs were made by using a blind gasket and union nut over end of blow-off cock; gasket blew out with considerable force, seriously injuring employee; 1 injured.

August 11, 1917, locomotive 2740, near Byers Junction, Ohio. Left intermediate side rod broke; old defect in rod; 1 injured.

August 12, 1917, locomotive 1354, Cuba, Ohio. Injured, due to top head air compressor gasket leaking badly; defect had existed for at least three days previous to accident, and no daily inspection report had been filed as required by rule 104; 1 injured.

August 17, 1917, locomotive 572, Youngstown, Ohio. Washout plug blew out while locomotive was running ahead; 1 injured.

August 20, 1917, locomotive 2660, near Layton, Pa. Boiler check cap blew out of check located in cab on backhead of boiler, due to badly distorted check casing and improper fit of cap, caused by hammer blow in delivery pipe; no vent hole, as required on this type of feed pipe; 2 injured.

September 5, 1917, locomotive 4222, near Coleman, Pa. Crown sheet failure; low water; no contributory causes found; 2 injured.

September 5, 1917, locomotive 4063, near Miamisburg, Ohio. Grease cup on main side-rod connection exploded, due to having had the contents of a fusee placed in cup on account of pin running hot; 2 injured.

September 20, 1917, locomotive 4142, near Dawson, Md. Rear tender truck wheel broke, due to old crack  $\frac{1}{4}$  inch from throat of flange extending 3 feet 5 inches around wheel. Left No. 1 tender truck wheel was found at time of accident with seam extending two-thirds of its circumference, which had been previously reported to the proper officials; 2 killed.

September 29, 1917, locomotive 4207, near McKenzie, Md. Crown sheet failure; low water; no contributory causes found; 2 injured.

October 16, 1917, locomotive 2246, Gilkeson, Pa. Drawbar pin and safety chains between locomotive and tender broke; drawbar pin badly worn and safety chains of excessive length—16 inches slack when coupled; 1 killed.

October 29, 1917, locomotive 2903, Pleasant Valley, Ohio. Right back tender truck arch bar broke; old crack one-half the cross-sectional area of arch bar; 1 injured.

\*December 5, 1917, locomotive 1264, Rosemont, W. Va. Eccentric blade strap bolts sheared off; 1 injured.

\*December 12, 1917, locomotive 1289, Clarksburg, W. Va. Lubricator glass broke; 1 injured.

December 21, 1917, locomotive 2131, Rockpoint, Pa. Left knuckle-joint pin worked out, striking wheel center, breaking both left side rods; 1 injured.

January 12, 1918, locomotive 1317, near Canton, Ohio. Grate shaker connection failed, causing fireman to fall; 1 injured.

January 16, 1918, locomotive 4053, near Kingmont, W. Va. Side rod broke; 1 injured.

January 23, 1918, locomotive 453, Dayton, Ohio. Arch tube plug blew out while being tightened under pressure; defective threads on plug; 1 injured.

January 24, 1918, locomotive 1791, Keyser, W. Va. Injector throttle union nut blew off; defective threads and union nut expanded, due to use of hammer and set in tightening; 1 injured.

February 3, 1918, locomotive 395 (C. St. P. M. & O.), Ivorydale, Ohio. Filling plug screwed out of lubricator, due to being incorrectly applied; plug with right hand threads applied to bushing with left hand threads; 1 injured.

February 4, 1918, locomotive 2163, near Holmes, W. Va. Left main driving wheel came off axle, breaking side rod; driving wheel reported, "Loose on axle," five times just previous to accident and repairs not made; 1 killed.

February 5, 1918, locomotive 1315, Dover, Ohio. Tire on right front engine-truck wheel slipped, causing derailment of locomotive; 1 injured.

February 21, 1918, locomotive 7204, near Wilson Store, Md. Crown sheet failure; low water; both injectors leaking through overflow valves, due to cut seats; right injector strainer stopped up; seven broken staybolts; 1 killed, 1 injured.

March 3, 1918, locomotive 2395, Anderson, Pa. Bolts in lugs of petticoat pipe worked loose, permitting pipe to fall over exhaust nozzle, causing back draft; 1 injured.

March 10, 1918, locomotive 1872, Keyser, W. Va. Right back crank pin broke off; old defect in pin; 1 injured.

March 13, 1918, locomotive 1529 (N. P.), Roachton, Ohio. Bottom water-glass cock stem blew out; 1 injured.

March 15, 1918, locomotive 4267, Paw Paw, W. Va. Crown sheet failure; low water; tank hose strainers partially stopped up with leaves, restricting flow of water; 1 injured.

March 16, 1918, locomotive 4274, near Martinsburg, W. Va. Main steam pipe in smoke box broke off, due to cylinder saddle being cracked and working badly, which had been reported seven times just prior to accident and each report approved, indicating that repairs had been made, when in fact they had not; 1 injured.

March 19, 1918, locomotive 882, near Vienna, W. Va. Driving-wheel axle broke; old defect in axle; 1 injured.

March 22, 1918, locomotive 4070, Miamisburg, Ohio. Main pipe connection to air reservoir broke loose, setting brakes in emergency; 1 injured.

March 27, 1918, locomotive 2920, Ironville, Ohio. Flue broke at weld; overheated in welding; 1 injured.

April 10, 1918, locomotive 97, Baltimore, Md. Explosion of fuel oil in fire-gauge missing; automatic safety valve to oil tank defective; pressure gauge missing; automatic safety cut-out valve inoperative; 1 injured.

April 11, 1918, locomotive 4152, Martinsburg, W. Va. Train parted between tender and car, due to low coupler on tender; 1 injured.

April 27, 1918, locomotive 4043, Vista, Pa. Union link of valve motion on right side became disconnected; 1 injured.

May 18, 1918, locomotive 463 (A. C. L.), Ellrod Tower, Pa. Ventilator door on top of cab came loose and fell while locomotive was running; 1 injured.

May 27, 1918, locomotive 210 (U. P.), near Lexington, Ohio. Flue broke at weld; overheated in welding; 1 injured.

May 29, 1918, locomotive 1703, Glenwood, Pa. Defective spring pocket buffer casting on tail piece, permitting buffer casting on engine to give away; 1 injured.

June 4, 1918, locomotive 1676, Brunswick, Md. Throttle lever became inoperative while open, due to pin in throttle rigging losing out; 1 injured.

June 8, 1918, locomotive 4868, Ilchester, Md. Crown sheet failure; crown bolts weak and defective, due to excessive caulking; 4 inches of mud found in water spaces and barrel; water-glass drip stopped up with mud; 1 injured.

June 15, 1918, locomotive 2790, near Otisco, Ind. Crown sheet failure; low water; bottom water-glass valve only three-fourths of a turn open; left tank hose defective; steam gauge 12 pounds heavy; 3 injured.

June 20, 1918, locomotive 2798, Columbus, Ohio. Injured due to governor exhaust pipe breaking off about 2 inches from governor; 1 injured.

June 25, 1918, locomotive 23, Philadelphia, Pa. Hand caught between reverse lever and cylinder cock lever, due to an obsolete style cylinder cock being improperly located; 1 injured.

June 30, 1918, locomotive 1449, Laurel, Md. Injured due to defective sand pipe; 1 injured.

Fifty-one accidents; 6 killed, 58 injured.

#### BANGOR & AROOSTOOK RAILROAD:

February 25, 1918, locomotive 141, near Stockholm, Me. Crown sheet failure; low water; water glass leaking; bottom water glass nut and hole in boiler for bottom fitting stopped up with scale; bottom gauge-cock nipple opening obstructed by sleeve in body of cock; gauge-cock drip stopped up; 1 killed, 1 injured.

April 14, 1918, locomotive 183, Stacyville, Me. Crown sheet failure; low water; no contributory causes found; 2 injured.

Two accidents; 1 killed, 3 injured.

#### BESSEMER & LAKE ERIE RAILROAD:

July 13, 1917, locomotive 145, near Greenville, Pa. Air pump steam pipe union nut blew off; loose-fitting nut; 1 injured.

January 22, 1918, locomotive 118, near Pardoe, Pa. Left intermediate side rod broke, stripping locomotive; old fractures in knuckle of rod; 1 injured.

Two accidents; 2 injured.

#### BOSTON & ALBANY RAILROAD:

November 8, 1917, locomotive 1021, Richmond Summit, Mass. Superheater unit burst; draft pipe loose in front end; 1 injured.

May 23, 1918, locomotive 1019, West Springfield, Mass. Squirt hose blew off; defective hose, and insecurely attached; 1 injured.

June 10, 1918, locomotive 1007, West Pittsfield, Mass. Squirt hose blew off; insecurely clamped; 1 injured.

June 30, 1918, locomotive 1049, near Hinsdale, Mass. Squirt hose blew off; 1 injured.

Four accidents; 4 injured.

#### BOSTON & MAINE RAILROAD:

\*July 1, 1917, locomotive 3235, South Lawrence, Mass. Wooden plug blew out of main reservoir; 1 injured.

July 2, 1917, locomotive 2616, Ayer, Mass. Grate shaker bar slipped off; 1 injured.

July 7, 1917, locomotive 121, Charlestown, Mass. Shaker bar slipped off, due to improper fit of bar on lever; 1 injured.

August 29, 1917, locomotive 1499, near Erving, Mass. Crown sheet failure; low water; bull's-eye water glass badly worn, showing false indication of water; 1 injured.

September 23, 1917, locomotive 994, Concord Junction, Mass. Crown sheet failure; low water; gauge cock drip stopped up, and left tank hose strainer missing; 1 injured.

October 6, 1917, locomotive 967, South Peabody, Mass. Cab curtain pole dropped down, due to bracket not being properly fastened to cab; 1 injured.

November 2, 1917, locomotive 1028, Northampton, Mass. Expansion pad stud blew out, due to defective threads in sheet and on stud; stud screwed into sheet only  $\frac{3}{8}$  inch; 1 injured.

November 5, 1917, locomotive 1495, East Fitchburg, Mass. Crown sheet failure; low water; top water glass cock partially closed; gauge cock drip stopped up; 3 injured.

November 29, 1917, locomotive 1029, South Vernon, Vt. Shaker bar slipped off, due to improper fit; 1 injured.

December 12, 1917, locomotive 2079, Winchendon, Mass. Ashpan lever slipped off, due to nut missing; 1 injured.

January 4, 1918, locomotive 3645, near Weirs, N. H. Crown sheet failure; low water; gauge cock drip stopped up; 1 killed, 2 injured.

January 21, 1918, locomotive 3662, Portsmouth, N. H. Shaker bar slipped off staff; 1 injured.

February 16, 1918, locomotive 2372, McIndoes, Vt. Drawbar and safety chains between locomotive and tender broke; old fracture in drawbar; 1 injured.

February 24, 1918, locomotive 2703, Mechanicsville, N. Y. Injector steam pipe broke at brazing sleeve; 1 injured.

March 8, 1918, locomotive 2628, Westmoreland, N. H. Injured while attempting to repair cylinder cocks; cylinder cocks inoperative on line of road; 1 injured.

March 15, 1918, locomotive 2429, Manchester, N. H. Shaker bar slipped off; bolt missing; 1 injured.

April 8, 1918, locomotive 2385, East Kingston, N. H. Crown sheet failure; low water; bull's-eye water glass steam cut, rendering false indication of water in glass; one safety valve inoperative, spring entirely compressed; injector final overflow valves leaking; 10 radial stays found broken; 1 injured.

April 17, 1918, locomotive 153, East Cambridge, Mass. Water glass burst; cut by flying glass; defective shield; 1 injured.

April 27, 1918, locomotive 1430, Irving, Mass. Pipe leading from acetylene tank to headlight defective and leaking, causing severe burn while attempting to light headlight; 1 injured.

May 6, 1918, locomotive 2722, Shelburne Falls, Mass. Shaker bar slipped off, due to improper fit; 1 injured.

May 14, 1918, locomotive 2076, South Ashburnham, Mass. Injured while operating reverse lever, due to loose eccentric and broken eccentric strap; 1 injured.

Twenty-one accidents; 1 killed, 24 injured.

#### CANADIAN PACIFIC RAILWAY:

August 24, 1917, locomotive 3497, Brownville Junction, Me. Headlight dynamo and generator burst; 2 injured.

One accident; 2 injured.

#### CENTRAL NEW ENGLAND RAILWAY:

November 17, 1917, locomotive 1597 (N. Y., N. H. & H.), Winsted, Conn. Crown sheet failure; low water; no contributory causes found; 1 injured.

One accident; 1 injured.

#### CENTRAL OF GEORGIA RAILWAY:

February 5, 1918, locomotive 1815, Alexander City, Ala. Arch tube burst, due to accumulation of scale in tube; 3 injured.

June 9, 1918, locomotive 1807, Slaughters, Ala. Flue broke at weld; overheated in welding; 1 injured.

Two accidents; 4 injured.



## CENTRAL RAILROAD OF NEW JERSEY:

July 20, 1917, locomotive 803, near Cheltenham, Pa. Blow-off cock blew out; defective threads in sheet due to corrosion and plug cross-threaded; 2 injured.

December 10, 1917, locomotive 318, Phillipsburg, N. J. Grate-bar stud blew out; 1 injured.

\* January 5, 1918, locomotive 444, Somerville, N. J. Throttle flew open; 1 injured.

March 11, 1918, locomotive 53 (L. & H.), Springtown, N. J. Crown sheet failure; four adjacent broken radials; seat of right check valve badly cut; injector steam pipe cracked and wrapped with rope; 1 injured.

June 25, 1918, locomotive 3187 (A., T. & S. F.), Coalport, Pa. Right main rod broke, knocking out cylinder head; old fracture in rod; 1 injured.

Five accidents; 6 injured.

## CHESAPEAKE &amp; OHIO RAILWAY:

\* July 24, 1917, locomotive 543, Alum Lick, W. Va. Left driving wheel broke; four spokes found broken with old breaks; 1 killed, 1 injured.

\* July 30, 1917, locomotive 548, Montgomery, W. Va. Joint blow off of injector; 1 injured.

December 22, 1917, locomotive 745, near Marmet, W. Va. Crown sheet failure; low water; gauge cock drip stopped up; 1 killed, 1 injured.

January 20, 1918, locomotive 638, Beatrice, Ind. Side rods on locomotive broke; 1 injured.

March 21, 1918, locomotive 758, near Milton, W. Va. Crown sheet failure; low water; right tank-hose strainer missing and left strainer partially stopped up with sediment; 4 to 8 inches of sand and sediment in bottom of feed-water tank; left inspirator cracked and leaking; 35 days since last boiler wash; 2 injured.

March 28, 1918, locomotive 459, Peru, Ind. Plug driven through right fire box side sheet while attempting to talk under pressure; 1 injured.

May 16, 1918, locomotive 363, Montgomery, W. Va. Injector steam pipe coupling nut broke; nut had been badly damaged by frequent use of hammer and chisel used in tightening at previous times; condition had been reported and report approved by foreman, but repairs not made; 1 injured.

May 18, 1918, locomotive 329, Peru, Ind. Nipple blew off of blow-off cock; defective threads in blow-off cock; 1 killed.

May 23, 1918, locomotive 212, Paintsville, Ky. Squirt hose parted at splice; hose spliced with small piece of iron pipe and not clamped; 1 injured.

Nine accidents; 3 killed, 9 injured.

## CHICAGO &amp; ALTON RAILROAD:

July 24, 1917, locomotive 412, near Mason City, Ill. Crown sheet failure; low water; water glass leaking at top, causing false reading, and gauge-cock drip pipe stopped up; 1 injured.

October 1, 1917, locomotive 808, near Selsa, Mo. Injured while operating reverse lever, due to counterbalance-spring rod breaking; 1 injured.

October 30, 1917, locomotive 431, Springfield, Ill. Turret valve and bonnet blew out, due to defective threads on bonnet and in turret; 1 injured.

December 6, 1917, locomotive 700, Shirley, Ill. Crown sheet failure; low water; no contributory causes found; 1 injured.

\* December 27, 1917, locomotive 313, Carlinville, Ill. Injector steam-pipe spanner nut broke; 1 injured.

January 12, 1918, locomotive 74, Chicago Ill. Right side sheet and wrapper sheet failed, due to low water; water glass inoperative; top and bottom water-glass cocks found closed at time of investigation; 1 injured.

January 19, 1918, locomotive 815, near Blackburn, Mo. Water-glass steam pipe broke off; 1 injured.

February 21, 1918, locomotive 438, near Vandalia, Mo. Flue broke at weld; defective weld; 1 injured.

March 3, 1918, locomotive 397, Springfield, Ill. Injector steam-pipe collar broke; collar too light; 2 injured.

May 8, 1918, locomotive 328, Slater, Mo. Bonnet blew out of valve in steam pipe to Ledgerwood, due to improper fit of bonnet in valve; 1 injured.

May 13, 1918, locomotive 452, Mexico, Mo. Blow-off pipe parted at union; defective threads, and pipe insecurely braced; 1 injured.

Eleven accidents; 12 injured.

## CHICAGO &amp; NORTHWESTERN RAILWAY:

July 25, 1917, locomotive 431, Escanaba, Mich. Squirt hose blew off; hose not clamped; 1 injured.

July 27, 1917, locomotive 1740, Manitowoc, Wis. Ash-pan wrench slipped off lever; defective wrench; 1 injured.

August 12, 1917, locomotive 304, Salem, Wis. Expansion pad stud worked out while under pressure, due to being applied loose in hole and only screwed into a  $\frac{1}{2}$ -inch sheet  $\frac{1}{4}$  inch, or six threads; no daily-inspection report was on file for previous trip, as required by rule 104, yet the foreman permitted the locomotive to be returned to service without the report being filed, and admitted that he knew the stud was leaking; 1 injured.

September 27, 1917, locomotive 1269, Belle Plaine, Iowa. Lubricator feed glass burst; 1 injured.

October 9, 1917, locomotive 1774, Missouri Valley, Iowa. Lubricator plug blew out; 1 injured.

November 7, 1917, locomotive 2038, Chicago, Ill. Water-glass drip pipe broke off; 1 injured.

November 9, 1917, locomotive 32, Tracy, Minn. Spring hanger broke; old crack one-half the area of hanger; 1 injured.

November 10, 1917, locomotive 1397, Freeport, Ill. Reverse lever slipped out of quadrant; 1 injured.

November 12, 1917, locomotive 308, near Gordon, Nebr. Crown sheet failure; low water; water-glass drain pipe had blind gasket in connection just below water-glass blow-off cock; left tank hose badly kinked; three radial stays broken; 2 injured.

December 29, 1917, locomotive 1401, White Law, Wis. Reverse lever slipped out of quadrant; rear end of quadrant too low; 1 injured.

December 30, 1917, locomotive 62, Milwaukee, Wis. Crown sheet failure; low water; left boiler check leaking; defect reported just previous to accident and repairs not made; 1 killed, 2 injured.

January 8, 1918, locomotive 1132, Tama, Iowa. Injured while attempting to close blow-off cock; blow-off cock stuck open; 1 injured.

January 15, 1918, locomotive 1887, near Honey Creek, Iowa. Reverse lever slipped out of quadrant, due to piece of valve ring catching in ports, and spring in reverse lever latch broken; 1 injured.

January 29, 1918, locomotive 1283, Eland Junction, Wis. Injured while handling reverse lever; quadrant loose and bolts badly worn; 1 injured.

February 3, 1918, locomotive 2222, near Rhinelander, Wis. Crown sheet failure; low water; no contributory causes found; 1 injured.

February 11, 1918, locomotive 638, Plum Creek, Iowa. Grate shaker became disconnected, due to cotter key missing; 1 injured.

February 15, 1918, locomotive 2218, Lake Mills, Wis. Injured while operating reverse lever; counter-balance spring broken; 1 injured.

February 18, 1918, locomotive 2226, Malvern, Wis. Injured while operating reverse lever; 1 injured.

February 20, 1918, locomotive 2377, Benld, Ill. Tank hose blew off; hose insecurely applied, and boiler check leaking; 1 injured.

February 25, 1918, locomotive 953, Hermosa, S. Dak. Injured while attempting to operate cut-out cock in blow-off discharge pipe; 1 injured.

February 25, 1918, locomotive 955, Casper, Wyo. Arch tube plug blew out; plug improperly applied—cross-threaded; 1 injured.

February 27, 1918, locomotive 1410, Peoria, Ill. Injured while operating blow-off cock; blow-off cock leaking, and handle loose on stem; 1 injured.

March 2, 1918, locomotive 1059, Huron S. Dak. Lubricator filling plug blew out; plug too small, and threads stripped; 1 injured.

March 2, 1918, locomotive 2207, Council Bluffs, Iowa. Washout plug blew out while being tightened under pressure; plug cross-threaded; 1 injured.

March 16, 1918, locomotive 241, Cedar Rapids, Iowa. Tubular lubricator glass burst, scalding fireman; 1 injured.

March 24, 1918, locomotive 2155, Chicago, Ill. Air pump failed, rendering power reverse gear inoperative; injury was caused by steam-operating valve being located in an inaccessible place, which could not be opened from cab, or while locomotive was in operation; 1 injured.

April 24, 1918, locomotive 1869, DeWitt, Iowa. Reverse-lever latch slipped out of quadrant, due to weak spring; 1 injured.

May 20, 1918, locomotive 181, Carrollville, Wis. Injured while operating shaker bar, due to shaker rigging becoming disconnected; 1 injured.  
 June 7, 1918, locomotive 7 (W. & N. W.), Fremont, Nebr. Crown sheet failure; low water; no contributory causes found; 1 killed, 1 injured.  
 Twenty-nine accidents; 2 killed, 31 injured.

## CHICAGO &amp; WESTERN INDIANA RAILROAD:

August 2, 1917, locomotive 212, Chicago, Ill. Water-glass cock spindle blew out; 1 injured.  
 One accident; 1 injured.

## CHICAGO, BURLINGTON &amp; QUINCY RAILROAD:

August 13, 1917, locomotive 1575, Chicago, Ill. Cylinder head blew out; 1 injured.

August 17, 1917, locomotive 1168, Gladstone, Ill. Squirt hose burst; 1 injured.

August 18, 1917, locomotive 2182, near Nettleton, Mo. Right go-ahead eccentric strap bolt lost out or broke while running causing cylinder head to be knocked out; 1 injured.

August 26, 1917, locomotive 6136, Centralia, Ill. Lubricator glass burst; shield not properly secured when steam was turned on; 1 injured.

August 31, 1917, locomotive 5262, Owens, Wyo. Cylinder head blew out; 1 injured.

September 16, 1917, locomotive 1726, Pacific Junction, Iowa. Blow-off cock discharge pipe blew off at nipple connection; threads on nipple stripped and discharge pipe stopped up; 1 injured.

October 16, 1917, locomotive 1579, Quincy, Ill. Cylinder head blew out; 1 injured.

November 13, 1917, locomotive 5239, Chariton, Iowa. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

November 20, 1917, locomotive 5034, Seneca, Nebr. Lubricator glass burst; shield removed at time of accident; 1 injured.

February 9, 1918, locomotive 2208, Old Monroe, Mo. Water glass burst; injured by flying glass; 1 injured.

February 21, 1918, locomotive 1936, La Grange, Mo. Flue broke; 1 injured.

April 7, 1918, locomotive 966, Bucknum, Wyo. Crown sheet failure; low water; no contributory causes found; 2 killed, 1 injured.

June 1, 1918, locomotive 1170, Aurora, Nebr. Bull's-eye lubricator glass and nut blew out; defective threads on nut; 1 injured.

Thirteen accidents; 2 killed, 13 injured.

## CHICAGO GREAT WESTERN RAILROAD:

\* January 31, 1918, locomotive 300, Oelwein, Iowa. Handhold pulled off back end of tank; 1 injured.

One accident; 1 injured.

## CHICAGO, MILWAUKEE &amp; ST. PAUL RAILWAY:

July 3, 1917, locomotive 5577, Milwaukee, Wis. Left cylinder head blew out, due to cylinder cocks inoperative, allowing accumulation of water in cylinder; 1 injured.

July 13, 1917, locomotive 5605, Aberdeen, S. Dak. Oil headlight on rear end of locomotive exploded; 1 injured.

July 26, 1917, locomotive 1289, Minneapolis, Minn. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

July 31, 1917, locomotive 5037, Rahway, Mont. Blow-off cock operating lever slipped off, due to being insecurely attached; 1 injured.

August 12, 1917, locomotive 2353, Wausau, Wis. Scalded by hot water from blow-off pipe, due to boiler check leaking and discharge pipe improperly applied, forming a trap for the accumulation of hot water; 1 injured.

August 19, 1917, locomotive 8033, near Bouton, Iowa. Reverse lever slipped out of quadrant, due to defective teeth in reserve lever latch; defective condition reported just previous to accident and proper repairs not made; 1 injured.

August 23, 1917, locomotive 1292, Chicago, Ill. Squirt hose blew off; insecurely clamped; 1 injured.

September 7, 1917, locomotive 6608, Eagle, Wis. Deck of tender 4 inches higher than deck of locomotive, causing cab apron to afford insecure footing; 1 injured.

September 13, 1917, locomotive 6101, Chicago, Ill. Flue broke at weld; overheated in welding; 1 injured.

September 15, 1917, locomotive 7239, Manilla, Iowa. Discharge pipe to blow-off cock in throat sheet blew out at tee connection, due to defective threads on pipe, and blow-off cock inoperative from cab, due to handle missing; 1 injured.

September 21, 1917, locomotive 5003, Melstone, Mont. Water glass burst; injured by falling while attempting to close water-glass cocks. In order to reach top water-glass cock, which was located on top of boiler head, it was necessary to climb up by placing feet in window on arm rest. When arm rest broke, causing fall; 1 injured.

October 1, 1917, locomotive 1193, Galewood, Ill. Broken tank step and bent bracket, causing employee to fall; 1 injured.

October 8, 1917, locomotive 8163, Oconomowoc, Wis. Crown sheet failure; low water; both injectors defective; injectors reported defective 14 times previous to accident; improper water-glass light; 3 injured.

October 9, 1917, locomotive 7231, near Gault, Mo. Injured while operating reverse lever, due to weak and inefficient spring in reverse lever latch; improper repairs made day previous to accident; 1 injured.

October 9, 1917, locomotive 315, near Cleveland, Minn. Dynamo exhaust pipe became loose at union, due to not being clamped; turned over and caused injury; 1 injured.

October 14, 1917, locomotive 726, Techuy, Ill. Hand caught between reverse lever and boiler head; stop block missing from forward end of reverse-lever quadrant; 1 injured.

\* October 16, 1917, locomotive 8009, Farmington, Minn. Drawbar on locomotive broke; 1 injured.

November 12, 1917, locomotive 6526, Perry, Iowa. Flue broke at weld; overheated in welding; 1 injured.

November 13, 1917, locomotive 7048, Chicago, Ill. Drawbar and safety chains between locomotive and tender broke; 1 injured.

December 12, 1917, locomotive 1222, Milwaukee, Wis. Insufficient clearance between handhold and cab, causing engineer to fall; 1 injured.

December 20, 1917, locomotive 3003, Milton Junction, Wis. Pipe to steam heat gauge blew out of collar, due to defective brazing; 1 injured.

January 2, 1918, locomotive 1251, Milwaukee, Wis. Injured due to defective handhold on locomotive; 1 injured.

January 12, 1918, locomotive 6314, Wyocena, Wis. Bolt lost out of cab apron hinge, permitting fireman to fall between locomotive and tender; 1 injured.

January 28, 1918, locomotive 7032, Chicago, Ill. Blow-off cock burst; 2 injured.

February 1, 1918, locomotive 2031, Milwaukee, Wis. Injured while operating reverse lever, due to counterbalance spring breaking; 1 injured.

February 24, 1918, locomotive 4335, Janesville, Wis. Arch tube washout plug blew out while attempting to tighten under pressure; 3 injured.

March 4, 1918, locomotive 7224, Ottumwa, Iowa. Superheater tube broke at weld; overheated in welding; 2 injured.

March 7, 1918, locomotive 8501, Bonfield, Mont. Handrail pulled out; insecurely applied; 1 injured.

March 13, 1918, locomotive 8105, Elkhorn, Wis. Injured, due to top coal gate being too short and giving away when attempting to pass over the top of coal; 1 injured.

April 18, 1918, locomotive 7221, Kansas City, Mo. Dump-grate wrench slipped off dead-grate bar on account of too much slack between end of bar and socket wrench; 1 injured.

April 20, 1918, locomotive 7204, Ottumwa, Iowa. Injured while operating reverse lever, counterbalance spring missing, due to spring bolt being badly worn and broken; 1 injured.

May 12, 1918, locomotive 341, Coon Rapids, Iowa. Injector steam-ram packing nut blew out, due to improper fit; 1 injured.

May 12, 1918, locomotive 3108, Milwaukee, Wis. Scalded when injector broke, due to leak in feed-water pipe; 1 injured.

May 13, 1918, locomotive 6306, Chicago, Ill. Injured while operating grate shaker, due to bolt breaking or missing; 1 injured.

Thirty-four accidents; 40 injured.

## ROCK ISLAND &amp; PACIFIC RAILWAY:

1917, locomotive 2024, near Amity, Mo. Grate fulcrum lever became  
 acted: 1 injured.

July 12, 1917, locomotive 2062, Hudson, N. Mex. Injector steam-pipe collar broke; old fracture in collar; 1 injured.

July 16, 1917, locomotive 114, Davenport, Iowa. Struck by throttle lever; throttle ratchet teeth worn and would not hold throttle in closed position; 1 injured.

August 26, 1917, locomotive 629, Blue Island, Ill. Handle on blow-off cock operating rod pulled off, due to defective threads on connection, when operating blow-off cock from running board in front of cab, causing fireman to fall while locomotive was running at a speed of about 15 miles per hour; 1 injured.

September 4, 1917, locomotive 1729, near South Bend, Nebr. Reverse lever flew into backward position when unlatched; left valve had back valve strip broken, and flange along outside of valve strip groove broken off entire length of groove; piece  $1\frac{3}{4}$  inches long and  $2\frac{1}{2}$  inches wide broken off back edge of pressure plate; 1 injured.

September 5, 1917, locomotive 1296, Herington, Kans. Insufficient clearance between reverse lever and injector, permitting engineer's hand to be caught; 1 injured.

September 5, 1917, locomotive 831, Forrest City, Ark. Blower pipe became disconnected at front end, causing back draft; 1 injured.

September 17, 1917, locomotive 1951, Hutchinson, Kans. Defective handhold on front end of locomotive, permitting fireman to fall; 1 injured.

September 27, 1917, locomotive 1572, Bridgeport, Okla. Right front crank-pin collar worked loose and struck radius bar while engineer was operating reverse lever; collar too large and held in place by rough bolt, creating insufficient clearance; 1 injured.

November 3, 1917, locomotive 1485, near Mercer, Mo. Reverse lever slipped out of quadrant; 1 injured.

November 5, 1917, locomotive 1803, Auvergne, Ark. Grate shaker rod became disconnected, due to pin working out; 1 injured.

November 14, 1917, locomotive 2006, near Alta Vista, Kans. Injured while shaking grates, due to pin working out of lower end of grate-shaker post; 1 injured.

December 11, 1917, locomotive 1013, Waveland, Ark. Injured while shaking grates, due to connecting rod breaking; 1 injured.

December 14, 1917, locomotive 1772, near Booneville, Ark. Pneumatic fire-door opener defective, preventing proper operation of door; 1 injured.

December 19, 1917, locomotive 109, Chickasha, Okla. Crown sheet failure; low water; both tank hose strainers partially stopped up with waste, rust, and dirt; left tank valve would not open to its full capacity; 1 injured.

December 21, 1917, locomotive 1760, Copperas Gap, Ark. Grate connecting rod broke; 1 injured.

December 27, 1917, locomotive 1667, Alvord, Mo. Eyebolt to counterbalance in tumbling shaft broke, causing reverse lever to go into forward motion; 1 injured.

January 1, 1918, locomotive 1132, near Orleans, Iowa. Bolt in left forward eccentric strap broke; 1 injured.

January 7, 1918, locomotive 1645, near Council Bluffs, Iowa. Flue broke at weld; overheated in welding; 1 injured.

January 10, 1918, locomotive 1858, near Hulbert, Ark. Crown sheet failure; low water; top end of water glass stopped up with packing; 3 injured.

January 10, 1918, locomotive 891, Kansas City, Mo. Injector ram bonnet blew out, due to loose fit; 1 injured.

January 11, 1918, locomotive 1456, near Madison, Ill. Spanner nut blew off throttle stuffing box; defective threads on stuffing box and too much packing used to permit properly engaging the threads on nut and stuffing box; 1 injured.

February 5, 1918, locomotive 885, Topeka, Kans. Reverse-lever latch slipped out of quadrant, permitting reverse lever to go into corner; 1 injured.

March 7, 1918, locomotive 1750, Courtland, Kans. Injector delivery pipe-spanner nut blew off while attempting to tighten under pressure; defective spanner nut, caused by frequent use of hammer and chisel in tightening at previous times; 1 injured.

March 15, 1918, locomotive 1910, Baty, Kans. Left crosshead pin broke, due to old fracture in pin; 1 injured.

April 2, 1918, locomotive 2550, Washington, Iowa. Shaker-bar lever broke, due to hole in lever, causing weakness; 1 injured.

April 5, 1918, locomotive 867, Cedar Rapids, Iowa. Spanner nut connecting delivery pipe to boiler check broke, while attempting to tighten with hammer and chisel; old fracture in nut; 1 injured.

April 10, 1918, locomotive 2115, near Yukon, Okla. Crown-sheet failure; low water; bottom nipple of klinger-type water glass had been cut off, and rubber gasket in bottom end of glass had entirely closed opening, rendering water glass inoperative; 2 injured.

Twenty-eight accidents; 31 injured.

#### CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RAILWAY:

January 28, 1918, locomotive 311, Minneapolis, Minn. Injured, due to piston packing blowing, obscuring vision; had been reported four times previous to accident; 1 injured.

February 11, 1918, locomotive 419, Millston, Wis. Shaker bar slipped off post; 1 injured.

March 13, 1918, locomotive 357, Rice Lake, Wis. Box attached on rear of tender for marker lamps rotted out and gave away when stepped on, causing fireman to fall to ground; 1 injured.

April 13, 1918, locomotive 324, Sioux City, Iowa. Squirt hose parted where spliced; not properly clamped; 1 injured.

Four accidents; 4 injured.

#### CHICAGO, TERRE HAUTE & SOUTHEASTERN RAILWAY:

December 17, 1917, locomotive 687, West Clinton, Ind. Flue broke at weld; overheated in welding; 1 injured.

February 19, 1918, locomotive 603, Delmar, Ill. Relief valve blew out; defective threads; 1 injured.

Two accidents; 2 injured.

#### CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY:

August 11, 1917, locomotive 6334, near Carey, Ohio. Left guide yoke broke, stripping engine on both sides, while hauling passenger train at a speed of about 50 miles per hour; due to an old break in guide yoke at its connection to frame; defect could have been easily detected by inspection; no report of defects had been made, as required by rule 104; 1 injured.

December 30, 1917, locomotive 6760, Springfield, Ohio. Arch tube washout plug blew out while boiler was under hydrostatic test of 250 pounds; defective threads on plug; 1 injured.

March 10, 1918, locomotive 7366, Cleveland, Ohio. Stop valve blew out of boiler check; defective threads on check; 1 injured.

\*April 4, 1918, locomotive 6531, Indianapolis, Ind. Handhold pulled off of locomotive; 1 injured.

May 28, 1918, locomotive 6778, Lovett, Ind. Injector steam pipe broke at collar connection; defective brazing and pipe insecurely clamped; 1 injured.

June 18, 1918, locomotive 6862, Harrisburg, Ill. Arch tube plug blew out; attempted to tighten under pressure; 1 killed.

Six accidents; 1 killed, 5 injured.

#### CUMBERLAND VALLEY RAILROAD:

December 23, 1917, locomotive 93, Rutherford, Pa. Blower pipe union connection in smoke box broke, causing back draft; 1 injured.

One accident; 1 injured.

#### DELAWARE & HUDSON Co.:

July 29, 1917, locomotive 602, Albany, N. Y. Squirt hose burst; 1 injured.

October 25, 1917, locomotive 833, Carbondale, Pa. Flue broke; overheated in welding; 1 injured.

\*April 2, 1918, locomotive 822, East Worcester, N. Y. Injector overflow pipe became disconnected; 1 injured.

Three accidents; 3 injured.

#### DELAWARE, LACKAWANNA & WESTERN RAILROAD:

September 25, 1917, locomotive 68, Morris Plains, N. J. Exhaust nozzle became loose and worked over exhaust ports, causing back draft, due to missing from exhaust nozzle base; defect reported the day previous to accident and repairs not made; 1 injured.

November 14, 1917, locomotive 330, Tully, N. Y. Flue broke at weld; overheated in welding; 1 injured.

January 16, 1918, locomotive 892, Port Morris, N. J. Crown sheet and fire-glass failure; low water; no contributory causes found; 2 injured.

February 21, 1918, locomotive 173, Elmira, N. Y. Flue broke at weld; defective weld; flues reported leaking just previous to accident and repairs not made; 1 injured.

March 4, 1918, locomotive 343, Bells Bridge, Pa. Flue broke at weld; overheated in welding; 1 injured.

June 4, 1918, locomotive 1106, Wharton, N. J. Three superheater tubes collapsed, due to low water; top water-glass opening stopped up with old gasket; 1 injured.

Six accidents; 7 injured.

#### DENVER & RIO GRANDE RAILROAD:

October 23, 1917, locomotive 1164, Springville, Utah. Shaker bar slipped off fulcrum lever; 1 injured.

December 19, 1917, locomotive 1194, Gilluly, Utah. Left intermediate side rod broke, due to flaw in material; 1 injured.

December 19, 1917, locomotive 1171, Ogden, Utah. Shaker bar slipped off fulcrum post, due to improper fit of shaker-bar socket on post; 1 injured.

April 24, 1918, locomotive 453, near Shirley, Colo. Tender truck derailed; 1 injured.

May 3, 1918, locomotive 637, Salt Lake City, Utah. Injured, due to cab apron being of insufficient length to afford secure footing; 1 injured.

May 10, 1918, locomotive 1151, near Beaver, Colo. Squirt hose burst; defective hose; 1 injured.

Six accidents; 6 injured.

#### DULUTH & IRON RANGE RAILROAD:

July 20, 1917, locomotive 223, Messaba, Minn. Squirt hose blew off; insecurely clamped; 1 injured.

May 24, 1918, locomotive 303, Two Harbors, Minn. Water glass burst; cut by flying glass; shield removed at time of accident; 1 injured.

Two accidents; 2 injured.

#### ERIE RAILROAD:

\*July 3, 1917, locomotive 1574, Meadville, Pa. Latch spring holding reverse lever in position broke, permitting lever to fly into forward motion; 1 injured.

July 12, 1917, locomotive 3128, Avoca, Pa. Coupler on tender broke, due to defective material; 1 injured.

July 25, 1917, locomotive 1536, near Ridgway, Pa. Crown sheet failure; low water; six radial stays found broken, five of which were adjacent, in the failed area; 1 injured.

August 9, 1917, locomotive 950, Jersey City, N. J. Eccentric blade bolts broke, due to being loose, as indicated by worn condition; 1 injured.

August 19, 1917, locomotive 4022, Marion, Ohio. Arch tube washout plug blew out while attempting to tighten under pressure by direction of the boiler foreman, and under supervision of the roundhouse foreman; defective threads in sheet; 1 injured.

August 24, 1917, locomotive 1767, North Judson, Ind. Squirt hose parted at splice; 1 injured.

December 1, 1917, locomotive 775, Buchanan Junction, Pa. Fell from running board when leaving terminal while trying to pound sand pipes to get them open; sand pipes stopped up; 1 injured.

December 30, 1917, locomotive 2048, Corry, Pa. Drawbar casting broke, permitting locomotive and tender to separate; old defect in drawbar casting which had been improperly repaired; 1 injured.

January 12, 1918, locomotive 1827, Brier Hill, Ohio. Section of left steam pipe, 3½ by 13 inches, blew out; old flaw in pipe; 1 injured.

February 2, 1918, locomotive 3018, Port Jervis, N. Y. Superheater tube burst; tube wasted away by leakage to about ¼ inch in thickness; 1 injured.

February 5, 1918, locomotive 1735, near Big Flats, N. Y. Injector steam pipe sleeve at injector connection broke; defective sleeve; 1 injured.

February 14, 1918, locomotive 3003, Wangaum Siding, Pa. Injured by steam from ash-pan blower, due to pipe being disconnected and not clamped; 1 injured.

March 17, 1918, locomotive 3115, Portage, N. Y. Defective coupler on tender, causing locomotive and tender to part from train; 1 injured.

March 24, 1918, locomotive 3003, Saco, Pa. Carrier strap on tender coupler broke, permitting locomotive and tender to part from train; 1 injured.

April 9, 1918, locomotive 1513, West Hawley, Pa. Injector steam pipe pulled out of sleeve at throttle connection, due to defective brazing; 1 injured.

April 10, 1918, locomotive 1846, Youngstown, Ohio. Flue broke at weld; defective flue; 1 injured.

April 25, 1918, locomotive 2064, Black Rock, N. Y. Flue blew out; 1 injured.

May 15, 1918, locomotive 1848, Secaucus, N. J. Auxiliary reservoir not equipped with drain cock; injured while removing plug from reservoir; due to plug blowing out; 1 injured.

June 1, 1918, locomotive 1655, Great Bend, Pa. Driving wheel tires loose and slipped; 1 injured.

\*June 13, 1918, locomotive 959, Jersey City, N. J. Pipe blew out of hose while washing cab floor; 1 injured.

\*June 15, 1918, locomotive 2000, Marion, Ohio. Plug blew out of crown sheet; 1 injured.

June 25, 1918, locomotive 1645, Painted Post, N. Y. Flue failed at bead, and as the hole was larger in diameter than the flue in the front flue sheet, and shims not used, the flue was forced out of back flue sheet; flue was weakened, due to excessive use of flue rollers, and was improperly applied; 1 injured.

Twenty-two accidents; 22 injured.

#### FORT WORTH & DENVER CITY RAILWAY:

March 22, 1918, locomotive 57, near Electra, Tex. Crown sheet failure; low water; no contributory causes found; 3 killed.

One accident; 3 killed.

#### FORT WORTH & RIO GRANDE RAILWAY:

January 30, 1918, locomotive 500 (K. C., F. S. & M.), Fort Worth, Tex. Crown sheet failure; low water; steam gauge pipe stopped up at nipple connection to boiler; fireman's gauge cock stopped up; left injector delivery pipe split, rendering injector inoperative; 2 injured.

One accident; 2 injured.

#### GRAND TRUNK RAILWAY:

\*December 29, 1917, locomotive 765, Schoolcraft, Mich. Injector steam pipe broke; 1 injured.

One accident; 1 injured.

#### GREAT NORTHERN RAILWAY:

July 12, 1917, locomotive 15, Havre, Mont. Boiler check leaking badly, rendering injector inoperative; squirt hose valve was open to relieve pressure in feed pipe so that injector could be started, when injury was caused by scalding from squirt hose; 1 injured.

August 13, 1917, locomotive 1951, Lynwood, Minn. Leak in ball joint of final exhaust, obscuring view of fireman, causing him to fall from running board; 1 injured.

August 20, 1917, locomotive 1970, Carlton, Minn. Scalded by hot water from squirt hose; defective valve; 2 injured.

August 29, 1917, locomotive 1757, Fielding, Mont. Shaker bar slipped off, due to pin connecting post to operating rod losing out; 1 injured.

September 3, 1917, locomotive 1476, Poplar, Mont. Water glass broke; inefficient shield; cut by flying glass; 1 injured.

September 30, 1917, locomotive 2011, Coram, Mont. Left intermediate injector throttle bonnet blew out; new bonnet had been applied, which was too small, and loose fitting; 1 injured.

October 11, 1917, locomotive 1545, Wolf Point, Mont. Crown sheet failure; low water; no contributory causes found; 2 killed, 2 injured.

November 16, 1917, locomotive 1017, Vista, Mont. Main throttle closed, due to lost motion in throttle rigging, when locomotive was entering tunnel, causing fire door to be blown open; defective latch on fire door; defects not reported as required by rule 104; 1 injured.

November 28, 1917, locomotive 1962, Andover, Minn. Air-pump oil pipe broke at collar; 1 injured.

December 5, 1917, locomotive 78, Minneapolis, Minn. Lubricator oil glass burst; shield removed at time of accident, due to obscuring view of glass; 1 injured.

February 7, 1918, locomotive 3015, Willmar, Minn. Broken rivet blew out of firebox side sheet while attempting to calk with 90 pounds pressure on boiler; 1 injured.

March 16, 1918, locomotive 1405, Borup, Minn. Flue broke, due to corrosion and deterioration; 1 injured.

April 2, 1918, locomotive 999, Willmar, Minn. Broken staybolt blew out of backhead; threads on bolt and in sheet entirely corroded away, and end of bolt covered with heavy scale, showing conclusively that bolt had been broken previous to last inspection; 2 injured.

April 24, 1918, locomotive 379, Superior, Wis. Bull's-eye lubricator glass blew out; packing nut too small; 1 injured.

Fourteen accidents; 2 killed, 17 injured.

#### GULF, COLORADO & SANTA FE RAILWAY:

\*December 15, 1917, locomotive 108, Hitchcock, Tex. Side rod broke; 1 injured.

April 4, 1918, locomotive 247, near Lometa, Tex. Scalded by hot water from squirt hose, due to boiler check sticking; 1 injured.

Two accidents; 2 injured.

#### HOCKING VALLEY RAILWAY:

August 31, 1917, locomotive 263, Sand Rund Junction, Ohio. Drawbar pin and safety chains between locomotive and tender broke; excessive lost motion between locomotive and tender and apparently poor material in pin; 1 killed.

September 17, 1917, locomotive 168, Prospect, Ohio. Bottom water glass cock spindle blew out; no means provided to prevent spindle from being screwed entirely out; 1 injured.

December 14, 1917, locomotive 187, Lancaster, Ohio. Arch tube pulled out of throat sheet; tube not belled or beaded in sheet; extended into sheet only  $\frac{1}{4}$  inch at bottom and flush with sheet at top; 1 injured.

May 1, 1918, locomotive 242, Nelsonville, Ohio. Throttle gland packing nut blew off; nut damaged due to use of hammer and chisel in tightening at previous times; 1 injured.

Four accidents; 1 killed, 3 injured.

#### ILLINOIS CENTRAL RAILROAD:

July 8, 1917, locomotive 855, Brookhaven, Miss. Squirt hose burst, due to worn place in hose, and defect not reported; 1 injured.

\*October 11, 1917, locomotive 1654, Gibbs, Tenn. Grate shaker rod broke; 1 injured.

\*November 23, 1917, locomotive 1964, Binney, Ill. Side rod on locomotive broke; 1 injured.

\*January 22, 1918, locomotive 281, Champaign, Ill. Injured due to broken footboard on locomotive; 1 injured.

\*January 26, 1918, locomotive 1523, Chicago, Ill. Oil cup blew out of air pump; 1 injured.

February 5, 1918, locomotive 658, Martin, Tenn. Counterbalance spring rod broke; old flaw in rod; 1 injured.

\*March 15, 1918, locomotive 548, New Orleans, La. Connecting rod in ashpan broke; 1 injured.

April 5, 1918, locomotive 476, Golconda, Ill. Flue broke; 1 injured.

\*April 13, 1918, locomotive 30, Ryan, Iowa. Steam pipe burst; 1 injured.

\*April 14, 1918, locomotive 1004, Water Valley, Miss. Squirt hose blew off connection; 1 injured.

May 11, 1918, locomotive 1506, Edgewood, Ill. Scalded by hot water from blow-off cock; blow-off cock insecurely clamped; 1 injured.

May 23, 1918, locomotive 661, Jackson, Tenn. Feed pipe connecting nut blew off at boiler check; 1 injured.

\*June 7, 1918, locomotive 815, New Athens, Ill. Handrail on locomotive pulled out; 1 injured.

\*June 21, 1918 (locomotive number not shown), Champaign, Ill. Throttle gland blew out; 1 injured.

Fourteen accidents; 14 injured.

#### ILLINOIS SOUTHERN RAILWAY:

May 27, 1918, locomotive 401, Nashville, Ill. Crown sheet failure; low water; bottom water-glass cock found closed at time of investigation; 1 killed, 2 injured.

One accident; 1 killed, 2 injured.

#### INTERNATIONAL & GREAT NORTHERN RAILWAY:

September 29, 1917, locomotive 150, Laredo, Tex. Squirt hose blew off; hose not clamped; 1 injured.

November 14, 1917, locomotive 420, Hearne, Tex. Blow-off cock valve stem broke and pulled out of place; 1 injured.

\*December 30, 1917, locomotive 265, San Antonio, Tex. Spring hanger on locomotive broke; 1 injured.

Three accidents; 3 injured.

#### KANSAS CITY SOUTHERN RAILWAY:

October 5, 1917, locomotive 72, Kansas City, Kans. Injured due to reverse lever going into forward motion; teeth on reverse lever latch and quadrant defective; 1 injured.

October 6, 1917, locomotive 515, Shreveport, La. Handhold used as step on feed oil tank gave away, due to old break; had been fastened in place with wire; 1 injured.

\*December 29, 1917, locomotive 802, Pittsburg, Kans. Squirt hose burst; 1 injured.

April 22, 1918, locomotive 466, Kansas City, Mo. Plate which had been applied with studs to side of firebox to prevent wheels from cutting side sheets came loose, and knocked out projecting washout plug; 1 injured.

June 19, 1918, locomotive 92, Pittsburg, Kans. Pipe attached to blow-off cock for purpose of filling boiler blew off; defective threads on pipe, and nut insecurely tightened; 1 injured.

Five accidents; 5 injured.

#### LEHIGH & NEW ENGLAND RAILROAD:

August 15, 1917, locomotive 55, Bath, Pa. Injector steam valve bonnet blew out; defective threads on bonnet and injector; 1 injured.

One accident; 1 injured.

#### LEHIGH VALLEY RAILROAD:

March 27, 1918, locomotive 908, near Victor, N. Y. Crown sheet failure; low water; no contributory causes found; 3 injured.

May 14, 1918, locomotive 4004, Olivers Mills, Pa. Crown sheet failure; low water; no contributory causes found; 1 injured.

Two accidents; 4 injured.

#### LOS ANGELES & SALT LAKE RAILROAD:

July 23, 1917, locomotive 3701, near Ames, Cal. Broken staybolt blew out of firebox sheet, due to defective threads; telltale hole in bolt not drilled required depth to give warning of broken bolt; 1 injured.

March 31, 1918, locomotive 3647, near Uvada, Nev. Crown sheet failure; low water; no contributory causes found; 1 injured.

Two accidents; 2 injured.

#### LOUISVILLE & NASHVILLE RAILROAD:

July 18, 1917, locomotive 1017, Sonora, Ky. Crown sheet failure; low water; no contributory causes found; 1 injured.

December 15, 1917, locomotive 1272, Covington, Ky. Nipple blew out of elbow of ash-pan blower; defective threads on nipple; 1 injured.

May 5, 1918, locomotive 1291, Elmore, Ala. Scalded by hot water from ash-pan blow-out pipe, due to loose union; 1 injured.

May 11, 1918, locomotive 2007, New Orleans, La. Lubricator glass broke; 1 injured.

Four accidents; 4 injured.

#### LOUISVILLE, HENDERSON & ST. LOUIS RAILWAY:

November 16, 1917, locomotive 25, near Howell, Ind. Side rod broke; old fracture in rod; 1 injured.

One accident; 1 injured.

#### MAINE CENTRAL RAILROAD:

October 3, 1917, locomotive 227, Beecher Falls, Vt. Boiler-check cage broke, due to old fracture in material; 1 injured.

November 21, 1917, locomotive 506, Etna, Me. Crown sheet failure; low water; no contributory causes found; 2 injured.

Two accidents; 3 injured.

## MANISTEE &amp; NORTHEASTERN RAILROAD:

July 25, 1917, locomotive 16, near Platt River, Mich. Squirt hose burst; defective hose; 1 injured.

One accident; 1 injured.

## MICHIGAN CENTRAL RAILROAD:

January 5, 1918, locomotive 7706, Chessaning, Mich. Flue broke at weld; 1 injured.

April 19, 1918, locomotive 7937, Michigan City, Ind. Plug in top knuckle of flue sheet driven through sheet while attempting to calk with 65 pounds of pressure on boiler; sheet was corroded and wasted down to a thickness of only one-eighth inch where plug had been inserted; 1 injured.

May 28, 1918, locomotive 7752, West Detroit, Mich. Water glass burst; scalded by escaping hot water; defective shield; 1 injured.

June 14, 1918, locomotive 7721, Detroit, Mich. Patch bolt blew out of fire-box door sheet; defective threads on bolt and in sheet; attempted to calk with 30 pounds pressure on boiler; 1 injured.

Four accidents; 4 injured.

## MINNEAPOLIS, ST. PAUL &amp; SAULT STE. MARIE RAILWAY:

March 17, 1918, locomotive 10, Danbury, Wis. Lubricator nut and glass blew out; threaded part of lubricator, where filling sight glass screws into lubricator, worn; 1 injured.

One accident; 1 injured.

## MISSOURI, KANSAS &amp; TEXAS LINES:

November 18, 1917, locomotive 363, St. Charles, Mo. Reversing gear counter-balance spring rod broke; rod was worn from  $\frac{1}{4}$  to  $\frac{3}{8}$  inch in diameter, due to rubbing in guide or support; 1 injured.

January 20, 1918, locomotive 518, Sedalia, Mo. Turbine wheel of dynamo burst; 1 injured.

March 25, 1918, locomotive, 289, Durant, Okla. Scalded by hot water from steam-heat pipe; steam-heat throttle leaking; 1 injured.

Three accidents; 3 injured.

## MISSOURI, OKLAHOMA &amp; GULF RAILWAY:

July 24, 1917, locomotive 231, Ketchum, Okla. Squirt hose burst; defective hose; 1 injured.

One accident; 1 injured.

## MISSOURI PACIFIC RAILROAD:

August 8, 1917, locomotive 7523, Newport, Ark. Blow-off cock broke off at throat sheet; 1 injured.

December 18, 1917, locomotive 60, Argenta, Ark. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

December 26, 1917, locomotive 69, Bryant, Ark. Headlight turbine broke; 1 injured.

January 1, 1918, locomotive 79, near Atchinson, Kans. Headlight turbine broke; 1 injured.

January 18, 1918, locomotive 9424, North Little Rock, Ark. Boiler-check cap blew out; defective threads on cap; 1 injured.

January 29, 1918, locomotive 486, Myrick, Mo. Injector steam pipe spanner nut broke while attempting to tighten under pressure; 1 injured.

February 1, 1918, locomotive 2394, Wagoner, Okla. Drain cock in branch pipe broke off, due to defective threads on bushing where screwed into feed pipe; 1 injured.

February 2, 1918, locomotive 1513, Todds, Nebr. Arch tube pulled out of flue sheet; tube too short and not beaded or belled; 4 injured.

\* March 6, 1918, locomotive 5540, Moark, Ark. Water glass burst; cut by flying glass; 1 injured.

March 19, 1918, locomotive 9531, East Little Rock, Ark. Lubricator glass burst; 1 injured.

\* April 5, 1918, locomotive 9420, North Little Rock, Ark. Blow-off cock came open; defective blow-off cock; 1 injured.

April 5, 1918, locomotive 8701, Arkansas City, Ark. Injured while attempting to repair pneumatic bell ringer which failed on line of road; 1 injured.

April 6, 1918, locomotive 2668, near Benton, Kans. Front end main rod strap bolt and key lost out, permitting rod to drop; 2 injured.

April 7, 1918, locomotive 10, near Montrose, Ark. Water glass burst; scalded while closing water-glass cocks, due to stems being bent and packing hard and dry; 1 injured.

Fourteen accidents; 18 injured.

## MONONGAHELA CONNECTING RAILROAD:

September 11, 1917, locomotive 66, Pittsburgh, Pa. Crown sheet failure; low water; no contributory causes found; 1 injured.

November 16, 1917, locomotive 56, Pittsburgh, Pa. Bull's-eye water glass blew out; 1 injured.

November 18, 1917, locomotive 30, Pittsburgh, Pa. Crown sheet failure; low water; top gauge cock inoperative, due to handle being loose; water glass missing and top water-glass opening plugged; left injector inoperative; 1 injured.

Three accidents; 3 injured.

## MORGAN'S LOUISIANA &amp; TEXAS R. R. &amp; S. S. Co.:

August 26, 1917, locomotive 552, Roux, La. Main air reservoir exploded; 1 injured.

One accident; 1 injured.

## NASHVILLE, CHATTANOOGA &amp; ST. LOUIS RAILWAY:

September 11, 1917, locomotive 603, Cowan, Tenn. Handrail on vanderbilt tank broken; apparently old break which had not been reported; 1 injured.

October 26, 1917, locomotive 351, near Rosser, Tenn. Glass blown out of front window while locomotive was running at a speed of 25 to 30 miles per hour; 1 injured.

November 12, 1917, locomotive 455, Nashville, Tenn. Injured due to handhold on cab not being secured in place at lower end; 1 injured.

\* December 15, 1917, locomotive 405, Cass, Ga. Draft pipe in front end came down; 1 injured.

January 26, 1918, locomotive 417, Atlanta, Ga. Injector steam-pipe collar blew off, due to being improperly brazed to pipe; 1 injured.

March 15, 1918, locomotive 901, near Cowan, Tenn. Crown sheet failure; low water; bottom water-glass opening partially stopped up; 2 killed, 3 injured.

Six accidents; 2 killed, 8 injured.

## NEW YORK CENTRAL RAILROAD—LINES EAST:

August 10, 1917, locomotive 1980, Paul, N. Y. Pipe used as nozzle blew out of squirt hose; not clamped; 1 injured.

September 6, 1917, locomotive 3451, Peekskill, N. Y. Drawbar pin between locomotive and tender worked out; cotter key provided to hold pin in place missing; 1 injured.

November 20, 1917, locomotive 3023, DeWitt, N. Y. Tip in end of expansion tube of steam gauge blew out, due to defective soldering; 1 injured.

December 24, 1917, locomotive 3755, near Corfu, N. Y. Crown sheet failure; low water; no contributory causes found; 3 injured.

December 31, 1917, locomotive 668, DeWitt, N. Y. Bull's-eye lubricator glass broke; 1 injured.

January 21, 1918, locomotive 2551, near Memphis, N. Y. Crown sheet failure; low water; lower end of water glass stopped up with gasket; 3 injured.

February 19, 1918, locomotive 597, New York, N. Y. Top water glass cock and water glass broke; old fracture in cock; 1 injured.

February 21, 1918, locomotive 1678, DeWitt, N. Y. Injector throttle bonnet blew out; 1 injured.

March 3, 1918, locomotive 2923, Harbor, N. Y. Injector steam-pipe spanner nut broke; spanner nut improperly applied; 1 injured.

Nine accidents; 13 injured.

## NEW YORK CENTRAL RAILROAD—LINES WEST:

November 23, 1917, locomotive 5823, Cleveland, Ohio. Crown sheet failure; low water; left boiler check seat cut and leaking; safety valves would not properly relieve pressure; both injector priming ram handles improperly applied—priming valves could not be closed; 4 injured.

January 8, 1918, locomotive 3687, West Seneca, N. Y. Injector delivery-pipe union nut stripped off; nut too large and cross-threaded; 1 injured.

February 8, 1918, locomotive 3917, Amboy, Ohio. Crown sheet failure; low water; no contributory causes found; 2 injured.

Three accidents; 7 injured.

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

October 12, 1917, locomotive 511, Hare Siding, Ohio. Crown sheet failure; low water; bottom of water glass stopped up with rubber gasket; 2 injured. One accident; 2 injured.

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

July 15, 1917, locomotive 217, near Steeles, Conn. Drawbar and safety chains between locomotive and tender broke; 1 injured.

July 29, 1917, locomotive 1354, Boston, Mass. Union in ash-pan blower pipe loose; 1 injured.

December 28, 1917, locomotive 1677, Newport, R. I. Broken rivet in patch in throat sheet blew out; 1 injured.

\*January 8, 1918, locomotive 2334, Boston, Mass. Injured due to defective footboard; 1 injured.

January 12, 1918, locomotive 1331, Milford, Conn. Injured while operating reverse lever; counterbalance spring broken; 1 injured.

January 27, 1918, locomotive 407, New Haven, Conn. Injured while operating reverse lever, due to stop pin missing from front end of quadrant, permitting lever to strike boiler head; 1 injured.

March 30, 1918, locomotive 1025, Pecowsic, Mass. Crown sheet failure; low water; left injector inoperative due to tank hose missing; steam nozzle loose and worked ahead against back end of combining tube in right injector; 2 injured.

April 4, 1918, locomotive 1007, Berlin, Conn. Reverse lever quadrant bracket stud blew out; stud improperly applied, and three other studs holding bracket to boiler broken off; defect reported four times previous to accident, and repairs not made; 1 injured.

April 26, 1918, locomotive 293, Worcester, Mass. Expansion pad stud blew out of backhead, due to being improperly applied; stud entered sheet only  $\frac{1}{8}$ -inch, and threads corroded and defective; 1 injured.

May 7, 1918, locomotive 456, Van Dusenville, Mass. Flue broke at weld; defective weld; 1 injured.

May 10, 1918, locomotive 1278, Oxford, Conn. Blower pipe in front end turned over, causing back draft; 1 injured.

May 20, 1918, locomotive 1566, near Wickford Junction, R. I. Eccentric strap broke, causing reverse lever to become unlatched; 1 injured.

June 23, 1918, locomotive 1092, Saybrook Junction, Conn. Inspection plug blew out of valve chamber while passing a passenger train, due to not being properly tightened; 12 injured.

Thirteen accidents; 25 injured.

## NEW YORK, ONTARIO &amp; WESTERN RAILWAY:

April 5, 1918, locomotive 357, near Fish's Eddy, N. Y. Crown sheet failure; low water; no contributory causes found; 2 injured.

April 19, 1918, locomotive 52, Mayfield, Pa. Main throttle packing nut worked off of stuffing box; 1 injured.

June 29, 1918, locomotive 50, Mayfield, Pa. Handhold on front end of switching locomotive gave away, causing brakeman to fall under engine, due to threads holding bracket in place being stripped; 1 killed.

Three accidents; 1 killed, 3 injured.

## NEW YORK, SUSQUEHANNA &amp; WESTERN RAILROAD:

May 8, 1918, locomotive 90, Bloomingdale, N. J. Drawbar between locomotive and tender broke; 1 injured.

One accident; 1 injured.

## NORFOLK &amp; WESTERN RAILWAY:

August 6, 1917, locomotive 898, Ingham, Va. Arch tube burst, due to accumulation of mud in tube; 1 injured.

August 20, 1917, locomotive 899, Williamson, W. Va. Crown sheet failure; low water; injectors had been reported as fair and bad by different engineers several times within 10 days preceding accident; 2 injured.

September 19, 1917, locomotive 1312, Dewey, Va. Flue broke at weld; defective butt weld; 1 injured.

September 25, 1917, locomotive 385, near Price, N. C. Flue broke at weld; defective butt weld; 1 injured.

November 13, 1917, locomotive 1007, Barytes, Va. Injector spanner nut blew off while attempting to tighten with hammer and chisel under pressure; defective threads and spanner nut too large for injector; 1 injured.

\* December 3, 1917, locomotive 1152, Wilson, Va. Injured while operating reverse lever; pin missing from quadrant; 1 injured.

\* December 12, 1917, locomotive 1102, Valley Crossing Yard, Ohio. Plug blew out of steam pipe; 1 injured.

January 25, 1918, locomotive 431, near Finney, Va. Stud holding cap on end of crank pin broke off flush with pin, permitting side rod to slip off of pin; 1 injured.

February 15, 1918, locomotive 733, Columbus, Ohio. Scalded by hot water from open top overflow pipe when injector broke; boiler check stuck open; 1 injured.

March 14, 1918, locomotive 1367, Bluefield, W. Va. Flue broke at weld; defective weld; 2 injured.

March 21, 1918, locomotive 1099, Williamsburg, Ohio. Flue broke at weld; defective weld; 1 injured.

April 9, 1918, locomotive 1309, Alinwick, W. Va. Flue broke at weld; defective butt weld; 1 injured.

April 16, 1918, locomotive 511 (S. A. L.), Walton, Va. Bottom water glass valve spindle screwed out, due to improper construction of valve; 1 injured.

April 23, 1918, locomotive 736, near Gary, W. Va. Arch tube pulled out of back flue sheet; tube not belled or beaded; accumulation of scale in tube, causing overheating; 1 injured.

May 12, 1918, locomotive 960, Cooper, W. Va. Left back side rod collar came off; 1 injured.

May 31, 1918, locomotive 1034, near Shenandoah, Va. Flue broke at weld; defective butt weld; 1 injured.

June 5, 1918, locomotive 465, Buena Vista, Va. Flue broke off at butt weld; defective weld; 1 injured.

June 5, 1918, locomotive 798, near Abingdon, Va. Two staybolts pulled out of inside throat sheet, due to accumulation of mud, causing overheating of sheet; 1 injured.

Eighteen accidents; 20 injured.

## NORTHERN PACIFIC RAILWAY:

July 5, 1917, locomotive 1075, Dickinson, N. Dak. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

July 12, 1917, locomotive 1552, Bald Eagle, Minn. Handrail on locomotive disconnected, causing brakeman to fall; 1 injured.

August 23, 1917, locomotive 1525, Weeksville, Mont. Lubricator steam pipe broke at brazing, due to being worn, and lubricator throttle handle missing, requiring the use of a wrench to close throttle; 1 injured.

September 14, 1917, locomotive 1556, Duluth, Minn. Injured while operating reverse lever, due to lever not properly counterbalanced; 1 injured.

October 10, 1917, locomotive 1276, Maltby, Wash. Squirt hose blew off; hose not clamped; 1 injured.

November 15, 1917, locomotive 2220, near Beach, N. Dak. Crown sheet failure, due to accumulation of scale or foreign matter on crown sheet, and defective crown stays; 1 injured.

November 16, 1917, locomotive 709, Arrow, Idaho. Top board of coal gate broke; 1 injured.

December 16, 1917, locomotive 2378, Carlton, Minn. Tank leaking over left sill steps, causing ice to freeze on steps and fireman to fall; 1 injured.

February 21, 1918, locomotive 1159, Seattle, Wash. Lubricator glass burst; burned by escaping hot oil; 1 injured.

April 1, 1918, locomotive 1616, Pasco, Wash. Injured by hot oil from lubricator discharge pipe, due to pipe being stopped up and lubricator failing to work; 1 injured.

April 29, 1918, locomotive 1523, Auburn, Wash. Washout plug blew out; plug insecurely applied; attempted to tighten under pressure; 1 injured.

Eleven accidents; 11 injured.

## OREGON-WASHINGTON RAILROAD &amp; NAVIGATION Co.:

August 18, 1917, locomotive 1736, Umatilla, Oreg. Reflex water glass burst; cut by flying glass; 1 injured.

August 30, 1917, locomotive 761, Reith, Oreg. Broken cross stay blew out while attempting to calk under pressure; threads on cross stay stripped; 1 injured.

\* March 28, 1918, locomotive 331, Fargher, Oreg. Reverse lever became unlatched; teeth in quadrant partially stopped up with dirt; 1 injured. Three accidents; 3 injured.

## PENNSYLVANIA RAILROAD—WESTERN LINES:

July 5, 1917, locomotive 8457, Logansport, Ind. Lubricator drain cock blew out; 1 injured.

August 9, 1917, locomotive 8448, Morrow, Ohio. Squirt pipe broke at reducer bushing; 1 injured.

August 11, 1917, locomotive 8448, near Richmond, Ind. Squirt pipe broke at reducer bushing; 2 injured.

October 3, 1917, locomotive 9238, Mahoningtown, Pa. Squirt hose burst, due to poor material in hose; 1 injured.

November 4, 1917, locomotive 7074, Mahoningtown, Pa. Injector throttle blew out of fountain, due to being cross-threaded, and not entering fountain but three threads; 1 injured.

November 16, 1917, locomotive 7749, Cleveland, Ohio. Main air reservoir exploded, due to thinning of metal, caused by corrosion; 2 injured.

November 19, 1917, locomotive 7682, Wellsville, Ohio. Squirt hose burst; defective hose; 1 injured.

\* November 20, 1917, locomotive 8545, Corliss, Pa. Lubricator plug blew out; 1 injured.

December 25, 1917, locomotive 7224, Glen Osborne, Pa. Cab angle iron stud blew out, due to improper fit of stud and poor threads in hole; cab loose and working badly, causing stud to work in threads; 1 injured.

January 5, 1918, locomotive 7904, Unionport, Ohio. Reverse lever quadrant studs pulled out of backhead; 1 injured.

January 9, 1918, locomotive 7142, Rochester, Pa. Flue broke at weld; defective weld; 2 injured.

January 10, 1918, locomotive 7228, Hazelton, Ohio. Arch tube pulled out of throat sheet; tube badly bent and blistered, and entered sheet only  $\frac{3}{8}$  inch; 1 injured.

February 8, 1918, locomotive 9001, Niles, Ohio. Water glass gasket blew out, due to broken stud; old defect in stud, and water glass reported leaking four times just previous to accident; 1 killed.

February 11, 1918, locomotive 9881, near Condit, Ohio. Crown sheet failure; low water; no contributory causes found; appurtenances were damaged by accident to such an extent that their previous condition could not be determined; 2 injured.

February 19, 1918, locomotive, 9709, Columbus, Ohio. Burned by hot oil from lubricator, due to filling plug being cracked; 1 injured.

April 30, 1918, locomotive 7198, Beloit, Ohio. Left back knuckle pin lost out, causing rods to strip; 2 injured.

May 15, 1918, locomotive 7375, Niles Junction, Ohio. Superheater unit burst; 1 injured.

May 29, 1918, locomotive 7625, Allegheny, Pa. Wooden plug which had been driven into hole in squirt pipe blew out; 1 injured.

June 3, 1918, locomotive 8745, near Columbia City, Ind. Injector steam ram bonnet blew out; threads on bonnet badly worn; 1 injured.

Nineteen accidents; 1 killed, 23 injured.

## PENNSYLVANIA RAILROAD—EASTERN LINES:

July 27, 1917, locomotive 3444, Marysville, Pa. Arch tube burst, due to accumulation of mud in tube; 3 injured.

August 3, 1917, locomotive 2187, Conemaugh, Pa. Cap on blower at side of smoke arch blew off, due to being insecurely applied when replaced; 1 injured.

August 6, 1917, locomotive 1667, near Gallitzin, Pa. Broken staybolt blew out of bottom section of flue sheet; defective threads; 2 injured.

August 21, 1917, locomotive 2930, Allegheny, Pa. Lubricator control valve stem broke off; 1 injured.

August 27, 1917, locomotive 1952, near Betzwood, Pa. Crown sheet failure, due to weak and defective crown bolts, heavy accumulation of scale and mud around bases of crown bolts and on crown sheet, causing excessive overheating; 1 injured.

August 27, 1917, locomotive 488, Erie, Pa. Back head injector delivery pipe in cab burst, due to being worn thin; five days previous to accident pipe had burst, at which time repairs were made by brazing on a patch; 1 injured.

September 16, 1917, locomotive 3153, Ridgway, Pa. Flue broke at weld; 1 injured.

September 17, 1917, locomotive 484, Jersey City, N. J. Packing nut worked off injector steam valve; 1 injured.

October 9, 1917, locomotive 2595, Tidioute, Pa. Crown sheet failure; low water; no contributory causes found; 3 injured.

October 9, 1917, locomotive 1655, near Harrisburg, Pa. Flue broke at weld; 2 injured.

October 20, 1917, locomotive 3195, Philadelphia, Pa. Nipple connecting squirt hose pipe to delivery pipe blew out; defective threads on nipple and injector delivery pipe; 2 injured.

November 2, 1917, locomotive 20, Pittsburgh, Pa. Throttle valve leaking, permitted sufficient steam to pass into cylinders, with throttle lever in closed position, to cause locomotive to move; 1 injured.

November 7, 1917, locomotive 2082, Norristown, Pa. Air-pump steam-valve bonnet blew out, due to loose and improper fit of bonnet in body of valve; 1 injured.

December 2, 1917, locomotive 2510, West Philadelphia, Pa. Broken rivet blew out while being calked under pressure; old break; 1 injured.

December 23, 1917, locomotive 3591, near Angola, N. Y. Crown sheet failure; low water; no contributory causes found; 2 injured.

December 30, 1917, locomotive 4114, Northumberland, Pa. Flue driven ahead while attempting to calk leak with 50 pounds pressure on boiler; flue cracked and wasted away; 2 injured.

January 4, 1918, locomotive 2766, Jersey City, N. J. Lubricator filling plug blew out, due to defective threads on plug; 1 injured.

January 8, 1918, locomotive 2542, Metuchen, N. J. Crown sheet failure; low water; no contributory causes found; 1 killed, 1 injured.

January 9, 1918, locomotive 1476, Harrisburg, Pa. Bolts holding coupler pocket casting to buffer beam broke; 1 killed.

January 18, 1918, locomotive 1501, near Trenton, N. J. Crown sheet failure; low water; no contributory causes found; 2 injured.

February 9, 1918, locomotive 1187, Trenton, N. J. Reach rod broke, permitting reverse lever to become unlatched; old fracture in reach rod and guide brace missing; 1 injured.

February 23, 1918, locomotive 1555, Perth Amboy Junction, N. J. Side rod broke due to rod brass breaking and pulverizing; repairs not made after same had been reported defective; 2 injured.

March 10, 1918, locomotive 3215, near Gallitzin, Pa. Flue broke at weld; badly corroded; 3 injured.

March 14, 1918, locomotive 245, Renova, Pa. Broken flexible staybolt blew out; 1 injured.

March 31, 1918, locomotive 3402, Princeton Junction, N. J. Crown sheet failure; low water; injector delivery pipe leaking; both feed-pipe strainers partially stopped up; tank very dirty; crown bolts excessively calked; 1 injured.

April 13, 1918, locomotive 3107, Valley Camp, Pa. Crown sheet failure; low water; no contributory causes found; 1 injured.

May 8, 1918, locomotive 3618, Parkton, Md. Klinger type water glass burst; 1 injured.

May 26, 1918, locomotive 4055, Baltimore, Md. Right injector delivery pipe failed; pipe had been wrapped with burlap; 1 injured.

June 1, 1918, locomotive 1985, Philadelphia, Pa. Relief valve on left side broke, permitting steam to enter windows of combination car and first coach of passenger train; 11 injured.

June 9, 1918, locomotive 1817, Enola, Pa. Squirt hose burst, due to having been burned; 1 injured.

June 9, 1918, locomotive 3103, near Hemlock, Pa. Flue broke at weld; defective weld; 1 injured.

June 11, 1918, locomotive 1556, Enola, Pa. Squirt hose burst; defective hose; 1 injured.

Thirty-two accidents; 2 killed, 54 injured.

## PERE MARQUETTE RAILROAD.

August 6, 1917, locomotive 194, near Grand Blanc, Mich. Flue pocket blew out, due to being improperly applied; prossered with  $\frac{1}{4}$ -inch prosser in  $\frac{1}{4}$ -inch sheet; 1 injured.



September 25, 1917, locomotive 1008, Wyoming, Mich. Washout plug blew out while attempting to tighten under pressure; plug insecurely applied; only screwed into sheet one thread; 1 injured.

\*November 5, 1917, locomotive 399, Breckenridge, Mich. Water glass burst; cut by flying glass; 1 injured.

Three accidents; 3 injured.

#### PHILADELPHIA & READING RAILWAY.

September 22, 1917, locomotive 304, Dunellen, N. J. Tire on right front engine truck wheel broke; 1 killed.

\*October 30, 1917, locomotive 1088, Sheridan, Pa. Arch tube pulled out of back-flue sheet, due to improper application; flue cut too short, did not extend through sheet; boiler had just been washed, and scale from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch thick was found in tubes after accident; 1 injured.

December 18, 1917, locomotive 609, Skillman, N. J. Relief valve blew out of steam pipe to steam chest; threads on valve stripped and crossed; 1 injured.

December 29, 1917, locomotive 1564, Rickenbach, Pa. Patch bolt blew out of barrel of boiler; threads in hole corroded and practically wasted away; 2 injured.

December 31, 1917, locomotive 1722, Woodlane, Pa. Crown sheet failure; low water; no contributory causes found; 2 injured.

\*January 7, 1918, locomotive 112, Philadelphia, Pa. Injured due to pilot step on locomotive coming off; bolt worked loose; 1 injured.

Six accidents; 1 killed, 7 injured.

#### PITTSBURGH & LAKE ERIE RAILROAD:

March 17, 1918, locomotive 9561, West Elwood Junction, Pa. Crown sheet failure; low water; bottom water glass cock nearly closed with hard scale; middle gauge cock stuck shut; gauge cock drip stopped up, and gauge cock nipples extended too far into drip pan to permit the ends of same to be seen; 3 injured.

One accident; 3 injured.

#### RUTLAND RAILROAD:

November 1, 1917, locomotive 2410, Altona, N. Y. Crown sheet failure; low water; opening in bottom water glass connection restricted due to scale, and heel of back head brace directly over opening into boiler; flue broken off at weld, permitting undue loss of water; 1 injured.

January 22, 1918, locomotive 2079, near Beldens, Vt. Crown sheet failure; low water; top and bottom water glass cocks found closed at time of investigation; top of water glass leaking, due to badly worn gasket; left injector delivery pipe cracked and leaking at collar; 1 killed, 1 injured.

Two accidents; 1 killed, 2 injured.

#### ST. LOUIS, BROWNSVILLE & MEXICO RAILWAY:

April 23, 1918, locomotive 84, Beaumont, Tex. Crown sheet failure; low water; water glass did not extend far enough into top nut, permitting rubber gasket to be forced down over top of water glass, restricting opening, which may have caused false reading; 1 killed, 1 injured.

One accident; 1 killed, 1 injured.

#### ST. LOUIS-SAN FRANCISCO RAILWAY Co.:

July 25, 1917, locomotive 1286, near Fulton, Kans. Right main crank pin broke, due to old fracture and crystallization; 2 injured.

September 11, 1917, locomotive 680, Amber, Okla. Crown sheet failure; low water; both tank hose strainers missing; gasket in right feed-pipe connection missing, causing bad leak; 2 injured.

September 20, 1917, locomotive 1035, near Fickinger, Mo. Injector steam pipe broke off at collar at injector connection; 1 injured.

October 7, 1917, locomotive 33, Sherman, Miss. Union in air pipe from main reservoir to reversing cylinder blew apart, due to not being properly tightened up; 1 injured.

October 10, 1917, locomotive 3752, Kansas City, Mo. Blow-off cock handle located on running board in front of cab, broke, allowing operator to fall to ground; 1 injured.

\*January 3, 1918, locomotive 782, Granby, Mo. Foot caught between engine frame and cab apron; engine deck 5 inches lower than shoveling sheet; 1 injured.

January 14, 1918, locomotive 1001, New Albany, Kans. Flue broke at weld; overheated in welding; 1 injured.

January 21, 1918, locomotive 3733, Rosedale, Kans. Squirt hose burst; 1 injured.

February 15, 1918, locomotive 1101, Fall River, Kans. Injured due to fire-door latch failing to hold door open properly; 1 injured.

March 21, 1918, locomotive 656, near Cherokee, Kans. Fire-door chain broke; 1 injured.

March 21, 1918, locomotive 1109, near Teubrook, Mo. Defective fire door and latch, causing injury to fireman, while opening and closing; 1 injured.

\*March 25, 1918, locomotive 1247, Sapulpa, Okla. Scalded by hot water from squirt hose; defective hose; 1 injured.

April 1, 1918, locomotive 1248, Rogers, Ark. Boiler check and seat blew out, due to defective threads in check casing; improper repairs made when defect was reported; 1 injured.

April 12, 1918, locomotive 1204, West Tulsa, Okla. Flue broke at weld; overheated in welding; 1 injured.

May 4, 1918, locomotive 801, Okmulgee, Okla. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

May 26, 1918, locomotive 679, near Green Cox, Mo. Throttle leaking, causing locomotive to move; 1 injured.

June 29, 1918, locomotive 438, Ocala, Mo. Spring hanger broke, allowing equalizer to strike and knock out a projecting washout plug; 1 injured.

Seventeen accidents; 19 injured.

#### ST. LOUIS SOUTHWESTERN RAILWAY:

November 8, 1917, locomotive 48, near Mt. Calm, Tex. Crown sheet failure; low water; engineer unable to see water glass, due to improper shield; 2 injured.

One accident; 2 injured.

#### SAN ANTONIO & ARANSAS PASS RAILWAY:

March 24, 1918, locomotive 232, Yoakum, Tex. Headlight turbine burst, due apparently to excessive speed; 1 injured.

One accident; 1 injured.

#### SEABOARD AIR LINE RAILWAY:

August 14, 1917, locomotive 601, Aucilla, Fla. Bolt in eccentric broke, causing reverse lever to come out of quadrant; 1 injured.

August 15, 1917, locomotive 592, Jacksonville, Fla. Right piston broke in keyway, knocking out cylinder head; old fracture in keyway of piston; 1 injured.

September 1, 1917, locomotive 622, Raleigh, N. C. Arch-tube washout plug blew out; attempted to tighten under pressure; 2 injured.

October 25, 1917, locomotive 911, La Crosse, Va. Crown sheet failure; low water; no contributory causes found; 3 injured.

November 30, 1917, locomotive 771, Quincy, Fla. Arch tube pulled out of flue sheet, due to defective bead on tube; 1 injured.

December 25, 1917, locomotive 740, Wilmington, N. C. Scalded while attempting to remove substance from injector delivery nozzle, due to boiler check stuck open and failure of injector to operate; had been reported three times previous to accident and repairs not made; 2 injured.

December 26, 1917, locomotive 1579, Jacksonville, Fla. Bottom water glass cock blew out, due to improper construction; 1 injured.

May 27, 1918, locomotive 1525, Cayce, S. C. Expansion pad stud pulled out, due to broken frame and expansion pad studs, allowing an undue strain on stud that failed; 1 injured.

Eight accidents; 12 injured.

#### SOUTHERN PACIFIC-ATLANTIC SYSTEM:

September 13, 1917, locomotive 700, near Seguin, Tex. Tender truck axle broke, due to old fracture three-fourths the area of axle; material in axle badly crystallized; 1 injured.

September 14, 1917, locomotive 419, Gold Dust, La. Main air reservoir exploded, due to material corroded to only  $\frac{3}{8}$  inch in thickness along bottom where rupture occurred; 2 injured.

November 26, 1917, locomotive 436, Houston, Tex. Crown sheet failure; low water; no contributory causes found; 2 killed, 6 injured.

December 15, 1917, locomotive 460, Angus, Tex. Lead seat blew off of gauge cock; 1 injured.

January 18, 1918, locomotive 826, Bremond, Tex. Headlight turbine exploded; 1 injured.

February 11, 1918, locomotive 842, Hearne, Tex. Handrail loose in post, permitting fireman to fall; 1 injured.

April 9, 1918, locomotive 512, near Deer Park, Tex. Crown sheet failure; low water; no contributory causes found; 1 killed, 1 injured.

April 13, 1918, locomotive 829, Ennis, Tex. Crown sheet failure; low water; two staybolts and six crown bolts found broken, old breaks; 1 killed, 1 injured. Eight accidents; 4 killed, 14 injured.

#### SOUTHERN PACIFIC—PACIFIC SYSTEM:

\*September 3, 1917, locomotive 2147, near Webster, Cal. Right back side rod broke; 1 injured.

One accident; 1 injured.

#### SOUTHERN RAILWAY SYSTEM:

July 10, 1917, locomotive 933, near Stearns, Ky. Squirt hose valve worked open; defective valve; 1 injured.

July 22, 1917, locomotive 1255, China Grove, N. C. Reverse lever counterbalance spring rod broke, due to old fracture; 1 injured.

August 4, 1917, locomotive 6656, Collinsville, Ala. Boiler check cap blew off; 1 injured.

August 6, 1917, locomotive 901, Junction City, Ky. Squirt hose blew off; insecurely applied; 1 injured.

August 12, 1917, locomotive 961, Stevenson, Ala. Scalded by steam from ash-pan blower valve, due to packing missing from valve stem; 1 injured.

August 15, 1917, locomotive 623, Hollywood, Ala. Eccentric strap bolt broke or lost out, causing reverse lever to go into forward motion with sufficient force to break engineer's arm; 1 injured.

August 20, 1917, locomotive 372, Kernersville, N. C. Squirt hose blew off; insecurely clamped; 1 injured.

September 2, 1917, locomotive 1228, Irvington, Ala. Boiler check leaking, causing tank hose to blow off while attempting to make repairs; 1 injured.

September 3, 1917, locomotive 332, Princeton, Ind. Running board on locomotive broke, allowing fireman to fall to ground; 1 injured.

September 17, 1917, locomotive 802, Juliette, Ga. Squirt hose blew off; insecurely clamped; 1 injured.

October 9, 1917, locomotive 378, Gamble, Ala. Scalded by hot water from squirt hose, due to boiler check leaking; 1 injured.

October 11, 1917, locomotive 777, near Oakdale, Tenn. Injured due to defective shovel sheet; inspection reports not on file for October 5, 6, 8, 11, and 23, as required by rule 104; 1 injured.

October 14, 1917, locomotive 674, Burgin, Ky. Shaker bar slipped off; 1 injured.

October 24, 1917, locomotive 341, Hanes, N. C. Squirt hose burst; defective hose; 1 injured.

October 27, 1917, locomotive 6282, Oakdale, Tenn. Shaker bar broke at weld; 1 injured.

November 12, 1917, locomotive 3817, Charleston, S. C. Center portion of cast-iron dome cap blew out, due to old crack three-fourths its circumference,  $\frac{5}{8}$  inch deep; 1 injured.

November 14, 1917, locomotive 968, Prospect, Ala. Valve yoke broke, causing reverse lever to fly out of quadrant; 1 injured.

November 29, 1917, locomotive 571, Avenstoke, Ky. Reverse lever slipped out of quadrant; 1 injured.

November 29, 1917, locomotive 753, Princeton, Ind. Brakeman's foot caught between cab apron and cistern while locomotive was rounding curve; insufficient clearance between apron and cistern; 1 injured.

November 30, 1917, locomotive 331, Chamblee, Ga. Injector delivery pipe spanner nut broke while being tightened with hammer and chisel, with injector operating; 1 injured.

December 1, 1917, locomotive 6886, Slidell, La. Bolt lost out of cab apron hinge, permitting fireman to fall from locomotive; 1 injured.

December 1, 1917, locomotive 6898, Barnett, Miss. Reverse lever slipped out of quadrant; 1 injured.

December 7, 1917, locomotive 1284, Tallapoosa, Ga. Shaker bar slipped off post, due to improper fit; 1 injured.

December 18, 1917, locomotive 796, near Braswell, Ga. Insufficient clearance between reverse lever grip and air pipe; 1 injured.

December 20, 1917, locomotive 6180, Dayton, Tenn. Shaker bar slipped off post; 1 injured.

December 28, 1917, locomotive 95, Waverly Hall, Ga. Shaker bar broke; 1 injured.

January 1, 1918, locomotive 6110, Cincinnati, Ohio. Injured while removing tender brake beam on the road, due to broken brake beam hanger which had been reported before locomotive left terminal, and proper repairs not made; 1 injured.

January 1, 1918, locomotive 670, Waddy, Ky. Shaker bar slipped off post; 1 injured.

January 7, 1918, locomotive 4589, Inman Yard, Ga. Insufficient clearance between reverse lever and cab; 1 injured.

January 15, 1918, locomotive 636, Cordova, Ala. Platform on back of tender gave away; 1 injured.

January 17, 1918, locomotive 802, Varnell, Ga. Headlight dynamo throttle bonnet blew out, due to not being securely screwed into valve body; 1 injured.

January 18, 1918, locomotive 579, Berry, Ala. Flue broke at weld; overheated in welding; 1 injured.

January 25, 1918, locomotive 6202, Brannon, Ky. Fire door inoperative, due to follower head in air cylinder working loose; 1 injured.

January 27, 1918, locomotive 3857, near Stockbridge, Ga. Side rod broke; old fracture in rod; 2 injured.

February 2, 1918, locomotive 845, Ashby, Ala. Injured while operating reverse lever; insufficient clearance between brake valve and reverse lever; 1 injured.

February 4, 1918, locomotive 6265, Greenwood, Ky. Injured due to broken air operative fire door pedal; 1 injured.

February 7, 1918, locomotive 661, McDonough, Ga. Shaker bar slipped off socket; socket too large for lever; 1 injured.

February 25, 1918, locomotive 796, Pinsen, Ga. Reverse lever slipped out of quadrant; teeth on quadrant worn and insufficient clearance between reverse lever and boiler head; 1 injured.

March 4, 1918, locomotive 6263, Danville, Ky. Bonnet in air pump throttle loose and screwed out when opening throttle; 1 injured.

March 17, 1918, locomotive 678, near Lawrenceburg, Ky. Injured due to defective shoveling plate; 1 injured.

March 18, 1918, locomotive 6279, Stearns, Ky. Injured while operating reverse lever, due to improper lubrication caused by defective lubricator; 1 injured.

April 7, 1918, locomotive 1582, Memphis, Tenn. Spring hanger broke; 1 injured.

April 9, 1918, locomotive 838, near Biltmore, N. C. Right steam pipe in front end burst, due to defect in material; 2 injured.

April 16, 1918, locomotive 1074, New Baden, Ill. Reverse lever flew out of quadrant; 1 injured.

April 16, 1918, locomotive 277, Finley, Ala. Scalded by hot water from open top overflow pipe while operating injector; 1 injured.

April 19, 1918, locomotive 6611, Trussville, Ala. Scalded while operating ash-pan blower; operating handle broken off; 1 injured.

April 23, 1918, locomotive 349, Armour, Ga. Vertical post shaker bar handle too long, permitting fireman's hand to be caught between end of bar and water tender; 1 injured.

April 26, 1918, locomotive 516, Branchville, S. C. Injector steam pipe spanner nut broke while attempting to tighten under pressure; old fracture in nut, due to repeated use of hammer and chisel used in tightening; 2 injured.

May 2, 1918, locomotive 6607, Irondale, Ala. Shaker bar slipped off lever; 1 injured.

May 6, 1918, locomotive 459, Merriam, Ill. Squirt hose blew off; insecurely clamped; 1 injured.

May 10, 1918, locomotive 795, Inman Yards, Ga. Injured while operating reverse lever; insufficient clearance around reverse lever; 1 injured.

May 12, 1918, locomotive 6027, Danville, Ky. Apron not roughened or provided with other secure footing, as required by rule 117; 1 injured.

May 20, 1918, locomotive 819, Columbia, S. C. Injector steam pipe collar broke at brazing; old fracture in collar; 1 injured.

May 21, 1918, locomotive 4541, Edwardsville, Ala. Spring hanger broke; 1 injured.

May 31, 1918, locomotive 6955, Derby, Miss. Ash-pan blower valve improperly located; in order to operate it was necessary to reach between spokes of main driving wheel; locomotive moved while valve was being closed, breaking fireman's arm; 1 injured.

June 14, 1918, locomotive 6263, Junction City, Ky. Squirt hose burst; defective hose; 1 injured.

June 15, 1918, locomotive 1725, Macon, Ga. Squirt hose blew off; defective hose and insecurely applied; 1 injured.

June 15, 1918, locomotive 6275, near Nemo, Tenn. Squirt hose parted at splice; hose not clamped; 1 injured.

Fifty-eight accidents; 61 injured.

#### TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS:

September 18, 1917, locomotive 123, St. Louis, Mo. Water glass burst; inefficient shield; cut by flying glass; 1 injured.

October 25, 1917, locomotive 101, St. Louis, Mo. Water glass burst; scalded while closing water-glass cocks, due to being hard to close; 1 injured.

November 9, 1917, locomotive 89, St. Louis, Mo. Stud supporting grate in left front corner of firebox blew out; 1 injured.

Three accidents; 3 injured.

#### TEXAS & PACIFIC RAILWAY:

July 16, 1917, locomotive 363, near Mingus, Tex. Reverse lever slipped out of quadrant, due to worn and defective teeth, and water in boiler foaming; 1 injured.

July 24, 1917, locomotive 278, near Bunkie, La. Grate shaker bar slipped off lever; 1 injured.

August 4, 1917, locomotive 387, Odessa, Tex. Ash-pan operating lever slipped off of staff, due to staff being worn and coal in deck not permitting bar to properly engage on end of staff; 1 injured.

August 17, 1917, locomotive 239, Stanton, Tex. Air pipes from main reservoir on top of rear of tender so located as to cause fireman to fall to ground; 1 injured.

September 23, 1917, locomotive 455, Fort Worth, Tex. Squirt hose burst; defective hose; 1 injured.

October 4, 1917, locomotive 360, near Boracho, Tex. Right main driving axle broke off flush with wheel; old fracture extending over one-third its area; 1 injured.

October 8, 1917, locomotive 312, near Loraine, Tex. Engineer fell from running board while locomotive was running at a speed of 35 miles per hour; handrail was broken and defective; 1 injured.

October 29, 1917, locomotive 325, near Aubrey, Tex. Crown sheet failure; low water; left tank hose strainer missing; opening in bottom water glass obstructed by piece of  $\frac{1}{4}$ -inch pipe nipple,  $\frac{1}{4}$  inch long, and piece of rubber gasket 1 inch in length,  $\frac{1}{4}$  inch wide and  $\frac{1}{8}$  inch thick; bottom portion of water glass so dirty that water could not be seen; water glass reported seven times previous to accident; and proper repairs not made; water glass improperly located and equipped with inefficient shield glass, could not be seen from engineer's or fireman's seat box; gauge cocks improperly located; could not be properly operated from engineer's position in cab; crown bolts defective, due to crown sheet having been previously overheated; 2 injured.

January 3, 1918, locomotive 383, near Ranger, Tex. Crown sheet failure; low water; right tank well full of coal, and operating rod to tank valve broken off, rendering injector inoperative; 2 injured.

May 6, 1918, locomotive 390, Levinson, Tex. Right piston-rod key struck guide yoke, causing key to become loose and work out; 1 injured.

Ten accidents; 12 injured.

#### TOLEDO & OHIO CENTRAL RAILWAY:

July 3, 1917, locomotive 9571, near Mortimer, Ohio. Right front crank pin collar or collar bolt lost off, permitting side rod to foul guides while running at a high rate of speed; 1 injured.

December 30, 1917, locomotive 9622, Rendville, Ohio. Crown sheet failure; low water; top fitting of water glass stopped up with rubber gasket; disk

broke from valve spindle of left boiler check; heavy deposit of scale on crown sheet; crown bolts excessively calked and leaking; 1 injured.  
Two accidents; 2 injured.

#### TOLEDO, ST. LOUIS & WESTERN RAILROAD:

May 17, 1918, locomotive 161, Sorento, Ill. Squirt hose burst; defective hose; 1 injured.

One accident; 1 injured.

#### UNION PACIFIC SYSTEM:

October 4, 1917, locomotive 278, Reliance, Wyo. Crown sheet failure; low water; 39 button-head crown bolts with defective heads, and threads in sheet wasted away due to leakage and corrosion; left boiler check defective; tank hose strainers missing; right feed pipe wrapped with canvas, due to  $\frac{3}{4}$ -inch hole in pipe; injectors reported defective 11 times within 30 days previous to accident; 1 injured.

October 18, 1917, locomotive 2205, near Allen, Wyo. Crown sheet failure due to low water; appurtenances had been disturbed, damaged, and lost to such extent previous to investigation that their condition could not be determined; water glass and bottom water glass cock, one injector, both injector steam pipes, and throttle valves, one feed pipe, one feed-pipe strainer, and one gauge cock were lost or were not preserved for inspection; seven radial stays, three stay-bolts, and one back-head brace found broken with old breaks; right feed hose strainer was partially stopped up with burlap ravelings, and right feed hose had some particles of coal in hose, due to strainer on interior of tank out of place and failing to perform its functions; daily inspection reports were not on file as required by rule 104 for 10 trips completed within the previous 30 days; daily inspection report on file for last trip prior to accident bore notation, "Change water glass, so dark it is dangerous," signed by engineer; notation on back of this report, "Water glass not changed account not necessary," signed by foreman; 3 killed.

November 24, 1917, locomotive 2899, near Maxwell, Nebr. Flue pocket blew out; flue pocket not properly rolled or expanded; 1 injured.

December 11, 1917, locomotive 257, Rock River, Wyo. Injector ram bonnet blew out, due to defective threads; 1 injured.

December 19, 1917, locomotive 215, near Borie, Wyo. Crown sheet failure; excessive amount of scale on crown sheet and around base of T-bar bolt thimbles; lowest reading of water glass,  $2\frac{1}{4}$  inches above highest point of top flange knuckle of flue sheet; lowest reading of bottom gauge cock,  $2\frac{1}{2}$  inches above highest point of top flange knuckle of flue sheet; gauge cock drip partially stopped up; white lantern used as cab light; 2 injured.

April 19, 1918, locomotive 277, near Red Desert, Wyo. Left front side rod knuckle-joint pin worked out, causing rods to be stripped; 1 injured.

June 27, 1918, locomotive 456, Sharon Springs, Kans. Scalded while using squirt hose; defective hose; 1 injured.

Seven accidents; 3 killed, 7 injured.

#### VIRGINIAN RAILWAY:

November 19, 1917, locomotive 462, Briery, Va. Crown sheet failure; low water; no contributory causes found; 3 injured.

December 26, 1917, locomotive 476, Eggleston, Va. Crown sheet failure; low water; lantern used for headlight, due to electric light having failed before leaving terminal; no oil was found in lantern at time of investigation and cab lights in defective condition; 1 injured.

Two accidents; 4 injured.

#### WABASH RAILWAY:

October 6, 1917, locomotive 641, Willow Creek, Ind. Right main driving spring broke while running at a speed of about 25 miles per hour and fell on link motion, causing reverse-lever latch to jump out of quadrant and lever to strike engineer; 1 injured.

January 4, 1918, locomotive 597, Decatur, Ill. Scalded while closing water-glass cocks after tubular glass had broken, due to water-glass cocks being stuck wide open and hard to close; 1 injured.

February 8, 1918, locomotive 830, Decatur, Ill. Washout plug blew out; plug not securely screwed into sheet; 1 injured.

March 3, 1918, locomotive 2509, Cerro Gordo, Ill. Crown sheet failure; low water; bad leak at top water-glass cock; defect reported just previous to accident and repairs not made; 3 injured.

March 27, 1918, locomotive 430, Springfield, Ill. Locomotive was moved while man was underneath cleaning ash pan, due to pan not being arranged as required by law; 1 injured.

May 30, 1918, locomotive 2154, near Salisbury, Mo. Crown sheet failure; low water; injectors would not supply boiler when engine was working hard; had been reported six times just previous to accident; 1 injured.

Six accidents; 8 injured.

WASHINGTON TERMINAL Co.:

January 26, 1918, locomotive 31, Washington, D. C. Left eccentric pin broke, causing reverse lever to go into forward motion; 1 injured.

One accident; 1 injured.

WESTERN MARYLAND RAILWAY:

August 11, 1917, locomotive 720, Stewarton, Pa. Crown sheet failure; low water; no contributory causes found; 2 injured.

One accident; 2 injured.

YAZOO & MISSISSIPPI VALLEY RAILROAD:

July 5, 1917, locomotive 486 (I. C.), near Pantherburn, Miss. Flue broke at weld; overheated in welding; 1 injured.

November 22, 1917, locomotive 102, Redwood, Miss. Shaker bar became disconnected, due to pin in connecting rod losing out; 1 injured.

Two accidents; 2 injured.

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ILLUSTRATIONS OF LOCOMOTIVE BOILER  
EXPLOSIONS AND LOCOMOTIVE DEFECTS.

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