

INTERSTATE COMMERCE COMMISSION

SIXTH ANNUAL REPORT

OF THE

CHIEF INSPECTOR OF LOCOMOTIVE
BOILERS

TO THE

INTERSTATE COMMERCE COMMISSION

For the FISCAL YEAR
ENDED JUNE 30, 1917



WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

ANNUAL REPORT OF THE CHIEF INSPECTOR OF LOCOMOTIVE BOILERS.

WASHINGTON, *October 9, 1917.*

To the Interstate Commerce Commission:

In compliance with the statute, the sixth annual report of the Chief Inspector of Locomotive Boilers for the fiscal year ended June 30, 1917, is herewith respectfully submitted.

The period covered by this report represents the first full year's work 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 or tenders; also all of the casualties resulting from failure thereof. For that reason it can not, as a whole, be compared with previous reports which refer only to locomotive boilers and their appurtenances, but comparisons are made wherever possible to do so.

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 of persons killed or injured thereby.

The amendment to the locomotive boiler inspection law did not become effective until September 4, 1915; therefore, the record for 1916 includes accidents and casualties investigated under the amended law for 9 months and 26 days only.

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

	1917	1916
Number of locomotives inspected	47,542	52,650
Number found defective	25,909	24,685
Percentage found defective	54.5	47
Number ordered out of service	3,294	1,943

Number of accidents, number killed, and number injured.

	1917	1916
Number of accidents.....		
Number killed.....	616	537
Number injured.....	721	599

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 year ended June 30, 1917, classified according to occupations:

	Year ended June 30—			
	1917		1916	
	Killed.	Injured.	Killed.	Injured.
Members of train crews:				
Engineers.....				
Firemen.....	16	230	11	205
Brakemen.....	21	304	12	225
Conductors.....	13	60	9	74
Switchmen.....	3	14	1	6
Roundhouse and shop employees:	1	8		6
Boiler makers.....				6
Machinists.....		11	1	11
Foremen.....		8	1	11
Inspectors.....		1	1	3
Watchmen.....		3		3
Boiler washers.....		5		8
Hostlers.....		7		10
Other roundhouse and shop employees.....		6		6
Nonemployees.....	2	19	1	21
Nonemployees.....	5	22		7
Nonemployees.....	1	23	1	3
Total.....	62	721	38	599

Briefly summarizing, for the purpose of comparison, the record of accidents caused by failure of locomotives or tenders, or any part thereof, which were investigated by this bureau, as required by the law as amended, it shows a total of 616 accidents, with 62 killed and 721 injured thereby. Of these accidents, 389, in which 52 persons were killed and 469 injured, were due to failure of locomotive boilers or some part or appurtenance thereof, and this may properly be compared with the record of accidents and casualties investigated by this bureau under the locomotive boiler inspection law, as shown in former annual reports. Two hundred and twenty-seven of the accidents shown in this report, in which 10 persons were killed and 252 injured, were caused by failure of some part of the locomotive or tender other than the boiler and its appurtenances, and were investigated under the amended law.

Much of the increase in the number of defective locomotives and the accidents and casualties resulting from failure thereof has, no doubt, been brought about by unprecedented operating conditions,

which, together with the shortage of labor and material, has made difficult the proper maintenance of locomotives.

This, however, is not a justification for the operation by any carrier of locomotives that are in an improper condition for service, and the fact that some carriers by diligent efforts and careful supervision of repairs have not only maintained the condition of their locomotives, but have actually improved it during the past year, thereby increasing operative efficiency, is evidence that it can be done even under the present exacting operating conditions.

The problems which have confronted this bureau in the matter of withholding locomotives from service when defective and in violation of the law, under the operating conditions which have existed since the declaration of war and during the months immediately preceding it, have been unusually difficult and have required the most careful consideration. The importance of the prompt, as well as safe, movement of trains has been constantly in mind, and every privilege consistent with the purpose of the law has been granted; first, by special instructions to inspectors to exert every effort, even to the extent of giving personal assistance when necessary, to facilitate the prompt and safe movement of traffic, and, later, with the approval of the Commission, by means of certain modifications of the inspection rules which the representatives of the carriers claimed would be beneficial to them during the period of the war. The modifications agreed upon with the representatives of the carriers were not extensive, because both in the preparation and the enforcement of the rules we have considered efficiency in the operation of locomotives as second only to safety; therefore, have endeavored to conduct our work in the way which will, to the highest degree, promote both.

In this we have, as usual, had the cooperation and assistance of most of the carriers. It is to be regretted that some carriers appear to consider a congestion of traffic a legitimate excuse for operating locomotives that are known to be in an improper condition for service and in violation of the law, but this is done to an extent that, I believe, fully justifies the statement that on such roads running repairs are neglected to an extent which, if continued, will cause serious interference to traffic during the coming winter in spite of the most diligent efforts of the limited force of Federal inspectors to enforce maintenance of locomotives as required by the law.

During the year 668 applications were filed for extension of time for removal of flues, under the provisions of rule 10. Our investigation showed 56 of these locomotives in such condition that no extension could be granted under the law. Forty-eight were in such condition that the full extension requested could not be granted, but an extension for a shorter period was allowed. Fifty-four extensions

were granted after defects, disclosed by our inspections, had been repaired. Thirty-three applications were withdrawn for various reasons. The remaining 477 were granted for the full period asked for. The number of extensions granted this year represents an increase of 16 per cent over those granted during the preceding fiscal year, while the number which were refused shows a decrease of 8 per cent. This indicates that a more thorough inspection is being made by railroad companies before filing applications for such extensions.

Under rule 54, which requires a specification card containing the results of the calculations made in determining the working pressure and other necessary data to be filed, with the Chief Inspector, for each locomotive operated, and an alteration report or corrected card when any changes are made which affect the data shown, approximately 3,500 specification cards and 9,500 alteration reports were filed. These specification cards and alteration reports are carefully checked to determine whether or not the factor of safety meets the requirements of the rules, and when locomotive boilers are found in service with the factor below that required by the law, action is taken as provided therein. The importance of carefully checking specification cards and alteration reports is demonstrated by the fact that serious errors have been found in hundreds of them. In some instances locomotives have been found in service with steam pressure greater than the boilers were originally designed to carry. In a number of instances alteration reports have been filed showing patches applied in a manner which materially decreased the strength of the boiler. Investigation developed the fact that some companies did not calculate the stress on the boiler when the repairs were made and that others had used improper methods in calculating such stresses.

In order to prevent this, we have recommended; first, that the strength of patches should be determined by a competent person before they are applied; second, that the patch plate be the same thickness as the shell plate to which it is applied; and third, the efficiency of the patch seams should equal the corresponding seams in the boiler as originally designed. Observing these very plain recommendations will prevent boilers from being weakened by the application of improperly designed patches.

Six hundred and sixteen accidents caused by failure of locomotives or tenders or some part or appurtenance thereof, including the boiler, have been investigated during the past year.

Accident investigation is only of value when the knowledge gained thereby is used to prevent similar accidents. The result of a single investigation may not be sufficiently conclusive to base a change in methods or equipment thereon, but where investigations cover numer-

ous accidents extending over a period of years, changes can be recommended which can reasonably be expected to be of substantial value in preventing accidents of a similar character.

We now have complete records of the investigation of all of the accidents due to failure of locomotive boilers or their appurtenances, which resulted in injury, for a period of six years on more than 60,000 locomotive boilers, and for approximately two years this record includes accidents due to failure of any part or appurtenance of locomotives or tenders.

The similarity of the effect of accidents of certain types clearly points to improvements in construction or in methods which will promote safety in the operation of locomotives.

Section 7 of the locomotive boiler inspection act requires, in addition to the annual report of the Chief Inspector, that he shall make such recommendations for the betterment of the service as he may desire.

The advisability of recommending additional rules at this time has been given careful consideration, with a view to avoiding, as far as consistent with the purpose of the law, regulations which would require additional equipment or labor during the war, except where it has been demonstrated that both safety and efficiency will be increased thereby.

In accordance with the above the following recommendations with the reasons therefor are made:

First. New locomotives placed in service should have a mechanically operated fire door, so constructed that it may be operated by pressure of the foot on a pedal or push button, or other suitable appliance, located in the deck or floor of the cab or tender at a suitable distance from the fire door, so that it may be conveniently operated by the fireman from his position while engaged in firing such locomotive. Locomotives now in service should be equipped with a mechanically operated fire door, as above described, the first time they are shopped for general or heavy repairs, and all locomotives should be so equipped within a reasonable time; provided, that the above recommendation should not apply to locomotives equipped with mechanical stokers nor to locomotives using oil for fuel.

Second. Air operated power reversing gear should also have a steam connection, with an operating valve conveniently located in the cab, and so arranged that in case of air failure steam may be quickly used to operate the reversing gear.

Third. Holes for plugs or studs in boiler sheets should have a good thread the full thickness of the sheet in which they are applied, and all plugs and studs and other fittings should be screwed through the sheet. Plugs, studs, or other boiler fittings should not be repaired by calking, and under no circumstances should an attempt be made to tighten them while there is steam pressure on the boiler.

The first recommendation is based on the result of hundreds of investigations of boiler failures of a character which permits the steam and water contained in the boiler to be discharged into the fire box. With the swing type door, which is at present largely used, such a failure invariably results in blowing the fire door open and dis-

charging steam and boiling water, together with the contents of the fire box, into the cab of the locomotive, seriously or fatally burning persons therein. Such accidents frequently occur while the fireman is in the act of putting coal in the fire box and has the fire door open. Under such conditions it is impossible to close it. The automatic fire door will remain closed if the failure occurs while it is closed; and if the failure occurs while it is open, it will automatically close the instant the fireman's foot is removed from the operating device, thus preventing the direct discharge of steam and scalding water into the cab of the locomotive. Automatic fire doors are not a new or untried device, as there are thousands of them in service, and they are required by law in some of the states; but with the increase in the number of arch tubes used and in the number of flue failures, as well as the number of fire box failures, during the past year, it is, I believe, one of the most valuable safety devices that can be applied to a locomotive.

The second recommendation is made because defects to certain types of brake equipment, which results in the loss of main reservoir pressure, not only renders the brake inoperative, but renders the air operated reversing gear also inoperative. When this occurs on a locomotive being operated light, it results in the complete loss of control of the locomotive; and instances where this has occurred, resulting in serious accidents, have been investigated by this bureau. In one case where such steam connection had been provided it was found that it had been obstructed by placing blind gaskets in it, because it was claimed that the steam damaged the packing in the reversing cylinder. Such practices should be prohibited, and the steam connection applied and maintained so that it can be quickly used at all times.

The third recommendation is based on an investigation of more than 200 accidents, due to plugs, studs, or other boiler fittings blowing out. In a large percentage of the cases it was due to improper application, as the plug, stud, or fitting had only been screwed part way through the sheet, while in some cases not more than two or three threads were holding in the sheet. In other cases the parts in question failed while being tightened under pressure, and it is a noteworthy fact that in almost every instance where injuries occur, due to such parts being tightened under pressure, the work is performed by or under the direct supervision of the foreman or officer in charge, whose duties are to prevent such practices. In no instance have these parts failed when properly applied and maintained.

No formal appeal from the decision of any inspector has been 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—					
	1917			1916		
	Accidents.	Killed.	Injured.	Accidents.	Killed.	Injured.
Air reservoirs	4	1	4	6		9
Aprons	6		6	2		2
Arch tubes	9		15	5	1	7
Ash-pan blowers	7	1	6	4		4
Axles	7		11	4		4
Blow-off cocks	22		23	19		20
Boiler checks	13		13	8		9
Boiler explosions:						
A. Shell explosions	1	2	8			
B. Crown sheet; low water; no contributory causes found	38	30	66	23	7	38
C. Crown sheet; low water; contributory causes or defects found	23	15	32	16	13	21
D. Fire box; defective stay bolts, crown stays or sheets	2		2	1		3
E. Fire box; water foaming				1		2
Brakes and brake rigging	1		1	4	1	6
Couplers	4	1	3	4		7
Crank pins, collars, etc.	6	2	4	8		9
Crossheads and guides	1		2	3		4
Cylinder cocks and rigging	1		1	1		1
Cylinder heads and steam chests	6	2	7	1		1
Dome caps				1	1	
Draft appliances	2		3	1		2
Draw gear	15	1	14	22	2	21
Fire doors, levers, etc.	5		5	2		2
Flues	50		60	37		46
Flue pockets	2		2	1		2
Footboards	8		8	2		2
Gauge cocks				1		1
Grease cups	3		3	3		3
Grate shakers	51		51	23		23
Handholds	15		15	4	1	3
Headlights and brackets	8	1	7	6		7
Injectors and connections (not including injector steam pipes)	18		19	27		28
Injector steam pipes	16	1	18	11		14
Lubricators and connections	11	1	12	13		13
Lubricator glasses	13		13	11		11
Patch bolts	1		1	2		3
Pistons and piston rods	4		4	5	1	4
Plugs (arch tube and washout)	8		12	17	2	22
Plugs in fire-box sheets	1		1	3		3
Reversing gear	29		29	38		38
Rivets	4		4	4		4
Rods (main and side)	17		20	15	1	16
Safety valves	1		1	1		1
Sanders	1		1	1		1
Side bearings	1		1	1		1
Springs and spring rigging	6		6	8	2	7
Squirt hose	69		70	62	1	61
Staybolts	3		5	1		1
Steam piping and blowers	9	1	13	16		22
Steam valves (inside and outside of cab)	6	1	5	10	1	13
Studs	7		11	10	2	8
Superheater tubes				3		4
Throttle glands	2		2	1		1
Throttle leaking	1		1	1		1
Throttle rigging	7	2	10	5	1	4
Trucks, leading, trailing, or tender	1		18			
Valve gear, eccentrics, and rods	10		11	7		7
Water bars				1		1
Water glasses	36		37	29		29
Water-glass fittings	7		7	7		7
Wheels	3		3			
Miscellaneous	14		14	14		15
Total	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 [The ownership is generally in a railroad corporation and the abbreviation for railroad or railway

Parts defective, inoperative or missing, or in violation of rules.	Akron & Barberton Belt.	Ala. Great Southern.	Ala., Tenn. & Northern.	Alliquipp & Southern.	Ann Arbor.	Arizona Eastern.	Atch., Top. & Santa Fe.	Atlanta & West Point and Atl. Western Ry. of Ala.
1 Air compressors.....								
2 Arch tubes.....			1				5	
3 Ash pans or mechanism.....							3	
4 Axles.....							1	2
5 Blow-off cocks.....								
6 Boiler checks.....	1				2	1	9	
7 Boilershell.....		1					7	
8 Brake equipment.....					2	2	43	
9 Cabs or cab windows.....		6	1		3	5	109	
10 Cab aprons or decks.....							18	
11 Cab cards.....						1	7	1
12 Coupling or uncoupling devices.....							8	
13 Crossheads, guides, pistons or piston rods.....		4				2	10	
14 Crown bolts.....		2			1		8	
15 Cylinders, saddles, or steam chests.....							17	
16 Cylinder cocks or rigging.....	1	2			1		65	
17 Domes or dome caps.....		2					7	
18 Draft gear.....							14	
19 Draw gear.....		1	1				8	
20 Driving boxes, shoes, wedges, pedestals, or braces.....	1	3	1		5	1	54	1
21 Fire-box sheets.....					4	1	8	
22 Flues.....					2		32	4
23 Frames, tailpieces or braces, locomotive.....						1	13	
24 Frames, tender.....							6	
25 Gauges or gauge fittings, air.....		1				1	7	
26 Gauges or gauge fittings, steam.....					2		4	
27 Gauge cocks.....					1		26	
28 Grate shakers.....		1	2		1	1	62	1
29 Handholds.....							12	
30 Injectors inoperative.....	1				1		5	
31 Injectors and connections.....							1	
32 Inspections or tests not made as required.....	3	4	3		3	4	127	1
33 Lateral motion.....			2		3	4	128	
34 Lights, cab or classification.....			1				24	
35 Lights, headlights.....		1				1	5	
36 Lubricator or shields.....							5	
37 Mud rings.....							5	
38 Packing nuts.....							21	
39 Packing, piston rod and valve stem.....						4	43	
40 Pilot or pilot beams.....					5		20	
41 Plugs or studs.....							22	
42 Reversing gear.....							16	
43 Rods, main or side, crank pins or collars.....							2	
44 Safety valves.....		2			8		35	
45 Sanders.....						1	6	
46 Springs or spring rigging.....		1				2	77	
47 Squirt hose.....		9	3		6		44	1
48 Staybolts.....							16	
49 Staybolts broken.....							3	
50 Steam pipes.....		1	2				127	2
51 Steam valves.....						1	20	
52 Steps.....			1				12	
53 Tanks or tank valves.....						2	8	
54 Telltale holes.....			1				41	
55 Throttle or throttle rigging.....					5		12	
56 Trucks, engine or trailing.....					2		9	
57 Trucks, tender.....		1					13	
58 Valve motion.....		4	1		2		29	
59 Washout plugs.....							1	
60 Water bar or combustion flues.....	1	1			1		105	
61 Water glass, fittings or shield.....							4	
62 Wheels.....		3			3	2	45	
63 Miscellaneous—Signal appliance, badge plates, brakes (hand).....		1	1		4	1	43	4
Number of defects.....	8	51	21		62	34	1,640	17
Locomotives reported.....	10	91	22	10	43	44	2,056	41
Locomotives inspected.....	6	56	15	17	33	29	1,488	63
Locomotives defective.....	5	27	9		13	8	689	8
Percentage inspected found defective.....	83	48	60		40	28	46	13
Locomotives ordered from service.....		2	6		4		53	4

ordered from service; and number and kind of defects. is omitted in most cases. In designating other corporations the abbreviation "Co." is added.]

Atlanta, Birm. & Atl.	Atlantic City.	Atlantic Coast Line.	Baltimore & Ohio.	Balt., Chesapeake & Atl.	Bangor & Aroostook.	Belt Ry. of Chicago.	Bessemer & Lake Erie.	Bingham & Garfield.	Birmingham Southern.	Boston & Albany.	Boston & Maine.	Boycie City, Gay, & Alp.	Brooklyn Eastern Dist. Terminal.	Buffalo & Susquehanna.	Buffalo Creek.	Buffalo, Roch. & Pitts.	Butte, Anaconda & Pac.
		2	45							1							1
		16	16														2
		3	12								1						3
		1	38														4
	1	8	91							1	1						5
		14	156		1					4	1						6
		93	603		2					8	22						7
		37	139						1	1	2		2				8
		3	24		2					1	14			1			9
		1	33								5						10
		61	78						2		5						11
		3	164								53						12
	1	26	91							8	5						13
		10	478								5						14
		3	25								3						15
		2	68								1						16
		2	72								1						17
		1	8								1						18
	1	45	227		1	2	2			7	56						19
		8	125							3	36						20
		25	146							1	1						21
	1	19	136							1	1						22
		85	58								15						23
		4	21								1						24
		3	20								1						25
	1	1	83								17						26
	1	1	46								48						27
			154							15	17						28
			18								2						29
		1	16								2						30
		107	659								54						31
	6	25	66								16						32
	1	1	107								13						33
			2								8						34
			2								13						35
			2								194						36
			24								11						37
	3	20	200							8	4						38
		1	3								2						39
		4	29								1						40
	1	2	51								1						41
		5	14								2						42
	1	17	506							13	194						43
			6								3						44
		4	61								1						45
		55	540								150						46
	3	1	25								1						47
		19	74								3						48
	10	283	615								300						49
			8								2						50
		10	67								2						51
		19	51								1						52
		53	275								2						53
	4	3	22								5						54
		22	90								1						55
	1	18	26								4						56
		23	60								20						57
			18								2						58
		18	197								5						59
		4	24								3						60
		30	149								17						61
	5	1	23								55						62
			204								1						63
			5														
	50	9	1,412	7,958	17	37	22	11	46	1	152	1,204		4	41	461	14
	86	15	845	2,388	12	95	83	193	21	25	369	1,141	13	10	54	22	329
	73	10	966	2,370	6	35	6	85	22	9	144	553		5	55	4	108
	28	3	556	1,737	3	16	4	3	13	1	60	331		1	17		71
	38	30	58	1,737	50	46	67	4	59	11	42	61		20	31		66
	4	1	77	250	1	2			1		9	93					32

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

Parts defective, inoperative, or missing, or in violation of rules.	Chicago, W. Pull. & Sou.									Colorado & Southern.																			
	Cin., Ham. & Dayton.	Cin., Indianapolis & W.	Cin., Leb. & Northern.	Cin., N. O. & Texas Pac.	Cincinnati Northern.	Cleve., Cin., Chi. & St. L.	Coal & Coke.	Colorado & Southern.	Colorado & Wyoming.	Colorado Midland.	Copper Range.	Cornwall & Lebanon.	Copper Riv. & Northwn.	Cripple Creek & C. Sigs.	Cumberland & Pa.	Cumberland Valley.	Davenport, R. I. & N.W.	Delaware & Hudson.	Delaware, Lack. & Wn.	Denver & Rio Grande.	Denver & Salt Lake.	Detroit & Mackinac.	Detroit & Tol. Shore L.	Detroit Terminal.	Detroit, Tol. & Irontoni.	Donora Southern.	Duluth & Iron Range.		
1 Air compressors	7		3			7														2						3		1	
2 Arch tubes	1				1															1						1		2	
3 Ash pans or mechanism	1	1	1	1	1																1							3	
4 Axles																												4	
5 Blow-off cocks	9	1	12			13														32						7		5	
6 Boiler checks	9	1	3		1	13	2												18							7		6	
7 Boiler shell	34	7	3		2	15	1												47							5		7	
8 Brake equipment	31	6	26		1	39	16												49							1		8	
9 Cabs or cab windows	6				6	13	12												2							5		9	
10 Cab aprons or decks	1					4	4												8							1		10	
11 Cab cards	6					4	3												3							2		11	
12 Coupling or uncoupling devices	4	1			1	3	1												6								12		
13 Crossheads, guides, pistons, or piston rods	17					8	8												9							4		13	
14 Crown bolts	22	2	1		1	8	8												5							6		14	
15 Cylinders, saddles, or steam chests	29	1	4		2	11	21												31							6		15	
16 Cylinder cocks or rigging	1	1	1		1	6	1												5							4		16	
17 Domes or dome caps	5					4	2												9							1		17	
18 Draft gear	2	3				2	7												3							1		18	
19 Draw gear	13		5		8	15	7												11							13		19	
20 Driving boxes, shoes, wedges, pedestals, or braces	4	1	1			7	7												3							4		20	
21 Fire-box sheets	50	2	6			4	2												9							19		21	
22 Flues	22	1	13			4	4												5							5		22	
23 Frames, tailpieces, or braces, locomotive	1	6	3			4	4												2							1		23	
24 Frames, tender	1					3	3												2							1		24	
25 Gauges or gauge fittings, air	1	1	1			1	2												6							1		25	
26 Gauges or gauge fittings, steam	14	1	2		1	24	1												15							2		26	
27 Gauge cocks	37	2	27		10	5	1												9							12		27	
28 Grateshakers																												28	
29 Handholds	3				1														1									29	
30 Injectors inoperative																												30	
31 Injectors and connections	62	4	10		16	46	12												20							14		31	
32 Inspections or tests not made as required	2	6	1		2	5	6												2							4		32	
33 Lateral motion	15	2	5		1	8	2												4							15		33	
34 Lights, cab or classification	4		2		3	3													4							1		34	
35 Lights, headlights						1																						35	
36 Lubricator or shields	5					1													9									36	
37 Mud rings	2	42	2	16		18	6												14							12		37	
38 Packing nuts	2	13	4	16	7	28	5												3							15		38	
39 Packing, piston rod and valvestem	2	31	3	26	21	21	3												9							10		39	
40 Pilot or pilot beams	4		2			2													1							3		40	
41 Plugs or studs	4		1		1	3													1									41	
42 Reversing gear	2	1				1													2									42	
43 Rods, main or side, crank pins, or collars	6	14	1	5	4	9	2												17							22		43	
44 Safety valves						1	2																				1		44
45 Sanders	2	4				5													8								4		45
46 Springs or spring rigging	23	6	10		1	28	2												14							25		46	
47 Squirt hose	4		1		2	4																						47	
48 Staybolts	23	1	3		3	1	1												1									48	
49 Staybolts broken	12	60	10	9	3	26	26												171							33		49	
50 Steam pipes	10	2	3		1	5	1												38							3		50	
51 Steam valves	2	1	2			5	1												1									51	
52 Steps	11		1		1	4	1												4							2		52	
53 Tanks or tank valves	38	2	9		5	15	5												17							12		53	
54 Telltale holes	2	6	2		2	1	1												5									54	
55 Throttle or throttle rigging	26	1	12		4	57	5												3							9		55	
56 Trucks, engine or trailing	5				2	6													1									56	
57 Trucks, tender	2	4		13	5	2	1												12							4		57	
58 Valve motion						2																						58	
59 Washout plugs	33	2	16		2	22													10							5		59	
60 Water bar or combustion flues	4	1	4			12													7							9		60	
61 Water glass, fittings or shield	21	5	18		15	31	2												2							9		61	
62 Wheels	2	17	3	4	2	46	3												26							12		62	
63 Miscellaneous—Signal appliance, badge plates, brakes (hand).	17																		3									63	
Number of defects	42	826	85	307	126	52	638	150	301											1,362	91	9	14		377		42		
Locomotives reported	10	171	52	24	194	38	763	32	192											584	59	35	14	17	67	14	111		
Locomotives inspected	10	247	60	56	84	40	399	46	131											577	28	39	6		93	20	24		
Locomotives defective	7	184	22	53	37	20	213	34	97											382	23	5	6		73		17		
Percentage inspected found defective	70	75	37	96	44	50	54	74	74											66	82	13	100		78		71		
Locomotives ordered from service	1	14	4	5	9	3	10	3	3											4	40	2			7		71		

Tables showing number of locomotives inspected, found

Table with 7 columns: Parts defective, inoperative, or missing, or in violation of rules. Ulster & Delaware. Union Pacific. Vandalia. Va. Iron, Coal & Coke Co. Virginian. Wabash. Rows include Air compressors, Arch tubes, Ash pans or mechanism, Axles, Blow-off cocks, Boiler checks, Boiler shell, Brake equipment, Cabs or cab windows, Cab aprons or decks, Cab cards, Coupling or uncoupling devices, Crossheads, guides, pistons, or piston rods, Crown bolts, Cylinders, saddles, or steam chests, Cylinder cocks or rigging, Domes or dome caps, Draft gear, Draw gear, Driving boxes, shoes, wedges, pedestals or braces, Fire-box sheets, Flues, Frames, tailpieces or braces, locomotive, Frames, tender, Gauges or gauge fittings, air, Gauges or gaugo fittings, steam, Grate shakers, Handholds, Injectors inoperative, Injectors and connections, Inspections or tests not made as required, Lateral motion, Lights, cab or classification, Lights, headlights, Lubricator or shields, Mud rings, Packing nuts, Packing, piston rod and valve stem, Pilot or pilot beams, Plugs or studs, Reversing gear, Rods, main or side, crank pins or collars, Safety valves, Sanders, Springs or spring rigging, Squirrel hose, Staybolts, Staybolts broken, Steam pipes, Steam valves, Steps, Tanks or tank valves, Telltale holes, Throttle or throttle rigging, Trucks, engine or trailing, Trucks, tender, Valve motion, Washout plugs, Water bar or combustion flues, Water glass, fittings or shield, Wheels, Miscellaneous—Signal appliances, badge plates, brakes (hand). Summary rows for Number of defects, Locomotives reported, Locomotives inspected, Locomotives defective, Percentage inspected found defective, and Locomotives ordered from service.

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

Table with 12 columns: Wabash-Pittsburgh Terminal Co., Washington Terminal, Western Maryland, Western Pacific, Wheeling & Lake Erie, Wichita Falls & North-western, Wichita Valley, Woodward Iron Co., Yazoo & Mississippi Valley, Zanesville & Western, Roads with less than 10 locomotives, Total defects. Rows include various locomotive parts and summary rows for Number of defects, Locomotives reported, Locomotives inspected, Locomotives defective, Percentage inspected found defective, and Locomotives ordered from service.

ACCIDENTS RESULTING FROM THE FAILURE OF LOCOMOTIVES AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

[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 advised thereof until 30 to 90 days subsequent to their occurrence, which was too late to permit a proper investigation.]

ARCHISON, TOPEKA & SANTA FE RAILWAY:

*July 15, 1916, locomotive 1619, Fulton, N. Mex. Drawbar pin between locomotive and tender broke, permitting fireman to fall between; 1 injured.

August 12, 1916, locomotive 1143, near La Rose, Ill. Crown sheet failure; low water; no contributory causes found. Gauge cocks, water-glass cocks, safety valve and steam gauge destroyed at time of accident; therefore, their condition could not be determined; 2 killed, 1 injured.

August 21, 1916, locomotive 1469, near Larson, Cal. Left high pressure main rod broke, knocking hole in boiler 4 by 8 inches; 1 injured.

September 15, 1916, locomotive 928, near Fluhr, Cal. Side rod broke, due to wrist pin losing out; excessive pound in main boxes and low-pressure cylinder loose; defective condition reported a number of times just previous to accident; 3 injured.

September 28, 1916, locomotive 3000, near Carrizo, Ariz. Crown sheet failure; low water; no contributory causes found; 1 injured.

*October 3, 1916, locomotive 964, San Bernardino, Cal. Drawbar on locomotive broke while making coupling; 1 injured.

*November 9, 1916, locomotive 975, Crozier, Ariz. Right front driver tire came off; 1 injured.

*November 9, 1916, locomotive 582, Emporia, Kans. Drain cock blew out of branch pipe; 1 injured.

January 25, 1917, locomotive 946, Summit, Cal. Drawbar and safety chains broke, due to chafing iron on tender of insufficient radius to permit proper curving of locomotive, and crystallization of drawbar; 1 injured.

February 7, 1917, locomotive 1968, Lamanda Park, Cal. Arch tube burst in oil-burning locomotive, due to improper circulation in tube; 1 injured.

February 20, 1917, locomotive 1126, near Engle, N. Mex. Drawbar and safety chains between locomotive and tender broke; right safety chain failed in defective weld which could have been easily detected by inspection; left safety chain failed by clevis spreading and slipping off pin. After repairs had been made and engine ready for service it was again found that right safety chain had 13 inches of slack and left one had 14 inches, standing on straight track; 1 killed.

*March 20, 1917, locomotive 1612, Domingo, N. Mex. Defective cab apron, causing fireman to fall; 1 injured.

April 3, 1917, locomotive 1604, near Gise, N. Mex. Crown sheet failure; low water; appurtenances disturbed and destroyed to such an extent that previous condition could not be determined; 2 killed, 1 injured.

April 14, 1917, locomotive 671, near Brazilton, Kans. Crown sheet failure; low water; no contributory causes found; 1 injured.

May 2, 1917, locomotive 1421, near Holbrook, Ariz. Crown sheet failure; low water; no contributory causes found; 1 killed, 3 injured.

May 25, 1917, locomotive 1650, Ribera, N. Mex. Squirt hose valve blew off of pipe, due to being improperly applied; 1 injured.

June 7, 1917, locomotive 1819, near Florence, Kans. Crown sheet failure; low water; no contributory causes found; 1 injured.

Seventeen accidents; 6 killed, 20 injured.

ATLANTIC COAST LINE RAILROAD:

February 4, 1917, locomotive 1022, Cades, S. C. Crown sheet failure; low water; no contributory causes found; 1 injured.

March 3, 1917, locomotive 352, near South Rocky Mount, N. C. Crown sheet failure; low water; top water-glass cock found only one-eighth turn open, and six radial stays broken; 2 injured.

May 28, 1917, locomotive 159, Jacksonville, Fla. Water glass burst; cut by flying glass; shield improperly applied; 1 injured.

June 26, 1917, locomotive 13, Wilmington, N. C. Washout plug blew out while attempting to tighten under pressure; defective threads; 1 injured.

Four accidents; 5 injured.

BALTIMORE & OHIO RAILROAD:

July 5, 1916, locomotive 2214, Glencoe, Ohio. Petticoat pipe in front end came loose and fell over nozzle, causing back draft, due to improper application when general repairs had been made to locomotive five days previous to accident; 2 injured.

July 7, 1916, locomotive 2017, Sleepy Creek, W. Va. Reverse lever quadrant bracket studs blew out; 2 injured.

July 8, 1916, locomotive 2216, Glenwood, Pa. Washout cap blew off while being tightened under pressure; defective cap and threads; 1 injured.

*August 3, 1916, locomotive 586, Lorain, Ohio. Train parted, due to worn lock pin on tender of locomotive; 1 injured.

August 29, 1916, locomotive 2622, Dorton, Ky. Spindle blew out of flange-oiler valve; defective valve; 1 injured.

August 31, 1916, locomotive 2734, Chicago Junction, Ohio. Lubricator drain valve broke off; old flaw in valve; 1 injured.

September 10, 1916, locomotive 1226, Foxburg, Pa. Injector steam pipe spanner nut blew off; defective threads and loose-fitting nut; nut had been badly damaged and stretched; 1 injured.

*September 23, 1916, locomotive 3756, Callery, Pa. Cross equalizer broke, allowing pilot to drop sufficiently to catch guard rail and derail locomotive, due to equalizer being worn and weakened; 1 injured.

October 11, 1916, locomotive 115, Security, Md. Reflex water glass burst; scalded by hot water and cut by flying glass; 1 injured.

October 20, 1916, locomotive 99, Philadelphia, Pa. Boiler brace stud in back head of boiler blew out, due to stud having been screwed into sheet only $\frac{1}{8}$ inch, or two and one-half threads; brace was attached to back head by two 1-inch studs, one of which had been broken off about six weeks. The one which blew out and caused accident had been carrying the entire load and had been leaking badly; 2 injured.

November 30, 1916, locomotive 4225, Nova, Ohio. Side rod broke, due to knuckle pin working out; 1 injured.

December 1, 1916, locomotive 4012, Rosedale, Ohio. Grease-cup plug blew out of back end of main rod, due to contents of fusee placed in cup on account of pin running hot; 1 injured.

*December 2, 1916, locomotive 970, Waterford, Ohio. Boiler check stuck open; 1 injured.

January 11, 1917, locomotive 1902, Newark, Ohio. Throttle valve could not be closed, due to excessive lift and valve wing catching on seat; 2 injured.

January 11, 1917, locomotive 2714, Cambridge, Ohio. Drifting valve bonnet blew off; 1 injured.

January 15, 1917, locomotive 1312, Everett, Ohio. Left main driving wheel tire and wheel center broke, due to old defects in rim and spokes; 1 injured.

*February 13, 1917, locomotive 1920, Triadelphia, W. Va. Boiler pad stud became loose, due to driving wheel rubbing; 1 injured.

February 18, 1917, locomotive 4328, near Poplar, Md. Crown sheet failure; low water; no contributory causes found; 4 injured.

*March 22, 1917, locomotive 1628, McMechen, W. Va. Drawbar between locomotive and tender broke; 1 injured.

March 31, 1917, locomotive 2339, near Barberton, Ohio. Drawbar pin between locomotive and tender broke; pin was reduced in size, due to wear, from original size of $2\frac{3}{4}$ to $2\frac{1}{2}$ inches, and had a flaw in material where drawbar engaged; locomotive had been operating without safety chains for a period of 60 days, in plain violation of rule 122; 1 injured.

*May 4, 1917, locomotive 687, near Wheatland, Ind. Reverse lever slipped out of quadrant, due to counterbalance spring being improperly adjusted, and reverse lever latch spring being too weak to hold lever in position; 1 injured.

*May 5, 1917, locomotive 2018, Stewart, W. Va. Left main driving axle broke; 1 injured.

May 10, 1917, locomotive 2384, Garret, Ind. Blower valve bonnet blew out, due to improper fit and defective threads; 1 injured.

May 13, 1917, locomotive 2158, Independence, W. Va. Left back section of side axle broke at weld; defective weld; 1 injured.

*May 24, 1917, locomotive 1433, Mineral, Ohio. Tiebar on tender truck came down, derailing tender and five passenger cars, due to defective threads on nuts and bolts, permitting nuts to work loose and shear cotter key; 18 injured.

June 8, 1917, locomotive 1680, Philadelphia, Pa. Handhold on locomotive gave way, due to nut on bolt, with which it was attached, being too large for threaded part of bolt and slipping off; 1 injured.

June 23, 1917, locomotive 1951, Haselton, Ohio. Injector delivery pipe became disconnected at injector connection, due to poor threads; defect reported twice just previous to accident and repairs not made; 1 injured.

June 23, 1917, locomotive 1879, near Opekeska, W. Va. Locomotive and tender derailed while backing up, due to broken tender truck center casting, allowing tender truck side bearing to run in contact; old defect which could have been easily detected and proper inspection been made as required by rule 104; 1 injured.

Twenty eight accidents; 52 injured.

PESSEMER & LAKE ERIE RAILROAD:

August 11, 1916, locomotive 67, Hewitts, Pa. Left No. 1 coil spring broke or lost out, causing cross equalizer to fly out of place, breaking off blow-off cock; 1 injured.

September 16, 1916, locomotive 67, Albion, Pa. Broken rivet blew out while being calked under 180 pounds steam pressure; defective rivet; 1 injured.

Two accidents; 2 injured.

BIRMINGHAM BELT RAILROAD:

March 7, 1917, locomotive 3707 (St. L. & S. F.), Marlee Junction, Ala. Lubricator plug blew out; defective threads on plug; 1 injured.

One accident, 1 injured.

BOSTON & ALBANY RAILROAD:

August 15, 1916, locomotive 1038, near Chester, Mass. Crown sheet failure; low water; crown sheet was covered with loose scale; opening in fusible plug filled with sediment or slag, rendering it inoperative; report of inspection made August 12, three days before accident occurred, shows fusible plug removed and cleaned, yet it was found in this condition and had to be cut out of the sheet; 3 injured.

December 8, 1916, locomotive 1203, near West Brookfield, Mass. Crown sheet failure; low water; gauge cock drip pipe stopped up; 1 injured.

March 1, 1917, locomotive 975, Chatham, Mass. Flue broke at safe end weld; reheated in welding; 1 injured.

Three accidents; 5 injured.

BOSTON & MAINE RAILROAD:

July 21, 1916, locomotive 1473, near Penacook, N. H. Grate shaker lever slipped from post; bolt missing from top of post; 1 injured.

August 7, 1916, locomotive 1337, Gilbertville, Mass. Scalded by hot water from defective squirt hose; 1 injured.

August 31, 1916, locomotive 2428, near North Wilmington, Mass. Crown sheet failure; low water; no contributory causes found; 1 injured.

October 4, 1916, locomotive 2912, East Cambridge, Mass. Ash-pan lever slipped from nut; due to nut missing; 1 injured.

October 14, 1916, locomotive 2419, near Wells Beach, Me. Grate shaker lever slipped off, due to pin missing; 1 injured.

October 14, 1916, locomotive 2355, Coventry, Vt. Tubular water glass burst; scalded by hot water and cut by flying glass; shield removed at time of accident; 1 injured.

November 13, 1916, locomotive 2320, near Sanford, Me. Grate shaker bar slipped from post; due to loose and improper fit on post; 1 injured.

November 27, 1916, locomotive 2422, near Bardwell, Mass. Shaker bar slipped off, due to pin missing; 1 injured.

December 18, 1916, locomotive 2724, near Baldwinville, Mass. Crown sheet failure; low water; no contributory causes found; 1 injured.

February 1, 1917, locomotive 3668, near Beaver Brook, Mass. Cab apron hinge broke, permitting fireman to fall between engine and tender; defective hinge; 1 injured.

February 3, 1917, locomotive 1104, Boston, Mass. Bull's-eye lubricator glass burst; burned by hot oil; 1 injured.

February 4, 1917, locomotive 2343, East Somerville, Mass. Studs fastening step bracket to side of boiler broke off, permitting step to fall; 1 injured.

February 17, 1917, locomotive 2407, Portland, Me. Injured while shaking grates, due to shaker bar pin coming out; 1 injured.

February 23, 1917, locomotive 2388, near Powwow River, N. H. Crown sheet failure; low water; no contributory causes found; 1 killed.

February 24, 1917, locomotive 1382, near Berlin, Mass. Blower pipe union in smoke box became disconnected, causing back draft, blowing flame into cab and igniting enginemens' clothing, burning engineer to death and seriously burning fireman, and entirely consuming cab; 1 killed, 1 injured.

March 1, 1917, locomotive 956, Salem, Mass. Gas exploded in acetylene headlight, while attempting to light headlight; 1 injured.

March 15, 1917, locomotive 2311, Woodsville, N. H. Footboard broke; 1 injured.

April 1, 1917, locomotive 2629, near Baldwinville, Mass. Shaker bar slipped off, due to improper fit; 1 injured.

April 13, 1917, locomotive 2323, near Erving, Mass. Shaker bar slipped off lever; 1 injured.

April 26, 1917, locomotive 10, Billerica, Mass. Bull's-eye lubricator glass and retaining ring blew out; 1 injured.

April 27, 1917, locomotive 1025, near Ware, Mass. Shaker bar slipped off lever, due to improper fit; 1 injured.

May 1, 1917, locomotive 2672, East Deerfield, Mass. Pilot step loose, causing engineer to fall; 1 injured.

May 1, 1917, locomotive 2614, West Kennebunk, Me. Bolt holding cab apron broke or lost out; 1 injured.

May 13, 1917, locomotive 2727, near Lincoln, Mass. Cab apron hinge bolt broke or lost out of hinge; 1 injured.

June 16, 1917, locomotive 2664, near Ayer, Mass. Entire Walschaert valve gear on left side of locomotive stripped off; 1 injured.

June 23, 1917, locomotive 955, Wamesit, Mass. Right main rod broke, due to a flaw or fracture in the rod; 1 injured.

Twenty-six accidents; 2 killed; 25 injured.

BUFFALO, ROCHESTER & PITTSBURGH RAILROAD:

July 13, 1916, locomotive 357, East Salamanca, N. Y. Bull's-eye water glass burst; very badly worn and defective glass; cut by flying glass; 1 injured.

July 25, 1916, locomotive 231, North Luthersburg, Pa. Reach rod became disconnected from tumbling shaft arm, due to improper workmanship; 1 injured.

September 7, 1916, locomotive 267, Butler Junction, Pa. Nipple between boiler and blow-off cock broke off, due to weak construction; 1 injured.

Three accidents; 3 injured.

CANADIAN PACIFIC RAILWAY:

December 29, 1916, locomotive 1068, near Skinner, Me. Crown sheet failure; low water; middle gauge cock inoperative; 1 injured.

One accident; 1 injured.

CAROLINA, CLINCHFIELD & OHIO RAILWAY:

September 5, 1916, locomotive 301, Erwin, Tenn. Safety valve casting blew off; 1 injured.

One accident; 1 injured.

CENTRAL NEW ENGLAND RAILWAY:

July 9, 1916, locomotive 111, Danbury, Conn. Petticoat pipe fell down over exhaust nozzle, causing back draft, due to defective and broken braces; 2 injured.

September 26, 1916, locomotive 111, Maybrook, N. Y. Main air reservoir burst; sheet badly pitted and corroded along longitudinal seam; 1 injured.

Two accidents; 3 injured.

CENTRAL RAILROAD OF NEW JERSEY:

*February 8, 1917, locomotive 373, Manville, N. J. Handhold on locomotive broke; 1 injured.

February 26, 1917, locomotive 590, near Winslow Junction, N. J. Left crank pin broke; old fracture in pin; 1 injured.

Two accidents; 2 injured.

CHESAPEAKE & OHIO RAILWAY:

February 3, 1917, locomotive 467, near Bagdad, Ky. Crown sheet failure, due to oil on sheet; 1 injured.

April 23, 1917, locomotive 41, Ashland, Ky. Scalded by hot water from defective squirt hose, 1 injured.

June 10, 1917, locomotive 165, near Pendleton, Va. Flue broke at weld; overheated in welding; 1 injured.

Three accidents; 3 injured.

CHICAGO & ALTON RAILROAD:

July 3, 1916, locomotive 330, near Green Valley, Ill. Flue broke; 1 injured.

July 25, 1916, locomotive 95, Bloomington, Ill. Scalded by hot water from steam heat pipe, due to valve leaking and trap formed in pipe; 1 injured.

July 28, 1916, locomotive 345, Venice, Ill. Scalded by hot water from defective squirt hose; 1 injured.

August 6, 1916, locomotive 259, near Drake, Ill. Injector overflow pipe became disconnected; 1 injured.

September 9, 1916, locomotive 392, Chicago, Ill. Injector steam pipe broke at spanner nut connection; old crack half way around collar; defect reported two times just previous to accident; 2 injured.

September 13, 1916, locomotive 215, near Lamont, Ill. Right side rod broke; 1 injured.

*November 8, 1916, locomotive 800, Bloomington, Ill. Defective handhold on locomotive; 1 injured.

November 23, 1916, locomotive 430, Slater, Mo. Bull's-eye lubricator glass blew out; 1 injured.

January 22, 1917, locomotive 856, near Funks Grove, Ill. Crown sheet failure, due to low water; locomotive was dispatched from terminal with water glass broken out and no report of inspection filed as required by rule 104; 1 injured.

May 18, 1917, locomotive 328, Tallula, Ill. Patch bolt blew out while being calked under pressure, due to threads being corroded away by leakage; 1 injured.

June 30, 1917, locomotive 337, Springfield, Ill. Fireman's foot caught between cab apron and tender cistern, due to cab apron being too wide; 1 injured.

Eleven accidents; 12 injured.

CHICAGO & EASTERN ILLINOIS RAILROAD:

August 6, 1916, locomotive 128, near Perryville, Ill. Crown sheet failure; low water; no contributory causes found; 1 injured.

One accident; 1 injured.

CHICAGO & NORTH WESTERN RAILWAY:

July 30, 1916, locomotive 2056, Proviso, Ill. Squirt hose blew off nipple; hose not clamped; 1 injured.

August 6, 1916, locomotive 1324, Chicago, Ill. Squirt hose parted at splice; hose not clamped; 1 injured.

August 10, 1916, locomotive 115, Council Bluffs, Iowa. Squirt hose parted at splice; hose not clamped; 1 injured.

August 25, 1916, locomotive 1350, near Crystal Falls, Mich. Side rod broke; old fracture in rod; 1 injured.

September 1, 1916, locomotive 284, Iroquois, S. Dak. Expansion plate stud blew off; defective threads in sheet, and stud screwed into sheet only one-fourth inch; 2 injured.

November 10, 1916, locomotive 295, near State Line, Mich. Crown sheet failure; low water; lowest reading of water glass $1\frac{1}{2}$ inches above highest point of crown sheet; bottom gauge cock located $1\frac{1}{4}$ inches above highest point of crown sheet; 2 injured.

November 23, 1916, locomotive 1800, Belle Plaine, Iowa. Rivet in fire-box seam blew out while being calked with 100 pounds pressure on boiler, due to head on water broken off; old break; 1 injured.

November 24, 1916, locomotive 1551, Chicago, Ill. Bull's-eye lubricator glass blew out; cut by flying glass and burned by hot oil; 1 injured.

January 7, 1917, locomotive 1843, Boone, Iowa. Flue broke at safe end; overheated in welding; 1 injured.

January 9, 1917, locomotive 181, Kewaskum, Wis. Injured while shaking grates, due to grate lever connection bolt working out; 1 injured.

January 12, 1917, locomotive 633, near Ringle, Wis. Grate shaker rod broke; 1 injured.

February 2, 1917, locomotive 893, near Branch, Wis. Crown sheet failure; low water; top gauge cock stopped up with scale; gauge-cock drip partly stopped up; 2 injured.

February 7, 1917, locomotive 1328, near Kenosha, Wis. Blow-off cock stuck open, due to lost motion in blow-off cock lever; 2 injured.

February 18, 1917, locomotive 2346, Nelson, Ill. Handhold on tender gave away, due to one end being broken entirely off; 1 injured.

February 25, 1917, locomotive 1795, West Side, Iowa. Reverse lever latch slipped out of quadrant teeth, due to dirt between teeth of quadrant; 1 injured.

February 28, 1917, locomotive 1124, Sheboygan, Wis. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

March 26, 1917, locomotive 464, Janesville, Minn. Crown sheet failure; low water; globe valve between boiler check and boiler nearly closed, and frost cock partly open, causing injector to lose water; 2 injured.

April 15, 1917, locomotive 1500, Green Bay, Wis. Scalded by steam from blower valve on side of smoke arch, due to defective valve; 1 injured.

April 20, 1917, locomotive 754, near Monmouth, Iowa. Flue broke at weld; overheated in welding; 1 injured.

April 25, 1917, locomotive 1378, near Sheboygan, Wis. Reverse lever flew into forward motion, due to counterbalance spring rod broken and spring missing; 1 injured.

May 5, 1917, locomotive 412, near Wausau Junction, Wis. Fire door flew shut while putting in coal, due to latch being badly worn and would not hold fire door open while running; 1 injured.

May 24, 1917, locomotive 513, New Ulm, Minn. Squirt hose blew off; insecurely clamped; 1 injured.

June 4, 1917, locomotive 1548, Clinton, Iowa. Electric headlight failure, due to wire becoming disconnected at binding post; 1 injured.

June 10, 1917, locomotive 1502, near Mount Prospect, Ill. Blow-off cock stuck open, due to piece of rivet lodging under valve; 1 injured.

June 11, 1917, locomotive 1587, Rochelle, Ill. Reverse lever went into forward motion; stop pin missing and not sufficient clearance around reverse lever; 1 injured.

June 14, 1917, locomotive 1475, Beach, Ill. Squirt hose blew off; hose insecurely clamped; 1 injured.

June 14, 1917, locomotive 2005, Clinton, Iowa. Spring hanger broke, due to old fracture; 1 injured.

Twenty-seven accidents; 32 injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

July 11, 1916, locomotive 2152, White Hall, Ill. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

July 31, 1916, locomotive 2108, Bevier, Mo. Squirt hose blew off; insecurely applied; 1 injured.

October 21, 1916, locomotive 3179, Kirby, Wyo. Crown sheet failure; low water; no contributory causes found; 1 injured.

December 24, 1916, locomotive 3178, near Spence, Wyo. Crown sheet failure; low water; no contributory causes found; 1 killed, 2 injured.

*March 29, 1917, locomotive 2932, Hamilton, Mo. Sand pipe swung out and struck telegraph operator when handing orders to engineer while train was passing, due to pipe not being properly secured in place; 1 injured.

May 11, 1917, locomotive 5248, Virden, Ill. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

June 25, 1917, locomotive 1937, Prairie du Chien, Wis. Scalded by hot water from squirt hose; defective hose; 1 injured.

Seven accidents; 1 killed, 8 injured.

CHICAGO GREAT WESTERN RAILROAD:

*July 17, 1916, locomotive 450, Oelwein, Iowa. Squirt hose became disconnected at splice; 1 injured.

*February 15, 1917, locomotive 455, Chicago, Ill. Water glass burst; cut by flying glass; 1 injured.

Two accidents; 2 injured.

CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY:

*February 3, 1917, locomotive 513, Lafayette, Ind. Shaker bar slipped off post; 1 injured.

One accident; 1 injured.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY:

July 1, 1916, locomotive 6521, near Lake, Wis. Squirt hose blew off; insecurely clamped; 1 injured.

July 3, 1916, locomotive 1217, Savanna, Ill. Reverse lever latch handle separated from lever and strap, due to defective pin and cotter key; 1 injured.

July 3, 1916, locomotive 6113, Chicago, Ill. Water glass burst; defective shield; cut by flying glass; 1 injured.

July 3, 1916, locomotive 6723, Rahway, Mont. Injector steam pipe collar broke; repairs made previous trip by inserting gasket in joint to stop reported leak; 1 injured.

July 11, 1916, locomotive 4376, Madison, Wis. Injured due to loose and broken headlight step on side of boiler; 1 injured.

August 30, 1916, locomotive 5507, Lewistown, Mont. Lubricator filling plug blew out, due to poor threads on plug; 1 injured.

September 8, 1916, locomotive 7031, Chicago, Ill. Hinges on filling hole cover on tender broke, due to old defect; 1 injured.

September 25, 1916, locomotive 1292, Chicago, Ill. Injured due to broken step in cab of locomotive; 1 injured.

September 29, 1916, locomotive 97, Appleton, Wis. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

October 10, 1916, locomotive 4309, Milwaukee, Wis. False deck on tender shifted forward, causing engineer to catch foot between false deck and feed-water tank; 1 injured.

October 10, 1916, locomotive 1209, Aberdeen, S. Dak. Scalded by hot water from blow-off pipe; pipe loose and blow-off cock handle missing; defect reported twice just previous to accident; 1 injured.

October 19, 1916, locomotive 515, near Milwaukee, Wis. Blower steam pipe collar blew off at turret connection, due to weak construction and improperly brazed collar; 2 injured.

October 24, 1916, locomotive 7610, Milwaukee, Wis. Injured while handling reverse lever; insufficient clearance between lever handle and back panel of cab, allowing hand to be mashed; 1 injured.

October 30, 1916, locomotive 5015, Miles City, Mont. Flue broke, due to excessive and improper expanding; 2 injured.

December 5, 1916, locomotive 4382, near Minnehaha Falls, Minn. Flue broke at weld; old flaw in weld; 2 injured.

December 12, 1916, locomotive 2414, near Wolsey, S. Dak. Arch tube burst, due to overheating; 1 injured.

December 22, 1916, locomotive 8517, McIntosh, S. Dak. Water glass burst; cut by flying glass; 1 injured.

January 7, 1917, locomotive 2053, Milwaukee, Wis. Shaker bar slipped off lever, due to improper fit; 1 injured.

January 18, 1917, locomotive 1176, Chicago, Ill. Flue broke off inside of flue sheet, due to excessive use of expanding tool; 1 injured.

February 3, 1917, locomotive 7041, Channing, Mich. Handhold on locomotive broke; 1 injured.

February 13, 1917, locomotive 7233, near Elmira, Mo. Injured while handling reverse lever; stop block at end of quadrant missing and insufficient clearance between reverse lever and boiler head; 1 injured.

February 23, 1917, locomotive 431, Galewood, Ill. Washout plug blew out; plug not securely screwed into boiler; 1 injured.

February 26, 1917, locomotive 7606, River Grove, Ill. Drawbar pin between locomotive and tender broke; 1 injured.

February 27, 1917, locomotive 1204, Egerton, Wis. Reverse lever became unlatched and flew into reverse position, due to link coming in contact with broken driver brake connecting rod; 1 injured.

March 15, 1917, locomotive 1205, Milwaukee, Wis. Flue broke at weld; overheated in welding; 1 injured.

March 25, 1917, locomotive 5557, McLaughlin, S. Dak. Crown sheet failure; low water; left tank well strainer and left tank hose strainer nearly stopped up with waste; 1 killed, 1 injured.

April 6, 1917, locomotive 3121, near Osgood, Mo. Washout plug blew out; 1 injured.

April 10, 1917, locomotive 2001, Reno, Minn. Injector ram packing nut worked off, allowing packing to blow out; 1 injured.

May 1, 1917, locomotive 1227, Milwaukee, Wis. Bolt lost out of grate shaker rigging, allowing shaker bar to slip off; 1 injured.

May 12, 1917, locomotive 8059, Savanna, Ill. Flue broke at weld; overheated in welding; 1 injured.

May 13, 1917, locomotive 8152, near Kirkland, Ill. Injured while shaking grates, due to bolt in shaker rigging breaking or losing out; 1 injured.

May 23, 1917, locomotive 3502, near Fay, Ill. Drawbar between locomotive and tender broke while hauling a passenger train at a speed of about 40 miles per hour; safety chains held, but due to small amount of apron lap on tender when safety chains were pulled taut, the apron dropped between, permitting fireman, who was standing on apron, to fall between engine and tender; 1 injured.

May 30, 1917, locomotive 7213, near Rodney, Iowa. Locomotive and tender parted to the length of safety chains, which had 11½-inch lost motion, permitting apron to drop between engine and tender and fireman to fall between. Drawbar pin worked up and out of back end of drawbar, due to suitable means of securing pin in place not being maintained. It was evident that this locomotive was being operated in violation of rules 122-a and c, which any reasonable inspection would have disclosed; 1 injured.

Thirty-three accidents; 2 killed, 36 injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY:

*July 6, 1916, locomotive 1684, Buckeye, Iowa. Tumbling shaft broke while reverse lever was being operated; 1 injured.

July 9, 1916, locomotive 2116, near Oklahoma City, Okla. Squirt hose burst; defective hose; 1 injured.

July 27, 1916, locomotive 894, Eldon, Iowa. Hand caught between end of reverse lever and graphite lubricator valve handle, due to insufficient clearance around handle of reverse lever; 1 injured.

August 10, 1916, locomotive 1619, Trenton, Mo. Squirt hose burst; defective hose; 1 injured.

*August 28, 1916, locomotive 1485, Cameron, Mo. Reverse lever slipped; worn notches on quadrant; 1 injured.

September 7, 1916, locomotive 1570, near Sayre, Okla. Injector steam pipe spanner nut blew off; nut too large for threaded portion of injector; 1 injured.

October 9, 1916, locomotive 1738, Palestine, Ark. Grate shaker pin lost out; 1 injured.

October 24, 1916, locomotive 113, Chicago, Ill. Oil headlight burst into flame at time of adjustment; 1 injured.

November 12, 1916, locomotive 1635, Inver Grove, Minn. Packing nut blew off main throttle stem; nut stretched and damaged, due to use of hammer and set while tightening at various times; 2 injured.

November 28, 1916, locomotive 825, Shelby, Iowa. Injured while handling reverse lever; counterbalance spring bolt broke; 1 injured.

November 30, 1916, locomotive 227, Chicago, Ill. Bull's-eye lubricator glass broke and blew out; 1 injured.

November 30, 1916, locomotive 1994, near Utica, Ill. Grate shaker rod broke; 1 injured.

December 10, 1916, locomotive 114, Rock Island, Ill. Lubricator glass burst; inefficient shield; 1 injured.

December 10, 1916, locomotive 2138, Holton, Kans. Steam pipe to left cylinder burst; defective material in pipe; 2 injured.

December 27, 1916, locomotive 2138, Kansas City, Kans. Piston rod key sheared and knocked out cylinder head; 1 injured.

January 8, 1917, locomotive 1779, Clay Center, Kans. Grate shaker bar slipped off post; improper fit; 1 injured.

January 18, 1917, locomotive 2542, near Allerton, Iowa. Right front cylinder head, valve chamber head, valve chamber, and steam port way blew off, due to old break in wall of cylinder; 1 injured.

January 18, 1917, locomotive 872, Goodland, Kans. Right main rod strap broke, knocking out cylinder head; old crack 1 by 3 inches in strap; brasses reported pounding badly on arrival previous trip; 1 injured.

January 18, 1917, locomotive 2558, Blue Island, Ill. Grate shaker bar slipped off post; 1 injured.

January 23, 1917, locomotive 1783, El Reno, Okla. Petticoat pipe in smoke arch fell across exhaust nozzle, causing back draft, due to bolt in petticoat pipe breaking; 1 injured.

January 23, 1917, locomotive 1914, near Rockdale, Ill. Grate shaker lever became detached from connecting bar, due to pin breaking or losing; 1 injured.

January 29, 1917, locomotive 1897, Blue Mountain, Ark. Link motion counterbalance spring rod broke; 1 injured.

February 1, 1917, locomotive 1779, Cline, Kans. Sideboards applied to increase coal capacity of tender loose and defective, causing party to fall from top of tender; 1 injured.

March 7, 1917, locomotive 1125, Beach, Iowa. Reverse lever slipped out of quadrant latch; 1 injured.

March 13, 1917, locomotive 1139, Sibley, Iowa. Shaker bar slipped off lever, due to improper fit; 1 injured.

March 19, 1917, locomotive 863, Mabel, Mo. Reverse lever quadrant stop improperly located, permitting reverse lever to strike boiler head; 1 injured.

March 23, 1917, locomotive 559, Cedar Rapids, Iowa. Blow-off cock blew out of throat sheet, due to not being securely screwed into sheet after having been removed while making repairs; 1 injured.

March 27, 1917, locomotive 737, Evans, Iowa. Shaker bar slipped off of fulcrum lever, due to loose fit; 1 injured.

May 28, 1917, locomotive 2101, Holdenville, Okla. Shaker bar broke; old fracture in metal; 1 injured.

June 18, 1917, locomotive 1959, near Sheffield, Ill. Crown sheet failure; low water; gauge cock drip stopped up; 2 injured.

Thirty accidents; 33 injured.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RAILWAY:

*February 9, 1917, locomotive 300, Tekamah, Nebr. Right injector steam pipe broke; 1 injured.

One accident; 1 injured.

CINCINNATI, HAMILTON & DAYTON RAILWAY:

August 11, 1916, locomotive 337, Middletown, Ohio. Scalded by hot water from injector overflow pipe, due to injector breaking; 1 injured.

*August 21, 1916, locomotive 340, Rupes, Ohio. Nut on blower valve blew off; 1 injured.

August 24, 1916, locomotive 352, Cincinnati, Ohio. Broken staybolt blew out while being calked under pressure, due to defective threads on bolt and in sheet; 1 injured.

September 20, 1916, locomotive 610, near Overpeck, Ohio. Flue broke; overheated in welding; 2 injured.

November 15, 1916, locomotive 344, Carlisle, Ohio. Side rods on both sides of locomotive broke; 1 injured.

December 1, 1916, locomotive 4133 (B. & O.), near Wapakoneta, Ohio. Injector steam pipe brazing collar broke at starting valve connection; sleeve of frail construction; only one-sixteenth inch thick; 2 injured.

February 12, 1917, locomotive 4128 (B. & O.), Rossford, Ohio. Ash pan operating rigging became disconnected; 1 injured.

Seven accidents; 9 injured.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC RAILWAY:

September 8, 1916, locomotive 908, Danville, Ky. Scalded by hot water from defective squirt hose; 1 injured.

One accident; 1 injured.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY:

November 2, 1916, locomotive 6751, Bellefontaine, Ohio. Boiler check-valve bonnet blew out; defective threads and loose-fitting bonnet; 1 injured.

November 16, 1916, locomotive 6828, Linndale, Ohio. Flue broke in weld; defective weld; 1 injured.

January 14, 1917, locomotive 6905, near Alma, Ind. Injector steam pipe brazing collar broke, due to collar being of too light construction and poor material; 2 injured.

February 14, 1917, locomotive 6212, Silver Lake, Ind. Crown sheet failure, due to overheating; improperly located water glass and gage cocks; lowest reading of water glass one-eighth inch above highest point of crown sheet; bottom gage cock 1½ inches above highest point of crown sheet; locomotive received new fire box in May, 1916, and had evidently been operating in this dangerous condition, and in violation of rule 7, since that date. It was also found that the safety valves allowed an accumulation of 25 pounds in excess of allowed steam pressure, in violation of rule 34; 3 injured.

Four accidents; 7 injured.

COLORADO & SOUTHERN RAILWAY:

August 16, 1916, locomotive 312, Eastonville, Colo. Scalded while siphoning water from water car to tender of locomotive, due to hose being too short; 1 injured.

August 17, 1916, locomotive 623, near milepost 284. Squirt hose valve knocked open, due to being improperly located; 1 injured.
Two accidents; 2 injured.

DELAWARE & HUDSON CO.:

*August 3, 1916, locomotive 789, Oneonta, N. Y. Injector pipe broke; 1 injured.
January 6, 1917, locomotive 1016, Hudson, Pa. Flue broke at weld; 1 injured.
January 30, 1917, locomotive 1029, near Avoca, Pa. Flue broke at weld; overheated in welding; 2 injured.
March 3, 1917, locomotive 775, Colonie, N. Y. Boiler check cap blew off while attempting to tighten under pressure, due to loose-fitting cap and worn and defective threads; 1 injured.
Four accidents; 5 injured.

DELAWARE, LACKAWANNA & WESTERN RAILROAD:

September 19, 1916, locomotive 755, Binghamton, N. Y. Lubricator glass burst; inefficient shield; cut by flying glass; 1 injured.
November 14, 1916, locomotive 1234, Hainsburg, N. J. Crown sheet failure; low water; no contributory causes found; boiler was blown from the frame and landed 180 feet ahead and 20 feet to right and at right angles to the track; all appurtenances were destroyed in the accident, therefore, no report of their previous condition could be made; 4 killed.
December 24, 1916, locomotive 1022, near Clarks Summit, Pa. Flue broke at sixth weld from flue sheet, due to thinning of material at point of fracture; 1 injured.
December 24, 1916, locomotive 325, near Vestal, N. Y. Lubricator steam pipe pulled out of collar at throttle connection; 1 injured.
January 5, 1917, locomotive 939, near Dover, N. J. Flue broke at safe end; overheated in welding; 1 injured.
Five accidents; 4 killed, 4 injured.

DENVER & RIO GRANDE RAILROAD:

August 19, 1916, locomotive 1050, Midvale, Utah. Insufficient clearance between handle of reverse lever and air pipes; 1 injured.
September 15, 1916, locomotive 410, Alamosa, Colo. Scalded by hot water from defective squirt hose; 1 injured.
October 17, 1916, locomotive 837, Garfield, Utah. Water glass burst; inefficient shield; cut by flying glass; 1 injured.
January 13, 1917, locomotive 1203, near Cisco, Utah. Shaker bar slipped off, due to improper fit of bar on fulcrum lever; 1 injured.
January 26, 1917, locomotive 1199, Canon City, Colo. Scalded by hot water from injector overflow pipe; boiler check leaking; 1 injured.
February 17, 1917, locomotive 1171, Kyune, Utah. Grate shaker bar slipped off post; lock pin missing; 1 injured.
March 7, 1917, locomotive 1191, Thistle, Utah. Grate shaker bar slipped off fulcrum lever, due to lock pin of improper size to insert in place; 1 injured.
March 21, 1917, locomotive 1142, near Thistle, Utah. Fireman burned by excessive heat from fire door, due to fire-door liner missing; 1 injured.
March 23, 1917, locomotive 169, near Cumbres, Colo. Left main crank pin broke, due to old flaw in pin; 1 killed.
April 16, 1917, locomotive 1195, Scenic, Utah. Boiler check valve and seat blew out; 1 injured.
April 19, 1917, locomotive 1138, Pine Creek, Colo. Burned by hot grease from grease cup, due to bushing being loose and turning in rod, causing pin to become overheated; 1 injured.
Eleven accidents; 1 killed, 10 injured.

DENVER & SALT LAKE RAILROAD:

December 4, 1916, locomotive 203, near Corona, Colo. Cylinder head blew out; 1 injured.
One accident; 1 injured.

DETROIT TERMINAL RAILROAD:

*August 26, 1916, locomotive 11, Fairview, Mich. Squirt hose burst; 1 injured.
One accident; 1 injured.

DETROIT, TOLEDO & Ironton RAILROAD:

July 22, 1916, locomotive 150, Delray, Mich. Feed-pipe spanner nut at boiler check connection gave away, due to nut being damaged by use of hammer and set for tightening at various times; 1 injured.

*August 16, 1916, locomotive 151, Dundee, Mich. Water glass burst; cut by flying glass; 1 injured.
Two accidents; 2 injured.

DULUTH & IRON RANGE RAILROAD:

July 20, 1916, locomotive 96, Hornby, Minn. Union nut in ashpan blower pipe broke; defective union nut; scalded by escaping hot water; 1 injured.
One accident; 1 injured.

DULUTH, MISSABE & NORTHERN RAILWAY:

*October 12, 1916, locomotive 316, Iron Junction, Minn. Counterbalance rod broke; 1 injured.
One accident; 1 injured.

EL PASO & SOUTHWESTERN RAILROAD:

November 16, 1916, locomotive 260, El Paso, Tex. Water glass burst; cut by flying glass; 1 injured.
One accident; 1 injured.

ERIE RAILROAD:

July 18, 1916, locomotive 977, Mahoning, Ohio. Flue broke at weld; overheated in welding; 1 injured.
July 25, 1916, locomotive 1882, Youngstown, Ohio. Injured, due to loose and insecurely applied handrail; 1 injured.
July 26, 1916, locomotive 2038, Columbus, Pa. Coupler broke, due to cracked and otherwise defective coupler shank; 1 injured.
July 28, 1916, locomotive 1705, Marion, Ohio. Squirt hose blew off; insecurely clamped; 1 injured.
August 30, 1916, locomotive 3051, Campbell Hall, N. Y. Three screw-reversing gear bracket studs blew out of boiler, due to bracket being loose and pounding on studs; 2 injured.
September 10, 1916, locomotive 1464, Elmira, N. Y. Leaky throttle and defective brakes, permitting locomotive to move; at our investigation it was found that tender brake was inoperative and that the driver brake would leak off in 1 minute and 45 seconds with automatic application; 1 injured.
October 10, 1916, locomotive 2725, near Niles, Ohio. Flue broke at weld; defective weld; 1 injured.
October 28, 1916, locomotive 1741, near Urbana, Ohio. Bolt lost out of reverse lever quadrant casting; threads stripped in reverse lever quadrant; 1 injured.
October 29, 1916, locomotive 1854, Youngstown, Ohio. Flue broke at weld; overheated in welding; 1 injured.
November 17, 1916, locomotive 785, Warwick, N. J. Bolt in grate shaker lever broke; 1 injured.
November 30, 1916, locomotive 1699, Bucktooth, N. Y. Boiler check stuck open, due to rubber gasket lodging under check valve; 1 injured.
December 5, 1916, locomotive 1613, near Bradford, Pa. Crown sheet failure; low water; no contributory causes found; 3 injured.
December 20, 1916, locomotive 1456, Goshen, N. Y. Brake head on tender broke, allowing brake beam to drop, causing derailment of tender; 1 injured.
December 22, 1916, locomotive 1724, Huntington, Ind. Washout plug blew out while attempting to tighten under pressure; 2 injured.
December 24, 1916, locomotive 1686, Akron, Ohio. Left valve stem key lost out, allowing valve stem to become disconnected and causing reverse lever to fly back; 1 injured.
December 28, 1916, locomotive 2516, Friendship, N. Y. Flue broke at weld; overheated in welding; 1 injured.
January 7, 1917, locomotive 3014, Kent, Ohio. Water glass burst; inefficient shield; 1 injured.
January 11, 1917, locomotive 3110, Marion, Ohio. Injector steam pipe spanner nut broke; attempted to tighten under pressure; 1 injured.
January 12, 1917, locomotive 987, Griffith, Ind. While attempting to board locomotive brakeman missed handhold, causing him to fall under engine and crush arm, necessitating amputation, due to mud ring leaking so bad that it obscured his vision; mud ring had been reported leaking badly twice immediately prior to accident and proper repairs had not been made. Investigation also disclosed that locomotive had been operating in violation of rules 107, 109, and 110 for the past three months; 1 injured.
January 17, 1917, locomotive 3082, near Hubbard, Ohio. Shaker bar slipped off, due to socket in shaker bar being broken out; old break; 1 injured.

February 1, 1917, locomotive 2019, Hornell, N. Y. Arch tube burst, due to accumulation of sediment in water legs of fire box extending above arch tube opening in throat sheet, caused by infrequent and improper boiler washing; 3 injured.

February 5, 1917, locomotive 1581, Shongo, N. Y. Flue broke at weld; overheated in welding; 1 injured.

March 1, 1917, locomotive 2716, Port Jervis, N. Y. Scalded by hot water from ash-pan blower pipe, due to disconnected union, and blower pipe not clamped; 1 injured.

March 15, 1917, locomotive 88, Youngstown, Ohio. Handhold on pilot came loose, due to bolt missing; 1 injured.

May 6, 1917, locomotive 1559, Little Valley, N. Y. Bull's-eye lubricator glass burst; 1 injured.

June 11, 1917, locomotive 1742, near Uniondale, Ind. Crown sheet failure; low water; no contributory causes found; 2 killed, 1 injured.

June 22, 1917, locomotive 1541, Brockwayville, Pa. Right No. 1 tender truck wheel tire worked loose, derailing tender; 1 injured.

Twenty-seven accidents; 2 killed, 33 injured.

FLORIDA EAST COAST RAILWAY:

January 3, 1917, locomotive 114, New Smyrna, Fla. Scalded by hot water from blow-off pipe; pipe insecurely applied; 1 injured.

February 24, 1917, locomotive 66, near Sebastian, Fla. Crown sheet failure; low water; locomotive was in charge of colored watchman, and was turned over to him with water glass broken; 2 killed.

May 26, 1917, locomotive 76, South Jacksonville, Fla. Cylinder head blew out; 1 killed; 1 injured.

Three accidents; 3 killed, 2 injured.

FORT WORTH & DENVER CITY RAILWAY:

August 11, 1916, locomotive 207, Herman Siding, Tex. Squirt hose blew off; hose insecurely clamped; 1 injured.

August 13, 1916, locomotive 150, Clarendon, Tex. Scalded by hot water from injector overflow pipe; defective injector; 1 injured.

September 14, 1916, locomotive 267, Quanah, Tex. Squirt hose blew off; hose insecurely clamped; 1 injured.

Three accidents; 3 injured.

GREAT NORTHERN RAILWAY:

*July 27, 1916, locomotive 715, Delta, Wash. Stop bolt worked loose on reverse lever; 1 injured.

September 15, 1916, locomotive 1822, Whitefish, Mont. Scalded by hot water from leaky blow-off cock, due to discharge pipe bent so as to form a trap for the accumulation of water; 1 injured.

October 11, 1916, locomotive 1448, near Bedford, N. Dak. Drawbar between locomotive and tender broke, due to old fracture; 1 injured.

October 29, 1916, locomotive 1129, Willmar, Minn. Flue pocket, rolled in end of burst flue, blew out; 1 injured.

November 1, 1916, locomotive 1032, Mukilteo, Wash. Injector steam pipe broke off at brazed collar; old break in pipe; 1 injured.

November 27, 1916, locomotive 1322, Butte, Mont. Water glass burst; cut by flying glass; not supplied with shield; 1 injured.

*December 14, 1916, locomotive 1834, Keith, N. Dak. Flue broke at weld; 1 injured.

January 22, 1917, locomotive 1484, Cutbank, Mont. Drifting throttle bonnet blew out, due to defective threads; 1 injured.

February 24, 1917, locomotive 25, Willmar, Minn. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

*February 26, 1917, locomotive 208, Minneapolis, Minn. Steam pipe to water glass broke; 1 injured.

March 2, 1917, locomotive 1454, Moorhead, Minn. Injector steam pipe collar broke, due to old fracture, and pipe 11½ feet long unbraced; 1 injured.

April 5, 1917, locomotive 1517, Paisley, Mont. Scalded by hot water from a squirt hose, due to improper application of hose; 1 injured.

June 13, 1917, locomotive 1968, Deadham, Wis. Ash-pan blower pipe blew apart at elbow connection, due to threads being corroded away; 1 injured.

June 27, 1917, locomotive 1984, Allouez, Wis. Ash-pan blower pipe blew apart, due to defective threads; 1 injured.

Fourteen accidents; 14 injured.

DENVER & COLORADO & SANTA FE RAILWAY:

August 29, 1916, locomotive 182, Brownwood, Tex. Elbow in blow-off cock discharge pipe blew out, due to defective threads; 1 injured.

September 12, 1916, locomotive 628, East Dallas, Tex. Injector delivery pipe nut blew off at boiler check connection; defective threads on check; reported as just previous to accident; 1 injured.

September 25, 1916, locomotive 250, near Richland Springs, Tex. Flue pocket on out of back flue sheet; pockets had been applied in corresponding holes in both front and back flue sheets by rolling and not prossering the pockets, thereby creating an improper and dangerous condition; 1 injured.

November 18, 1916, locomotive 687, Cleburne, Tex. Burned by hot oil from lubricator, due to condensing valve leaking; 1 injured.

December 29, 1916, locomotive 652, Bleakwood, Tex. Right intermediate side rod cap broke, due to old seam; 1 injured.

January 30, 1917, locomotive 1912 (A., T. & S. F.), Blair, Tex. Brickwork in oil-burning fire box fell in front of burner; injury due to explosion in fire box when lighting fire; 1 injured.

Six accidents; 6 injured.

MOCKING VALLEY RAILWAY:

*August 31, 1916, locomotive 162, Harpster, Ohio. Flue burst; 1 injured.

February 3, 1917, locomotive 250, near Gallopolis, Ohio. Flue broke at weld; overheated in welding; 1 injured.

June 1, 1917, locomotive 181, Columbus, Ohio. Arch tube pulled out of throat sheet, due to improper application, being neither beaded nor belled in sheet; 2 injured.

Three accidents; 4 injured.

ILLINOIS CENTRAL RAILROAD:

July 7, 1916, locomotive 769, Springfield, Ill. Scalded by hot water from squirt hose; hole worn in hose, due to rubbing on cab apron; 1 injured.

July 13, 1916, locomotive 759, Waterloo, Iowa. Squirt hose blew off; insecurely clamped; hose applied parallel to deck; 1 injured.

August 8, 1916, locomotive 285, Memphis, Tenn. Water glass burst; cut by flying glass; 1 injured.

August 11, 1916, locomotive 60, near Manchester, Iowa. Squirt hose parted at elbow; hose not clamped; 1 injured.

October 2, 1916, locomotive 1667, Herrin, Ill. Main air reservoir burst, due to being badly corroded and thin; had previously been tapped and plugged where rusted through; 1 injured.

October 10, 1916, locomotive 207, Jackson, Tenn. Fire hose blew off connection; hose insecurely applied; 1 injured.

January 10, 1917, locomotive 1536, Mount Olive, Ill. Crown sheet failure; low water; no contributory causes found; 2 injured.

January 19, 1917, locomotive 872, North Howell, Ind. Flue broke at weld; defective weld; 1 injured.

February 20, 1917, locomotive 1718, Clinton, Ill. Scalded by hot water from blow-off cock; clamp missing, permitting blow-off cock which was screwed into sheet only on threads to turn in sheet; 1 injured.

March 26, 1917, locomotive 1656, near Thompsonville, Ill. Grate shaker rod became disconnected, due to being improperly attached; 1 injured.

March 30, 1917, locomotive 1681, Paducah, Ky. Handhold pulled off, due to pin handrail bracket missing; 1 injured.

April 3, 1917, locomotive 882, Wilderman, Ill. Flue broke at weld; overheated in welding; 1 injured.

Twelve accidents; 13 injured.

ILLINOIS SOUTHERN RAILWAY:

March 9, 1917, locomotive 402, Salem, Ill. Chambers throttle had been substituted with throttle of ordinary type, and hole in back head closed by inserting wooden plug, and in place by gland, which blew out; 1 injured.

One accident; 1 injured.

INDIANA HARBOR BELT RAILROAD:

August 8, 1916, locomotive 5944 (N. Y. C.), Blue Island, Ill. Scalded by hot water from defective squirt hose; 1 injured.

September 3, 1916, locomotive 258, near Wireton, Ill. Left main driving axle broke, due to defective material; 2 injured.

Two accidents; 3 injured.

INTERNATIONAL & GREAT NORTHERN RAILWAY:

* September 15, 1916, locomotive 146, Jacksonville, Tex. Reverse lever came out of quadrant; spring pin in reverse lever latch broken; 1 injured.

* October 8, 1916, locomotive 215, Jacksonville, Tex. Water glass burst; cut by flying glass; 1 injured.

February 27, 1917, locomotive 263, Genoa, Tex. Crown sheet failure; low water; water glass missing and boiler carrying 19 pounds excess pressure; 1 killed.

April 22, 1917, locomotive 150, Orvil, Tex. Crown sheet failure; low water; no contributory causes found; 3 injured.

Four accidents; 1 killed, 5 injured.

KANSAS CITY, CLINTON & SPRINGFIELD RAILWAY:

April 10, 1917, locomotive 2706, near Harrisonville, Mo. Headlight turbine burst; 1 injured.

One accident; 1 injured.

KANSAS CITY SOUTHERN RAILWAY:

* October 20, 1916, locomotive 482, Amsterdam, Mo. Injured due to defective cab apron; hole in apron; 1 injured.

October 24, 1916, locomotive 556, Oskaloosa, Mo. Grate shaker bar slipped off post; 1 injured.

June 16, 1917, locomotive 400, Sulphur Springs, Ark. Expansion pad stud blew out of boiler; 1 injured.

June 18, 1917, locomotive 488, Thomasville, Okla. Slide valve, steam chest broke; 1 injured.

Four accidents; 4 injured.

LAKE ERIE & WESTERN RAILROAD:

August 4, 1916, locomotive 5201, near South Bend, Ind. Crown bar type boiler; left side of wrapper sheet above fire box failed along line of cross stays and washout holes for a distance of 74 inches, and along flange of back head for a distance of 26 inches; the wrapper sheet was grooved along the line of cross stays three-sixteenths inch deep; flange of back head was cracked or grooved to a depth of one-eighth inch to one-fourth inch deep for a distance of 36 inches; a patch 6 by 12 inches had been applied over this crack at some previous time, with patch bolts; the force of explosion caused the locomotive to turn completely over while hauling a passenger train at a speed of about 35 miles per hour; 2 killed, 8 injured.

One accident; 2 killed, 8 injured.

LEHIGH & NEW ENGLAND RAILROAD:

* September 25, 1916, locomotive 26, Lansford, Pa. Flue broke at weld; 1 injured. One accident; 1 injured.

LEHIGH VALLEY RAILROAD:

October 25, 1916, locomotive 1809, Depew, N. Y. Injector steam pipe spanner nut broke, due to weak and improperly designed nut; 1 injured.

January 1, 1917, locomotive 3057, Newark, N. J. Water-glass steam pipe became disconnected at water-glass connection; 1 injured.

Two accidents; 2 injured.

LOS ANGELES & SALT LAKE RAILROAD:

February 2, 1917, locomotive 3703, near Cajon, Cal. Main reservoir air pipe broke, rendering E. T. brake equipment and air operative reverse gear inoperative on mountain grade, allowing locomotive, which was being operated light, to attain excessive speed and become derailed and turn over; the steam pipe line for operating power reverse gear in cases of emergency was inoperative; 1 killed, 1 injured.

One accident; 1 killed, 1 injured.

LOUISVILLE & NASHVILLE RAILROAD:

July 20, 1916, locomotive 1314, Corbin, Ky. Scalded by steam and hot water from defective blow-off cock; 1 injured.

August 9, 1916, locomotive 888, Middlesboro, Ky. Squirt hose parted at splice; hose not clamped; 1 injured.

August 11, 1916, locomotive 1239, Boyles, Ala. Lubricator drain cock broke; drain cock defective; 1 injured.

November 7, 1916, locomotive 2079, Bessemer, Ala. Scalded by hot water from leaky blow-off cock; 1 injured.

November 17, 1916, locomotive 346, Nashville, Tenn. Grate shaker rod broke; 1 injured.

November 22, 1916, locomotive 190, Watts Creek, Ky. Main driving axle broke; fracture in axle approximating one-third total area; 1 injured.

December 16, 1916, locomotive 1183, Trent, Va. Both front side rods and both back and front side rod straps broke; 1 injured.

January 12, 1917, locomotive 903, near Gurnee Junction, Ala. Drawbar pin broke, due to old fracture in pin; 1 injured.

January 12, 1917, locomotive 1285, near Hardy, Ala. Main driving axle broke, due to old fracture; 1 injured.

March 30, 1917, locomotive 64, Caborn, Ind. Side rod broke; 1 injured.

May 25, 1917, locomotive 1282, Calera, Ala. Ashpan blow-off cock stuck open, due to bracket for guide rod missing; 1 injured.

Eleven accidents; 11 injured.

MAINE CENTRAL RAILROAD:

August 17, 1916, locomotive 464, Falmouth, Me. Squirt hose blew off; insecurely applied; 1 injured.

One accident; 1 injured.

MINNEAPOLIS & ST. LOUIS RAILROAD:

* December 26, 1916, locomotive 155, Farmington, Ill. Water glass burst; cut by flying glass; 1 injured.

One accident; 1 injured.

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

August 18, 1916, locomotive 2425, near Irvine, Wis. Crown sheet failure; low water; gauge cock drip nearly stopped up; rubber gasket under water glass nearly closing opening, and lower water glass cock nearly closed with hard scale—opening only about one-sixteenth inch; 2 killed, 1 injured.

December 12, 1916, locomotive 405, near Max, N. Dak. Crown sheet failure; low water; no contributory causes found; 1 injured.

January 21, 1917, locomotive 601, Gagen, Wis. Main driving axle broke off flush with hub on both sides, due to old fracture in axle; 3 injured.

January 24, 1917, locomotive 449, near Farwell, Minn. Scalded by hot water from water glass blow-off pipe; pipe loose; 1 injured.

January 31, 1917, locomotive 338, Minneapolis, Minn. Scalded by hot water from blow-off cock, due to absence of proper means to hold blow-off cock closed; 1 injured.

February 3, 1917, locomotive 2424, North Milwaukee, Wis. Lap-welded arch tube burst; tube defective in manufacture; 2 injured.

February 16, 1917, locomotive 2604, Milwaukee, Wis. Boiler check stuck open; scalded by hot water from split squirt pipe while trying to seat check valve; 1 injured.

March 18, 1917, locomotive 38, White Bear Beach, Minn. Drawbar and safety chains between locomotive and tender broke; 1 injured.

April 29, 1917, locomotive 717, Superior, Wis. Top water glass cock broke off flush with boiler, due to weak construction and inferior material; 1 injured.

Nine accidents; 2 killed, 12 injured.

MISSOURI, KANSAS & TEXAS LINES:

July 4, 1916, locomotive 708, near Sweeney, Mo. Crown sheet failure; low water; bottom gauge cock inoperative; bottom of water glass stopped up with rubber gasket; killed, 1 injured.

July 9, 1916, locomotive 612, Muskogee, Okla. Left injector feed pipe blew off injector connection, due to defective union nut; 1 injured.

August 9, 1916, locomotive 684, Hunt, Tex. Squirt hose blew off; hose not clamped; 1 injured.

August 25, 1916, locomotive 827, near Sealy, Tex. Shaker bar slipped off; 1 injured.

September 4, 1916, locomotive 767, near Hagerman, Tex. Foot caught between reverse lever and boiler head while trying to handle reverse lever, due to insufficient clearance; 1 injured.

September 18, 1916, locomotive 545, Cisco, Tex. Squirt hose burst; 1 injured.

January 30, 1917, locomotive 540, Dunlap, Okla. Bull's-eye lubricator glass blew out; gasket had been reported defective, but had not been repaired; 1 injured.

* February 10, 1917, locomotive 318, Bartlesville, Okla. Blow-off cock turned in seat while being opened; 1 injured.

March 1, 1917, locomotive 611, Dallas, Tex. Injector primer valve bonnet blew out, due to defective threads on bonnet; 1 injured.

March 24, 1917, locomotive 93 (W. F. & N. W.), Woodward, Okla. Shaker bar slipped off of post, due to bolt breaking; 1 injured.

June 27, 1917, locomotive 281, Burleson, Tex. Squirt hose nipple bushing screwed out of squirt hose valve; bushing did not fit valve properly; 1 injured.
Eleven accidents; 1 killed, 11 injured.

MISSOURI, OKLAHOMA & GULF RAILWAY:

August 18, 1916, locomotive 227, Muskogee, Okla. Squirt hose parted at splice; hose not clamped; 1 injured.

May 3, 1917, locomotive 215, near Allen, Okla. Squirt hose blew off; insecurely clamped; 1 injured.

Two accidents; 2 injured.

MISSOURI PACIFIC RAILROAD CO.:

July 19, 1916, locomotive 1815, Sparda, Ark. Scalded by hot water, due to leaky blow-off cock and outer end of discharge pipe being too high, forming trap for accumulation of water; 1 injured.

July 26, 1916, locomotive 85, North Junction, Ill. Squirt hose burst; defective hose; 1 injured.

July 27, 1916, locomotive 9534, Argenta, Ark. Lubricator glass burst; burned by escaping hot oil; 1 injured.

July 29, 1916, locomotive 162, Webb City, Mo. Water glass burst; inefficient shield; cut by flying glass; 1 injured.

August 6, 1916, locomotive 8742, Batesville, Ark. Squirt hose blew off; insecurely applied; 1 injured.

August 26, 1916, locomotive 526, Levesque, Ark. Hand caught between reverse lever and injector handle; insufficient clearance between reverse lever and injector handle; 1 injured.

August 29, 1916, locomotive 462, Fredericktown, Mo. Ash-pan blower valve broke off at nipple connection; 1 injured.

September 6, 1916, locomotive 6509, near Bucyrus, Kans. Left side rod broke, knocking hole 4 by 7 inches in throat sheet, and hole 2 by 3 inches in back flue sheet, causing steam to blow into cab; old defect in rod; 2 injured.

September 6, 1916, locomotive 6514, Cliff Cave, Mo. Scalded by hot water from squirt hose; valve leaking; 1 injured.

September 8, 1916, locomotive 486, near Osage, Mo. Squirt hose blew off; insecurely clamped; 1 injured.

September 14, 1916, locomotive 7708, near Eureka, Kans. Injector steam pipe spanner nut broke; attempted to tighten nut under pressure with 14-inch Stillson wrench; 1 injured.

*September 15, 1916, locomotive 462, Lutesville, Mo. Right intermediate eccentric blade broke; bad flaw in metal; 1 injured.

September 21, 1916, locomotive 2349, Kirkwood, Mo. Squirt hose blew off; 1 injured.

October 20, 1916, locomotive 459, near Hopewell, Mo. Right main rod broke, due to old fracture; 1 injured.

October 21, 1916, locomotive 5201, Poplar Bluff, Mo. Grate shaker bar broke, due to old flaw halfway through; 1 injured.

October 28, 1916, locomotive 57, Argenta, Ark. Boiler check stuck open; scalded by hot water from overflow pipe joint at injector connection; 1 injured.

December 12, 1916, locomotive 6511, Osawatomie, Kans. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

January 4, 1917, locomotive 9418, Kansas City, Kans. Cap blew off of blow-off pipe; defective threads on pipe; 1 injured.

February 1, 1917, locomotive 1252, Grand Pass, Mo. Grate shaker bar slipped off fulcrum lever, due to improper fit; 1 injured.

February 6, 1917, locomotive 1232, Jefferson City, Mo. Blow-off cock discharge pipe cap blew off, due to defective threads; 1 injured.

February 12, 1917, locomotive 1805, Van Buren, Ark. Water glass burst; cut by flying glass; 1 injured.

February 25, 1917, locomotive 2337, St. James, La. Scalded, due to blow-off cock discharge pipe not being properly clamped; 1 injured.

March 7, 1917, locomotive 1212, near Lupus, Mo. Crown sheet failure due to low water; water foaming badly and boiler not washed "as often as water conditions require"; 1 injured.

May 30, 1917, locomotive 436, near Lexa, Ark. Flue broke at weld; defective weld; 1 injured.

Twenty-four accidents; 25 injured.

ORGAN'S LOUISIANA & TEXAS R. R. & S. S. CO.:

September 15, 1916, locomotive 67, Algiers, La. Water glass broke; cut by flying glass; 1 injured.

One accident; 1 injured.

ASHVILLE, CHATTANOOGA & ST. LOUIS RAILWAY:

November 16, 1916, locomotive 533, Asylum, Tenn. Flue broke near weld; overated in welding; 2 injured.

*March 16, 1917, locomotive 616, Chattanooga division. Scalded by hot water from squirt hose; 1 injured.

*April 24, 1917, locomotive 530, Estill Springs, Tenn. Squirt hose burst; defective hose; 1 injured.

Three accidents; 4 injured.

NEW YORK CENTRAL RAILROAD—LINES EAST.

September 22, 1916, locomotive 2135, near Sterling, N. Y. Crown sheet failure; low water; contributory causes found; 3 injured.

September 25, 1916, locomotive 114, Weehawken, N. J. Flue broke off at front flue sheet, due to being badly corroded in front end by accumulation of cinders and moisture; 2 injured.

October 6, 1916, locomotive 3708, Mattoon, N. Y. Hand caught between reverse lever and boiler head, due to stop pin missing from quadrant; 1 injured.

February 11, 1917, locomotive 3140, Port Byron, N. Y. Injector steam pipe broke collar, due to old defect; had been reported previous trip; repairs not made, and injector not properly braced to boiler; 1 killed.

April 27, 1917, locomotive 3630, near Belle Isle, N. Y. Crown sheet failure; low water; no contributory causes found; 4 injured.

Five accidents; 1 killed, 10 injured.

NEW YORK CENTRAL RAILROAD—LINES WEST.

November 1, 1916, locomotive 5744, North Adams, Mich. Injector steam pipe spanner nut broke; nut defective, due to use of improper tools in tightening; 1 injured.

December 27, 1916, locomotive 4684, Ashtabula, Ohio. Bonnet blew out of blow-off pipe in dome; 1 injured.

January 7, 1917, locomotive 4143, near State Line, N. Y. Crown sheet failure; low water; no contributory causes found; 2 killed, 1 injured.

February 17, 1917, locomotive 5567, Cleveland, Ohio. Crown sheet failure; low water; no contributory causes found; 2 killed, 9 injured.

March 4, 1917, locomotive 5610, Zearing, Ill. Fell from running board in front of boiler while operating blow-off cock; operating handle improperly located; 1 injured.

Five accidents; 4 killed, 13 injured.

NEW YORK, CHICAGO & ST. LOUIS RAILROAD:

March 6, 1917, locomotive 60 (Walsh Construction Co.), Conneaut, Ohio. Fusible plug blew out while being calked around, due to leaking; fusible metal was entirely gone out of plug and space filled with hard scale; the square on the plug was practically burned away, showing that plug had not been recently removed, as required by rule 14, although inspection and repair reports filed with the Government under date of February 14 and 28 show that this plug had been removed and cleaned as required; 1 injured.

One accident; 1 injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 12, 1916, locomotive 345, Bethel, Conn. Reverse lever quadrant stop missing; wrong reverse lever handle to go forward and strike boiler head; 1 injured.

July 22, 1916, locomotive 2541, Boston, Mass. Coupler on locomotive too low; upper beam loose and both bumper beam braces broken, all old defects; while locomotive was engaged in switching service cars became detached from locomotive on a grade and ran away; 1 killed.

September 18, 1916, locomotive 1571, South Boston, Mass. Grate bar stud blew out; improperly applied; screwed into sheet only two threads; 1 injured.

September 19, 1916, locomotive 1584, Stoughton, Mass. Left back driving spring hanger broke; 1 injured.

October 26, 1916, locomotive 2421, Hartford, Conn. Injured handling reverse lever, due to defective counterbalance spring; 1 injured.

October 28, 1916, locomotive 2439, Springfield, Mass. Burned by hot oil while handling lubricator; drain pipe partly stopped up; 1 injured.

December 17, 1916, locomotive 1412, Hawleyville, Conn. Eccentric blade broke, due to defective weld, causing reverse lever latch to fly out of quadrant, due to quadrant notches badly worn; 1 injured.

*March 1, 1917, locomotive 2541, Boston, Mass. Equalizing spring in reverse lever broke; 1 injured.

April 11, 1917, locomotive 277, near Air Line Junction, Conn. Reverse lever slipped out of quadrant, due to weak latch spring; 1 injured.

Nine accidents; 1 killed, 8 injured.

NEW YORK, ONTARIO & WESTERN RAILWAY:

October 13, 1916, locomotive 356, Middletown, N. Y. Stud in throttle quadrant prevented throttle from closing properly; locomotive had been placed on track outside of shop and was being fired up for the purpose of setting safety valves and preparing for service after general repairs had been made; while workmen were employed on the engine and when the steam pressure had reached about 150 pounds the locomotive moved and ran into erecting shop; locomotive was equipped with air reverse gear, but air had not yet been pumped up to operate this or the brakes; 1 killed, 2 injured.

One accident; 1 killed, 2 injured.

NORFOLK & WESTERN RAILWAY:

July 6, 1916, locomotive 891, Ingham, Va. Arch tube burst; tube stopped up with mud; 2 injured.

July 30, 1916, locomotive 489, near Graves, Va. Flue broke at butt weld; defective weld; 1 injured.

August 13, 1916, locomotive 1007, West Roanoke, Va. Scalded, due to steam valve on cold-water sprinkler leaking; 1 injured.

September 7, 1916, locomotive 582, near Circleville, Ohio. Piston key sheared, knocking out cylinder head; 1 injured.

September 27, 1916, locomotive 468, Shenandoah, Va. Scalded by hot water while removing cap from strainer box on left injector feed pipe, due to cold-water sprinkler valve leaking badly; 1 injured.

November 26, 1916, locomotive 1017, Basic, Va. Flue broke at butt weld; defective weld; 1 injured.

December 9, 1916, locomotive 680, near Devon, W. Va. Crank-pin collar lost off, allowing rod to come off of pin while train was running at a speed of about 25 miles per hour; 1 injured.

February 4, 1917, locomotive 689, Norfolk, Va. Flue broke at butt weld; defective weld; 2 injured.

February 26, 1917, locomotive 1023, Solitude, Va. Left main crank pin broke; old crack in pin; 1 killed.

March 21, 1917, locomotive 423, Pine Hall, N. C. Flue broke at butt weld; defective weld; 1 injured.

April 5, 1917, locomotive 1053, Cloverdale, Va. Step at gangway of locomotive turned, due to being loose and failure to make proper repairs when reported; 1 injured.

June 3, 1917, locomotive 406, Fountain, Va. Flue pulled out of back flue sheet, due to bead missing and flue end excessively rolled; 1 injured.

Twelve accidents; 1 killed, 13 injured.

NORTHERN PACIFIC RAILWAY:

July 20, 1916, locomotive 127, Bozeman, Mont. Squirt-hose valve bonnet blew out; 1 injured.

August 20, 1916, locomotive 1658, Dayton, Minn. Tank leaking at right front corner, causing steps to become slippery; 1 injured.

August 26, 1916, locomotive 1533, Washtucna, Wash. Injector broke; scalded by hot water from an improperly located overflow pipe; 1 injured.

October 18, 1916, locomotive 1220, Storey, Mont. Shaker bar slipped off staff, due to connecting pin working out; 1 injured.

November 6, 1916, locomotive 604, St. Paul, Minn. Scalded by hot water from blow-off cock while boiler was being emptied, due to defective threads on discharge pipe and blow-off cock; 1 injured.

December 6, 1916, locomotive 129, Colgate, Mont. Arch tube pulled out of flue sheet; improperly applied; tube did not enter sheet at right angle, nor were any of the tubes belled or beaded; 2 injured.

January 3, 1917, locomotive 75, Northtown, Minn. Injured while reversing locomotive, due to reversing-gear counterbalance being inoperative on account of one bolt missing; 1 injured.

February 17, 1917, locomotive 426, Embden, N. Dak. Water glass burst; cut by flying glass; 1 injured.

February 18, 1917, locomotive 38, St. Paul, Minn. Handhold on locomotive broke, due to old fracture; 1 injured.

February 20, 1917, locomotive 2211, Lind, Wash. Main crank pin broke; old fracture in pin; 1 injured.

March 3, 1917, locomotive 2217, Skones, Mont. Air valve to fire door stuck; 1 injured.

March 6, 1917, locomotive 2305, Denhoff, N. Dak. Injured, due to lower step at gangway of locomotive broken off; 1 injured.

March 26, 1917, locomotive 1221, Cle Elum, Wash. Ash-pan lever slipped off of post, due to improper fit; 1 injured.

April 26, 1917, locomotive 2081, Pasco, Wash. Handrail bracket post broke, due to old fracture; 1 injured.

May 7, 1917, locomotive 1521, Washtucna, Wash. Grate connecting rod pin lost out, due to pin not being properly secured; 1 injured.

May 9, 1917, locomotive 3015, Kennedy, Wash. Crown sheet failure; low water; no contributory causes found; 1 killed, 1 injured.

June 18, 1917, locomotive 502, Parkwater, Wash. Washout plug blew out while attempting to tighten under pressure; plug cross threaded; 1 injured.

June 21, 1917, locomotive 2378, Staples, Minn. Water-glass valve and spindle blew out of cock, due to improper construction; valve was so constructed that it could be screwed entirely out of cock without removing bonnet or packing nut; 1 injured.

Eighteen accidents; 1 killed, 19 injured.

OREGON SHORT LINE RAILROAD:

July 20, 1916, locomotive 567, near Pocatello, Idaho. Crown sheet failure; low water; no contributory causes found; 1 injured.

One accident; 1 injured.

OREGON-WASHINGTON RAILROAD & NAVIGATION CO.:

*September 24, 1916, locomotive 3513, St. Clair, Wash. High-pressure main rod strap broke, stripping engine; old defect in strap; 1 injured.

One accident; 1 injured.

PENNSYLVANIA LINES WEST OF PITTSBURGH:

July 1, 1916, locomotive 9872, Cleveland, Ohio. Squirt hose burst; defective hose; 1 injured.

July 1, 1916, locomotive 7303, Alliance, Ohio. Reflex water glass broke; 1 injured.

July 6, 1916, locomotive 7220, Wellsville, Ohio. Grease cup exploded, due to contents of fusee in cup on account of hot pin; 1 injured.

July 11, 1916, locomotive 9773, Hudson, Ohio. Boiler check valve stuck open; defective valve; 1 injured.

July 15, 1916, locomotive 7374, Conway, Pa. Squirt hose burst; defective hose; 1 injured.

July 26, 1916, locomotive 7208, Pittsburgh, Pa. Squirt hose parted at splice; hose not clamped; 1 injured.

July 27, 1916, locomotive 9440, Alliance, Ohio. Squirt hose parted at splice; hose not clamped; 2 injured.

July 27, 1916, locomotive 8096, Columbus, Ohio. Squirt hose burst; defective hose; 1 injured.

August 3, 1916, locomotive 7606, Allegheny, Pa. Broken rivet blew out of fire-box sheet while being calked under pressure; rivet fit in hole defective and head had been excessively calked; 1 injured.

August 21, 1916, locomotive 7800, Conway, Pa. Squirt hose defective; 1 injured.

August 22, 1916, locomotive 7546, Glenfield, Pa. Squirt hose defective; 1 injured.

September 2, 1916, locomotive 7481, Rochester, Pa. Scalded by hot water from defective squirt-hose valve; 1 injured.

September 22, 1916, locomotive 7567, Cleveland, Ohio. Squirt hose burst; defective hose; 1 injured.

September 24, 1916, locomotive 8689, Indianapolis, Ind. Arch tube pulled out of flue sheet, due to not extending through sheet far enough to permit of beading or rolling; 1 injured.

*October 14, 1916, locomotive 9077, Conway, Pa. Grate-shaker bar slipped off post; bar did not fit post properly; 1 injured.

October 15, 1916, locomotive 7386, Mansfield, Ohio. Injector delivery pipe burst, due to defective pipe and improper repairs; 1 injured.

October 23, 1916, locomotive 7388, Youngstown, Ohio. Tool box in end of tank had hook that holds door closed missing, allowing door to swing open and strike fireman in head while putting in fire; 1 injured.

November 11, 1916, locomotive 7077, Crestline, Ohio. Lubricator-valve bonnet broke through stuffing box, due to weak construction; 1 injured.

November 24, 1916, locomotive 7708, Wellsville, Ohio. Washout cap blew out while attempting to tighten cap with 180 pounds pressure on boiler; defective threads; 4 injured.

November 25, 1916, locomotive 7238, Conway, Pa. Reflex water glass broke; 2 injured.

December 23, 1916, locomotive 20 (C. L. & N.), near Selma, Ohio. Flue pulled out of back flue sheet; beads were missing from 15 flues, and 14 others with beads nearly gone; 1 injured.

January 24, 1917, locomotive 7136, Chicago, Ill. Locomotive ran away from coal chute with no one in cab, colliding with another locomotive; throttle latch spring was disconnected and inoperative; 1 killed, 1 injured.

January 25, 1917, locomotive 7398, Dry Run, Ohio. Crown sheet failure; low water; no contributory causes found; 1 injured.

March 4, 1917, locomotive 9355, Mansfield, Ohio. Flue broke in weld; imperfect weld; 2 injured.

March 15, 1917, locomotive 9969, Leetonia, Ohio. Squirt hose burst; 1 injured.

April 21, 1917, locomotive 7928 (L. M.), Indianapolis, Ind. Injector ram bonnet blew out; defective threads; 1 injured.

April 27, 1917, locomotive 9945, Avon, Ohio. Air compressor steam pipe blew out at brazed collar, due to defective brazing; 1 injured.

May 1, 1917, locomotive 7797, Upper Sandusky, Ohio. Stoker valve bonnet blew out; 1 killed.

June 16, 1917, locomotive 7508, Massillon, Ohio. Shaker bar slipped off of stand, due to an improper fit bar; 1 injured.

June 21, 1917, locomotive 8590, Thornburg, Pa. Crown sheet failure; low water; no contributory causes found; 3 killed.

June 28, 1917, locomotive 7971, Cincinnati, Ohio. Squirt hose burst, due to defective hose; 1 injured.

Thirty-one accidents; 5 killed, 35 injured.

PENNSYLVANIA RAILROAD:

July 1, 1916, locomotive 3002, near Harrisburg, Pa. Drawbar and safety bars between locomotive and tender broke; 1 injured.

July 17, 1916, locomotive 861, Harrisburg, Pa. Boiler check cap blew out, due to defective and worn threads; 1 injured.

August 4, 1916, locomotive 6227, Oil City, Pa. Squirt hose parted at splice; insecurely clamped; 1 injured.

August 17, 1916, locomotive 2691, near Spruce Creek, Pa. Crown sheet failure; low water; bottom gauge cock stopped up with scale; 1 killed, 2 injured.

August 27, 1916, locomotive 1326, near Millham Junction, N. J. Flue broke at weld; overheated in welding; 1 injured.

September 3, 1916, locomotive 2441, Rhems, Pa. Struck by piece of steam-heat connection flying from between locomotive and tender while locomotive was in motion, due to defective coupling, allowing parts to become disconnected and fall to ground; defective coupling had been reported several times previous to accident; 1 injured.

October 14, 1916, locomotive 5063, Bear, Del. Cylinder head blew out, due to excessive pressure; valve improperly blocked when valve stem was disconnected because of eccentric-rod bushing losing out; 1 injured.

October 15, 1916, locomotive 966, Jersey City, N. J. Crown sheet failure; low water; no contributory causes found; 2 injured.

October 20, 1916, locomotive 1957, Waterford, Pa. Reach rod broke, due to defective weld; injured while making temporary repairs, due to throttle leaking badly; 2 injured.

November 2, 1916, locomotive 2747, Columbia, Pa. Top blew off of washout cap, due to old crack extending 4½ inches around cap; 1 injured.

November 4, 1916, locomotive 2637, near Corry, Pa. Boiler check stuck open, causing back pressure in delivery pipe, causing heater-cock bonnet to blow out, due to defective threads; 1 injured.

November 10, 1916, locomotive 452, Pitcairn, Pa. Lubricator steam-pipe collar blew off, due to defective brazing and improper design of collar; 1 injured.

November 29, 1916, locomotive 3336, near Harrisburg, Pa. Broken staybolt blew out of fire-box side sheet; threads on bolt and in sheet corroded away; 2 injured.

December 13, 1916, locomotive 185, Blairsville, Pa. Engineer unable to close throttle, due to defective throttle-lever mechanism, causing runaway locomotive; defective condition reported just previous to accident; 1 injured.

December 17, 1916, locomotive 6261, Dotter, Pa. Crown sheet failure; low water; bottom water-glass cock and gauge cocks nearly closed with hard scale; water-glass drain cock inoperative by hand; left injector found defective; injectors reported defective 10 consecutive times immediately prior to accident; 1 injured.

December 25, 1916, locomotive 2922, Seward, Pa. Main driving rod broke; 1 injured.

December 25, 1916, locomotive 3343, Renova, Pa. Cylinder head blew out; 1 injured.

January 1, 1917, locomotive 1816, Marysville, Pa. Flue broke at weld; imperfect weld; 2 injured.

January 14, 1917, locomotive 101, near Paxtonville, Pa. Injured by back draft, when throttle was closed, while trying to close fire door which was stuck open, due to defective fire-door latch; 1 injured.

January 14, 1917, locomotive 2250, Van Voorhis, Pa. Shaker bar slipped off, due to improper fit of bar on post; 1 injured.

January 17, 1917, locomotive 1018, Morrisville, Pa. Flue broke at weld; defective weld; 1 injured.

February 16, 1917, locomotive 1691, Philadelphia, Pa. Flue broke at weld; defective weld; 2 injured.

February 21, 1917, locomotive 2727, Gallitzin, Pa. Defective throttle-lever latch failed to hold throttle closed, causing locomotive to move; 1 injured.

March 5, 1917, locomotive 2205, Allegheny, Pa. Flue broke in two, due to corrosion; 1 injured.

March 6, 1917, locomotive 247, Altoona, Pa. Baffle plate worked loose, falling across exhaust nozzle, causing back draft; baffle plate insecurely applied; 2 injured.

April 18, 1917, locomotive 518, Mortimer, Pa. Crosshead broke, knocking out cylinder head; old fracture in crosshead; 2 injured.

May 1, 1917, locomotive 1008, Philadelphia, Pa. Crown sheet failure; low water; no contributory causes found; all appurtenances were destroyed so that their condition could not be ascertained by inspection; 5 killed, 1 injured.

May 16, 1917, locomotive 1201, Enola, Pa. Blow-off cock blew out, due to defective threads in sheet, and attempting to tighten in sheet while under pressure; 1 injured.

May 21, 1917, locomotive 1530, Mount Union, Pa. Left cylinder broke off, due to old fracture in casting; 1 killed, 2 injured.

May 25, 1917, locomotive 513, White Station, Pa. Cylinder head knocked out, due to piston being loose on rod and blowing off; 1 injured.

May 28, 1917, locomotive 1484, near Plainsboro, N. J. Eccentric rod broke; 1 injured.

May 29, 1917, locomotive 5041, Greensboro, Md. Flue broke at prosser mark next to flue sheet, due to being badly pitted and corroded; 1 injured.

June 3, 1917, locomotive 3329, Trafford, Pa. Flue broke at weld; defective weld; 1 injured.

Thirty-three accidents; 7 killed, 42 injured.

GREY MARQUETTE RAILROAD:

August 12, 1916, locomotive 359, Plymouth, Mich. Squirt hose blew off; insecurely clamped and end of pipe not turned down; 1 injured.

November 9, 1916, locomotive 476, Toledo, Ohio. Shaker bar slipped off post; improperly fitted; 1 injured.

November 26, 1916, locomotive 358, Saginaw, Mich. Throttle gland spanner nut blew off; spanner nut too large; 1 injured.

January 11, 1917, locomotive 615, Monroe, Mich. Flue broke at weld; 1 injured.

March 2, 1917, locomotive 484, Toledo, Ohio. Defective throttle lever latch and quadrant failed to hold throttle in closed position, allowing locomotive to move; 1 injured.

Five accidents; 5 injured.

PHILADELPHIA & READING RAILWAY:

August 8, 1916, locomotive 1401, Port Reading, N. J. Reflex water glass burst; 1 injured.

August 18, 1916, locomotive 922, Perkasi, Pa. Reflex water glass burst; scalded by escaping steam and water; 1 injured.

September 1, 1916, locomotive 1569, Skillman, N. J. Reflex water glass burst; scalded by escaping steam and water; 1 injured.

November 26, 1916, locomotive 1005, Lorberry Junction, Pa. Arch tube pulled out of back flue sheet, due to being too short to permit of beading or belling end; 1 injured.

December 23, 1916, locomotive 1082, Harrisburg, Pa. Collar pulled off lubricator steam pipe, due to not being properly brazed; 1 injured.

December 23, 1916, locomotive 318, Spring Mill, Pa. Water glass burst; scalded by escaping steam and water, due to being unable to close water glass cocks; 1 injured.

December 29, 1916, locomotive 1250, Wilmington, Del. Reflex water glass burst; 1 injured.

January 22, 1917, locomotive 805, near Treverton, Pa. Left main rod broke, due to old crack of about one-third the cross-sectional area of rod; 1 injured.

February 3, 1917, locomotive 1739, Macungie, Pa. Reflex water glass gasket blew out; scalded while closing valves; 1 injured.

March 10, 1917, locomotive 1734, near Chambersburg, Pa. Oil headlight exploded; 1 injured.

March 31, 1917, locomotive 22, Camden, N. J. Injector steam pipe spanner nut broke; nut badly mutilated due to use of hammer and chisel when tightening; 1 injured.

June 7, 1917, locomotive 1508, Bridgeport, Pa. Reflex water glass burst; scalded by escaping steam and water; 1 injured.

Twelve accidents; 12 injured.

PITTSBURGH & LAKE ERIE RAILROAD:

November 1, 1916, locomotive 9216, Newport, Pa. Main crank pin broke; old defect in pin; 1 injured.

One accident; 1 injured.

RUTLAND RAILROAD:

April 15, 1917, locomotive 2416, near Middlebury, Vt. Crown sheet failure; low water; right injector was defective and had been reported four times just previous to accident; 1 injured.

One accident; 1 injured.

ST. LOUIS & SAN FRANCISCO RAILROAD:

July 9, 1916, locomotive 727, Carl Junction, Mo. Scalded by steam and hot water from injector delivery pipe, due to boiler check sticking, and defective drain cock; 1 injured.

July 11, 1916, locomotive 517, near Joplin, Mo. Lubricator feed glass broke; burned by hot oil; 1 injured.

July 17, 1916, locomotive 587, Joplin, Mo. Handrail came loose, causing switchman to fall; 1 injured.

July 26, 1916, locomotive 721, near Neodesha, Kans. Scalded by steam and hot water from throttle stem, due to packing leaking; 1 injured.

November 6, 1916, locomotive 528, near Piedmont, Kans. Crown sheet failure; low water; water foaming and bottom gauge cock stopped up; 3 injured.

January 12, 1917, locomotive 691, near Grand View, Mo. Crown sheet failure; low water; no contributory causes found; 3 killed.

January 17, 1917, locomotive 787, Bourbon, Mo. Injector steam pipe blew off at turret connection, due to inner flange on spanner nut being cracked by undue strain, and proper repairs not made when leak was reported; 1 injured.

February 11, 1917, locomotive 742, near Thayer, Mo. Crown sheet failure; low water; five radial stays found broken with old breaks; 2 killed.

February 14, 1917, locomotive 527, near Neodesha, Kans. Squirt pipe broke off, due to old defect; 1 injured.

February 20, 1917, locomotive 1322, near Hillsdale, Kans. Water glass cock spindle blew out, due to loose fit in bonnet, and no means provided to prevent valve from being screwed entirely out; 1 injured.

February 24, 1917, locomotive 355, Carterville, Mo. Hook connecting chain to fire door came off when fireman attempted to open door; defective hook and too much slack in fire-door chain; 1 injured.

March 20, 1917, locomotive 730, near Gravois, Mo. Squirt pipe nipple blew out; 1 injured.

May 18, 1917, locomotive 1318, Vinita, Okla. Lubricator steam pipe collar broke, due to defective material and to overheating when brazed, driving engineer out of cab; passenger train approaching railroad crossing at grade ran into side of a freight train then occupying the crossing; 1 killed, 2 injured.

Thirteen accidents; 6 killed, 14 injured.

ST. LOUIS SOUTHWESTERN RAILWAY:

July 3, 1916, locomotive 569, Buena Vista, Ark. Fire hose burst; defective hose; scalded by escaping hot water; 1 injured.

One accident; 1 injured.

SEABOARD AIR LINE RAILWAY:

August 25, 1916, locomotive 757, near Hampton, Fla. Squirt hose blew off where applied; 1 injured.

September 13, 1916, locomotive 838, Thelma, N. C. Injured while operating reverse lever; not sufficient clearance between lever and boiler head; 1 injured.

September 28, 1916, locomotive 741, Hamlet, N. C. Reverse lever latch slipped out of quadrant, due to lost motion in latch and quadrant; 1 injured.

October 4, 1916, locomotive 310, Algren, Va. Crown sheet failure; low water; owing to removal of all boiler appurtenances by the railroad company prior to arrival of inspectors, proper investigation could not be made; 2 injured.

October 9, 1916, locomotive 511, near Island Grove, Fla. Flue broke at weld; defective weld; 1 injured.

November 12, 1916, locomotive 991, near Aberdeen, N. C. Injured due to defective handhold on cab; 1 injured.

November 16, 1916, locomotive 992, near Rockmart, Ga. Crown sheet failure; low water; no contributory causes found; 1 injured.

November 22, 1916, locomotive 639, near Athens, Ga. Main driving axle broke, due to old crack and crystallization; 2 injured.

December 17, 1916, locomotive 728, Floyd, Ga. Crown sheet failure; low water; no contributory causes found; 2 injured.

January 6, 1917, locomotive 604, Live Oak, Fla. Plug blew out of air reservoir; defective threads on plug; 1 injured.

February 6, 1917, locomotive 214, near Dinwiddie, Va. Crown sheet failure; low water; no packing in top water-glass cock, causing bad leak and lowering of pressure on top of water in water glass; handle wired to keep spindle from blowing out of cock; defect reported four times just previous to accident and repairs not made; bottom water-glass cock was found only one-tenth of a turn open; 3 killed.

June 7, 1917, locomotive 427, Savannah, Ga. Squirt hose blew off; hose not clamped; 1 injured.

June 21, 1917, locomotive 101 (T. N.), Bradley Junction, Fla. Cap blew out of boiler check, due to defective and improper fit of cap, and defective condition of check valve; 1 injured.

Thirteen accidents; 3 killed, 15 injured.

SEATTLE, PORT ANGELES & WESTERN RAILWAY:

May 16, 1917, locomotive 7605 (C. M., & St. P.), near Lyre, Wash. Water glass burst; cut by flying glass; inefficient shield; 1 injured.

One accident; 1 injured.

SOUTHERN PACIFIC, ATLANTIC SYSTEM:

September 28, 1916, locomotive 959 (G. H. & S. A.), near Piasano, Tex. Flue broke; overheated in welding; 1 injured.

January 11, 1917, locomotive 810 (G. H. & S. A.), near Kingsbury, Tex. Crown sheet failure; low water; bottom water glass opening reduced to one-eighth inch due to scale; 2 injured.

April 30, 1917, locomotive 753 (G. H. & S. A.), near Watkins, Tex. Injecting manure through injector into boiler to stop leaks; 1 injured.

May 16, 1917, locomotive 753, Valentine, Tex. Flue broke off inside of flue sheet, due to excessive use of prosser; 1 injured.

Four accidents; 5 injured.

SOUTHERN PACIFIC, PACIFIC SYSTEM:

November 18, 1916, locomotive 2602, Ordway, Cal. Crown sheet failure; low water; no contributory causes found; 3 injured.

One accident; 3 injured.

SOUTHERN RAILWAY:

*July 22, 1916, locomotive 1593, Memphis, Tenn. Handhold pulled off locomotive due to loose casting; 1 injured.

July 24, 1916, locomotive 372, Gastonia, N. C. Lubricator glass broke; cut by flying glass; shield removed at time of accident; 1 injured.

July 29, 1916, locomotive 720, Melrose, N. C. Squirt hose blew off; insecurely clamped; 1 injured.

August 1, 1916, locomotive 774, Princeton, Ind. Ash-pan blower pipe blew apart at union, due to defective threads and pipe not being properly clamped; 1 killed.

August 26, 1916, locomotive 1623, Macon, Ga. Flue broke at weld; overheated in welding; 1 injured.

October 24, 1916, locomotive 287 (Yadkin), Granite Quarry, N. C. Squirt hose blew off; hose insecurely clamped; 1 injured.

January 7, 1917, locomotive 4621, near Lawyer, Va. Squirt hose blew off; insecurely clamped; 1 injured.

January 12, 1917, locomotive 698, Spencer, N. C. Headlight turbine burst; 1 killed.

January 21, 1917, locomotive 824, near Paint Rock, N. C. Crown sheet failure; low water; no contributory causes found; 1 killed, 1 injured.

February 13, 1917, locomotive 4534, Melrose, N. C. Squirt hose blew off; hose insecurely clamped; 1 injured.

May 19, 1917, locomotive 1292, Charlotte, N. C. Squirt hose blew off; insecurely clamped; 1 injured.

May 22, 1917, locomotive 1080, Savannah, Ga. Bull's-eye lubricator glass burst and blew out; 1 injured.

June 20, 1917, locomotive 764, Duncan, Ind. Squirt hose blew off; insecurely clamped; 1 injured.

Thirteen accidents; 3 killed, 11 injured.

SOUTHERN RAILWAY CO. IN MISSISSIPPI:

November 11, 1916, locomotive 3030, Ittabena, Miss. Drawbar pin between locomotive and tender broke, due to broken draw casting on locomotive; 1 injured.

One accident; 1 injured.

TENNESSEE CENTRAL RAILROAD CO.:

November 29, 1916, locomotive 30, near Cookeville, Tenn. Crown sheet failure due to improper repairs to crown bolts; crown sheet had been overheated three times previous to accident, when repairs had been made by only redriving hammered crown bolts; 1 injured.

One accident; 1 injured.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS:

December 31, 1916, locomotive 99, St. Louis, Mo. Water glass burst; inefficient shield; cut by flying glass; 1 injured.

One accident; 1 injured.

TEXAS & NEW ORLEANS RAILROAD:

September 28, 1916, locomotive 438 (G. H. & S. A.), near Colmesneil, Tex. Transverse equalizer hanger broke; old fracture in hanger; 1 injured.

One accident; 1 injured.

TEXAS & PACIFIC RAILWAY:

August 13, 1916, locomotive 398, Pyote, Tex. Scalded, due to defective extension rod to injector water valve, causing injector to break; 1 injured.

August 14, 1916, locomotive 394, Fort Hancock, Tex. Steam turbine to dynamo exploded; 1 injured.

*September 2, 1916, locomotive 381, Fort Worth, Tex. Injector branch pipe blew off; threads stripped; 1 injured.

September 15, 1916, locomotive 130, El Paso, Tex. Blow-off cock stem pulled out, due to defective threads; 1 injured.

September 22, 1916, locomotive 102, Abilene, Tex. Squirt-hose nipple blew off; 1 injured.

*September 25, 1916, locomotive 357, Terrell, Tex. Grate shaker rod broke; 1 injured.

October 23, 1916, locomotive 160, El Paso, Tex. Spring hanger broke, knocking out washout plug; 1 injured.

November 19, 1916, locomotive 160, El Paso, Tex. Headlight step bolt broke, permitting engineer to fall between locomotive and cars while moving; 1 injured.

December 13, 1916, locomotive 338, Grand Prairie, Tex. Grate shaker bar slipped off fulcrum lever; 1 injured.

December 13, 1916, locomotive 200, Lamorie, La. Shaker bar slipped, due to fulcrum bolt losing out or breaking while shaking grates; 1 injured.

February 18, 1917, locomotive 293, Grand Saline, Tex. Grate shaker bar slipped off staff; 1 injured.

February 24, 1917, locomotive 364, near Gozar, Tex. Cylinder cock blew out, due to being insecurely applied; 1 injured.

March 4, 1917, locomotive 275, near Clyde, Tex. Shaker bar slipped off of fulcrum lever, due to improper fit; 1 injured.

March 5, 1917, locomotive 183, Marshall, Tex. Handhold on tender broke, due to one end broken off; defect reported day previous to accident and repairs not made; 1 injured.

March 19, 1917, locomotive 412, near Mingus, Tex. Shaker bar slipped off staff; 1 injured.

March 30, 1917, locomotive 201, Fort Worth, Tex. Water glass cock spindle blew out; no means provided to prevent spindle from being screwed entirely out; 1 injured.

March 31, 1917, locomotive 349, Radey, Tex. Shaker bar slipped off lever; 1 injured.

May 1, 1917, locomotive 407, near Lambert, Tex. Headlight turbine exploded; 1 injured.

May 5, 1917, locomotive 369 (K. C. S.), Wills Point, Tex. Crown sheet failure; low water; lowest reading of bottom gauge cock $2\frac{1}{8}$ inches above highest point of crown sheet and lowest reading of bottom water glass cock $2\frac{1}{8}$ inches above highest point of crown sheet; 13 adjacent radials and 7 staybolts broken; 1 killed, 3 injured.

Nineteen accidents; 1 killed, 21 injured.

TOLEDO & OHIO CENTRAL RAILWAY:

*November 20, 1916, locomotive 9504, Columbus, Ohio. Handrail on tender broke, due to old defect; 1 injured.

One accident; 1 injured.

TOLEDO, ST. LOUIS & WESTERN RAILROAD:

July 2, 1916, locomotive 178, Frankfort, Ind. Flue broke at weld; flue worn thin previous to application; 1 injured.

*November 26, 1916, locomotive 43, Kaufman, Ill. Left main and right back axles broke, due to old fracture and crystallization of metal; 1 injured.

Two accidents; 2 injured.

UNION PACIFIC RAILROAD:

August 2, 1916, locomotive 417, near Arena, Colo. Right main rod strap broke, due to old crack; 1 injured.

January 24, 1917, locomotive 1264, near Carnerio, Kans. Broken staybolt blew out of side sheet; defective threads and old break in staybolt. Locomotive had been inspected the day previous to accident and all stay bolts reported good on monthly inspection and repair report; upon investigation at time of accident there was found 32 staybolts with defective heads and leaking in sheet; 2 injured.

February 21, 1917, locomotive 1246, St. Paul, Nebr. Broken rivet blew out of fire box flue sheet seam while being calked with pressure on boiler; 1 injured.

Three accidents; 4 injured.

WABASH RAILWAY CO.:

*September 22, 1916, locomotive 2428, West Lebanon, Ind. Piston head and cylinder head blew out; 1 injured.

February 9, 1917, locomotive 2304, Hannibal, Mo. Scalded by hot water from blow-off pipe; blow-off cock leaking slightly and pipe applied with outer end higher than blow-off cock connection, which formed a trap for hot water to accumulate and squirt out at intervals; 1 injured.

March 6, 1917, locomotive 2159, Imogene, Iowa. Boiler check stuck open; 1 injured.

June 14, 1917, locomotive 2326, Kinderhook, Ill. Injector operating valve bonnet blew out, due to loose fitting bonnet; 2 injured.

Four accidents; 5 injured.

WESTERN MARYLAND RAILWAY:

August 8, 1916, locomotive 913, near Mount Wilson, Md. Crown sheet failure; low water; no contributory causes found; 2 injured.

*September 2, 1916, locomotive 502, Ridgely, W. Va. Drawbar and safety chains between locomotive and tender broke, due to old crack in eye of drawbar; 1 injured.

December 5, 1916, locomotive 761, Rockwood, Pa. Squirt hose pipe broke, due to light material; 1 injured.

Three accidents; 4 injured.

WESTERN PACIFIC RAILROAD Co.:

*December 2, 1916, locomotive 156, San Francisco, Cal. Defective tender deck, causing fireman to fall; 1 injured.

March 11, 1917, locomotive 19, Salt Lake City, Utah. Shaker bar slipped off of fulcrum lever, due to improper fit; 1 injured.

Two accidents; 2 injured.

YAZOO & MISSISSIPPI VALLEY RAILROAD:

August 8, 1916, locomotive 173 (I. C.), Helena, Ark. Fire hose blew off; defective hose; scalded by escaping hot water; 1 injured.

One accident; 1 injured.

ILLUSTRATIONS OF LOCOMOTIVE BOILER
EXPLOSIONS AND LOCOMOTIVE DEFECTS.
