

INTERSTATE COMMERCE COMMISSION

THIRD ANNUAL REPORT

OF THE

Chief Inspector of Locomotive
Boilers

TO THE

INTERSTATE COMMERCE COMMISSION

OCTOBER 10, 1914



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ANNUAL REPORT
OF THE
CHIEF INSPECTOR OF LOCOMOTIVE BOILERS.

INTERSTATE COMMERCE COMMISSION,
DIVISION OF LOCOMOTIVE BOILER INSPECTION,
Washington, October 10, 1914.

To the Interstate Commerce Commission:

In compliance with section 7 of the act of February 7, 1911 (Public, No. 383), commonly known as the locomotive boiler inspection law, the annual report of the Chief Inspector of Locomotive Boilers for the fiscal year ended June 30, 1914, is respectfully submitted.

In presenting this, the third annual report of the work of the Division of Locomotive Boiler Inspection, a comparative summary is given of the work performed, the conditions found, and the results accomplished during the three-year period, because it is believed that sufficient time has elapsed since the law has been in force to permit the benefits which may reasonably be accredited to its operation to be fairly shown.

The following table shows in concrete form the inspection work performed each year since the passage of the law; and the decrease in the percentage of locomotives reported defective indicates in a measure the improvement in conditions.

	1914	1913	1912
Number of locomotives inspected.....	92,716	90,346	74,234
Number found defective.....	49,137	54,522	48,768
Percentage found defective.....	52.9	60.3	65.7
Number ordered out of service.....	3,365	4,676	3,377

It does not, however, fully show the improved conditions resulting from the operation of the law, because, as pointed out in our 1913 report, our attention was first concentrated on the more serious defects, so that the number of fatalities might be reduced; therefore,

the improvement is more accurately indicated by the reduction in the number of casualties, as shown by the following table:

	1914	1913	1912
Number of accidents.....	555	820	856
Decrease from previous year..... per cent.	32.3	4.2	
Number killed..... do.	35.1		
Decrease from previous year..... per cent.	23	36	91
Decrease from 1912..... do.	36.1	60.4	
Number injured..... do.	74.7		
Decrease from previous year..... per cent.	614	911	1,005
Decrease from 1912..... do.	32.6	9.3	
	38.9		

The facts shown in the above tables are so conclusive that nothing further that might be said could add to or take from their weight; therefore, it is not necessary to enlarge on the information contained therein.

In addition to the inspection work above shown, a careful investigation has been made of every accident reported in accordance with the provisions of the locomotive boiler inspection law. In each case active steps were taken to remedy any conditions or practices which could be shown to have caused or contributed to the cause of the accident, and this action has materially assisted in reducing the accident list.

Four hundred and six applications for extension of time for removal of flues, in accordance with the provisions of rule 10, were filed, of which number 67 were withdrawn by the railroad companies before an investigation was made. An investigation was made in each of the remaining 339 cases, in 264 of which the full extension asked for was granted, in 21 an extension for a portion of the time asked for was allowed, and 54 applications, or 16 per cent of the total number, were refused after an investigation.

The cuts of boiler check openings shown on plates XII and XIII show some of the conditions found to exist on locomotives for which an extension of time was asked for the removal of flues, and indicate the importance of making careful investigations in such cases.

Rule No. 2 of the locomotive-boiler inspection rules provided that—

The lowest factor of safety to be used for all locomotives in service or under construction on or before January 1, 1912, will be fixed after investigation and hearing and after the expiration of the time allowed for filing specification cards.

In accordance therewith a careful investigation, extending over the two-year period allowed for filing specification cards, was conducted by this division. This investigation showed that 11,153 locomotives, or about 17 per cent of the total number for which specifica-

tion cards were filed, had a factor of safety below 4, being divided as follows:

4,407 with a factor between $3\frac{1}{2}$ and 4.
 2,531 with a factor between $3\frac{1}{2}$ and $3\frac{1}{4}$.
 2,039 with a factor between $3\frac{1}{4}$ and $3\frac{1}{2}$.
 1,082 with a factor between 3 and $3\frac{1}{4}$.
 1,094 with a factor below 3, on some of which the factor was found to be below 2.

This factor is based on the ultimate tensile strength of the material; the elastic limit, at which point the metal takes a permanent set and never recovers, is usually about one-half of the ultimate tensile strength; therefore, the imperative need of increasing the factor to a point which might reasonably be expected to provide adequate protection against flaws or hidden defects in the material, poor workmanship, and undiscovered deterioration becomes apparent.

All of these points were carefully considered at a conference held at the office of the Chief Inspector of Locomotive Boilers on April 28 and 29, 1914, at which the railroad companies and their employees were represented; and suitable amendments to the rules, providing for improved methods of construction and increased safety of operation, were agreed upon, to be submitted to the Commission for its approval.

It was also found that there were many locomotives in service with excessive stresses on stays and braces; therefore, a maximum allowable stress for stays and braces was included in the amendments to the rules.

In preparing these amendments the practice established by the Commission in previous cases of a similar character was followed, and a series of time limits were provided for the making of the necessary changes, so arranged as to require the more serious conditions to be promptly remedied and allow more time for other necessary improvements in cases where the conditions, while improper, were not so likely to cause accidents. Therefore, the amended rules as approved by the Commission on June 9, 1914, will not materially add to the expense of maintenance, as the required improvements can in most instances be made when the locomotives are shopped for regular repairs.

In the following table is shown the total number of persons killed and injured in locomotive boiler accidents during the past three years, classified in accordance with their occupations:

	Year ended June 30--					
	1914		1913		1912	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Members of train crews:						
Engineers.....	8	187	12	268	22	310
Firemen.....	8	290	12	478	19	491
Brakemen.....		46	6	79	8	79
Conductors.....	1	6	2	7	4	16
Switchmen.....		1		2		7
Roundhouse and shop employees:						
Boiler makers.....	1	18		10	2	3
Machinists.....	2	5		11	7	11
Foremen.....	1	6		4	1	4
Inspectors.....		3		3	1	2
Watchmen.....	1	7		8	3	6
Boiler washers.....		8		4	1	4
Hostlers.....		9	1	6		5
Other roundhouse and shop employees.....	1	17	1	24	14	62
Other employees.....		10		4	3	3
Nonemployees.....		1	2	3	6	2
Total.....	23	614	36	911	91	1,006

A check of the above table shows that 86 per cent of the total number of killed and injured were engine and train men, and that the accidents were caused by failure of some part of the boiler or appurtenances thereof while in service. Thirteen per cent of these casualties were caused by failures due to low water where no contributory cause could be shown to exist.

Three per cent of the total number killed and injured were boiler makers who were engaged in making repairs to boilers under pressure; about 50 per cent of these casualties were due to plugs, studs, or rivets blowing out or being driven into the boiler while being calked with pressure on the boiler. To reduce the number of accidents from this source, we are requiring all plugs more than 1½ inches in diameter in fire-box sheets, excepting fusible plugs, to be secured by a stay bolt. Approximately 16 per cent of the injuries to boiler makers occurred while trying to tighten washout or arch-tube plugs while there was pressure on the boiler, which under no circumstances should be required or permitted.

The remaining 11 per cent of the total number killed and injured were from the various classes of employees engaged in the work of caring for and repairing locomotives at terminals.

Two formal appeals from the decision of inspectors, as provided in section 6 of the law, were filed during the year, in both of which a subsequent investigation resulted in the decision of the inspector being sustained.

No prosecutions for violations have been filed during the year, as the beneficial effect of the law and rules is being generally recog-

nized by railroad officials, most of whom show a disposition to comply with the very reasonable requirements and to cooperate with us in bringing about improved conditions. On two or three of the larger roads, however, and on several smaller ones, conditions and practices appear to indicate that we may be unable to obtain a full compliance with the requirements of the law without resorting to the courts.

During the year 2,141 defects to locomotives for which the present laws do not provide a remedy, 1,155 of which were defective wheels, were reported to this division by inspectors and directed to the attention of the proper railroad officials. In most instances locomotives with defects of this character were held for repairs by the local officials when their attention was directed to the defective conditions. In some cases it has been necessary to wire the president of the road in order to get the repairs made, and even that has not always brought about the desired result.

In one instance inspectors objected to the use of a locomotive in passenger service which had sharp flanges on both engine-truck wheels, three driving wheels, and one trailer wheel, and also one loose driving-wheel tire, and were assured by the local officials that the locomotive would not again be used until repaired. Instead of holding the locomotive for repairs, however, the local officials sent it light to a point a few miles from the terminal, sent a passenger train out to that point with another locomotive, and changed locomotives, sending the defective one through with the passenger train.

If a freight car with similar defects were offered to this carrier in interchange by a connecting line, it would be refused under their own rules as unsafe to handle; yet this defective locomotive was sent out on a passenger train by the officials after their attention had been directed to its condition, and existing laws provide no remedy.

Our records contain other instances of a similar character; therefore, the recommendation made in our report for the year 1913, that the provisions of the boiler inspection law be extended to cover the entire locomotive is respectfully renewed.

In this connection it seems appropriate to state that the inspectors now in the service are men of wide experience in railroad work, who were selected after passing a competitive civil-service examination; and their three years' training as inspectors, in addition to their previous experience and training, has eminently fitted them to perform the additional duties that such a law would impose in as satisfactory a manner as they do their present ones, and, it is not unreasonable to say, with equally good results.

Respectfully submitted.

FRANK McMANAMY,
Chief Inspector Locomotive Boilers.

Accidents and casualties resulting from failures of locomotive boilers and their appurtenances.

Nature of failure or defect.	Year ended June 30—								
	1914			1913			1912		
	Accidents.	Killed.	Injured.	Accidents.	Killed.	Injured.	Accidents.	Killed.	Injured.
Arch-tube failures.....	12		19	20	3	27	18		23
Ash-pan blowers defective.....	5		5	14	1	14	3		3
Blowers defective.....	11		11	13		13	11		15
Blow-off cocks defective.....	15	1	15	16		18	23	2	22
Boiler checks defective.....	14		14	11		12	11	1	11
Boiler explosions:									
A. Shell explosions.....	1		1				3	27	41
B. Crown sheet failures due to low water where no contributory causes were found.....	36	13	59	44	23	67	69	35	129
C. Crown sheet failures due to low water where contributory causes or defects were found.....	12	3	18	28	6	50	23	15	38
D. Fire-box failures due to defective staybolts, crown stays, or sheets.....	4	1	7	5		8	1	1	1
E. Fire-box failures due to water foaming.....	1		2	1	2	1	1	3	
Cross stays defective.....				1		3			
Crown stays defective.....				1		2			
Dome caps defective.....				2		2			2
Draft appliances defective.....	1		1	4		4	3		4
Exhaust nozzle breaking.....				1		1			
Fire doors defective.....				2		2			
Fire-hose failures.....	3		3						
Flue failures.....	51		56	54	1	63	56	1	62
Flue-plug failures.....							7		8
Flue pockets defective.....	3		4	2		2	3		4
Flue sheets defective.....				1		1	2		2
Gauge cocks defective.....	3		3	2		2	4		4
Grates defective.....				1		1			
Handhole plates defective.....	1		1				1		1
Injectors and connections defective (not including injector steam pipes).....	33		33	28		28	47		48
Injector steam-pipe failures.....	15		18	36		47	31		38
Lubricators defective.....	14		14	11		12	11		12
Lubricator glasses bursting.....	20		20	45		45	49		49
Lubricator piping defective.....	8		9	4		5			
Mud-drum failures.....	1	2	2						
Mud ring defective.....							1		1
Patch bolts defective.....							1		1
Plugs (arch-tube) defective.....	4	1	5				2		4
Plugs in fire-box sheet defective.....	6		7	5		6	1		1
Plugs (fusible) defective.....	2		2	1		1	1		1
Plugs in steam chest defective.....				1		1			
Plugs (washout) defective.....	17	1	17	20		23	11	2	14
Rivets defective.....	4		5	2		2			
Safety valves defective.....	1		1	1		1			
Squirt-hose failures.....	139		140	266		267	243		245
Stay bolts defective.....	5		5	2		3	9		11
Steam-heat hose defective.....				1		1			
Studs defective.....	18		21	20		21	14		16
Steam piping defective.....	14		16	5		6	11	2	11
Superheater-tube failures.....				1		2	1		1
Tank hose defective.....	2		2	3		3			
Throttle glands defective.....	3		3	3		4			
Throttle leaking.....	1	1							
Valves defective (not including safety valves).....	3		3	6		6	5		5
Water-bar failures.....	2		2	1		1	3		4
Water glass bursting.....	60		60	128		128	165	1	168
Water-glass fittings defective.....	10		10	7		7	8		8
Miscellaneous.....							1	1	
Total.....	555	23	614	820	36	911	856	91	1,005

TABLES SHOWING NUMBER OF LOCOMOTIVES OWNED, INSPECTED,

Table with 9 columns (Defects, Denver & Rio Grande, Denver & Salt Lake, Detroit & Mackinac, Detroit & Tol. Shore Line, Detroit, Toledo & Ironton, Donora Southern, Dul., Missabe & Northern, Dul., South Shore & At.) and rows 1-63 listing various defects. Includes summary rows for 'Number of defects...', 'Locomotives owned...', 'Locomotives inspected...', 'Locomotives defective', 'Percentage inspected found defective', and 'Locomotives ordered from service'.

1 Number of locomotives reported with this defect.

FOUND DEFECTIVE, AND ORDERED FROM SERVICE, ETC.—Continued.

Table with 16 columns representing different railroad systems (Duluth, Winnipeg & Pacific, E. Broad Top R. R. & Coal, Elgin, Joliet & Eastern, El Paso & Southwestern, Erie, Florence & Cripple Creek, Florida East Coast, Fort Smith & Western, Fort Worth & Denver City, Fort Worth & Rio Grande, Gal., Harrisburg & San An., Gal., Houston & Henderson, Georgetown & Western, Georgia, Georgia & Florida, Georgia, Florida & Ala., Georgia, Southern & Fla., Grand Rapids & Indiana) and rows 1-63 listing various defects. Includes summary rows for 'Number of defects...', 'Locomotives owned...', 'Locomotives inspected...', 'Locomotives defective', 'Percentage inspected found defective', and 'Locomotives ordered from service'.

In the preceding tables the number of locomotives owned has been omitted in a number of cases where the railroad is part of a system. In these instances the number is given under the system with which the road is identified, as follows: Northern Central and Philadelphia, Baltimore & Washington included in Pennsylvania Railroad; St. Louis, Iron Mountain & Southern included in Missouri Pacific.

It will be noted that in several instances the number of locomotives shown inspected exceeds the number owned. This is due to the fact that in some cases the same locomotives were inspected more than once during the year.

ACCIDENTS RESULTING FROM THE FAILURE OF LOCOMOTIVE BOILERS AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1914.

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

ATCHISON, TOPEKA & SANTA FE RAILWAY Co.:

July 17, 1913, locomotive 42, Madison Junction, Kans. Engineman scalded by hot water escaping from squirt hose at connection to valve; hose not properly clamped; 1 injured.

August 4, 1913, locomotive 1452, Shopton, Iowa. Water glass burst; injured by escaping steam; 1 injured.

August 31, 1913, locomotive 362, Rincon, N. Mex. Hose attached to blow-off cock for filling boiler blew off; insecurely applied; 2 injured.

September 15, 1913, locomotive 1674, Seligman, Ariz. Rivet blew out of door sheet seam while being calked with pressure on boiler; defective rivet; 2 injured.

October 28, 1913, locomotive 977, near Williams, Ariz. Crown sheet failure due to low water; water glass inoperative (tube broken); 2 injured.

November 15, 1913, locomotive 1211, near Baxter, Colo. Flue burst; defective material; 1 injured.

April 8, 1914, locomotive 2414, Frontenac, Kans. Water glass burst; injured by escaping steam; 1 injured.

May 26, 1914, locomotive 1092, near Knox, Ill. Right injector steam pipe blew off at fountain; defective threads on union nut; 1 injured.

June 7, 1914, locomotive 243, near Artesia, N. Mex. Engineman scalded by hot water from squirt hose; defective valve; 1 injured.

June 30, 1914, locomotive 519, Chicago, Ill. Flue burst at safe end; overheated in welding, which reduced material to one thirty-second inch thick in space 5 inches long; 1 injured.

Ten accidents; 13 injured.

ATLANTIC COAST LINE RAILROAD Co.:

July 25, 1913, locomotive 118, Wilmington, N. C. Bottom water glass cock broke off; old defect in casting; 1 injured.

* October 20, 1913, locomotive 1259, Thonotosassa, Fla. Flue burst; 1 injured.

November 4, 1913, locomotive 1284, near Willacoochee, Ga. Flue pulled out of back flue sheet; improperly beaded and hole in front flue sheet larger than hole in back flue sheet; 1 injured.

February 4, 1914, locomotive 1108, Columbia, S. C. Water glass burst; injured by escaping steam; 1 injured.

March 4, 1914, locomotive 1123, Jacksonville, Fla. Water glass burst; injured by flying glass; defective shield; 1 injured.

March 21, 1914, locomotive 286, South Rocky Mount, N. C. Crown sheet failure, low water; no contributory cause found; 3 injured.

June 23, 1914, locomotive 919, High Springs, Fla. Water glass burst while shield was removed; injured by flying glass; 1 injured.

Seven accidents; 9 injured.

BALTIMORE & OHIO RAILROAD Co.:

* July 1, 1913, locomotive 1944, Glenwood, Pa. Lubricator glass burst; injured by hot oil; 1 injured.

July 2, 1913, locomotive 552, Foxburg, Pa. Wooden plug blew out of frost cock hole in left branch pipe; 1 injured.

* July 11, 1913, locomotive 1275, Philadelphia, Pa. Lubricator glass burst; injured by hot oil; 1 injured.

* July 12, 1913, locomotive 1853, Reels Mills, Md. Automatic feed on lubricator stripped; 1 injured.

July 29, 1913, locomotive 977, Mansfield, Ohio. Flue burst; parts not held for inspection; 1 injured.

July 30, 1913, locomotive 1290, Willow Grove, Pa. Arch tube pulled out of flue sheet, improperly applied—tube cut too short and not beaded; 1 injured.

* August 13, 1913, locomotive 2155, Ohio Pyle, Pa. Squirt hose parted at splice; 1 injured.

August 24, 1913, locomotive 4258, Rosedale, Ohio. Washout plug blew out; defective threads; 1 injured.

August 29, 1913, locomotive 4224, Keyser, W. Va. Rivet blew out of fire-box sheet while being calked; defective rivet; 1 injured.

* August 31, 1913, locomotive 2168, Frederick Junction, Md. Lubricator glass burst; injured by hot oil; 1 injured.

September 10, 1913, locomotive 2779, Hyndman, Pa. Squirt hose burst; defective hose; 1 injured.

* September 11, 1913, locomotive 4296, Gaithers, Md. Blower valve blew out; 1 injured.

September 17, 1913, locomotive 1153, Youngstown, Ohio. Filling lubricator, pump could not be stopped due to leaking throttle; 1 injured.

September 17, 1913, locomotive 328, Cleveland, Ohio. Crown sheet failure, low water; no contributory cause found; 2 injured.

October 6, 1913, locomotive 784, Boothwyn, Pa. Running-board bracket stud blew out; defective threads and excessive weight on one stud; 1 injured.

October 8, 1913, locomotive 4230, Cumberland, Md. Washout plug blew out; improperly applied; 1 injured.

October 20, 1913, locomotive 2500, North Bend, Ohio. Crown sheet failure, low water; no contributory cause found; 2 injured.

* October 27, 1913, locomotive 2266, Holloway, Ohio. Blow-off cock blew off; improper material used; 1 injured.

* November 9, 1913, locomotive 353, Lima, Ohio. Engineman scalded; ash pan valve stuck; 1 injured.

January 13, 1914, locomotive 4280, near Rodemer, W. Va. Crown-sheet failure; low water; no contributory cause found; 3 injured.

January 18, 1914, locomotive 2607, Rivervale, Ohio. Arch tube pulled out; improperly applied—tube cut too short and not beaded; 2 injured.

January 20, 1914, locomotive 2344, Parkersburg, W. Va. Lubricator glass burst; inefficient shield, injured by flying glass; 1 injured.

March 3, 1914, locomotive 201, East Dayton, Ohio. Boiler maker scalded while working on defective flue with a pressure on boiler; 1 injured.

March 10, 1914, locomotive 4140, New Castle Junction, Pa. Squirt-hose nipple broke; 1 injured.

April 7, 1914, locomotive 1322, Glenwood, Md. Two pocket flues blew out; improperly applied; 2 injured.

April 10, 1914, locomotive 1295, Akron Junction, Ohio. Drain plug blew out of lubricator; defective threads; 1 injured.

April 11, 1914, locomotive 1506, Salisbury Junction, Pa. Stud blew out; defective threads; 1 injured.

May 4, 1914, locomotive 1828, near Arden, W. Va. Crown sheet failure; low water; no contributory cause found; 1 killed; 1 injured.

May 13, 1914, locomotive 3136, Glenwood, Pa. Flue burst; weakened by excessive use of sectional expander; 1 injured.

May 26, 1914, locomotive 1381, Kenova, W. Va. Grate-bar bearing stud blew out; defective threads and improperly applied; 1 injured.

June 5, 1914, locomotive 27, Ivorydale, Ohio. Water glass burst; inefficient shield; 1 injured.

June 19, 1914, locomotive 1773, Gypsy, W. Va. Lubricator glass burst; no shield in use; injured by hot oil; 1 injured.

Thirty-two accidents; 1 killed, 38 injured.

BIRMINGHAM SOUTHERN RAILROAD Co.:

* August 20, 1913, locomotive 17, Bessemer, Ala. Hot water escaping through hole in squirt pipe; defective pipe; 1 injured.

One accident; 1 injured.

BOSTON & ALBANY RAILROAD:

November 17, 1913, locomotive 968, near Middlefield, Mass. Flue pulled out of back flue sheet; defective beading; 3 injured.

January 23, 1914, locomotive 956, Wellesley, Mass. Water glass burst; injured by escaping steam; 1 injured.

February 16, 1914, locomotive 542, Chester, Mass. Crown sheet failure, low water; no contributory cause found. Complete investigation could not be made, owing to removal of appurtenances prior to investigation; 1 injured.

February 18, 1914, locomotive 1037, West Springfield, Mass. Water glass burst; injured by escaping steam and hot water; defective shield; 1 injured.

* February 28, 1914, locomotive 906, Worcester, Mass. Engineman scalded while trying water glass; drainpipe broke off; 1 injured.

May 7, 1914, locomotive 1022, near Brookview, N. Y. Flue burst; defective weld; 1 injured.

Six accidents; 8 injured.

BOSTON & MAINE RAILROAD Co.:

July 12, 1913, locomotive 2320, Woodsville, N. H. Squirt hose blew off; insecurely applied; 1 injured.

July 14, 1913, locomotive 2384, Jefferson, Mass. Squirt hose blew off; insecurely applied; 1 injured.

July 22, 1913, locomotive 2054, Rigby, Me. Defective squirt hose; 1 injured.

July 24, 1913, locomotive 2358, Everts, Vt. Squirt hose blew off; insecurely applied; 1 injured.

August 11, 1913, locomotive 1113, Haverhill, Mass. Squirt hose defective; 1 injured.

August 17, 1913, locomotive 2626, Gardner, Mass. Squirt hose blew off; insecurely applied; 1 injured.

August 24, 1913, locomotive 2337, near Claremont Junction, N. H. Nipple connecting squirt pipe to injector pipe broke while being tightened; defective nipple; 1 injured.

August 26, 1913, locomotive 3626, Wachusett, Mass. Squirt hose blew off; insecurely applied; 1 injured.

September 13, 1913, locomotive 3624, Keene, N. H. Arch-tube plug blew out while being tightened with pressure on boiler; defective threads on plug; 1 killed.

September 24, 1913, locomotive 1445, near North Adams, Mass. Squirt hose blew off; insecurely applied; 1 injured.

* October 7, 1913, locomotive 2402, Lowell, Mass. Injector steam valve leaking; 1 injured.

November 18, 1913, locomotive 229, Concord, N. H. Water glass burst; injured by escaping steam; 1 injured.

March 1, 1914, locomotive 2041, Portland, Me. Lubricator glass burst; injured by flying glass; defective shield; 1 injured.

Thirteen accidents; 1 killed, 12 injured.

BUFFALO CREEK RAILROAD Co.:

* March 20, 1914, locomotive 12, Buffalo, N. Y. Water glass burst; inefficient shield; 1 injured.

One accident; 1 injured.

CENTRAL NEW ENGLAND RAILWAY Co.:

October 11, 1913, locomotive 310, Green Haven, N. Y. Water glass drainpipe broke at coupling; 1 injured.

One accident; 1 injured.

CENTRAL OF GEORGIA RAILWAY Co.:

September 4, 1913, locomotive 1019, Raymond, Ga. Squirt hose blew off; insecurely applied; 1 injured.

December 23, 1913, locomotive 1340, Opelika, Ala. Squirt pipe broke; parts not held for inspection; 1 injured.

April 21, 1914, locomotive 1077, Macon, Ga. Blow-off cock opened while pipe to same was being repaired under pressure; 1 injured.

May 29, 1914, locomotive 1032, Griffin, Ga. Spanner nut on injector delivery pipe blew off while being tightened under pressure; threads crossed and improper tools used to tighten nut; 1 injured.

Four accidents; 4 injured.

CENTRAL RAILROAD OF NEW JERSEY:

July 3, 1913, locomotive 461, Springtown, N. J. Water bar burst; bar stopped up with mud and scale preventing circulation of water, causing tube to become overheated; 1 injured.

January 14, 1914, locomotive 514, Bethlehem Junction, Pa. Flue burst; overheated in welding; 1 injured.

Two accidents; 2 injured.

CHESAPEAKE & OHIO RAILROAD:

February 23, 1914, locomotive 410, near Kingston, W. Va. Crown sheet failure, due to low water; no contributory cause found; 1 injured.

June 11, 1914, locomotive 89, Lake Bruce, Ind. Crown sheet failure, due to low water; no contributory cause found; 1 injured.

Two accidents; 2 injured.

CHICAGO & ALTON RAILROAD:

July 5, 1913, locomotive 817, Tallula, Ill. Fireman screwed top water-glass spindle entirely out of cock; engineer injured replacing spindle, with pressure on boiler; 1 injured.

September 10, 1913, locomotive 360, Roodhouse, Ill. Laborer scalded by hot water from leaking steam-heat valve; 1 injured.

September 26, 1913, locomotive 630, Kansas City, Mo. Waste pipe disconnected from blow-off cock; defective threads; 1 injured.

November 9, 1913, locomotive 79, Brighton Park, Ill. Injector steam pipe blew off; spanner nut defective, due to use of improper tools; 1 injured.

February 1, 1914, locomotive 606, near Ryder, Mo. Fire door frame stud blew out; defective threads; 1 injured.

March 21, 1914, locomotive 172, Toluca, Ill. Barrel explosion; due to pitted patch three-eighths inch thick, 44 inches wide by 134 inches long applied full length of two courses. Patch was badly pitted and grooved 126 inches along inside calking edge of seam; 1 injured.

April 5, 1914, locomotive 505, Lenox, Ill. Fire door frame stud blew out; parts not held for inspection; 1 injured.

Seven accidents; 7 injured.

CHICAGO & EASTERN ILLINOIS RAILROAD:

*August 11, 1913, locomotive 880, Lenox, Ill. Squirt hose blew off; insecurely applied; 1 injured.

October 2, 1913, locomotive 928, West Montezuma, Ind. Oil pipe to left steam chest disconnected at collar; engineman scalded in attempting to make repairs; 1 injured.

Two accidents; 2 injured.

CHICAGO & NORTHWESTERN RAILWAY:

July 8, 1913, locomotive 225, Huron, S. Dak. Blower hose blew off siphon cock; insecurely applied; 1 injured.

July 21, 1913, locomotive 1528, Clinton, Iowa. Squirt hose blew off; insecurely applied; 1 injured.

July 22, 1913, locomotive 463, Peshtigo, Wis. Water glass burst; injury received jumping from locomotive; 1 injured.

July 30, 1913, locomotive 919, Virden, Ill. Spanner nut between injector and branch pipe worked loose; defective threads on nut; 1 injured.

July 31, 1913, locomotive 316, Miami, Iowa. Squirt hose leaking and defective; 1 injured.

August 6, 1913, locomotive 271, Omaha, Nebr. Lubricator glass burst; blowing off shield; inefficient shield; 1 injured.

August 7, 1913, locomotive 168, Chicago, Ill. Union in blow-off pipe line disconnected; due to defective coupling; 1 injured.

August 19, 1913, locomotive 1518, near Clarence, Iowa. Squirt hose blew off; insecurely applied; 1 injured.

August 19, 1913, locomotive 1759, Belvidere, Ill. Injector steam pipe spanner nut broke while being tightened under pressure; defective nut; 1 injured.

August 24, 1913, locomotive 745, Madison, Wis. Squirt hose blew off; insecurely applied; 1 injured.

September 2, 1913, locomotive 247, Chicago, Ill. Squirt hose blew off; insecurely applied; 1 injured.

September 25, 1913, locomotive 2008, Chicago, Ill. Arch tube burst; tube overheated—accumulation of scale in tube; 1 injured.

October 19, 1913 locomotive 1368, Boone, Iowa. Bonnet screwed out of top blower throttle; insecurely applied; 1 injured.

January 10, 1914, locomotive 77, London, Wis. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

January 12, 1914, locomotive 1064, near Jefferson, Iowa. Steam pipe to lubricator blew out of collar; improper brazing; 1 injured.

January 17, 1914, locomotive 266, near Spring Valley, Ill. Arch tube pulled out of door sheet, due to improper application of tube; tube cut too short to allow proper beading; 1 injured.

March 18, 1914, locomotive 1146, Fairmont, Minn. Flue burst; weakened by use of expander; 1 injured.

April 20, 1914, locomotive 178, Hortonville, Wis. Crown-sheet failure; defective threads on crown bolts and in sheet; 2 injured.

June 7, 1914, locomotive 77, Devils Lake, Wis. Crown-sheet failure due to low water; lowest gauge cock $2\frac{1}{2}$ inches and lowest reading of water glass $2\frac{1}{8}$ inches above highest point of crown sheet. Appurtenances removed prior to our investigation, so that report of their condition could not be made; 1 injured.

Nineteen accidents; 20 injured.

CHICAGO & WESTERN INDIANA RAILROAD:

* July 27, 1913, locomotive 88, Chicago, Ill. Water glass burst; 1 injured.

* September 25, 1913, locomotive 88, Argo, Ill. Water glass burst; injured by flying glass; 1 injured.

* November 14, 1913, locomotive 82, Chicago, Ill. Water glass burst; injured by flying glass; 1 injured.

* December 6, 1913, locomotive 211, Chicago, Ill. Lubricator steam pipe pulled loose from connection at boiler; defective brazing; 1 injured.

* December 27, 1913, locomotive 56, Chicago, Ill. Water glass burst; 1 injured.

April 30, 1914, locomotive 56, Chicago, Ill. Water glass burst; injured by escaping steam; 1 injured.

Six accidents; 6 injured.

CHICAGO, BURLINGTON & QUINCY RAILROAD:

July 9, 1913, locomotive 2002, Victory, Wis. Squirt hose blew off; insecurely applied; 1 injured.

July 18, 1913, locomotive 1835, Waltonville, Ill. Water glass burst; injured by escaping steam; 1 injured.

July 23, 1913, locomotive 1814, Council Bluffs, Iowa. Squirt hose blew off; insecurely applied; 1 injured.

August 6, 1913, locomotive 1839, King City, Mo. Squirt hose pipe blew off; due to defective threads in coupling; 1 injured.

August 23, 1913, locomotive 1695, Burlington, Iowa. Water glass burst; injured by escaping steam; 1 injured.

August 28, 1913, locomotive 1172, Neponset, Ill. Water glass burst; injured by escaping steam; 1 injured.

August 28, 1913, locomotive 1978, Arenzville, Ill. Squirt hose blew off; insecurely applied; 1 injured.

September 9, 1913, locomotive 2198, Meadville, Mo. Squirt hose parted at splice; insecurely clamped; 1 injured.

September 12, 1913, locomotive 1935, Ottumwa, Iowa. Washout plug blew out while being tightened under pressure; plug improperly applied (cross-threaded); 1 injured.

October 6, 1913, locomotive 3173, Sheridan, Wyo. Fountain valve bonnet blew out while being tightened under pressure; threads stripped on bonnet; 1 injured.

November 2, 1913, locomotive 1695, Burlington, Iowa. Water glass burst; injured by escaping steam; 1 injured.

November 4, 1913, locomotive 1471, Denver, Colo. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

November 7, 1913, locomotive 1687, Sheridan, Wyo. Water glass burst; injured by escaping steam; 1 injured.

January 26, 1914, locomotive 1966, Liberty, Mo. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

February 5, 1914, locomotive 1420, Chicago, Ill. Water glass burst; injured by escaping steam; 1 injured.

February 28, 1914, locomotive 2119, near Menominee, Ill. Flue burst at weld; 1 injured.

March 14, 1914, locomotive 953, Galesburg, Ill. Flue burst; overheated in welding; 1 injured.

March 19, 1914, locomotive 1968, Hannibal, Mo. Flue burst; overheated in welding; 1 injured.

March 26, 1914, locomotive 1486, Pacific Junction, Iowa. Gauge cock blew out; defective threads; 1 injured.

April 9, 1914, locomotive 2095, Milledgeville, Ill. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

June 12, 1914, locomotive 2139, Congress Park, Ill. Injector steam pipe broke; defective collar; 1 injured.

Twenty-one accidents; 21 injured.

CHICAGO GREAT WESTERN RAILROAD:

July 6, 1913, locomotive 221, Oelwein, Iowa. Washout plug blew out while being tightened under pressure; threads crossed and stripped; 1 killed.

* August 28, 1913, locomotive 326, Eden, Minn. Squirt hose nipple broke off; 1 injured.

* September 4, 1913, locomotive 256, Tennant, Iowa. Squirt hose blew off; 1 injured.

* September 18, 1913, locomotive 351, Conception, Mo. Gauge cock blew out; 1 injured.

Four accidents; 1 killed, 3 injured.

CHICAGO, INDIANA & SOUTHERN RAILROAD Co.:

September 3, 1913, locomotive 11, Dunne Park, Ind. Squirt hose burst; defective hose; 1 injured.

March 2, 1914, locomotive 22, Franklin Park, Ill. Lubricator steam pipe broke; overheated in brazing; 1 injured.

June 20, 1914, locomotive 5489, Gibson, Ind. Right injector ram bonnet screwed out while testing injector at terminal; due to packing nut being tightened down on hard packing to stop leak; 1 injured.

Three accidents; 3 injured.

CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY:

March 15, 1914, locomotive 520, Lafayette, Ind. Arch-tube plug blew out while being tightened under pressure; 1 injured.

One accident; 1 injured.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY:

July 5, 1913, locomotive 2410, near Rutledge, Iowa. Squirt hose blew off; insecurely applied; 1 injured.

July 8, 1913, locomotive 1154, North McGregor, Iowa. Packing nut on injector ram blew off; too much packing applied; 1 injured.

* August 7, 1913, locomotive 2416, Earling, Iowa. Squirt hose burst; 1 injured.

August 13, 1913, locomotive 1173, Chicago, Ill. Engineman scalded while using squirt hose, due to leaking boiler check; 1 injured.

August 14, 1913, locomotive 3506, Chicago, Ill. Water glass burst; injured by escaping steam; 1 injured.

August 14, 1913, locomotive 5015, Burgoyne, Mont. Crown sheet failure due to low water; injector and water glass defective; 2 killed, 2 injured.

September 5, 1913, locomotive 305, near Mendota, Minn. Squirt hose blew off; insecurely applied; 1 injured.

September 11, 1913, locomotive 6704, Bonfield, Mont. Flue burst; flue rolled very thin and badly pitted; 1 injured.

September 27, 1913, locomotive 1256, Milwaukee, Wis. Water glass burst; injured by escaping steam; 1 injured.

* November 9, 1913, locomotive 7124, Mason City, Iowa. Boiler check stuck; 1 injured.

November 14, 1913, locomotive 7140, near Whittimore, Iowa. Flue burst at weld; overheated in welding; 2 injured.

November 22, 1913, locomotive 4110, near Portage, Wis. Washout plug forced out right side sheet due to contact with flange of driving wheel; excessive lateral motion; 1 injured.

January 21, 1914, locomotive 1142, Mitchell, S. Dak. Packing nut blew off injector; defective threads; 1 injured.

January 29, 1914, locomotive 2161, Tomahawk, Wis. Injector steam pipe spanner nut broke; defective nut; 1 injured.

February 14, 1914, locomotive 7052, Mosby, Mo. Arch tube pulled out of flue sheet, due to improper application; pipe cut too short to permit proper beading; 3 injured.

March 9, 1914, locomotive 1512, Milwaukee, Wis. Water glass burst; injured by escaping steam; 1 injured.

March 10, 1914, locomotive 2108, Irma, Wis. Lubricator glass burst; injured by escaping hot oil; 1 injured.

March 27, 1914, locomotive 2326, Preston, Iowa. Bonnet blew out of intermediate blower throttle while being tightened under pressure; defective threads; 1 injured.

April 27, 1914, locomotive 2140, Murdo-McKenzie, S. Dak. Valve controlling squirt hose open and boiler check stuck up; 1 injured.

May 7, 1914, locomotive 8508, Grace, Mont. Crown sheet failure; cause not determined owing to removal of appurtenances and washing boiler before investigation; 1 injured.

Twenty accidents; 2 killed, 24 injured.

CHICAGO, PEORIA & ST. LOUIS RAILROAD:

March 27, 1914, locomotive 71, Dow, Ill. Squirt hose blew off; insecurely applied; 1 injured.

One accident; 1 injured.

CHICAGO, ROCK ISLAND & GULF RAILWAY:

November 20, 1913, locomotive 1299, Graham, Tex. Lubricator glass burst; injury received in attempting to escape hot oil; 1 injured.

One accident; 1 injured.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY:

* July 13, 1913, locomotive 209, Shawnee, Okla. Squirt hose burst; 1 injured.

August 30, 1913, locomotive 2107, near Comanche, Okla. Squirt hose blew off; insecurely applied; 1 injured.

February 23, 1914, locomotive 1045, Chicago, Ill. Steam heat pipe disconnected at coupling; improperly fitted spanner nut; 1 injured.

March 4, 1914, locomotive 1530, Geary, Okla. Bonnet blew off injector ram; defective threads; 1 injured.

March 28, 1914, locomotive 1868, Eldorado, Ark. Squirt hose blew off; insecurely applied; 1 injured.

April 24, 1914, locomotive 1825, Ardmore, Okla. Fireman scalded by hot water from squirt-hose pipe when injector was applied, due to removal of squirt hose and valve from pipe; 1 injured.

May 9, 1914, locomotive 382, Nichols, Iowa. Lubricator glass burst while engineer was attempting to tighten packing nut with pressure in lubricator; 1 injured.

May 13, 1914, locomotive 1251, near Fuller, Tex. Frost-valve cap nut blew off left injector; defective nut; 1 injured.

June 11, 1914, locomotive 972, Verdi, Iowa. Squirt hose burst; parts not held for inspection; 1 injured.

June 30, 1914, locomotive 1763, Haileyville, Okla. Squirt hose burst; parts not held for inspection; 1 injured.

Ten accidents; 10 injured.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RAILWAY:

December 13, 1913, locomotive 319, Chaska, Minn. Flue burst; defective weld; 1 injured.

* December 21, 1913, locomotive 235, East St. Paul, Minn. Flue burst; 1 injured.

Two accidents; 2 injured.

CINCINNATI, HAMILTON & DAYTON RAILWAY:

August 29, 1913, locomotive 337, Indianapolis, Ind. Crown sheet failure due to low water; no contributory cause found; 2 injured.

December 1, 1913, locomotive 382, Indianapolis, Ind. Blow-off cock opened while being repaired with pressure on boiler; defective blow-off cock; 1 killed.

* December 13, 1913, locomotive 2862, Deshler, Ohio. Boiler check cap blew out; 1 injured.

Three accidents; 1 killed, 3 injured.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY:

July 15, 1913, locomotive 6791, Vernon, Ohio. Squirt hose blew off; insecurely applied; 1 injured.

August 23, 1913, locomotive 6959, near Crestline, Ohio. Squirt hose blew off at union; defective threads; 1 injured.

November 24, 1913, locomotive 2152, near Shiloh, Ohio. Crown-sheet failure due to low water; no contributory cause found; 3 injured.

December 19, 1913, locomotive 7303, Linndale, Ohio. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

June 17, 1914, locomotive 6815, Ivorydale, Ohio. Squirt hose blew off; insecurely applied; 1 injured.

June 30, 1914, locomotive 6879, Mount Carmel, Ill. Squirt hose blew off; insecurely applied; 1 injured.

Six accidents; 8 injured.

COLORADO & SOUTHERN RAILWAY:

July 24, 1913, locomotive 12, near Pine Grove, Colo. Squirt hose blew off; insecurely applied; 1 injured.

February 11, 1914, locomotive 224, Denver, Colo. Water glass burst, blowing off shield; shield insecurely applied; 1 injured.

Two accidents; 2 injured.

COLORADO MIDLAND RAILWAY:

October 10, 1913, locomotive 38, Colorado City, Colo. Washout plug blew out while being tightened under pressure; defective threads; 1 injured.

One accident; 1 injured.

DELAWARE & HUDSON Co.:

November 11, 1913, locomotive 830, Port Henry, N. Y. Injector delivery pipe disconnected; coupling nut defective and improperly fitted; 1 injured.

December 27, 1913, locomotive 558, near Whitehall, N. Y. Crown sheet failure due to low water; no contributory cause found; 2 injured.

January 3, 1914, locomotive 1020, near Minooka, Pa. Flue burst; overheated in welding; 1 injured.

January 16, 1914, locomotive 506, Plattsburg, N. Y. Air-pump throttle bushing blew out of dome; defective threads and improperly fitted bushing; 2 injured.

February 20, 1914, locomotive 381, Colonie, N. Y. Blower valve blew out of boiler head while being tightened under pressure; defective threads; 1 injured.

Five accidents; 7 injured.

DELAWARE, LACKAWANNA & WESTERN RAILROAD:

November 12, 1913, locomotive 325, near Paterson, N. J. Flue burst; defective flue; 1 injured.

November 26, 1913, locomotive 811, Hallstead, Pa. Flue burst at weld; overheated in welding; 1 injured.

January 20, 1914, locomotive 968, near Far Hills, N. J. Rivet blew out of seam in fire box; defective rivet, had head broken off; 1 injured.

May 5, 1914, locomotive 1151, near Gouldsboro, Pa. Flue burst at weld; overheated in welding; 2 injured.

Four accidents; 5 injured.

DENVER & RIO GRANDE RAILROAD:

October 3, 1913, locomotive 658, Thistle, Utah. Washout plug blew out; plug improperly applied, cross-threaded; 1 injured.

March 19, 1914, locomotive 1122, Grand Junction, Colo. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

June 25, 1914, locomotive 598, Lark, Utah. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

Three accidents; 3 injured.

DETROIT, TOLEDO & IRONTON RAILROAD Co.:

* March 17, 1914, locomotive 63, Ironton, Ohio. Tank hose blew off; 1 injured.

One accident; 1 injured.

DULUTH & IRON RANGE RAILROAD:

September 2, 1913, locomotive 86, Two Harbors, Minn. Squirt hose blew off; insecurely applied; 1 injured.

One accident; 1 injured.

ERIE RAILROAD:

November 13, 1913, locomotive 3002, Kent, Ohio. Two adjacent flues burst; 1 injured.

January 25, 1914, locomotive 2022, near De Cliff, Ohio. Flue burst; overheated in welding; 1 injured.

February 20, 1914, locomotive 2048, near Redhouse, N. Y. Flue burst at weld; overheated in welding; 1 injured.

February 23, 1914, locomotive 3111, near Creston, Ohio. Crown sheet failure due to low water; no contributory cause found; 3 injured.

March 22, 1914, locomotive 1659, near Painted Post, N. Y. Injector steam-pipe spanner nut broke; nut defective and pipe not properly clamped; 1 injured.

May 4, 1914, locomotive 2547, Marion, Ohio. Washout plug blew out of front flue sheet; plug improperly applied; 1 injured.

May 10, 1914, locomotive 556, Lakeview, N. J. Draft pipe in smoke box dropped down, causing back draft; pipe insecurely applied; defective bolts; 1 injured.

June 1, 1914, locomotive 1852, Cleveland, Ohio. Blow-off pipe blew off at elbow; defective handle and worn threads on fittings; 1 injured.

June 7, 1914, locomotive 1406, Marion, Ohio. Fire-extinguisher hose burst; inefficient hose; 1 injured.

Nine accidents; 11 injured.

FORT WORTH & DENVER CITY RAILWAY:

December 18, 1913, locomotive 301, near Dalhart, Tex. Injector steam pipe spanner nut broke; defective nut; 2 injured.

December 31, 1913, locomotive 256, near Cowan, Tex. Flue burst; overheated in welding; 1 injured.

Two accidents; 3 injured.

GEORGIA RAILROAD:

August 21, 1913, locomotive 49, Lithonia, Ga. Squirt hose blew off; insecurely applied; 1 injured.

November 4, 1913, locomotive 4, near Greensboro, Ga. Crown sheet failure, due to low water; no contributory cause found; 1 injured.

December 18, 1913, locomotive 4, near Lithonia, Ga. Arch tube burst; metal overheated, due to obstruction of circulation through tube; 1 injured.

January 3, 1914, locomotive 11, near Conyers, Ga. Crown sheet failure, due to low water; no contributory cause found; 1 injured.

Four accidents; 4 injured.

GRAND RAPIDS & INDIANA RAILROAD:

September 27, 1913, locomotive 72, Ross, Mich. Squirt hose burst; defective hose; 1 injured.

One accident; 1 injured.

GRAND TRUNK RAILWAY:

December 3, 1913, locomotive 1437, Maynard, Ind. Arch tube burst; accumulation of mud and scale in tube; 1 injured.

January 27, 1914, locomotive 2247, Durand, Mich. Plug driven through crown sheet while being calked with pressure on boiler; defective threads and plug not stayed; 1 injured.

Two accidents; 2 injured.

GREAT NORTHERN RAILWAY:

July 23, 1913, locomotive 1229, Rexford, Mont. Squirt hose blew off; insecurely applied; 1 injured.

August 1, 1913, locomotive 1005, near Cascade, Wash. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

September 11, 1913, locomotive 1821, Essex, Mont. Flue burst; locomotive not held for inspection; 1 injured.

September 12, 1913, locomotive 1821, Skyland, Mont. Flue burst; locomotive not held for inspection; 1 injured.

* November 1, 1913, locomotive 1817, Trinidad, Wash. Water glass burst; 1 injured.

November 5, 1913, locomotive 3058, Superior, Wis. Washout plug blew out while being calked with pressure on boiler; plug improperly applied and cross threaded; 1 injured.

November 5, 1913, locomotive 1902, Tonga, Wash. Crown sheet failure, due to using large button-head radial stays in oil-burning locomotive; heads overheated; 1 killed, 1 injured.

November 9, 1913, locomotive 1245, Flint, Minn. Water glass burst; shield insecurely applied; 1 injured.

* November 27, 1913, locomotive 2016, Essex, Mont. Water glass burst; 1 injured.

December 2, 1913, locomotive 2019, Wilson Creek, Wash. Stud supporting seam brick in fire box pulled out while repairs were being made with pressure on boiler; stud insecurely applied; 1 injured.

April 19, 1914, locomotive 1191, Kelly Lake, Minn. Water glass burst; injured by escaping steam; 1 injured.

April 23, 1914, locomotive 1443, Libby, Mont. Squirt hose valve opened; injured by hot water; 1 injured.

May 4, 1914, locomotive 1919, near Tye, Wash. Water glass burst; injured by flying glass; shield had been removed at time of accident; 1 injured.

May 30, 1914, locomotive 1843, Great Falls, Mont. Drip pipe to water glass blow-off cock insecurely fastened; engineman scalded while blowing out glass; 1 injured.

Fourteen accidents; 1 killed, 14 injured.

GUIGNARD BRICK WORKS:

January 12, 1914, locomotive 2, Brookland, S. C. Crown sheet failure, due to low water; no contributory cause found; 1 injured.

One accident; 1 injured.

GULF, COLORADO & SANTA FE RAILWAY:

July 14, 1913, locomotive A., T. & S. F. 1900, Rio Vista, Tex. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

July 30, 1913, locomotive A., T. & S. F. 764, near Gainesville, Tex. Squirt hose blew off; insecurely applied; 1 injured.

August 8, 1913, locomotive 676, Alvin, Tex. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

August 12, 1913, locomotive 654, View, Tex. Blower pipe leaking at union to smoke box; loose union nut; 1 injured.

August 17, 1913, locomotive 2071, Temple, Tex. Squirt hose burst; defective hose; 1 injured.

September 8, 1913, locomotive 676, Alvin, Tex. Squirt hose blew off; insecurely applied; 1 injured.

September 26, 1913, locomotive A., T. & S. F. 2070, Temple, Tex. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

February 2, 1914, locomotive 627, Dallas, Tex. Injector delivery pipe disconnected at boiler check; defective threads; 1 injured.

March 22, 1914, locomotive 774, Brookville, Okla. Brakeman scalded by hot water from blow-off cock; drainpipe missing; 1 injured.

March 28, 1914, locomotive 623, Gainesville, Tex. Water glass burst; injured by flying glass; improper application of shield; 1 injured.

May 1, 1914, locomotive A., T. & S. F. 2071, Temple, Tex. Packing nut blew out of bull's-eye lubricator; improper application of nut; 1 injured.

May 20, 1914, locomotive 153, near Beaumont, Tex. Right injector steam pipe blew out; due to use of improper collar and poor workmanship; 1 injured.

June 8, 1914, locomotive 0217, near Hitchcock, Tex. Broken stay bolt blew out of back head; defective threads; telltale hole riveted over and bolt leaking around threads; 1 injured.

Thirteen accidents; 13 injured.

HOCKING VALLEY RAILWAY:

August 15, 1913, locomotive 119, Columbus, Ohio. Washout cap blew off; parts not held for inspection; 1 injured.

One accident; 1 injured.

ILLINOIS CENTRAL RAILROAD:

August 8, 1913, locomotive 1676, Centralia, Ill. Water glass burst; injured by escaping steam; 1 injured.

September 7, 1913, locomotive 701, Sitloff, Miss. Engineman scalded while operating blow-off cock; improper application of cock; 1 injured.

September 22, 1913, locomotive 227, Freeport, Ill. Packing nut blew off main throttle stem while being tightened under pressure; nut improperly applied, cross threaded; 1 injured.

October 19, 1913, locomotive 704, near Cruger, Miss. Cap blew off release valve to steam chest; defective threads; 1 injured.

November 8, 1913, locomotive 662, Natural Bridge, Ala. Flue pocket blew out back flue sheet; improperly applied; 1 injured.

December 8, 1913, locomotive 966, Chicago, Ill. Cap blew off tank hose strainer box; cap defective and improperly fitted; 1 injured.

December 8, 1913, locomotive 1602, near Fulton, Ky. Flue burst; defective weld; 2 injured.

* December 16, 1913, locomotive 945, Temple, Tenn. Flue burst; 1 injured.

December 20, 1913, locomotive 957, Clinton, Ill. Blow-off cock blew out; improperly applied, cross threaded and loose in sheet; 1 injured.

January 13, 1914, locomotive 1440, Chicago, Ill. Crown sheet failure due to low water; no water glass; lowest gauge cock $2\frac{3}{4}$ inches above crown sheet; one injector inoperative; 2 injured.

January 17, 1914, locomotive 1620, Mendota, Ill. Crown sheet failure caused by water foaming in boiler; 2 injured.

February 24, 1914, locomotive 183, Memphis, Tenn. Crown sheet failure due to low water; water glass defective and cocks closed; defective threads on crown stays and in crown sheet; 2 injured.

March 25, 1914, locomotive 1422, near Harvey, Ill. Right injector steam pipe disconnected; defective collar; 1 injured.

April 3, 1914, locomotive 1439, Chicago, Ill. Expansion pad brace stud blew out; expansion pad insecurely applied and loose; 1 injured.

April 10, 1914, locomotive 442, Madison, Wis. Blow-off cock blew out of throat sheet; improperly applied; 1 injured.

May 10, 1914, locomotive 887, Water Valley, Miss. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

June 21, 1914, locomotive 1116, Jackson, Tenn. Washout plug blew out while being tightened under pressure; 1 injured.

Seventeen accidents; 21 injured.

INTERNATIONAL & GREAT NORTHERN RAILROAD:

October 11, 1913, locomotive 312, Mart, Tex. Crown sheet failure; low water; no contributory cause found; 1 injured.

One accident; 1 injured.

KANSAS CITY SOUTHERN RAILWAY:

August 27, 1913, locomotive 529, near Whatley, Tex. Squirt hose burst; defective hose; 1 injured.

September 25, 1913, locomotive 73, Kansas City, Mo. Squirt hose blew off; insecurely applied; 1 injured.

December 30, 1913, locomotive 369, near Wasey, La. Crown sheet failure due to low water; no contributory cause found; 2 injured.

February 11, 1914, locomotive 92, Pittsburg, Kans. Lubricator glass burst; injured by flying glass; inefficient shield; 1 injured.

April 19, 1914, locomotive 550, Kansas City, Mo. Squirt hose valve left open when injector was started; 1 injured.

Five accidents; 6 injured.

KANSAS CITY TERMINAL RAILWAY:

December 10, 1913, locomotive 22, Kansas City, Mo. Center of mud drum cap blew out; defective material in cast-iron cap; 2 killed, 2 injured.

One accident; 2 killed, 2 injured.

LAKE ERIE & WESTERN RAILROAD:

December 1, 1913, locomotive 5510, near Glynnwood, Ohio. Arch tube burst; defective tube; not proper thickness; 1 injured.

December 5, 1913, locomotive 5200, Peru, Ind. Water glass burst; injury caused by flying glass; inefficient shield; 1 injured.

Two accidents; 2 injured.

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY:

* August 7, 1913, locomotive 5761, White Pigeon, Mich. Pipe connecting main and auxiliary lubricators burst; 1 injured.

September 6, 1913, locomotive 4758, Burnham, Ill. Squirt hose parted at splice; insecurely clamped; 1 injured.

October 30, 1913, locomotive 4702, Collinwood, Ohio. Arch tube plug blew out while being tightened under pressure; defective threads; 2 injured.

November 9, 1913, locomotive 5607, Elkhart, Ind. Engineman scalded by hot water from blow-off cock; cock improperly applied, being obstructed by air pipe; 1 injured.

November 10, 1913, locomotive 5012, Fort Wayne, Ind. Crown sheet failure due to low water; no contributory cause found; 1 injured.

April 15, 1914, locomotive 5707, Ypsilanti, Mich. Injector steam pipe spanner nut broke while being tightened with pressure on boiler; nut damaged due to use of improper tools; 1 injured.

June 12, 1914, locomotive 5823, Collinwood, Ohio. Stud blew out of barrel of boiler; defective stud; 1 injured.

Seven accidents; 8 injured.

LEHIGH VALLEY RAILROAD:

July 7, 1913, locomotive 805, South Somerville, N. J. Crown sheet failure due to low water; no contributory cause found; 1 injured.

July 25, 1913, locomotive 1384, Perth Amboy, N. J. Flue burst at weld; overheated in welding; 1 injured.

August 5, 1913, locomotive 243, Coxton, Pa. Lubricator glass burst; injured by flying glass; inefficient shield; 1 injured.

August 17, 1913, locomotive 1374, Hommets Ferry, Pa. Flue burst at weld; flue defective; overheated in welding; 1 injured.

September 14, 1913, locomotive 1606, South Bethlehem, Pa. Injector steam pipe collar broke; defective collar; 1 injured.

September 22, 1913, locomotive 741, Coxton, Pa. Lubricator glass burst; injured by flying glass; inefficient shield; 1 injured.

September 27, 1913, locomotive 704, Easton, Pa. Lubricator glass burst; injured by flying glass; inefficient shield; 1 injured.

October 22, 1913, locomotive 1804, Manchester, N. Y. Flue burst; flue defective; overheated in welding; 1 injured.

January 21, 1914, locomotive 1653, Manville, N. J. Air pump bracket stud blew out; stud improperly fitted to boiler and bracket insecurely applied; 1 injured.

Nine accidents; 9 injured.

LONG ISLAND RAILROAD:

August 26, 1913, locomotive 124, Morris Park, N. Y. Pocket flue blew out; improperly applied; 1 injured.

One accident; 1 injured.

LOUISIANA & ARKANSAS RAILWAY:

July 22, 1913, locomotive 404, near Fryeburg, La. Crown sheet failure, due to low water; water glass stopped up with rubber gasket; 1 injured.

One accident; 1 injured.

LOUISVILLE & NASHVILLE RAILROAD:

September 14, 1913, locomotive 1279, Boyles, Ala. Blow-off cock leaking; 1 injured.

October 24, 1913, locomotive 1273, Coopers, Ala. Bonnet broke off controller valve to lubricator; defective bonnet; 1 injured.

October 31, 1913, locomotive 2002, near Hanceville, Ala. Ash-pan blower pipe became disconnected at ash pan; 1 injured.

November 22, 1913, locomotive 1018, Latham, Ky. Scalded in operating ash-pan blower account valve leaking; 1 injured.

December 30, 1913, locomotive 169, Brooks, Ky. Steam pipe burst in front end; defective pipe; 1 injured.

March 25, 1914, locomotive 606, Atkinson, Ky. Lubricator glass burst, blowing off shield; inefficient shield; 1 injured.

March 29, 1914, locomotive 1174, Junta, Ga. Injector primer valve bonnet blew out; bonnet insecurely applied; 1 injured.

April 27, 1914, locomotive 976, Corbin, Ky. Opening blow-off valve, defective handle caused fireman to fall from running board; 1 injured.

June 30, 1914, locomotive 141, De Funiak Springs, Fla. Packing nut blew off bonnet of ash-pan blower valve; defective threads; 1 injured.

Nine accidents; 9 injured.

LOUISVILLE, HENDERSON & ST. LOUIS RAILWAY:

January 21, 1914, locomotive 13, Rock Haven, Ky. Gasket blew out of Klinger water glass; 1 injured.

One accident; 1 injured.

MAINE CENTRAL RAILROAD:

February 6, 1914, locomotive 359, Embden, Me. Engineman scalded by hot water escaping through defective squirt hose; 1 injured.

One accident; 1 injured.

MICHIGAN CENTRAL RAILROAD:

October 30, 1913, locomotive 8413, Buffalo, N. Y. Flue burst at weld; overheated in welding; 1 injured.

One accident; 1 injured.

MINNEAPOLIS & ST. LOUIS RAILWAY:

* December 1, 1913, locomotive 235, Algona, Iowa. Water glass burst; inefficient shield; 1 injured.

* January 24, 1914, locomotive 309, near New Ulm, Minn. Arch tube burst; defective tube; 1 injured.

* May 9, 1914, locomotive 332, Watertown, S. Dak. Squirt hose valve worked open; loose packing in valve; 1 injured.

Three accidents; 3 injured.

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

* July 28, 1913, locomotive 2619, Clayton, Wis. Squirt hose blew off; 1 injured.

* August 15, 1913, locomotive 2603, Waupaca, Wis. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

* November 14, 1913, locomotive 469, Prentice, Wis. Squirt hose valve open; injector applied; 1 injured.

* November 14, 1913, locomotive 400, Flaxton, N. Dak. Squirt hose blew off; 1 injured.

Four accidents; 4 injured.

MISSOURI & NORTH ARKANSAS RAILROAD:

July 13, 1913, locomotive 10, near Everton, Ark. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

One accident; 1 injured.

MISSOURI, KANSAS & TEXAS RAILWAY:

August 11, 1913, locomotive 336, Cumby, Tex. Deck brace stud blew out; defective threads; 1 injured.

* September 10, 1913, locomotive 480, Hiattville, Kans. Flue burst at weld; 1 injured.

* January 1, 1914, locomotive 317, Ahlso, Okla. Steam heat pipe blew off at governor; defective threads; 1 injured.

January 26, 1914, locomotive 654, near Trenton, Tex. Crown sheet failure; low water; right injector defective; 1 injured.

February 18, 1914, locomotive 220, Ringgold, Tex. Lubricator glass burst; eye injured by hot oil; 1 injured.

March 16, 1914, locomotive 543, LaGrange, Tex. Cock in boiler check body broke off; old fracture; 1 injured.

June 2, 1914, locomotive 600, Wainright, Mo. Flue burst at weld; 1 injured.

Seven accidents; 7 injured.

MISSOURI PACIFIC SYSTEM:

July 2, 1913, locomotive 2660, Kansas City, Mo. Washout plug blew out while being tightened under pressure; defective threads; 1 injured.

July 8, 1913, locomotive 73, Garner, Ark. Squirt host burst; defective hose; 1 injured.

July 22, 1913, locomotive 86, Van Buren, Ark. Scalded by hot water from defective squirt hose; 1 injured.

July 26, 1913, locomotive 461, Alexandria, La. Left delivery pipe blew off intermediate check connection; defective spanner nut; 1 injured.

August 21, 1913, locomotive 32, Paragould, Ark. Water glass burst; injured by flying glass; inefficient shield; 1 injured.

August 23, 1913, locomotive 159, Atchison, Kans. Gasket blew out of injector; 1 injured.

* September 1, 1913, locomotive 99, Kirkwood, Mo. Squirt hose burst; 1 injured.

September 2, 1913, locomotive 11, Wagoner, Okla. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

September 7, 1913, locomotive 81, Nevada, Mo. Lubricator drain pipe broke off at bushing; improper drain pipe; 1 injured.

September 7, 1913, locomotive 2320, Newport, Ark. Injector broke while coupling overflow pipe without shutting off injector; 1 injured.

September 17, 1913, locomotive 2324, Oak Grove, La. Squirt hose burst; defective hose; 1 injured.

October 1, 1913, locomotive 69, Gurdon, Ark. Injector feed pipe disconnected at union; defective coupling and pipe not clamped; 1 injured.

November 7, 1913, locomotive 2726, Argenta, Ark. Lubricator glass burst; injured by flying glass and fall from locomotive; no shield on glass; 1 injured.

November 10, 1913, locomotive 2618, near Bosco, La. Crown sheet failure, due to low water; bottom gauge cock $1\frac{1}{4}$ inches above highest part of crown sheet; 1 injured.

April 4, 1914, locomotive 9459, St. Louis, Mo. Water glass burst; injured by escaping steam; 1 injured.

May 23, 1914, locomotive 14, Bald Knob, Ark. Squirt hose blew off; insecurely applied; 1 injured.

May 25, 1914, locomotive 88, Julian, Nebr. Squirt hose parted at splice; not securely clamped; 1 injured.

June 4, 1914, locomotive 514, near McClintock Mine, Ill. Fire extinguisher hose blew off; insecurely applied; 1 injured.

June 21, 1914, locomotive 9468, Omaha, Nebr. Fusible plug blew out of crown sheet while boilermaker was making repairs in fire box; defective threads; 1 injured.

Nineteen accidents; 19 injured.

MOBILE & OHIO RAILROAD:

October 4, 1913, locomotive 338, Verona, Miss. Crown sheet failure; low water; water glass stopped up; 1 injured.

* December 19, 1913, locomotive 314, Trenton, Tenn. Squirt hose burst; 1 injured.

* December 31, 1913, locomotive 313, Tupelo, Miss. Squirt hose blew off; 1 injured.

March 26, 1914, locomotive 532, Murphysboro, Ill. Reverse lever quadrant stud blew out; defective threads; 1 injured.

Four accidents; 4 injured.

MORGANTOWN & KINGWOOD RAILROAD:

* January 26, 1914, locomotive 13, Caddell, W. Va. Exhaust pipe to air pump disconnected while engineman was attempting to make repairs; 1 injured.

One accident; 1 injured.

NASHVILLE, CHATTANOOGA & ST. LOUIS RAILWAY:

August 2, 1913, locomotive 216, Florence, Tenn. Collar pulled off injector steam pipe; improperly brazed; 2 injured.

One accident; 2 injured.

NEW ORLEANS & NORTHEASTERN RAILROAD:

* July 20, 1913, locomotive 452, Jackson, Miss. Squirt hose burst; 1 injured.

* August 21, 1913, locomotive 408, Beechwood, Miss. Squirt hose blew off; 1 injured.

* October 4, 1913, locomotive 109, Meridian, Miss. Spindle blew out of top water-glass cock; 1 injured.

Three accidents; 3 injured.

NEW YORK CENTRAL & HUDSON RIVER RAILWAY:

July 3, 1913, locomotive 548, Buffalo, N. Y. Water glass burst; injured by escaping steam; 1 injured.

July 16, 1913, locomotive 3602, Angus, N. Y. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

July 30, 1913, locomotive 514, De Witt, N. Y. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

August 2, 1913, locomotive 3059, Poughkeepsie, N. Y. Squirt pipe broke off at connection; 1 injured.

August 6, 1913, locomotive 2111, near Catskill, N. Y. Bonnet of injector overflow valve blew out; defective threads; 1 injured.

August 16, 1913, locomotive 3581, North Frankfort, N. Y. Injector steam-pipe collar broke; collar too light and improperly brazed; 2 injured.

August 17, 1913, locomotive 3591, Hudson, N. Y. Squirt hose blew off; insecurely applied; 1 injured.

August 19, 1913, locomotive 520, Gardenville, N. Y. Squirt hose burst; defective hose; 1 injured.

August 25, 1913, locomotive 3587, Rensselaer, N. Y. End of stay bolt blew out of fire-box sheet; stay bolt broken and threads defective; 1 injured.

September 2, 1913, locomotive 3036, Depew, N. Y. Squirt hose burst; defective hose; 1 injured.

October 17, 1913, locomotive 491, Eastwood, N. Y. Bonnet blew off boiler check; defective threads; 1 injured.

October 24, 1913, locomotive 2164, Loon Lake, N. Y. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

November 5, 1913, locomotive 2920, Syracuse, N. Y. Water glass burst; injured by escaping steam; 1 injured.

November 5, 1913, locomotive 3129, Greenway, N. Y. Crown sheet failure, low water; no contributory cause found; 1 injured.

December 6, 1913, locomotive 891, Harmon, N. Y. Bonnet blew out of blower valve while being tightened under pressure; 1 injured.

December 15, 1913, locomotive 1981, Watertown, N. Y. Bonnet blew out of boiler check; bonnet improperly fitted; 1 injured.

December 27, 1913, locomotive 1721, Brewster, N. Y. Rivet blew out of door sheet flange; head broke off rivet; 1 injured.

January 25, 1914, locomotive 189, Albany, N. Y. Water glass burst; injured by escaping steam; 1 injured.

February 16, 1914, locomotive 379, Geneva, N. Y. Nut connecting delivery pipe to boiler check blew off; defective threads; 1 injured.

February 18, 1914, locomotive 3479, Harmon, N. Y. Arch tube plug blew out of throat sheet while being tightened under pressure; plug cross-threaded; 1 injured.

April 7, 1914, locomotive 3077, Germantown, N. Y. Flue burst at weld; overheated in welding; 1 injured.

May 4, 1914, locomotive 558, Ravena, N. Y. Squirt hose parted at splice; insecurely clamped; 1 injured.

June 15, 1914, locomotive 3745, Hoffmans, N. Y. Squirt hose blew off; insecurely applied; 1 injured.

June 19, 1914, locomotive 2017, Oakvale, N. Y. Elbow blew out of squirt pipe; parts not held for inspection; 1 injured.

Twenty-four accidents; 26 injured.

NEW YORK, CHICAGO & ST. LOUIS RAILROAD:

January 25, 1914, locomotive 306, near Continental, Ohio. Washout plug blew out of front flue sheet; defective threads; 2 injured.

One accident; 2 injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 1, 1913, locomotive 2450, Boston, Mass. Squirt hose blew off; insecurely applied; 1 injured.

July 4, 1913, locomotive 2456, Providence, R. I. Squirt hose blew off; insecurely applied; 1 injured.

July 21, 1913, locomotive 2462, Springfield, Mass. Squirt hose blew off; insecurely applied; 1 injured.

July 29, 1913, locomotive 453, near Brewster, N. Y. Squirt hose blew off; insecurely applied; 1 injured.

August 18, 1913, locomotive 2382, Cedar Hill, Conn. Injector broke; brakeman scalded while passing overflow; overflow pipe too short; 1 injured.

September 8, 1913, locomotive 2455, Providence, R. I. Squirt hose blew off; insecurely applied; 1 injured.

* September 24, 1913, locomotive 2313, Cedar Hill, Conn. Lubricator valve blew out; 1 injured.

December 9, 1913, locomotive 358, East Haven, Conn. Ash pan blower valve leaking; 1 injured.

December 12, 1913, locomotive 392, near Westerly, R. I. Crown sheet failure, low water; no contributory cause found; 1 injured.

January 28, 1914, locomotive 1337, Wood River Junction, R. I. Collar on lubricator steam pipe broke; defective and improperly brazed; 1 injured.

March 13, 1914, locomotive 309, near Wood River Junction, R. I. Crown sheet failure, low water; no contributory cause found; 1 killed; 2 injured.

June 7, 1914, locomotive 316, near Sound Beach, Conn. Lubricator steam pipe broke at connection to lubricator; improper brazing; 2 injured.
Twelve accidents; 1 killed, 14 injured.

NEW YORK, ONTARIO & WESTERN RAILWAY:

*September 17, 1913, locomotive 216, Cadonia, N. Y. Water glass burst; 1 injured.

*January 8, 1914, locomotive 250, Northfield, N. Y. Packing nut blew off of throttle gland; 1 injured.

February 22, 1914, locomotive 174, Sidney, N. Y. Flue burst; defective flue; 1 injured.

June 14, 1914, locomotive 39, Sidney, N. Y. Water glass burst; injured by escaping steam; 1 injured.

Four accidents; 4 injured.

NORFOLK & WESTERN RAILWAY:

July 31, 1913, locomotive 843, Williamson, W. Va. Squirt hose burst; defective hose; 1 injured.

August 10, 1913, locomotive 787, Winston-Salem, N. C. Engineman scalded using squirrt hose; defective boiler check; 1 injured.

August 10, 1913, locomotive 384, near Farm, W. Va. Squirt pipe blew out of delivery pipe; defective threads; 1 injured.

August 21, 1913, locomotive 493, Portsmouth, Ohio. Flue burst at weld; defective flue; 1 injured.

September 6, 1913, locomotive 556, Pulaski, Va. Blow-off cock discharged while engineman was oiling around; 1 injured.

October 15, 1913, locomotive 783, Kenova, W. Va. Flue burst; defective weld; 1 injured.

November 7, 1913, locomotive 1045, Williamson, W. Va. Filling plug blew out of lubricator while being tightened; 1 injured.

November 10, 1913, locomotive 1319, near Prospect, Va. Scalded by steam from small hole in top of oil cup on grate shaker; 1 injured.

December 6, 1913, locomotive 549, Willis, W. Va. Crown sheet failure, low water; no contributory cause found; 1 killed.

December 10, 1913, locomotive 997, near Lurich, Va. Flue burst; defective weld; 1 injured.

January 13, 1914, locomotive 481, Bluefield, W. Va. Scalded while using squirrt hose; boiler check stuck; 1 injured.

March 27, 1914, locomotive 455, Wurno, Va. Flue burst; defective weld; 1 injured.

May 16, 1914, locomotive 709, West Roanoke, Va. Lubricator filling plug blew out; plug improperly fitted and threads defective; 1 injured.

June 3, 1914, locomotive 1092, Duvall, Ohio. Crown sheet failure, low water; no contributory cause found; 2 killed.

June 22, 1914, locomotive 1300, near Arthur, Va. Crown sheet failure, low water; no contributory cause found; 2 killed.

Fifteen accidents; 5 killed; 12 injured.

NORTHERN PACIFIC RAILWAY:

July 2, 1913, locomotive 17, Laurel, Mont. Squirt hose burst; defective hose; 1 injured.

July 15, 1913, locomotive 147, Horton, Mont. Squirt hose blew off; insecurely applied; 1 injured.

August 28, 1913, locomotive 1562, Cyr, Mont. Squirt hose burst; defective hose; 1 injured.

January 27, 1914, locomotive 1611, Tacoma, Wash. Pipe attached to blow-off cock blew off; insecurely applied; 1 injured.

Four accidents; 4 injured.

OREGON SHORT LINE RAILROAD:

*October 21, 1913, locomotive 967, Pocatello, Idaho. Squirt hose blew off; 1 injured.

*November 10, 1913, locomotive 880, Pocatello, Idaho. Squirt hose burst; 1 injured.

November 15, 1913, locomotive 1102, Michaud, Idaho. Arch tube pulled out of flue sheet; improperly applied; 3 injured.

Three accidents; 5 injured.

OREGON-WASHINGTON RAILROAD & NAVIGATION Co.:

September 1, 1913, locomotive 354, North Powder, Ore. Arch tube pulled out of back flue sheet; improperly applied; tube cut too short to permit proper leading; 2 injured.

January 5, 1914, locomotive 259, near Rockford, Wash. Arch tube burst; defective tube; 2 injured.

Two accidents; 4 injured.

PENNSYLVANIA LINES WEST OF PITTSBURGH:

July 2, 1913, locomotive 8058, Wheeling, W. Va. Squirt hose burst; defective hose; 1 injured.

July 2, 1913, locomotive 9914, Summit, Ohio. Squirt hose burst; defective hose; 1 injured.

*July 3, 1913, locomotive 9989, Conway, Pa. Squirt hose blew off; insecurely applied; 1 injured.

*July 8, 1913, locomotive 9383, Chicago, Ill. Squirt hose blew off; insecurely applied; 1 injured.

August 10, 1913, locomotive 8160, Pittsburgh, Pa. Spindle blew out of top gudge cock while engineer was attempting to open it; defective threads; 1 injured.

August 29, 1913, locomotive 2310, Yorkville, Ohio. Squirt hose burst; defective hose; 1 injured.

August 29, 1913, locomotive 8971, Cincinnati, Ohio. Squirt hose burst; defective hose; 2 injured.

August 31, 1913, locomotive 8502, Dennison, Ohio. Squirt hose pulled apart at splice; insecurely clamped; 1 injured.

*September 5, 1913, locomotive 7541, Colehour, Ind. Squirt hose blew off; insecurely applied; 1 injured.

*September 11, 1913, locomotive 7116, Chicago, Ill. Squirt hose blew off; insecurely applied; 1 injured.

November 21, 1913, locomotive 9085, Crestline, Ohio. Squirt hose burst; defective hose; 1 injured.

December 16, 1913, locomotive 8333, Noblesville, Ind. Flue burst; defective flue; 1 injured.

January 22, 1914, locomotive 7025, Ravenna, Ohio. Lubricator glass burst; shield removed without shutting off steam; 1 injured.

May 19, 1914, locomotive 9789, Columbus, Ohio. Packing nut to top water-tass cock blew off while being tightened under pressure; 1 injured.

June 28, 1914, locomotive 8422, Dennison, Ohio. Squirt hose burst; defective hose; 1 injured.

Fifteen accidents; 16 injured.

PENNSYLVANIA RAILROAD:

July 10, 1913, locomotive 4132, Loucke, Pa. Squirt hose blew off; insecurely applied; 1 injured.

July 15, 1913, locomotive 366, Waverly, N. J. Squirt hose blew off; insecurely applied; 1 injured.

July 29, 1913, locomotive 510, Connellsville, Pa. Packing nut blew off injector steam ram; defective threads; 1 injured.

August 1, 1913, locomotive 366, Newark, N. J. Squirt hose blew off; insecurely applied; 1 injured.

August 2, 1913, locomotive 4200, Pottsville, Pa. Injector delivery pipe burst; defective pipe; 1 injured.

August 9, 1913, locomotive 5319, Principio, Md. Injector water-regulating nut worked loose; 1 injured.

August 23, 1913, locomotive 312, Philadelphia, Pa. Steam escaped from under injector overflow cap; cap not properly tightened; defective spanner nut; 1 injured.

September 4, 1913, locomotive 2433, Pomeroy, Pa. Squirt hose blew off; insecurely applied; 1 injured.

September 9, 1913, locomotive 213, Harrisburg, Pa. Nut pulled off of steam pipe to air pump governor; defective threads; 1 injured.

September 15, 1913, locomotive 3319, Quaker Bridge, N. Y. Crown sheet failure, low water; right boiler check corroded and stuck; 1 injured.

September 15, 1913, locomotive 2178, Brownsville Junction, Pa. Squirt hose blew off; insecurely applied; 1 injured.

September 25, 1913, locomotive 6066, Egg Harbor, N. J. Flue burst; overheated in welding; 1 injured.

* September 28, 1913, locomotive 3285, Allegany, N. Y. Squirt hose burst; defective hose; 1 injured.

October 8, 1913, locomotive 2528, Bollivar, Pa. Fire extinguishing hose blew off; insecurely applied; 1 injured.

October 12, 1913, locomotive 2962, Pitcairn, Pa. Drain plug to lubricator broke while being tightened; defective plug; 1 injured.

October 15, 1913, locomotive 2839, Downingtown, Pa. Cap blew off of flexible stay bolt; 1 injured.

October 22, 1913, locomotive 1806, Shire Oaks, Pa. Stud blew out of fire-box sheet; defective threads; 1 injured.

October 26, 1913, locomotive 1996, Philadelphia, Pa. Collar broke off air-pump steam pipe; insecurely brazed; 1 injured.

* October 27, 1913, locomotive 2602, Near Nadine, Pa. Flue burst; 1 injured.

October 28, 1913, locomotive 4071, Baltimore, Md. Union nut in blower line burst; 1 injured.

November 14, 1913, locomotive 1112, West Philadelphia, Pa. Cap blew off boiler check; defective threads; 1 injured.

November 23, 1913, locomotive 1458, New Brunswick, N. J. Flue burst at weld; overheated in welding; 1 injured.

December 5, 1913, locomotive 3035, Renovo, Pa. Washout cap blew off while being tightened under pressure; cap improperly applied; 1 injured.

December 19, 1913, locomotive 2893, Lykens, Pa. Squirt-hose valve blew off nipple; defective threads; 1 injured.

* January 10, 1914, locomotive 6252, Prospect, N. Y. Union in blower pipe burst; defective union; 1 injured.

January 14, 1914, locomotive 01782, Williamsport, Pa. Packing nut blew off injector ram; defective threads; 1 injured.

* February 6, 1914, locomotive 5, East Tyrone, Pa. Right injector blew out; defective threads on injector; 1 injured.

February 10, 1914, locomotive 6203, Oil City, Pa. Bull's-eye lubricator glass burst; 1 injured.

February 18, 1914, locomotive 448, Lancaster, Pa. Engineman scalded by steam from air-pump governor, due to absence of drainpipe; 1 injured.

March 13, 1914, locomotive 2854, Etna, Pa. Flue burst; defective weld; 1 injured.

March 20, 1914, locomotive 4116, Williamstown, Pa. Packing nut blew off steam ram to right injector; parts not held for inspection; 1 injured.

March 23, 1914, locomotive 729, Paoli, Pa. Packing nut blew off left injector; defective threads; 1 injured.

March 27, 1914, locomotive 3234, Pittsburgh, Pa. Packing nut blew off injector steam ram; defective threads; 1 injured.

April 15, 1914, locomotive 2427, West Philadelphia, Pa. Washout cap blew off while being tightened under pressure; cap defective and improperly applied; 1 injured.

May 18, 1914, locomotive 1848, Erie, Pa. Injector delivery pipe blew out of collar; defective brazing; 1 injured.

June 29, 1914, locomotive 6231, Oil City, Pa. Handhole plate blew off while being tightened under pressure; 1 injured.

Thirty-six accidents; 36 injured.

PEORIA & PEKIN UNION RAILWAY COMPANY:

* March 26, 1914, locomotive 38, East Peoria, Ill. Water glass burst; injured by steam and hot water; 1 injured.

One accident; 1 injured.

PEORIA & EASTERN RAILWAY:

October 25, 1913, locomotive 6506, near Danville, Ill. Engineer under locomotive repairing driving-brake rigging; locomotive started, caused by throttle leaking; 1 killed.

One accident; 1 killed.

PERE MARQUETTE RAILROAD:

* October 26, 1913, locomotive 608, Canton, Mich. Stud-holding shaker bracket to boiler head blew out; threads stripping; 2 injured.

* January 26, 1914, locomotive 328, Wellsboro, Ind. Water glass burst; injured by escaping steam; 1 injured.

* February 6, 1914, locomotive 352, Sunfield, Mich. Throttle packing gland blew off; 1 injured.
Three accidents; 4 injured.

PHILADELPHIA & READING RAILWAY:

* July 6, 1913, locomotive 1090, Catawissa, Pa. Squirt hose blew off; insecurely applied; 1 injured.

August 25, 1913, locomotive 1561, Shippensburg, Pa. Connection between steam pipe and globe valve on boiler head leaking; defective union; 1 injured.

September 4, 1913, locomotive 311, Reading, Pa. Glass and follower plug blew out of bull's-eye lubricator; improperly applied; 1 injured.

October 28, 1913, locomotive 1076, near Allentown, Pa. Bull's-eye lubricator glass blew out; improperly applied; 1 injured.

November 19, 1913, locomotive 1503, Plymouth Junction, Pa. Water glass burst; injured by escaping steam; 1 injured.

February 7, 1914, locomotive 269, Reading, Pa. Injector-globe valve blew out while being tightened under pressure; valve improperly applied; 1 injured.

February 27, 1914, locomotive 1037, Tamaqua, Pa. Washout plug blew out while being tightened under pressure; 1 injured.

March 10, 1914, locomotive 1706, Broad Mountain, Pa. Steam pipe burst in smoke box; defective pipe; 2 injured.

April 1, 1914, locomotive 612, Fanwood, N. J. Crown sheet failure, low water; no contributory cause found; 2 injured.

April 13, 1914, locomotive 317, Rutherford, Pa. Water bar pulled out of sheet, due to defective condition of threads and sheet; 1 injured.

June 8, 1914, locomotive 716, Wyomissing, Pa. Squirt hose burst; defective hose; 1 injured.

Eleven accidents; 13 injured.

PITTSBURGH & LAKE ERIE RAILROAD:

November 29, 1913, locomotive 9373, near Boston, Pa. Crown sheet failure, low water; water glass shut off account of being defective; water foaming; 4 injured.

One accident; 4 injured.

QUINCY, OMAHA & KANSAS CITY RAILROAD:

February 28, 1914, locomotive 21, Gault, Mo. Flue burst; overheated in welding; 1 injured.

One accident; 1 injured.

ST. LOUIS & SAN FRANCISCO RAILROAD:

July 26, 1913, locomotive 803, Pittsburg, Kans. Studs holding shaker-bar bracket to boiler pulled out; defective threads; 1 injured.

August 4, 1913, locomotive 775, Ruth, Mo. Bonnet blew off steam ram to injector; defective threads; 1 injured.

* September 2, 1913, locomotive 447, Cement, Okla. Squirt hose burst; 1 injured.

* October 10, 1913, locomotive 1046, Springfield, Mo. Squirt hose blew off; 1 injured.

February 26, 1914, locomotive 685, near Chaffee, Mo. Steam ram blew out while engineman was repairing injector; injector throttle leaking so steam could not be shut off; 1 injured.

March 12, 1914, locomotive 609, Oklahoma City, Okla. Air pump steam pipe blew out of collar at fountain-throttle connection; defective threads and not screwed into collar far enough; 1 injured.

April 30, 1914, locomotive 3741, St. Louis, Mo. Water glass burst; injured by flying glass; shield improperly applied; 1 injured.

June 18, 1914, locomotive 645, near Garvin, Okla. Cap blew out of boiler check; cap improperly fitted; 1 injured.

Eight accidents; 8 injured.

SEABOARD AIR LINE RAILWAY:

December 29, 1913, locomotive 609, Jacksonville, Fla. Spanner nut pulled off right injector steam pipe while being tightened under pressure; nut improperly fitted; 1 injured.

January 14, 1914, locomotive 582, Vidalia, Ga. Lubricator glass burst; injured by hot oil; 1 injured.

February 7, 1914, locomotive 842, Winder, Ga. Scalded in attempting to tighten jam nut of safety valve; parts not held for inspection; 1 injured.

June 24, 1914, locomotive 581, Americus, Ga. Squirt hose blew off; insecurely applied; 1 injured.

Four accidents; 4 injured.

SOUTHERN PACIFIC Co., ATLANTIC SYSTEM:

July 18, 1913, locomotive 278, near Fauna, Tex. Crown sheet failure; low water; no contributory cause found; 2 killed.

November 15, 1913, locomotive 711, Kirby, Tex. Crown sheet failure, due to low water; no contributory cause found; 4 injured.

November 26, 1913, locomotive 72, New Orleans, La. Squirt hose blew off; defective clamp; 1 injured.

December 4, 1913, locomotive H. & T. C. 247, Shreveport, La. Crown sheet failure, due to low water; no contributory cause found (water became low while laborer was acting as night watchman); 1 injured.

December 23, 1913, locomotive 432, near Littig, Tex. Nut blew off left boiler check cap while engineman was attempting to seat valve; nut improperly fitted; 1 injured.

March 26, 1914, locomotive G. H. & S. A. 483, near Crowley, La. Crown sheet failure, due to low water; no contributory cause found; 2 injured.

Six accidents; 2 killed, 9 injured.

SOUTHERN PACIFIC Co., PACIFIC SYSTEM:

September 5, 1913, locomotive 1804, Tracy, Cal. Squirt hose blew off; insecurely applied; 1 injured.

February 2, 1914, locomotive 4037, near Edison, Cal. Crown sheet failure, low water; no contributory cause found; 2 killed.

Two accidents; 2 killed, 1 injured.

SOUTHERN RAILWAY:

July 10, 1913, locomotive 922, near Kernersville, N. C. Expansion-pad stud blew out; threads defective; 1 injured.

July 11, 1913, locomotive 134, near Winston-Salem, N. C. Broken stay bolt blew out of fire-box sheet; defective threads; 1 injured.

July 16, 1913, locomotive 79, Parrish, Ala. Squirt hose blew off; insecurely applied; 1 injured.

July 26, 1913, locomotive 1600, Hamburg, S. C. Filling plug blew out of lubricator; defective threads; 1 injured.

September 22, 1913, locomotive 472, near Culpeper, Va. Squirt hose burst; defective hose; 1 injured.

November 5, 1913, locomotive 373, near Louisville, Ky. Plug blew out of crown sheet; defective threads; crown sheet overheated account of low water; 1 injured.

November 10, 1913, locomotive 702, Seney, Ga. Scalded by hot water from defective squirt hose; 1 injured.

November 24, 1913, locomotive 698, near Old Fort, N. C. Squirt hose blew off; insecurely applied; 1 injured.

March 7, 1914, locomotive 259, Newberry, S. C. Spanner nut between check and stop valve broke while being tightened under pressure; improper tools used; 1 injured.

March 22, 1914, locomotive 447, Sheffield, Ala. Two and one-eighth inch plug in back flue sheet driven into boiler while boiler maker was making repairs with pressure on boiler; threads defective and plug not stayed; 1 injured.

May 21, 1914, locomotive 1237, Hill Top, N. C. Flue burst; defective flue; 1 injured.

June 3, 1914, locomotive 1912, Macon, Ga. Squirt hose blew off; insecurely applied; 1 injured.

June 22, 1914, locomotive 1705, Atlanta, Ga. Squirt hose burst; defective hose; 1 injured.

Thirteen accidents; 13 injured.

SPOKANE, PORTLAND & SEATTLE RAILWAY:

September 14, 1913, locomotive 50, Rainier, Oreg. Crown sheet failure, low water; no contributory cause found; 1 injured.

One accident; 1 injured.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS:

May 27, 1914, locomotive 86, St. Louis, Mo. Stem of oil-control valve of lubricator blew out; 1 injured.

One accident; 1 injured.

TEXAS & PACIFIC RAILWAY:

July 6, 1913, locomotive 417, near Strawn, Tex. Squirt hose blew off; insecurely applied; 1 injured.

* July 10, 1913, locomotive 315, Sherman, Tex. Squirt hose burst; defective hose; 1 injured.

August 6, 1913, locomotive 271, near Palmetto, La. Deck casting stud blew out; parts not held for inspection; 1 injured.

November 14, 1913, locomotive 194, near Rosa, La. Crown sheet failure; raising of water under dome and poor crown bolts; 1 injured.

April 14, 1914, locomotive 267, Hahnville, La. Expansion-pad stud blew out; improperly applied; 2 injured.

Five accidents; 6 injured.

TEXAS CENTRAL RAILROAD:

* August 14, 1913, locomotive M., K. & T. 438, Walnut Springs, Tex. Stud blew out; 2 injured.

* August 17, 1913, locomotive 136, De Leon, Tex. Squirt hose blew off; 1 injured.

* January 1, 1914, locomotive 128, Aquilla, Tex. Squirt hose blew off; 1 injured.

Three accidents; 4 injured.

TOLEDO & OHIO CENTRAL RAILWAY:

July 10, 1913, locomotive 9616, St. Marys, Ohio. Blower pipe became disconnected while engineman was attempting to tighten same; defective threads; 1 injured.

January 14, 1914, locomotive 9648, near Seneca, Ohio. Flue burst; overheated in welding; 1 injured.

May 6, 1914, locomotive 9636, Columbus, Ohio. Squirt hose burst; defective hose; 1 injured.

Three accidents; 3 injured.

TOLEDO, ST. LOUIS & WESTERN RAILROAD:

January 21, 1914, locomotive 188, Frankfort, Ind. Injector steam pipe blew off at injector coupling; defective threads on coupling; 1 injured.

One accident; 1 injured.

UNION PACIFIC RAILROAD:

August 4, 1913, locomotive 247, Strawberry, Utah. Squirt hose parted at splice; insecurely clamped; 1 injured.

August 19, 1913, locomotive 1909, Corlett, Wyo. Injector throttle blew out of turret; defective threads; injector not fastened to boiler, causing excessive vibration and strain on throttle; 1 injured.

November 3, 1913, locomotive 1646, Cheyenne, Wyo. Plug in fire-box sheet became loose while leaks were being calked with pressure on boiler; defective plug; 1 injured.

November 5, 1913, locomotive 743, Red Desert, Wyo. Fusible plug blew out of crown sheet; defective threads on plug and in crown sheet; 1 injured.

November 11, 1913, locomotive 248, near Buda, Nebr. Plug blew out of crown sheet; threads defective and plug not stayed; 2 injured.

November 21, 1913, locomotive 1679, near Peoria, Colo. Crown sheet failure, due to defective condition of radial stays and overheat caused by accumulation of foreign matter at point where sheet pocketed down; 3 injured.

Six accidents; 9 injured.

UNION RAILROAD:

June 27, 1914, locomotive 92, Bessemer, Pa. Flue burst; overheated in welding; 1 injured.

One accident; 1 injured.

VANDALIA RAILROAD:

September 13, 1913, locomotive 302, North Manchester, Ind. Squirt hose burst; defective hose; 1 injured.

One accident; 1 injured.

WABASH RAILROAD:

August 10, 1913, locomotive 652, Alexander, Ill. Crown sheet failure, low water; locomotive being operated without water glass; gauge cock drip pipe stopped up; 1 killed.

September 30, 1913, locomotive 613, St. Louis, Mo. Plug in fire-door flange blew out while being calked under pressure; defective threads; 1 injured.

October 24, 1913, locomotive 2156, Stanberry, Mo. Squirt hose parted at splice; insecurely clamped; 1 injured.

November 22, 1913, locomotive 801, Brunswick, Mo. Water glass burst; injured by flying glass; shield improperly applied; 1 injured.

December 25, 1913, locomotive 1899, Buffalo, N. Y. Crown sheet failure; low water; no contributory cause found; 2 killed; 7 injured.

February 7, 1914, locomotive 269, St. Louis, Mo. Crown sheet failure; low water; no contributory cause found; 3 injured.

*March 17, 1914, locomotive 651, Centralia, Ill. Steam heat hose valve leaking; 1 injured.

March 28, 1914, locomotive 718, Moberly Mo. Washout plug blew out while being tightened under pressure; defective threads; 1 injured.

Eight accidents; 3 killed; 15 injured.

WAYCROSS & SOUTHERN RAILROAD:

June 11 1914, locomotive 3, near Waycross, Ga. Crown sheet failure, low water; no contributory cause found; 2 injured.

One accident; 2 injured.

WESTERN MARYLAND RAILWAY:

August 18, 1913, locomotive 91, Thomas, W. Va. Squirt hose blew off; hose defective and insecurely applied; 1 injured.

*September 7, 1913, locomotive 404, Fort Covington, Md. Squirt hose blew off; 1 injured.

Two accidents; 2 injured.

WHEELING & LAKE ERIE RAILROAD:

July 18, 1913, locomotive 2142, Brewster, Ohio. Employee struck by blow-off pipe when pressure was applied; pipe not properly coupled; 1 injured.

August 12, 1913, locomotive 2101, Brewster, Ohio. Spindle screwed out of water-glass cock under pressure; 1 injured.

November 13, 1913, locomotive 322, Brewster, Ohio. Water glass burst; injured by escaping steam and jumping from locomotive; 1 injured.

December 18, 1913, locomotive 714, near Dillingvale, Ohio. Spindle blew out of water-glass cock; spindle improperly fitted and loose threads; 1 injured.

April 20, 1914, locomotive 44, Cleveland, Ohio. Defective blower pipe allowed steam to fill front end, forcing gas and heat through fire door; 1 injured.

Five accidents; 5 injured.

WRIGHTSVILLE & TENNILLE RAILROAD:

*February 27, 1914, locomotive 40, Tennille, Ga. Engineman injured by hot cinder blown from fire box, due to leaking stay bolt; 1 injured.

One accident; 1 injured.

YAZOO & MISSISSIPPI VALLEY RAILROAD:

May 12, 1914, locomotive 52, Rena Laura, Miss. Cap blew off boiler check while engineman was attempting to seat valve; defective threads; 1 injured.

One accident; 1 injured.

PLATES ILLUSTRATING LOCOMOTIVE BOILER
EXPLOSIONS AND DEFECTS.
