

50 more by one of the above roads, and an additional order was placed for 120 by another road. Thus we find that there have been 189 Street stokers applied to locomotives in service and 173 on order, making a grand total of 362.

It is particularly interesting to note that the Crawford and Street stokers, while representing two distinct types, are developing at about an equal rate, judging from the number of machines which have been applied. The Street stoker has been placed on a larger number of roads, while the Crawford stoker, with the exception of 2, has been confined to the Pennsylvania System. The 2 stokers referred to have been applied, 1 each, to two different railways.

Of the 38 roads replying to the circular of inquiry issued by your committee, 7 report stokers in operation, ranging in number from 1 to 153, there being a total of 326 stokers reported in operation, of which number we find 159 are of the "underfeed" Crawford stoker; and the remainder, 167 of the "overfeed" or "scatter" type; 2 Hanna, and the rest Street stokers.

In Table 1 is shown a list of railways which report using stokers, furnishing at the same time the number and type of each machine and the principal dimensions of the engines to which applied. An expression was invited concerning any further application of stokers, which was replied to as shown. Checking the number of stokers reported as being in service, we find they include about 189 of the Street pattern. This figure was secured from the Locomotive Stoker Co., and as but 165 are shown by the reports from the different roads, we conclude there are some roads using the stoker who have not replied to the circular.

Your committee has been able to secure but very little information concerning the actual and detailed operation of stokers from roads where they have been installed in any considerable number; however, the reports we have been able to secure have been put together, as shown in tabulated form. While the information is quite limited, it will no doubt be of some interest.

Table 2. Performance of Crawford double underfeed stoker on Pennsylvania Lines West of Pittsburgh, including all trips of all stokers from the experimental installation to Feb. 28, 1913.

Coal fired by stoker in per cent. of total Coal fired	No. of trips	Per cent. trips Total Number of trips
100	19,475	61.0
99	280	0.9
98	416	1.3
95-98	1,530	4.8
90-95	1,847	5.8
85-90	680	2.1
80-85	903	2.8
75-80	1,209	3.8
70-75	379	1.2
Below 70	5,191	16.3
Total	31,910	100.0

Table 2 gives a rather comprehensive idea of the success with which the Crawford underfeed stokers have been operated on the Penna. Rd. The tabulation covers the performance of the stokers with respect to handling fuel. Up to Feb. 28, 1913, the stoker-fired engines had made 31,910 trips. Of this total number of trips, 19,475, or 61% were 100% trips; that is to say, trips on which the stoker handled practically all of the coal which was placed in the fire box. In comparison with this, we find that only 16.3% of the total number of trips were below 70% stoker fired. The table also shows the number of trips which were partially successfully stoker fired, which

TABLE 3—PERFORMANCE OF MALLET LOCOMOTIVES RELATING TO THE OPERATION OF STREET STOKERS ON NORFOLK & WESTERN RY. AND C. & O. RY. ON NORFOLK & WESTERN RY.

Month	ENGINE DAYS		ENGINE FAILURES ATTRIBUTED TO STOKER							Monthly Engine Mileage	Average Mileage per Stoker failure	Average mileage per failure other than stoker	STOKER REPAIRS INCLUDED IN REPAIRS TO STOKER ENGINES, BRICK ARCH REPAIRS INCLUDED				BRICK ARCH REPAIRS INCLUDED IN REPAIRS TO STOKERS									
	Total in Month	In service or in hands of C. I. Department	Out of Service or in hands of M.P. Department	Improper handling	Lack of Lubrication	Hidden Defect	Machinery or Fresh Break	Shop Fail	Clogged with Wood Bots, Etc				Total	Improper handling	Lack of Lubrication	Hidden Defect	Machinery or Fresh Break	Shop Fail	Clogged with Wood Bots, Etc	Total	Labor in Dollars	Material in Dollars	Total in Dollars	Accumulated Dollars	Total Dollars	Accumulated Dollars
1912	52	40	12	4	1	4	1	3	12	4,835	4,835	9.57	0.15	9.72	207.10	2.01	3.60	19.82	23.42	3.60	19.82	23.42	3.60	19.82	23.42	
April	408	266	142	4	1	4	1	3	12	3,786	3,786	188.85	8.53	197.38	7.30	7.30	2.25	10.82	13.17	2.25	10.82	13.17	2.25	10.82	13.17	
May	450	316	134	1	1	1	1	1	4	No failures	2,670.5	178.88	21.80	200.68	6.26	6.26	4.53	11.33	15.86	4.53	11.33	15.86	4.53	11.33	15.86	
June	465	343	117	1	2	1	2	2	4	No failures	5,770.6	149.17	30.41	179.58	5.18	5.18	2.60	10.82	13.17	2.60	10.82	13.17	2.60	10.82	13.17	
July	465	348 1/2	116 1/2	1	1	1	1	1	4	No failures	4,145.4	185.99	111.53	207.52	7.97	7.97	4.53	11.33	15.86	4.53	11.33	15.86	4.53	11.33	15.86	
August	457	348 1/2	118 1/2	2	1	1	2	2	5	37,988	4,748.5	176.47	30.32	206.79	5.44	5.44	2.60	10.82	13.17	2.60	10.82	13.17	2.60	10.82	13.17	
Sept.	895	616 1/2	278 1/2	2	1	1	2	2	5	63,888.12	5,914.4	234.59	35.49	270.08	4.22	4.22	1.41	4.12	5.53	1.41	4.12	5.53	1.41	4.12	5.53	
Oct.	1,199	827	372	4	1	1	4	4	7	12,140.4	5,665.5	403.62	72.21	475.83	5.60	5.60	3.44	3.44	3.54	3.44	3.54	3.44	3.54	3.44	3.54	
Nov.	1,240	811	429	2	1	1	2	2	8	11,212.2	2,718.1	415.06	73.63	488.69	5.45	5.45	3.22	6.43	9.65	3.22	6.43	9.65	3.22	6.43	9.65	
Dec.	1,240	807	433	1	3	1	4	3	12	9,430.2	3,650.4	365.49	115.15	480.64	4.25	4.25	6.86	10.39	17.25	6.86	10.39	17.25	6.86	10.39	17.25	
1913	6871	4718 1/2	2152 1/2	14	7	1	9	14	45	525,563	11,679.2	2,307.69	499.22	2,806.91	5.34	5.34	25.91	62.01	87.92	25.91	62.01	87.92	25.91	62.01	87.92	
Total	68711	47185	21525	1.4	1.4	1.1	1.4	1.4	4.5	52,556.3	3,527	230.77	49.92	280.69	5.34	5.34	2.59	6.20	8.79	2.59	6.20	8.79	2.59	6.20	8.79	
Avg.																										

ON ENGINES OF THE CHESAPEAKE & OHIO RY.

1912	87,416	4,856	748.86	2,150.10	5.30	6.16	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16	7.50
Nov.	121,269	3,675	745.88	1,401.24	6.20	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16	7.50	
Dec.	18	87,416	4,856	748.86	2,150.10	5.30	6.16	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16
1913	33	121,269	3,675	745.88	1,401.24	6.20	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16	7.50
Jan.	27	140,275	5,195	748.86	2,150.10	5.30	6.16	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16
Total	78	348,960	4,474	716.70	2,150.10	5.30	6.16	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16
Avg.	26	348,960	4,474	716.70	2,150.10	5.30	6.16	7.50	140,275	5,195	748.86	2,150.10	5.30	6.16