

equals column XVII. divided by 17 (the number of square feet of grate surface).
 Column XIX., which gives dry coal per indicated horse-power per hour, equals column XVII. divided by column X. in table I.

Column XXIV., which gives dynamometer horse-power, equals column X. in table I. minus column XXII. in table II.
 Column XXV., which gives the drawbar pull, equals column XXIV. divided by (.000547 multiplied by the revolutions per

circle represents a test, and the number written in the circle represents the laboratory number by which the tests are identified. The results of tests under super-

Table 1.

Number	Laboratory Symbol	Speed Miles per hour	Dry Coal per Sq. Ft. of Grate Surface per Hr.	Smoke Box Temperature Degrees F.	Eqv Evap per Sq. Ft. Heating Surface per Hr.	Eqv Evap per Pound of Dry Coal	Cut-Off Per-Cent of Stroke	M.E.P. pounds per Sq. inch	Indicated Horse-Power	Pounds of Steam per I.H.P. per Hr.	Pounds Coal per I.H.P. per Hour	Draw-Bar Pull Pounds	Draw-Bar Horse Power
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
1	30-2-200	30.0	55.0	673	6.96	9.82	14.19	37.88	262.9	27.01	3.48	2965	237.4
2	30-4-200	30.0		682	8.56		18.87	51.69	367.1	25.70		3847	307.4
3	30-6-200	30.0	98.0	788	11.12	8.83	26.75	68.90	489.2	24.91	3.40	5380	430.1
4	30-4-160	29.9	51.9	662	6.60	9.89	17.84	38.39	272.1	26.86	3.24	2655	211.9
5	30-6-160	30.0	68.9	707	8.75	9.87	25.67	54.08	383.9	25.28	3.05	3786	302.5
6	30-8-160	30.0		763	10.91		33.06	65.58	465.1	25.69		5130	410.9
7	30-4-120	30.0	35.4	608	4.70	10.32	17.62	24.09	171.0	30.63	3.52	1277	102.1
8	30-8-120	30.1	63.6	676	7.99	9.77	32.79	45.82	325.5	27.46	3.32	3369	269.5
9	30-14-120	29.9	130.7	835	13.99	8.33	56.25	72.56	514.0	30.31	4.28	6258	500.6

Column XX., which gives the equivalent steam per indicated horse-power per hour, equals column XV. divided by column X. in table I.
 Column XXI., which gives the machine friction in terms of mean effective pres-

minute), in which .000547 is the tractive horse-power constant of the locomotive.
 Column XXVI., which gives the coal per dynamometer horse-power per hour, equals column XVII. divided by column XXIV.
 Column XXVII., which gives the equiva-

Table 2.

Number	Laboratory Symbol	Eqv Steam for Engine per Hour Feed Water of 60 F.	Eqv Evap per Pound of Dry Coal E=11.305-32.61M	Dry Coal fired per Hr. Carried by Equation	Dry Coal per Sq. Ft. Grate Surface per Hr.	Dry Coal per I.N.P. per Hr.	Eqv Steam per I.N.P. per Hr.	Machine-Friction				Dynamometer Horse-Power	Draw Bar Pull	Coal per Pyma Horse Power per Hr.	Eqv Steam per Pyma Horse Power Per Hour
								Mean Effective Pressure	Indicated Horse-Power	Per Cent I.N.P.	Machine-Friction				
I	II	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	
1	30-2-200	8768	9639	891	52.4	3.31	32.60	6.5	46.1	17.1	222.8	2780	4.00	39.35	
2	30-4-200	11354	9406	1207	71.0	3.29	30.92	8.5	60.4	16.4	306.7	3830	3.93	37.02	
3	30-6-200	14685	8850	1659	97.6	3.39	30.00	9.3	66.0	13.5	423.2	5290	3.92	34.70	
4	30-4-160	8785	9836	893	52.5	3.28	32.28	8.5	60.4	22.2	211.7	2640	4.22	41.50	
5	30-6-160	11663	9355	1246	73.3	3.25	30.38	9.3	66.0	17.2	317.9	3970	3.92	36.69	
6	30-8-160	14347	8906	1611	94.8	3.46	30.85	8.4	59.6	12.8	405.4	5070	3.97	35.39	
7	30-4-120	6269	10257	611	35.9	3.57	36.69	8.5	60.4	35.4	110.6	1350	5.52	56.68	
8	30-8-120	10663	9519	1122	66.0	3.45	32.80	8.4	59.6	18.3	265.9	3320	4.22	40.18	
9	30-14-120	18654	8186	2278	134.0	4.43	36.29	3.0	21.3	4.1	492.7	6160	4.62	37.86	

sure, was taken from fig. 13, page 158, of the 1909 report of Dean Goss.
 Column XXII., which gives the machine friction in horse-power, is obtained by using the values of m. e. p. of column XXI. and the speed in revolutions per minute of

lent steam per dynamometer horse-power per hour, equals column XV. divided by column XXIV.
 Tests Using Superheated Steam.
 THE TESTS INVOLVING SUPERHEATED Steam, as run on Schenectady no.

Table 3.

Number	Laboratory Symbol	Speed Miles per Hour	Dry Coal per Sq. Ft. of Grate Surface per Hr.	Smoke Box Temp Degrees F.	Degrees Superheat F.	Eqv Evap per Sq. Ft. of Heating Surface per Hr.	Eqv Evap per Pound of Dry Coal	Lb of dry Coal	Cut-Off Per-Cent of Stroke	M.E.P. pounds per Sq. in	Indicated Horse-Power	Pounds of Steam per I.H.P. per Hr.	Pounds of Coal per I.H.P. per Hr.	Draw-Bar Pull	Draw-Bar Horse Power
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV		
1	30-2-200	30.3	48.2	558	187.0	6.08	10.40	17.87	41.42	290.2	21.30	2.92	2808	226.9	
2	30-4-200	30.1	62.1	622	222.0	7.79	10.38	31.35	61.47	438.1	17.88	2.41	4499	361.4	
3	30-6-200	29.9	82.6	657	246.2	9.20	37.45	74.82	528.5	17.49	2.67	5702	452.8		
4	30-9-200	30.0	127.3	714	238.5	12.42	8.06	49.54	97.34	696.4	18.64	3.11	7454	596.7	
5	30-4-160	30.0	46.5	579	201.6	6.01	10.70	21.00	44.90	317.2	19.56	2.50	3282	261.2	
6	30-6-160	30.0	59.2	609	226.3	7.30	10.20	30.00	55.30	394.0	18.77	2.55	4165	334.3	
7	30-8-160	30.0	74.4	610	245.4	8.88	9.86	38.00	69.06	490.7	18.38	2.58	5293	423.2	
8	30-9-160	29.6	92.7	627	270.3	9.65	8.78	44.55	77.59	544.4	18.67	2.90	5543	437.8	
9	30-11-160	30.0	109.3	682	253.1	11.70	8.84	52.40	86.90	615.1	19.75	3.02	6664	532.6	
10	30-12-160	28.9	124.2	842	244.3	12.30	8.18	56.82	93.41	643.5	20.09	3.28	7199	553.6	
11	30-8-120	30.0	59.6	583	229.6	7.03	9.77	38.93	47.59	343.2	21.30	2.95	3845	308.8	
12	30-10-120	30.0	65.0	584	243.9	8.24	9.74	44.13	59.37	419.7	20.14	2.64	4702	374.2	
13	30-14-120	30.0	96.9	629	277.1	10.86	8.99	59.84	72.19	511.4	21.52	3.21	5856	469.7	
14	30-15-120	31.2	103.3	685	305.1	11.68	9.34	60.48	74.04	548.8	21.87	3.20	5288	441.3	
15	30-16-120	30.0	110.3	696	293.1	11.71	8.76	64.45	75.42	535.7	22.54	3.50	6137	491.0	
16	30-18-120	29.9	121.7	726	280.0	12.95	8.79	73.08	77.79	550.6	24.50	3.76	6342	503.4	

the individual test, together with the indicated horse power constant or the locomotive.
 Column XXIII., which gives the machine friction in per cent. of indicated horse-power, equals column XXII. divided by column X. in table I. and multiplied by 100.

3, were at a speed of 30 miles an hour, at the same pressures as were used on the original locomotive—that is, 200, 160 and 120 lbs. The conditions of pressure and cut off under which the tests were run are shown diagrammatically in fig. 3, in which the cut off is determined by the position of the reverse lever. Each

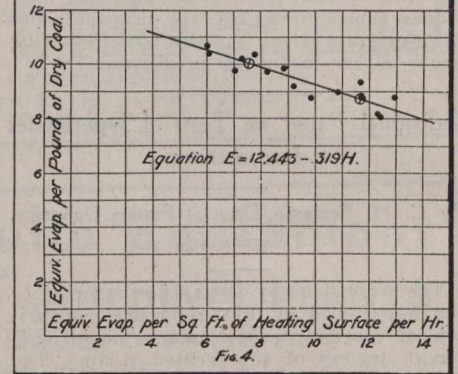
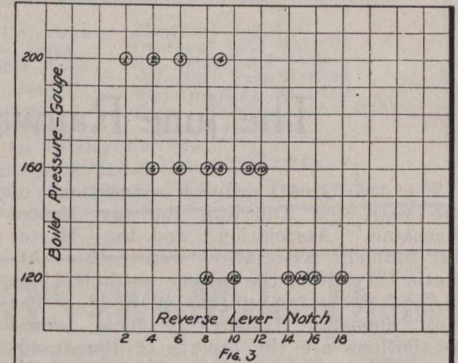


Fig. 3.—Conditions of Pressure and Cutoff for Superheated Steam Locomotive.

Fig. 4.—Relation Between Equivalent Evaporation per Pound of Dry Coal and Equivalent Evaporation per sq. ft. of Heating Surface per Hour for Superheated Steam Locomotive.

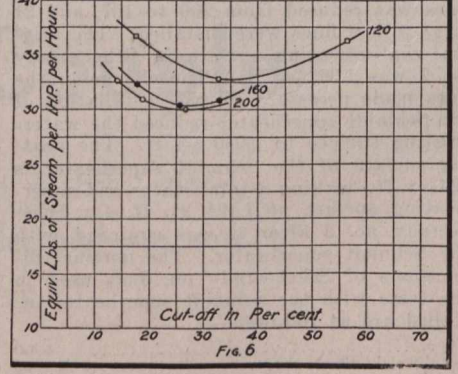
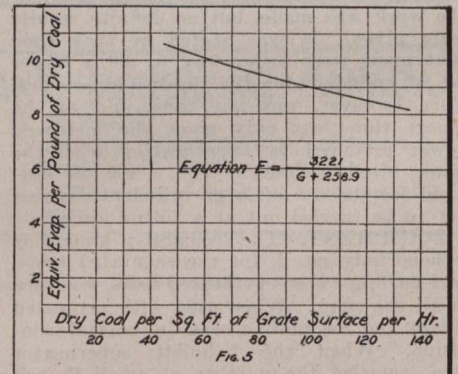


Fig. 5.—Relation Between Equivalent Evaporation per Pound of Dry Coal, and Dry Coal per sq. ft. of Grate Surface per Hour for Superheated Steam Locomotive.

Fig. 6.—Relation Between Equivalent Pounds of steam per i.h.p. Hour and Cutoff for Saturated Steam Locomotive.

heated steam are shown in tables III. and IV. It will be seen that the reverse lever was carried to a higher notch than with