

Improvements in Locomotive Boilers.

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(CONTINUED FROM OCTOBER ISSUE.)

B.—Boilers with water tubes.—Steam superheaters and valve gear for superheated steam.—Feed water heaters.

WATER TUBES.—None of the replies received indicate that any water tube boilers are in use.

STEAM SUPERHEATERS.—The replies received from the various administrations with respect to the use of superheated steam are extremely meagre and with one exception those roads which have equipped engines with superheating appliances have done so as an experiment only. The C.P.R. has, however, adopted it extensively and has at present about 475 engines using superheated steam. In 1901 this road applied a Schmidt smoke-box superheater to an 18 by 24 in. cylinder, 4-6-0, freight engine with 62 in. wheels, and the results obtained from this experiment being satisfactory, two years later, two 4-6-0 compound freight engines were equipped with superheaters of the Schmidt smoke tube type. These engines also showed a substantial economy over similar engines without superheaters, and in 1904, 41 simple 2-8-0 freight engines were constructed, 20 of which were equipped with Schmidt smoke tube type of superheater and 21 with the Cole superheater of the Field tube type. The Cole superheaters did not prove satisfactory and were removed after about a year's service, but the engines with the Schmidt smoke tube superheaters were entirely successful and during their first six months service showed a saving of 18% in fuel compared to compound 2-8-0 engines of a similar though slightly smaller type which had been constructed two years previously. This economy was not entirely due to the use of superheated steam, as the compounds were not in as good condition as the newer engines, but it was regarded as showing that the superheated steam engines were more efficient, and that they could with economy be used in place of compound engines which had proved expensive to maintain.

Following these engines the C.P.R.

constructed fifty 4-6-0 simple freight engines, 10 of which were equipped with the Schmidt smoke tube, 30 with the Cole return bend smoke tube and 10 with Vaughan-Horsey smoke tube superheater, which is a design developed on that road. Since that time, with the exception of 25 engines equipped with the Cole return bend superheater, all new freight and passenger engines constructed have been equipped with the Vaughan-Horsey smoke tube superheater and 55 engines with the Cole return bend design have also been converted to that type. In addition this superheater has been applied to twelve 4-6-0 simple passenger engines and one 4-4-2 passenger engine. A list of the engines now equipped is as follows:

Number.	Type.	Cylinders.	Driving wheels.	Boiler pressure.	Weight on drivers.	Total Weight	Type of superheater.
1	4-6-0	18×24	62 inches.	180	95,425	119,225	Schmidt Smoke Box.
1	4-6-0	22 and 35×26	63 "	200	128,000	169,000	" " Tube.
1	4-6-0	22 and 35×30	63 "	200	147,075	192,150	" " "
10	4-6-0	21×28	63 "	200	141,000	190,000	" " "
105	4-6-0	21×28	63 "	200	141,000	190,000	Vaughan-Horsey.
115	4-6-0	22½×28	63 "	180	141,000	190,000	" " "
12	4-6-0	20×26	69 "	200	129,450	166,000	" " "
1	4-4-2	20×26	84 "	200	97,310	170,250	" " "
17	4-6-2	21×28	75 "	200	139,000	212,600	" " "
83	4-6-2	21×28	69 "	200	139,300	214,300	" " "
20	2-8-0	21×28	57 "	200	168,150	192,350	Schmidt Smoke Tubes.
110	2-8-0	22½×28	57 "	180	171,900	195,500	Vaughan-Horsey.

The results obtained have been on the whole exceedingly satisfactory. Figures derived from extensive service on all sections of the road, and based on the total quantity of fuel delivered to the engines have shown an economy in fuel of from 10 to 15% in passenger service.

A noticeable difference between simple engines using superheated steam and two cylinder compound engines using saturated steam is also found in the greater flexibility of the simple engine. Under conditions favorable to the compound engine when it is working on a level road or otherwise uniformly worked at slow or moderate speeds, its efficiency is equal or but slightly below that of the superheater engine, but when on a undulating road or when worked at high speeds the economy of the superheater engine is decidedly superior. No opportunity exists on the C.P.R. of com-

paring simple superheater steam engines with four cylinder compound engines in passenger service, but as compared with simple saturated steam engines, in addition to the economy above mentioned, superheated steam engines of identical design develop at least 10% greater sustained power and also run more freely and faster.

The figures for economy given above are not for the purpose of showing the best results that have been obtained, but rather a conservative estimate of the average saving that has been effected on a large number of engines working under average conditions, and on which no effort was made to obtain good results from engines using superheated steam rather than from other engines

and it is fairly representative of the saving that may be expected.

Experiments to determine the amount of superheat obtained show that with the Schmidt superheater on a 2-8-0 freight engine, having a boiler pressure of 200 lbs. per square inch corresponding to a temperature of 388 deg. Fahr., the temperature of the steam in the steam chest averaged from 440 deg. Fahr., to 480 deg. Fahr., according to the way in which the engine was worked, the higher temperature occurring when the engine was worked to a greater capacity.

Tests of the Vaughan-Horsey superheater in passenger service with the same boiler pressure showed an average temperature in the steam chest of 540 deg. Fahr., averaging from 520 deg. Fahr., to 560 deg. Fahr., according to the way in which the engine was worked

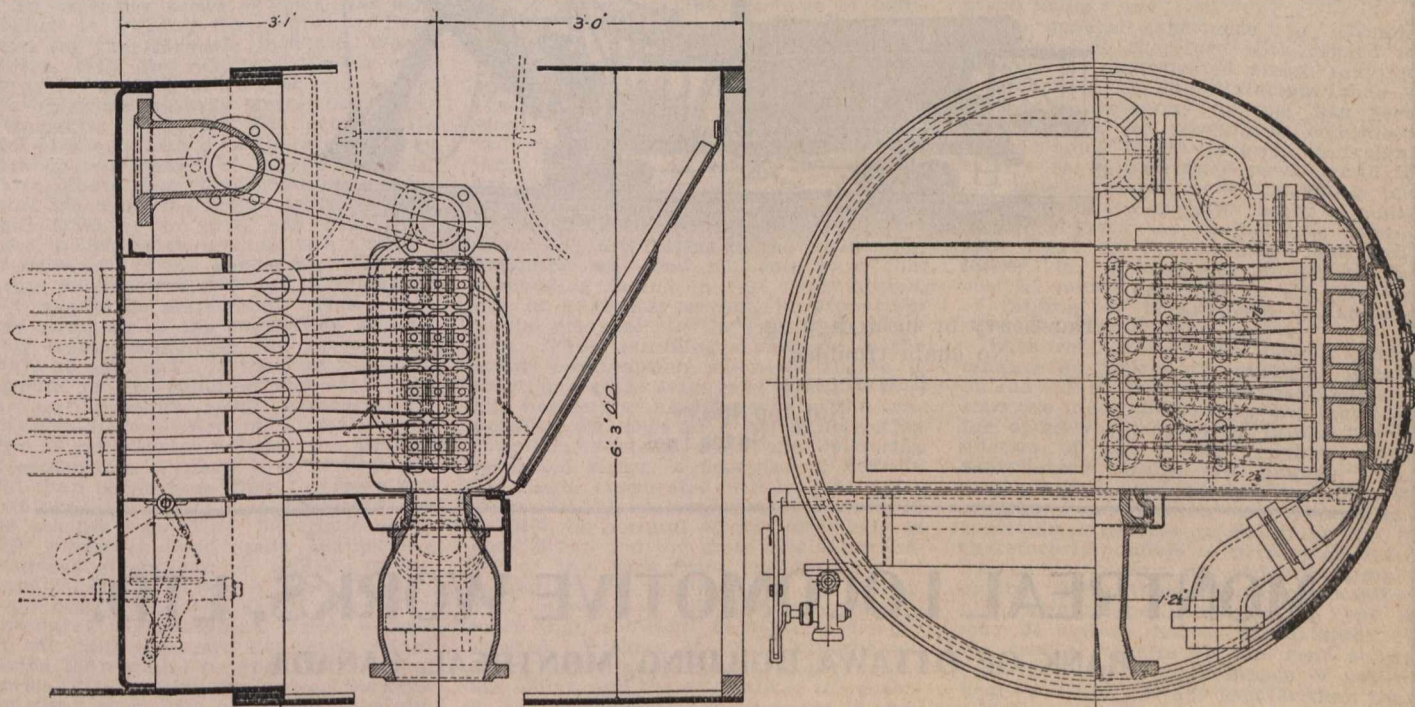


Fig. 40.