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SUPERHEATING ON LOCOMOTIVES.

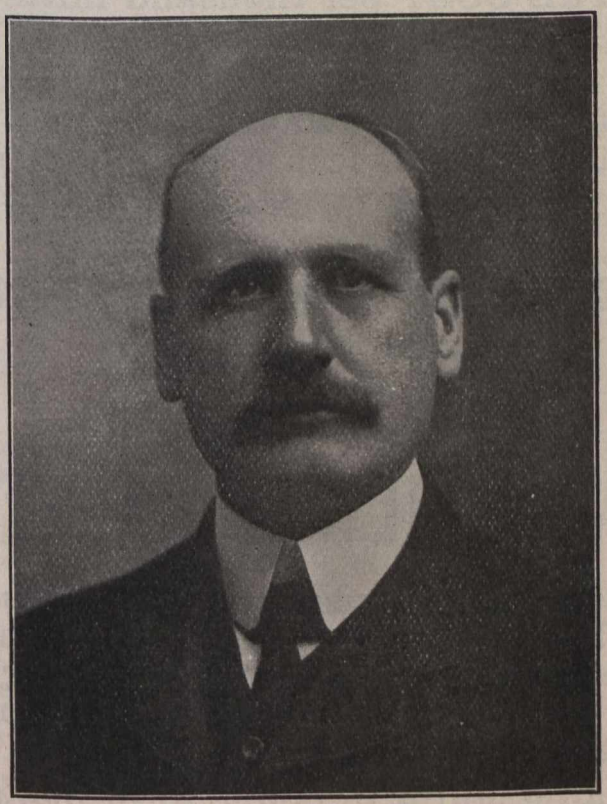
At the Master Mechanics' Association meeting at Atlantic City recently the following report was presented by the chairman of the committee on superheating, H. H. Vaughan, Assistant to the Vice-President C.P.R.:

During 1907 comparatively few engines were equipped with superheaters in the United States, although the C.P.R. continued to apply them to all road engines it constructed, 173 in all, bringing the total number of superheater engines on that road to 350, of which 110 are consolidation freight, 192 ten-wheel freight and 48 passenger engines. The most important development in the U.S. has been with the Baldwin or Vauclain superheater, 52 engines having been constructed during the year 1907 equipped with this device. With this exception the only other engines constructed during the year with superheaters were two on the Union Pacific Railway, one of which was equipped with the Vaughan-Horsey smoke-tube superheater, the other with the Union Pacific smoke-box type. A statement of the engines equipped during the year, so far as ascertained, is as follows:

Road.	Type of Superheater.	No. of Engines.
C.R.I. & P. Ry.	Vauclain	1
P.S. & Northern	"	1
Central Ry., Brazil	"	2
Chicago & Alton	"	1
A.T. & Santa Fe	"	49
Central of Georgia	"	1
Union Pacific	Vaughan-Horsey	1
Union Pacific	Union Pacific	1
Canadian Pacific	Vaughan-Horsey	173

The Vauclain superheater may now be said to have developed beyond the experimental stage. It is of the smoke-box type, in which the waste heat of the front end gases is utilized to superheat the steam on its way to the cylinders. It consists of two cast-steel headers in the upper and two in the lower portion of the smoke-box, the upper headers having a passage extending from the T-pipe flange at the back of the header to a cavity in the front of the header, which is divided into three chambers by longitudinal and transverse ribs. The lower header is U-shaped in section, divided into three chambers by transverse ribs, the steam-pipe flange opening into the back chambers. The headers are each open on the face, which is closed by a flange plate jointed to the header by bolts. Tubes 1¼ inches in diameter, no. 13 b.w.g. thick, are expanded into the flange plates. The steam passes from the dry pipe to the upper chambers at the front of the upper headers, thence through the tubes to the front chamber of the lower headers and back through other tubes to the lower chamber of the upper header, thence to the middle chamber of the lower header, back to the upper header and thence to the rear chamber in the lower header, from which the steam connection leads to the cylinders. A steel plate partition within the tubes causes the gases issuing from the flue sheet to traverse the superheater tubes on their way to the stack, in order to obtain as much benefit as possible from the heat they contain. This arrangement is evidently somewhat similar to the Schmidt smoke-box superheater, with the exception that the large flue leading from the fire-box to the front end, which in Schmidt's design enabled a high degree of superheat to be obtained, has been omitted, and consequently the only heat available for superheating the steam is that contained in the gases after leaving the evaporating tubes. The Baldwin Locomotive Works have furnished particulars of a test on this superheater conducted on the Chicago, Rock Island and Pacific Railway. The engine tested was a consolidation weighing 237,000 lbs., of which 210,000 lbs. was on the drivers, and the principal dimensions as follows:

Cylinders	22 by 28 in.
Valves	Slide balance.
Boiler, type	Straight.
Boiler, diameter	80 in.
Boiler, pressure per square inch	163 lbs.
Firebox, length	120 in.
Firebox, width	72¼ in.
Heating surface, firebox	179 sq. ft.
Heating surface, tubes	3,658 sq. ft.
Heating surface, total	3,837 sq. ft.
Driving wheels	63 in.



J. E. HUTCHESON,
Superintendent Ottawa Electric Railway and President Canadian Street Railway Association.

The test consisted of six runs on the Illinois Division between Blue Island and Silvis, a distance of 158 miles, and six on the El Paso Division between Delhart and Tucumari, a distance of 93¼ miles. The general averages of the results obtained were as follows:

	Illinois Div.	El Paso Div.
Number of cars.	45 loaded, 25 light.	37 loaded, 21 light.
Weight of train exclusive of weight of engine and tender	2,327.0 tons.	1,833.4 tons.
Number of stops	14.7	3.8.
Time consumed in stops.	3 hrs. 16 min.	1 hr. 33 min.
Total time of run.	12 hrs. 57 min.	6 hrs. 29 min.
Speed	16.1 M.P.H.	15.5 M.P.H.
Indicated horse-power.	821.5	891.6.
Weight of coal (losses subtracted).	33,987.0 lbs.	15,752.6 lbs.
Weight of coal per indicated horse - power, per hour.	4.23 lbs.	3.86 lbs.
Weight of coal per ton mile.	.091 lbs.	.119 lbs.
Weight of water losses subtracted.	217,706.3 lbs.	97,267.7 lbs.
Weight of water per indicated horse - power hour.	27.5 lbs.	22.6 lbs.
Weight of water per ton mile.	.597 lbs.	.721 lbs.
Equivalent evaporation.	7.86 lbs.	7.54 lbs.
Superheat (from initial pressure of cards)	48.8° F.	56.44° F.
Superheat (from boiler pressure	24.63° F.	33.20° F
Temperature of steam chest.	386.3° F.	403.6° F.
Boiler pressure.	154.4 lbs.	159.8 lbs.
Tractive effort.	21,375.0 lbs.	24,404.7 lbs.
Length of run.	157.0 miles.	74.5 miles.
Coal per square foot of grate surface per hr.	57.6 lbs.	54.9 lbs.

During the first two runs on the Illinois Division the temperature of the front-end gases in front and back of the superheater were shown to be 534° and 635° F., showing a drop of 101° in passing through the superheater. An interesting comparison was also made by taking the temperatures of the steam in the valve chest of a simple consolidation, which averaged 24° below that corresponding to saturated steam at the boiler pressure, so that the superheater, which showed an average temperature in the steam chest of from 25° to 33° above that corresponding to the boiler pressure, may be assumed to have raised the temperature of the steam 50° to 60°. No comparison was attempted on these tests, but the Baldwin Locomotive Works conclude from the results obtained in a test of a balanced compound and simple engine in passenger service, and