

GRAND
TRUNK
RAILWAY
LOCOMOTIVE
DEVELOPMENT

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Grand Trunk Railway Pacific Type Locomotives.

The G.T.R. has recently received 19 Pacific-type locomotives which exert a tractive force of 33,800 lbs., and with 146,700 lbs. on driving wheels the ratio of adhesion is 4.34. The driving wheels are 69 ins. in diameter. The proportions of the design are such as to fit the locomotives for either fast freight or heavy medium speed passenger service. The advantage of the Pacific type over the 10 wheeled for work of this character lies in the increased relative steaming capacity of the former, and in

nala. All the driving springs are under-
hung, and every wheel under the locomotive
and tender is braked.

The tender frame is composed of 10 in. steel channels, with oak bumpers. The trucks are of the arch bar type, with steel tired wheels, cast steel bolsters and triple elliptic springs. The fuel space is closed in front with metal coal gates.

The locomotives were built by the Baldwin Locomotive Works. Their principal dimensions are as follows:—

Cylinders	23 x 28 ins.
Valves	balanced piston.
Boiler—type	straight.
" length	96 7/8 ins.
" width	75 1/2 ins.

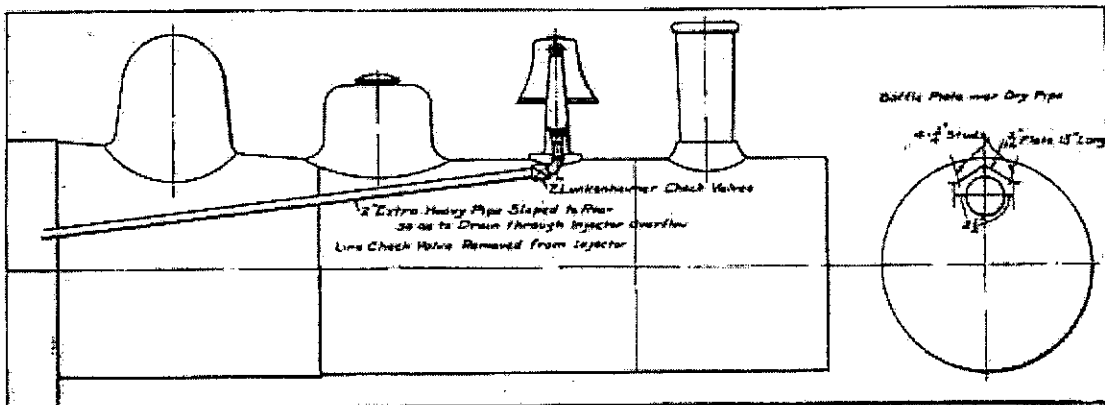
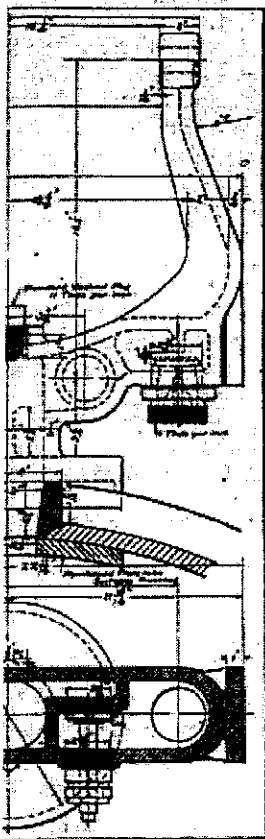


Fig. 9.—C.N.R. Standard Bell Stand Injector Arrangement.

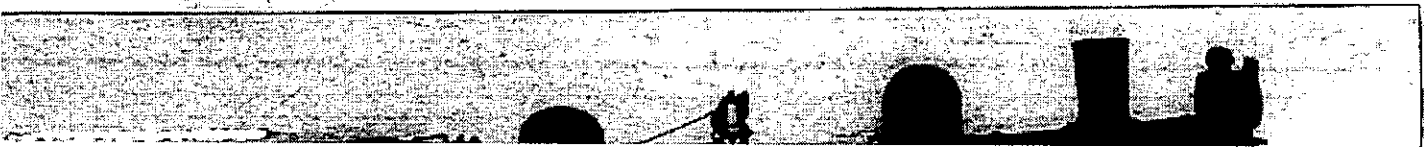
the fact that, with a given amount of grate area, a larger furnace volume can be provided. This feature is of special value in locomotives using high volatile coal as fuel.

These locomotives are equipped with a Schmidt fire tube superheater and also with a brick arch, which is supported on four water tubes. These features have fully proved their ability to raise the efficiency of the locomotive and increase its capacity per ton of weight; and the new locomotives, as far as their proportions and construction are concerned, represent the most approved practice for engines of their type.

"	"	depth, front	72 3/4 ins.
"	"	depth, back	56 1/4 ins.
"	"	thickness of sheets, sides	3/8 in.
"	"	material	steel.
"	"	diameter	70 1/2 ins.
"	"	thickness of sheets	3/8 in.
"	"	working pressure	185 lbs.
"	"	fuel	soft coal.
"	"	staying	radial.
Fire box—	Material	steel.	
"	thickness of sheets, back	3/8 in.	
"	thickness of sheets, crown	3/8 in.	
"	thickness of sheets, tube	3/8 in.	
Water Space—	front	5 1/2 ins.	
"	sides	4 1/2 ins.	
"	back	4 1/2 ins.	
Tubes—	material	steel	
"	thickness	0.150-0.125 ins.	
"	number	24-181.	
"	length	20 ft. 7 ins.	

and Feed Water Inlet.

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overflow, eliminating
piping.
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JUNE 1913

Railway Equipment Notes.

The James Bay Ry. has invited tenders for 200 flat cars, 60,000 lbs., four cabooses, and five 10-wheel locomotives.

The Winnipeg, Selkirk and Lake Winnipeg Ry. has converted one of its flat cars into a box car, and is using it for the conveyance of fish from Selkirk, Man., to Winnipeg.

The Intercolonial Ry. added to its equipment between Aug. 22 and Oct. 24, 49 4-wheel hopper cars, 30,000 lbs. capacity, from Rhodes Curry & Co., Amherst, N.S.

The G.T.R. has recently added to its equipment two switching locomotives, 13 Richmond compound locomotives, five 10-wheel locomotives and 30 refrigerator cars.

The Bertram Engine Works Co., Toronto, has completed three large locomotive boilers, 5 1/2 ft. diameter, and 23 ft. long, for a steam pressure of 180 lbs. to the square inch, for the Canada Atlantic Ry.

The Locomotive and Machine Co., of Montreal, has delivered to the G.T.R. five of the locomotives, the general dimensions of which were given on pg. 355 of our Oct. issue, and five more are in process of construction. An illustration of one of these locomotives is given on this page.

The Egerton Tramway Co., which opened its line between Westville and Trenton, N.S.

138 flat cars, and 12 flangers, at its Angus shops; and 31 vans at its Farnham, Que., shops.

The Simplex Ry. Appliance Co.'s plans for its new plant at Montreal show 18 buildings, including machine, general appliance and blacksmith shops, power plant, etc. Employment will be given to 1,500 hands, and Vice-President Butler told a press representative, Oct. 9, that the plant would have a capacity of 25 cars a day, and that steel cars would be turned out if orders were received. The plant would turn out structural steel of all kinds.

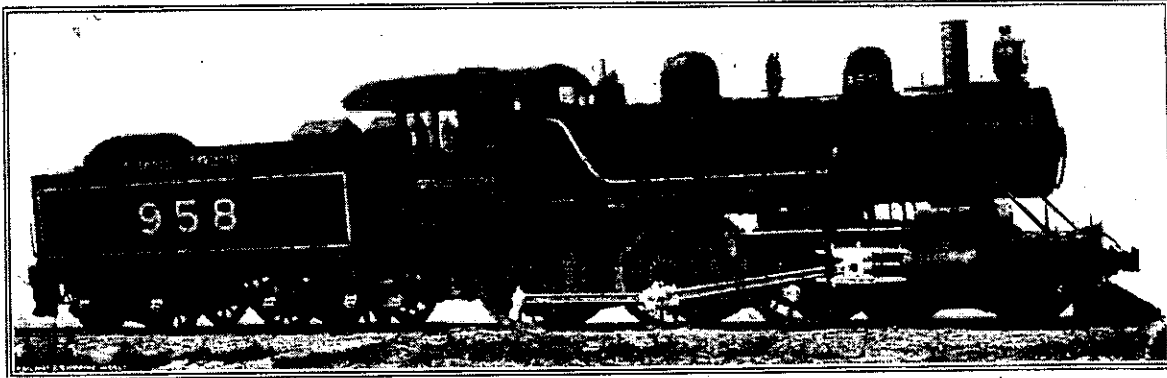
The C.P.R., from Aug. 12 to Oct. 15, received the following new rolling stock: 20 freight locomotives from the American Locomotive Co.'s Schenectady works; six freight locomotives from the Canadian Locomotive Co.; two freight locomotives from the Locomotive and Machine Co., of Montreal; two first-class cars and eight tourist cars, from its Angus shops; 93 box cars, 100 stock cars, and 85 flat cars from its Perth, Ont., shops; and 24 vans from its Farnham, Que., shops.

Among the matters of which the Ontario fruit growers complained to the Board of Railway Commissioners, was the damage to fresh fruit caused by the cars in which they are transported by the railways. This matter has been given over to the Commissioners' Chief Traffic Officer, J. Hardwell, who went

Safety valves	..... muffled
Brakes	..... Westinghouse
Weight of tender, loaded	..... 143,000 lbs.
Capacity of tank	..... 5,800 imp. gals.
Style of tank	..... diamond shaped
Coal capacity	..... 10 tons
Style of tank	..... diamond
Diameter of wheel	..... 34 in.
Kind of wheel	..... steel tired
Diameter and length of journal	..... 15 in. x 10 in.
Brake beam	..... metal. R. R. Co.'s standard

The Schenectady works of the American Locomotive Co. is building five locomotives for the G.T.R. They are of the 460-178 type, and have the following general dimensions:

Gauge	..... 4 ft. 8 1/2 in.
Fuel	..... Bituminous coal
Weight in working order	..... 180,000 lbs.
on drivers	..... 172,000 lbs.
engine and tender in working order	..... 225,000 lbs.
Wheel base, driving	..... 15 ft. 8 in.
rigid	..... 15 ft. 8 in.
total	..... 26 ft. 12 in.
total, engine and tender	..... 26 ft. 8 1/2 in.
Diameter of cylinders	..... 20 in.
Stroke of piston	..... 26 in.
Size of steam ports	..... 20 in. x 13 in.
exhaust ports	..... 20 in. x 3 in.
bridges	..... 15 in.
Kind of slide valves	..... American balanced
Greatest travel of slide valves	..... 5/8 in.
Outside lap of slide valves	..... 1 in.
Inside lap of slide valves	..... 7/8 in.
Lead of valves in full gear	..... Line and line.
No. of driving wheels	..... 6
Diameter of driving wheels outside of tire	..... 73 in.
Material of driving wheel centres	..... main, cast steel; others cast iron
Thickness of tire	..... 3/4 in.
Driving box material	..... cast steel.



LOCOMOTIVE BUILT BY THE LOCOMOTIVE AND MACHINE CO., OF MONTREAL, FOR THE G.T.R.

Oct. 11, purchased five 10-ft. double truck vestibuled cars from a Canadian firm. Each car is fitted with two 25 h.p. motors, Sterling safety brakes, panel and cylinder electrical heaters. Three cars have longitudinal seats and two have cross seats. Each car will seat 50 persons.

The Michigan Central Rd., built during Aug. and Sept., at its St. Thomas, Ont., shops, 26 merchandise cars, 80,000 lbs. capacity. It has also added to its equipment in Canada one compound consolidation locomotive, built at the Schenectady works of the American Locomotive Co., of the same general dimensions as those described on pg. 161 of our May issue.

The Intercolonial Ry. has placed the following orders for equipment between Aug. 22 and Oct. 24: 10 first-class cars and 100 platform cars from Rhodes Curry & Co., Amherst, N.S.; four 2nd-class sleeping cars,

to New York, Oct. 27, for the purpose of examining the various kinds of cars in use in the U.S. for the carriage of fruit and other perishables. J. M. Riddell, local freight agent, G.T.R., Montreal, and W. R. Bunting, President of the Ontario Fruit Growers' Association, joined Mr. Hardwell in New York, to look over the cars.

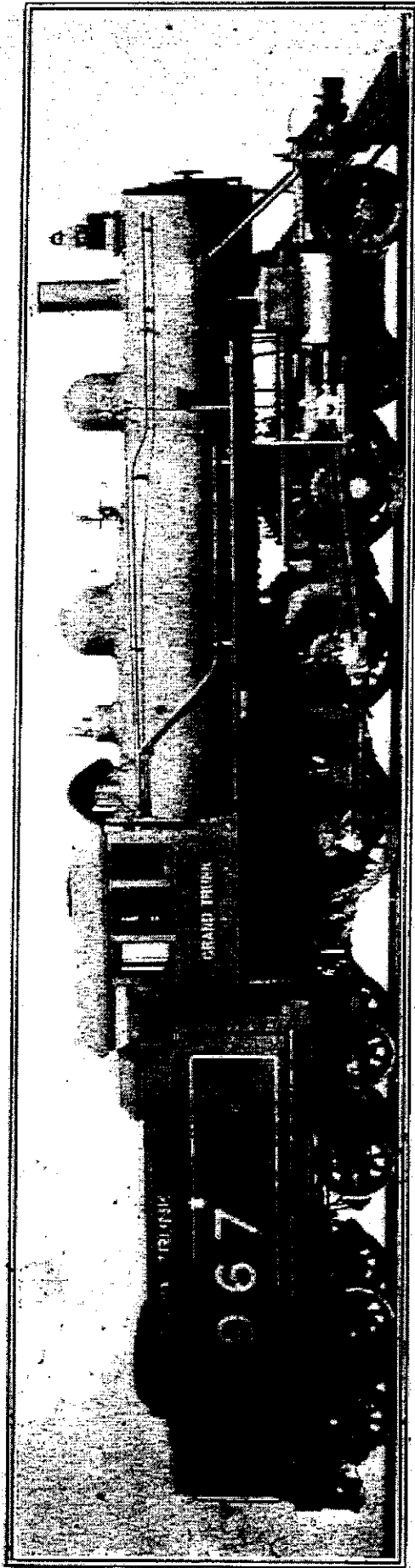
The G.T.R. has placed an order with the Canadian Locomotive Co., Kingston, Ont., for 25 Richmond compound mogul freight locomotives, to be delivered between June 1 and Aug. 31, 1905. Following are the general dimensions:

Fuel used	..... Bituminous coal
Weight in working order, drivers	..... 140,750 lbs.
total	..... 165,000 lbs.
Wheel base of engine, rigid	..... 15 ft. 8 in.
total	..... 22 ft. 3 in.
and tender	..... 24 ft. 6 in.
Length over all, engine and tender	..... 65 ft. 11 1/2 in.
Width	..... 10 ft. 6 in.
Height	..... 17 ft. 1 1/2 in.

Diameter and length of driving journals	..... 6 1/2 in. x 12 in.
main crank pin journals (main)	..... 7 1/2 in. x 15 1/2 in. x 6 in.
side and crank pin journals	..... 5 1/2 in. x 4 in.
Engine truck, kind	..... four wheel, swing centre
journals	..... 8 1/2 in. x 10 1/2 in.
Diameter of engine truck wheels	..... 36 in.
Kind of engine truck wheels	..... cast iron spoke.
Boiler, style	..... extended wagon top, radial stay.
Outside diameter of first ring	..... 22 1/2 in.
Working pressure	..... 225 lbs.
Thickness of plates in barrel and outside of fire box	..... 1 in., 1 1/2 in., and 1 3/4 in.
Horizontal seams	..... Butt joint, sextuple riveted
Circumferential seams	..... double
Firebox, length	..... 11 1/2 in.
width	..... 40 in.
depth, front	..... 70 1/2 in.
back	..... 64 1/2 in.
plates, thickness, sides, 1 in.; back, 1 1/2 in.; crown, 1 1/2 in.; tube sheet, 3/4 in.	.....
water space, 4 in. front, 3 in. sides, 2 in. back	.....
cross staying	..... radial
stay bolts, best quality double refined iron	..... 1 in. diam.
Tubes, material and gauge	..... Lap welded charcoal iron, 175 thick
number	..... 282

10000 POUND FREIGHT LOCOMOTIVE WITH THE LOCOMO

DELIVERY



10000 POUND FREIGHT LOCOMOTIVE BUILT BY THE AMERICAN LOCOMOTIVE CO. AT SCHEMECTADY FOR THE G.T.R.

January 1905

St. Clair rivers.
Eight G.T.R. locomotives were badly damaged by a fire at the roundhouse, Bathurst St., Toronto, Nov. 27. Four were sent for repairs to the Toronto shops, and two each to Stratford and Montreal.
The C.P.R. between Nov. 15 and Dec. 13, received the following rolling stock from its shops: Montreal—6 locomotives, 5

January
1906

W. A. Ducker, J. S. Gray, R. R. Scott, W. M. McLeod, J. McDiarmid, and A. N. N. Pherson, of Winnipeg.

York and Carleton Ry.—The contractors for the extension from Glippen Glen to Ryan's Brook, N.B., one mile, is J. A. Young, Taymouth, N.B. The work will be completed this season. (Jan., pg. 7.)

The C.P.R. has moved its district freight office at London, Ont., from the passenger station to the Bank of Commerce Building.

The Board of Railway Commissioners has decided to make an investigation into the charges of telephone and express companies, and G. F. Shepley, K.C., Toronto, has been appointed counsel to conduct the enquiry. The investigation will be a public one.

The C.P.R. has filed with the Board of Railway Commissioners the following standard passenger tariffs: Between Guelph and Goderich, Ont., 3c. per mile; between LaCombe and Stettler, Alta., and between Wetaskiwin and Hardisty, Alta., 3½c. per mile; between Spence's Bridge and Nicola, B.C., 4c. per mile.

Railway Rolling Stock Notes.

The Canadian Northern Ry. has ordered 20 30-ton refrigerator cars from Rhodes, Curry & Co., for June delivery.

The Canadian Northern Ry. is building a business car at its Winnipeg shops for Superintendent Cameron.

The Canada Car Co. has received orders for 100 Hart convertible bullst cars to be built for the patentees, the Dominion Dump Car Co.

The Canadian Locomotive Co., Kingston, Ont., has delivered one switching and five consolidation locomotives to the Intercolonial Ry.

Rhodes, Curry & Co., Amherst, N.S., has delivered four first-class passenger cars, two mail and express cars, and one caboose to the Canadian Northern Ry.

The Canadian Northern Ry. has received a snow plow from Rhodes, Curry & Co., and the Canadian Northern Ontario Ry. has also received one from the same builders.

The Dominion Dump Car Co., Montreal, has sold to MacDonell & O'Brien, who have a contract on the Eastern Division of the Transcontinental Ry., 10 additional Hart-

mond railways have the following rolling stock under order for delivery during the current year: 10 ten-wheel and 15 consolidation locomotives, Locomotive and Machine Co. of Montreal; 15 ten-wheel and 15 consolidation locomotives, Canadian Locomotive Co.; 15 ten-wheel and 25 consolidation locomotives, Canadian Locomotive Co.; 16 passenger cars, 6 mail and express cars, Rhodes, Curry & Co.; 16 passenger cars, 4 baggage cars, 4 mail and express cars, Crossen Car Manufacturing Co.; 1 passenger car, 2 parlor cars, 3 sleeping cars, 2 dining cars, being built in the U.S.; 1,500 box cars, Rhodes, Curry & Co.; 100 flat cars, 200 stock cars, 15 cabooses, Crossen Car Mfg. Co.; 200 Hart convertible cars, Dominion Dump Car Co.

The C.P.R. has received from the Locomotive and Machine Co. of Montreal a Walsheart gear cross-compound piston valve locomotive, of which an illustration is given on this page. The leading dimensions are:

Cylinders, type piston valve, Richardson compound, diameter, 22½ and 35 in. stroke 32 in. TRACTIVE POWER, 34,500.
WHEEL BASE, driving and rigid, 17 ft. total, 25 ft. 9 in. engine and tender, 57 ft. 3½ in.
WEIGHT, in working order, 206,350 lbs., all drivers 180,110 lbs. engine and tender 350,850 lbs.

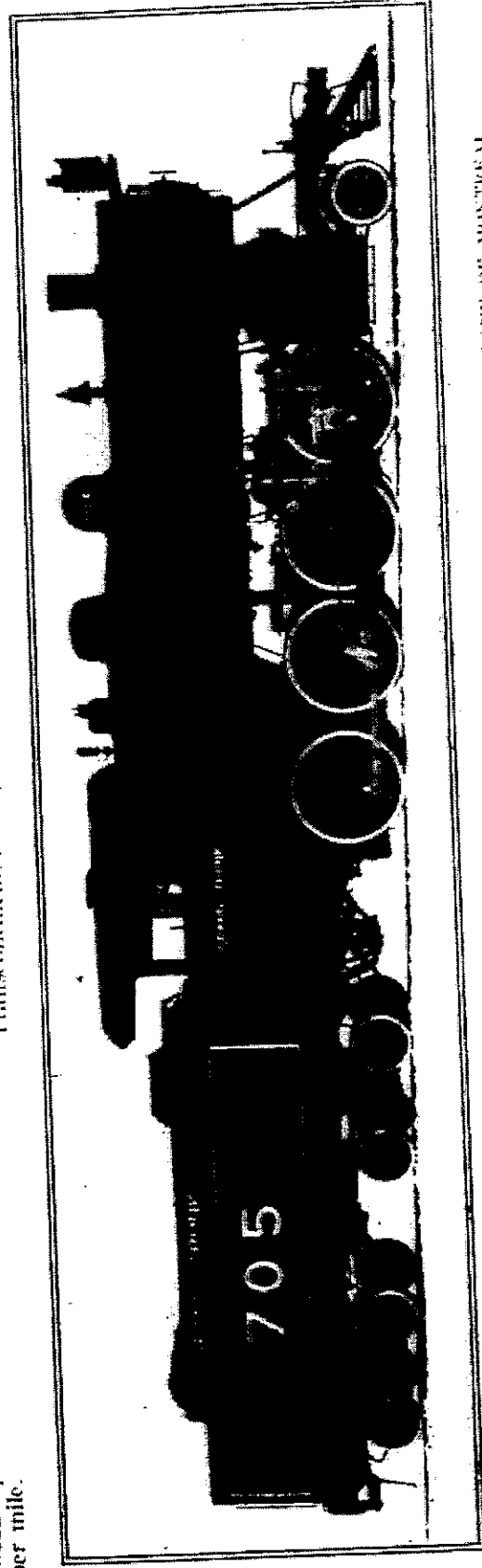


Illustration of Hart convertible locomotive, built by the Locomotive and Machine Company of Montreal.

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mail and express cars, and one engine for the Canadian Northern Ry.

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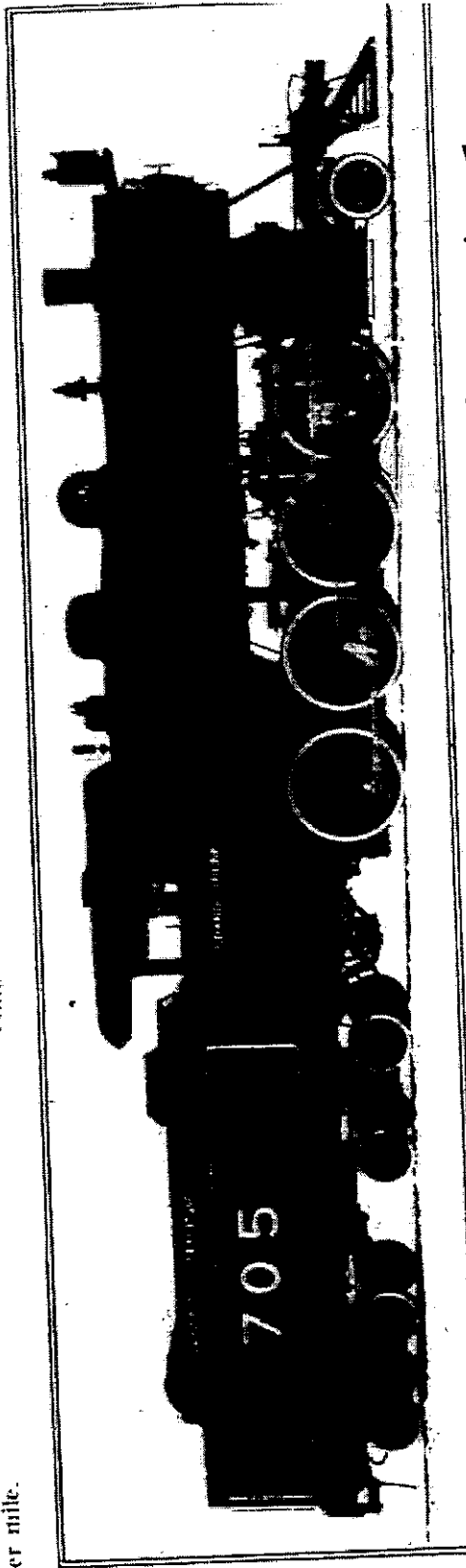
The Dominion Dredge Car Co., Montreal, has sold to MacDonnell & O'Brien, who have a contract on the Eastern Division of the Transcontinental Ry., 10 additional Hart-

motive and Machine Co. of Montreal a Walschaert gear cross-compound piston valve locomotive, of which an illustration is given on this page. The leading dimensions are:

Cylinders. Type, piston valve. Richmond compound, diameter 21", and 35 in. Stroke, 37 in. Tractive power, 34,360.

Wheel base, driving and rigid, 17 ft. total 25 ft. 9 in.; engine and tender, 57 ft. 3½ in.

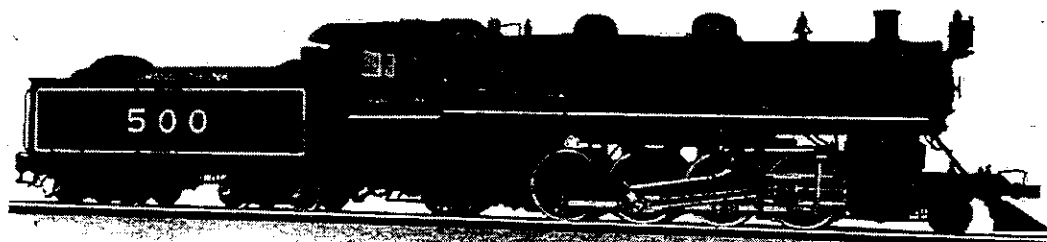
Weight. In working order, 266,350 lbs.; drivers, 180,110 lbs.; engine and tender, 356,850 lb.



February 1907

INCREASED TRAIN LOADS

MIKADOS VS. CONSOLIDATIONS



Total Weight of Engine 263,000 pounds. Weight on Drivers 213,000 pounds. Diameter of Drivers 5 inches. Boiler Pressure 170 pounds. Cylinders 17 x 30 inches. Maximum Tractive Power 32,000 pounds.

The substitution of Mikado locomotives for Consolidations on the Grand Trunk Railway System has enabled that road to greatly increase train loads and to properly provide for the growth of freight traffic.

This is shown by the following ratings that have recently been put into effect on the Western division:

	Miles	Helper Service	Consolidation	Mikado	Increase
Port Huron to Nichols	156 $\frac{1}{2}$	None	2000	2800	40%
Nichols to Elsdon	168 $\frac{1}{2}$	None	1700	2500	47%
Elsdon to Nichols	168 $\frac{1}{2}$	For 5 miles	2000	2800	40%
Nichols to Port Huron	156 $\frac{1}{2}$	None	2000	2800	40%

The Western division is made up of broken grades not exceeding 0.6 per cent., except a 5 mile 0.95 per cent. grade from Sedley to Valparaiso, where a helper is required.

Fifty additional Mikado locomotives are now being delivered by this company to the Grand Trunk Railway System.



Total Weight of Engine 212,000 pounds. Weight on Drivers 186,000 pounds. Diameter of Drivers 5 inches. Boiler Pressure 210 pounds. Cylinders 25 $\frac{1}{2}$ and 35 x 30 inches. Maximum Tractive Power 34,400 pounds.

MONTREAL LOCOMOTIVE WORKS, LIMITED,
DOMINION EXPRESS BUILDING, MONTREAL, CANADA

Grand Trunk Railway Mikado Locomotives.

The Grand Trunk Ry. has recently received 25 locomotives of the 2-8-2 class from the American Locomotive Co., and an order was placed with the same builders for 50 more of the same design.

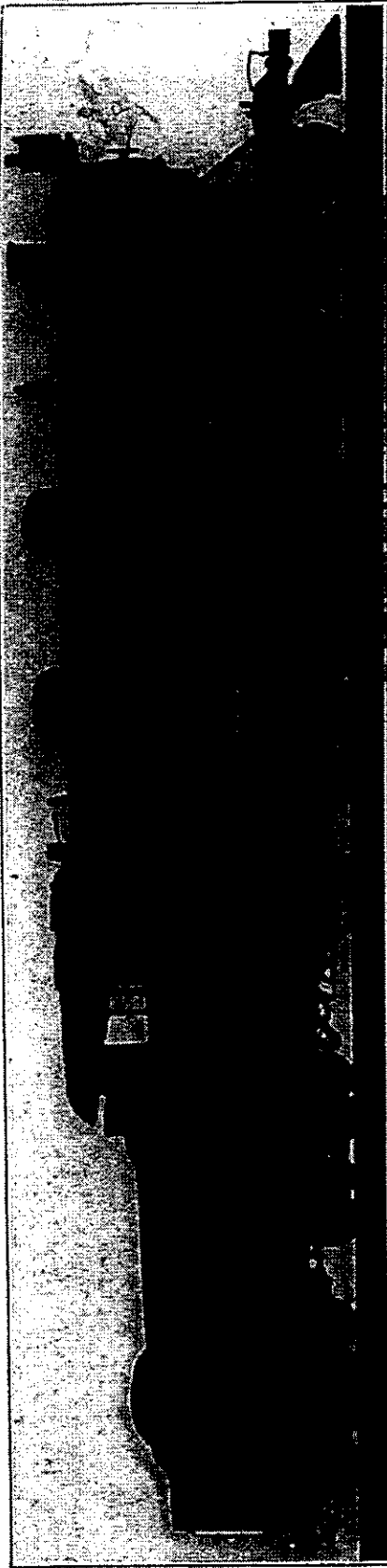
Freight traffic on the G.T.R. has until recently been hauled mainly by Richmond compound consolidation type locomotives, which have a total weight, including the tender, of 349,800 pounds, and a tractive power of 34,000 lbs. The mikados have a total weight, including

Nichols to Elsdon..... 168½ None 1700 2500 47%
 Elsdon to Nichols..... 168½ For 5 miles 2800 40%
 Nichols to Port Huron..... 156½ None 2000 2800 40%
 These runs are being made over this division with an average speed for the consolidations of 20 miles an hour, and for the mikados of 22 miles an hour. The consolidations are averaging 38,500 ton miles, and the mikados 60,000, an increase of 56%.

been included in this design are, outside steam pipes, screw reverse gear, self centering valve stem guides, the new guide for the extended piston rod, long main driving box and the improved outside bearing radial trailing truck.

Following is a comparison of dimensions and ratios with that of the consolidations:—

Type.....	2-8-2	2-8-0
Weight on driving wheels.....	213,500	183,700
Weight on leading truck.....	26,000	25,700
Weight on trailing truck.....	43,500	209,400
Weight, total of engine/lbs.....	283,000	



Grand Trunk Railway 2-8-2 Mikado Locomotive.

the tender, of 455,100 lbs., and a tractive power of 51,700 lbs. With an increase in weight of only 30%, an increase in tractive power of 52% is obtained. This is very important, as more power per pound of locomotive weight means more revenue from the same motive power investment.

The consolidations are saturated engines, and have a total heating surface of 2,962 sq. ft. The mikados have an equivalent heating surface (evaporating heating surface plus 1½ times the super-

Weight of tender, lbs.....	172,100	140,400
Wheel base, driving, ft. and ins.....	16-6	17-0
Wheel base, total of engine, ft. and ins.....	35-1	25-9
Wheel base, total of engine and tender, ft. and ins.....	67-4	57-3
Cylinders, diameter and stroke, ins.....	27x40	22½ x 35x32
Valves, type.....	Piston	Piston
Valve gear.....	Walsley	Stephenson
Wheels, diameter of driving, ins.....	63	63
Wheels, diameter of truck, ins.....	31	31

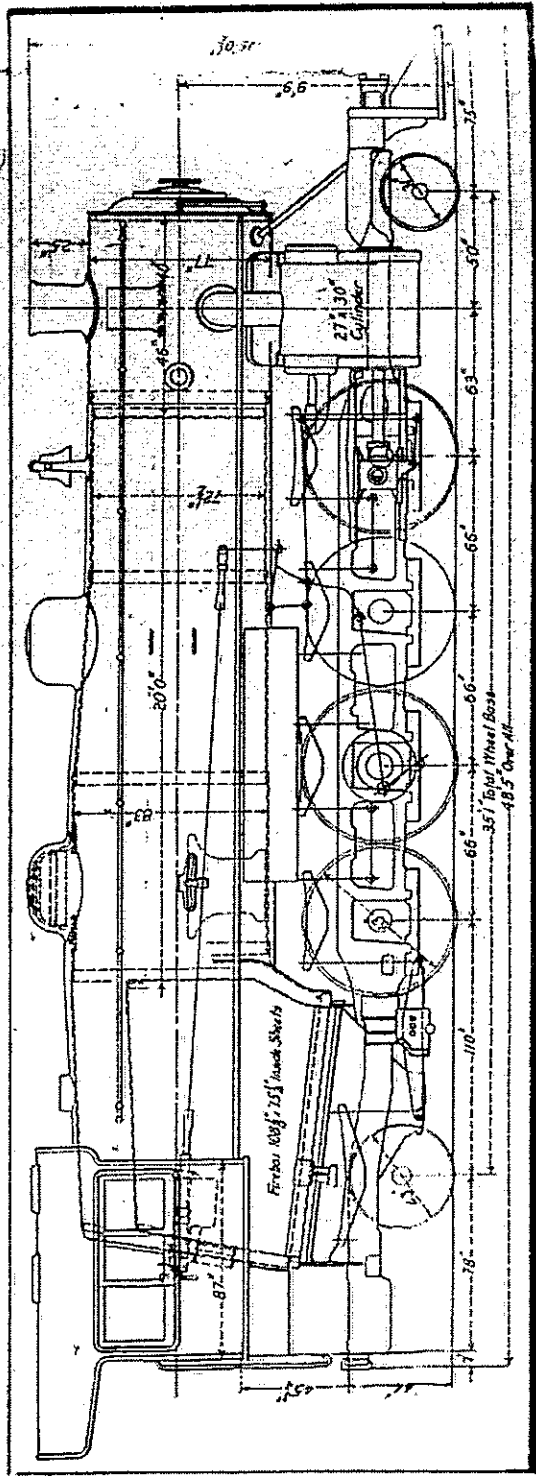
Grand Trunk Railway a-8-a Mikado Locomotive.

the tender, of 455,100 lbs., and a tractive power of 51,700 lbs. With an increase in weight of only 30%, an increase in tractive power of 62% is obtained. This is very important, as more power per pound of locomotive weight means more revenue from the same motive power investment.

The consolidations are saturated engines, and have a total heating surface of 2,952 sq. ft. The mikados have an equivalent heating surface (evaporating heating surface plus $1\frac{1}{2}$ times the super-

The design in general follows the standard of the builders. The boiler is of the extended wagon top type. It is 74 ins. in diameter outside at the front end, and 83 ins. in diameter outside at the largest course. The barrel is fitted with 240 two in. tubes, 20 ft. long, and a 32 unit, Schmidt type, top header superheater. The firebox is $108\frac{1}{2}$ by $75\frac{1}{2}$ ins., and includes a firebrick arch, a pneumatic fire door, and a power operated grate shaker. This well proportioned boiler, equipped with fuel saving

Weight of tender, lbs.	172,100	140,400
Wheel base, driving, ft.	16-6	17-0
Wheel base, total of engine, ft. and ins.	35-1	25-9
Wheel base, total of engine and tender, ft. and ins.	67-4	57-3
Cylinders, diameter and stroke, ins.	27x30	22 $\frac{1}{2}$ x 35x32
Piston	Walsh	Stephenson
Valve gear	Walschert	
Wheels, diameter of driving, ins.	63	63
Wheels, diameter of truck, ins.	31	31



Elevation of Grand Trunk Ry. a-8-a Mikado Locomotive.

heating surface), of 4,776 sq. ft., an increase of 62% over the consolidations, with an increased grate area of only 11 $\frac{1}{2}$ %.

The mikados are doing their best work on the Western Division, which is made up of broken grades, which do not exceed 0.6%, except in one case, where a 6 mile 0.95% grade requires a helper service.

On the Western Division the following ratings have been put into effect:—

Miles helper	Con-	Mil-	In-
Ser-	solid	ton	ton
vice	duration	tons	tons
		156%	None 2000
		3800	40%

devices, should give great economy in operation.

An interesting feature is the arrangement of the throttle lever support. It combines the lever fulcrum and quadrant support in an integral casting. This means a saving in the number of parts and also a reduction in the number of holes in the back head. It is also universal, as the support fits around the stuffing box as a sleeve, and can be turned to any desired angle to bring the lever in a convenient position. It is also of great advantage as a means of passing obstacles on the back head.

Other interesting features which have

Wheels, diameter of trailing, ins.	43	43
Wheels, diameter of tender, ins.	34	34
Journals, driving main, ins.	11x20	11x20
Journals, driving others, ins.	10x12	10x12
Journals, truck, ins.	6 $\frac{1}{2}$ x12	6 $\frac{1}{2}$ x12
Journals, trailing, ins.	8x14	8x14
Journals, tender, ins.	6x11	6x11
Boiler, type, on top	175	175
Boiler pressure, lbs.	175	175
Boiler, outside diameter, front end,	74	74
Boiler, outside diameter, back end,	83	83
Firebox length, ins.	108-1-8	108-1-8
Firebox width, ins.	75 $\frac{1}{2}$	75 $\frac{1}{2}$
Tubes, number and diameter, ins.	240-2	353-2

August, 1913.]

CANADIAN RAILWAY AND MARINE WORLD

Floes, number and diameter, ins.	32-5-3-8		ft.	757		those
Tubes, length, ft. and ins.	20-0	15-0	Grate area, sq. ft.	56.5	50.6	of w
Heating surface, tubes, sq. ft.	3398	2757	Water, capacity of tender, galls.	9000	7000	the
Heating surface, firebox, sq. ft.	215	168	Coal, capacity of tender, tons.	15	10	indic
Heating surface, arch tubes, sq. ft.	27	27	Length over all, engine and tender, ft. and ins.	78-2-7-8	67-4¼	teria
Heating surface, total, sq. ft.	3640	2952	Extreme width, ft. and ins.	10-4	10-0	Ta
Superheating surface, sq. ft.			Extreme height, ft. and ins.	15-0½	15-0	chas
			Tractive power, maximum lbs.	51,700	33,970	1911
						St
						pure
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THE CANADIAN RAILWAY AND MARINE WORLD : 1913