EFFICIENCY OF COAL CONSUMPTION IN RAILWAY PRACTICE.*

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Concluded from last Issue.

Patent fuel, a combination of coal dust and tar manufactured under pressure into "briquettes," while giving good evaporative results, has not, owing to the cost of production, been equal to successful competition with coal.

Petroleum by-products have been tried, and are successfully used in Russia. In Canada the uncertainty as to cost, owing to limited area and extent of production, and the unavoidable risk that would attend operations on a scale of sufficient magnitude, constitute objections which are not likely to be overcome, so long as coal can be obtained at or about present prices.

On the Great Eastern Railway of England satisfactory results are reported from the residual product of the illuminating gas used in passenger coaches. On that railway the oil and coal are used together, and the ultimate cost of operating is about the same as for coal alone; but a use is thus found for a refuse commodity which otherwise would be difficult to dispose of. To accomplish a given amount of work, petroleum occupies about one-half the space of coal, and this fact is no doubt a point towards a favorable consideration of its merit. I will now call your attention to some of the influences which affect the consumption of fuel in locomotives. Apart from the loss sustained through interruptions and obstructions by snow, there is a well defined condition of inverse ratio due to heat radiation from the boiler and cylinders on the one hand, and to the temperature of the feed water on the other, existing as between atmospheric temperature and fuel consumption.

Some interesting information as to the relative summer and winter operations extending over a number of years will be found in the following figures:

Year.	January: Coal used per car per mile, lbs.	January: Temperature of atmosphere, Montreal.	January: Snowfall, Montreal, inches.	January: Snow plough miles run per mile of railway.	February: Coal used per car per mile, lbs.	February: Temperature of atmosphere, Montreal.	February: Snowfall, Montreal, inches.	February: Snow plough miles run per mile of railway.	July: Coal used per car per mile, lbs.	July: Temperature of atmosphere, Montreal.	August: Coal used per car per mile, lbs.	August: Temperature of atmosphere, Montreal.
1882..	4.02	13	28	.69	3.74	19	23	.99	2.83	68	2.86	68
1883..	4.46	6	20	4.71	5.80	12	17	10.78	3.00	67	3.08	66
1884..	5.23	6	44	6.68	4.56	18	29	1.97	2.95	68	2.95	70
1885..	4.15	13	22	1.03	4.95	4	44	5.87	2.96	71	2.91	64
1886..	4.02	11	17	.82	4.06	11	10	2.38	2.92	70	2.96	68
1887..	4.63	5	59	10.17	4.50	12	34	6.98	2.99	75	3.12	66
1888..	4.76	2	34	5.63	4.41	13	30	2.15	3.15	70	3.32	65
1889..	4.14	9	41	.60	4.87	9	32	7.48	3.21	69	3.26	65

*Extracts from the President's address at the annual meeting of the Canadian Society of Civil Engineers.

These figures are based upon the total car mileage of the Grand Trunk Railway. It is quite true that a possible variation in the rate of train speed, or in the weight of the cars or their contents, would interfere with a too close comparison as between one year and another. They are, nevertheless, quite reliable as illustrating my remarks. The figures show that over a series of eight consecutive years, the average weight of coal required to carry the freight traffic of the Grand Trunk Railway was 50 per cent. more per car per mile during the months of January and February, than during July and August. They also show that while January has been the colder month during the time referred to, the rate of coal consumption has been relatively higher in February, owing no doubt to greater interference by snow during that month. If exception should be taken to the use of Montreal thermometric records, I will say that the traffic of the Grand Trunk Railway is chiefly derived from the West, and that the prevailing winds from that quarter seem to regulate the atmospheric temperature in something like an equal ratio throughout the section of country to which the statistics apply. This will be seen from the records in degrees Far., also given, for the months of January and February, 1888 and 1889, at the five terminal points:

Year.	Detroit. Jan.	Detroit. Feb.	Buffalo. Jan.	Buffalo. Feb.	Toronto. Jan.	Toronto. Feb.	Montreal. Jan.	Montreal. Feb.	Portland. Jan.	Portland. Feb.
1888	15	21	17	21	15	22	2	13	11	19
1889	27	16	29	18	28	18	19	9	27	17

The following figures give the coal consumption per car mile for each month during 1895:—

1895.	Temperature of air, Far.	Cars per train. Pass'r.	Cars per train. Freight.	Speed of trains in miles per hour. Pass'r.	Speed of trains in miles per hour. Freight.	Coal consumed in lbs. per car per mile. Pass'r.	Coal consumed in lbs. per car per mile. Freight.
Jan. ..	14.9	4.7	17.5	21.1	11.9	13.19	4.95
Feb. ..	14.2	4.5	17.4	19.3	10.5	13.85	5.08
March.	22.1	4.6	18.6	21 5	12.2	12.25	4.41
April ..	41.2	4.8	19.1	22.0	12.8	11.18	3.84
May ..	58.3	4 8	19.3	22.2	12.9	10.51	3.53
June ..	69.5	4.9	18.7	21.9	12.9	10.31	3.40
July ..	67.2	5.2	18.2	21 7	12.8	10.20	3.47
August.	65.8	5 3	18.0	21.6	12.7	10.14	3.53
Sept. ..	60.3	5.4	18.8	21.8	12.8	10.16	3.57
October	41.2	4.9	19.0	22.7	12.5	11.07	3.91
Nov. ..	34.3	4.8	19.5	22.9	12.2	11.62	4.13
Dec. ..	22.5	4.9	19.0	22.5	11.8	12.22	4.37

I have included the results of the passenger as well as of the freight train service, though the latter furnish a better guide, owing to the fact that freight trains are, as a rule, worked more closely to the capacity of the engines. The average rate of speed is also recorded, and the number of cars of which the trains were made up, so that these influences upon the rate of fuel consumption may be duly appreciated. Unfortunately the weight of the trains is not obtainable, though it is likely the variation as between one month and another for a year would not be important. The advantages accruing to railway companies, whose lines are removed from the rigor of our northern latitudes, is made by these figures sufficiently apparent. The influence of gradients and curvature may here be illustrated by reference to trials made some years ago on the main line of the Grand Trunk Railway between Sarnia, a town situated on the River St. Clair, and Portland, Maine, the distance being 798 miles. This mileage was divided into nine locomotive divisions, of which the shortest was 58 and the longest 125 miles in length.