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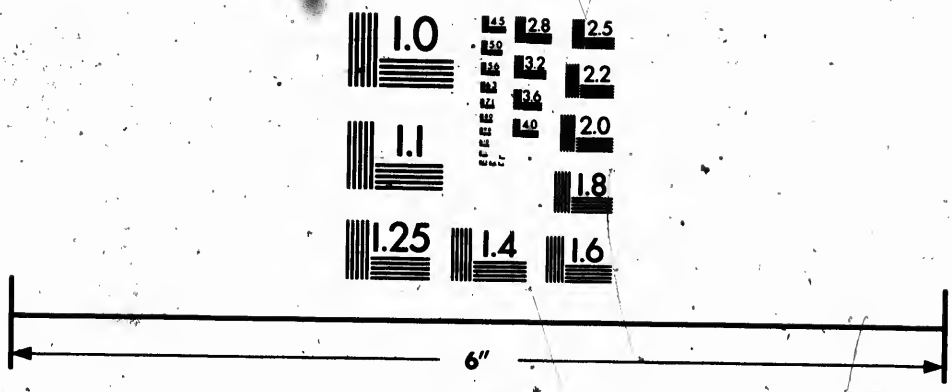

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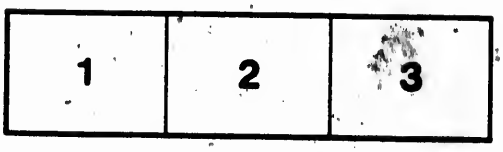

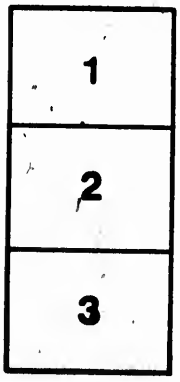

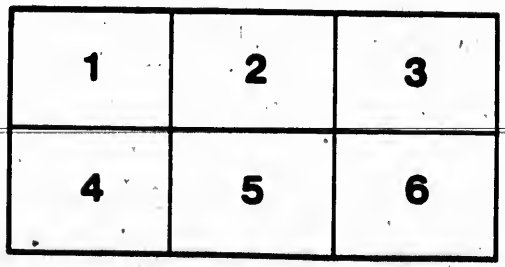

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J. D. Barnett. Esq.
with Mr. Hickson's Compliments

THE GRAND TRUNK RAILWAY COMPANY OF CANADA.

In connection with Report for the Half-year to 31st December, 1878.

MEMORANDUM

BY

SIR HENRY W. TYLER, *President,*

ON THE

COST AND CONSUMPTION OF FUEL AND REPAIRS OF ROLLING-STOCK ON THE GRAND TRUNK, AND GREAT WESTERN OF CANADA, AND OTHER RAILWAYS.

LONDON:
WATERLOW AND SONS LIMITED, PRINTERS, LONDON WALL.

1879

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MEMORANDUM

ON THE

COST AND CONSUMPTION OF FUEL AND REPAIRS OF ROLLING-STOCK ON THE GRAND TRUNK, AND GREAT WESTERN OF CANADA, AND OTHER RAILWAYS.

INTRODUCTION.

THE questions of the cost and consumption of fuel and of maintenance of rolling-stock on the Grand Trunk Railway, and also the comparative cost of these items on the Grand Trunk and other railways, have formed constant subjects of inquiry for many years past. In 1867, I made a general report on the Grand Trunk system, after a detailed inspection of it in company with Mr. Eborall; and these subjects received their share of attention. In 1868, Mr. Trevithick, an eminent locomotive engineer, was sent to Canada, and specially reported on the relative cost of fuel on the Grand Trunk and Great Western Railways. More or less in every subsequent presidential visit to Canada, and by frequent correspondence, these questions have been discussed, it may almost be said, *usque ad nauseam;* and I returned from my last visit to Canada in 1877, with a series of comprehensive reports and statements, and the results of experiments on these (as well as other) subjects. Ample information for a series of years has thus been obtained; and as some stress was laid, at the last half-yearly meeting, on erroneous comparisons founded on the published accounts of the Grand Trunk and Great Western Railways, and further attention has since been directed to such comparisons, I have drawn up, for the information of the Board, and, if they deem it right, of the Shareholders also, the following detailed memorandum on the subject. It has been represented that these two lines, both in Canada, form the best means of comparison that can be obtained. The discussion has thus been forced upon us, but in demonstrating how far such is or is not the case, and in considering whether any further lessons can be learnt from such a comparison, I particularly

wish to avoid any injurious reflections on the Great Western management, and it is not my object to make a defence of the Grand Trunk management. Seeking only the whole truth of the matter, and with nothing to conceal, the Directors are more closely interested than any of their critics in discovering blots, if such exist; in correcting any defects which they may be able to discover; and in making any improvement that it may be found possible to effect. I am under some disadvantages, however, in making comparisons, because, although I have at my command full information in regard to all details on the Grand Trunk system, I am unable to obtain the same amount of information in regard to other systems. There is a general feeling amongst many directors and managers of railways, that it is not wise to afford too much information—that it may lead to trouble and criticism; but this is a feeling which I do not by any means share, and with which I know my co-directors do not sympathize. We are determined that the Grand Trunk Railway shall be worked as efficiently and as economically as it can be worked. We have nothing to conceal, and no desire to defend anything which is not strictly wise and just and right; and we are ready at all times to discuss fully, fairly and openly with all of our Proprietors who may desire it, all questions into which we can properly enter without affording undue information to our rivals, or those whose interests are hostile to the Company.

UNITS AND ELEMENTS OF CALCULATION AND COMPARISON.

But in instituting such comparisons, it is necessary to lay down at the outset what are and what are not fair elements of calculation, and fair units of comparison, and, in doing so, some of the fallacies of our critics will at once be apparent. When they compare our cost of repairs *per engine*, or our cost or consumption of fuel *per engine-mile*, with those of the Great Western or any other Company, they are comparing things which may or may not be similar, but which, as I shall abundantly show, are in this case essentially different. It is, indeed, obvious, when simply stated, that the same engines, working under the same conditions, must require more or less fuel and more or less repair according to the work they perform; and when they work under varied conditions of traffic, load, climate, and gradients, as well as of price, quality and distance of fuel—those differences must be proportionately increased. It is not economical to possess a surplus of engines, or of rolling-stock of any description; and a company spending annually, say £250 per engine on repairs may be working on the whole more economically than another company which is spending only £150 per engine on repairs; the engines in the former case doing proportionately more useful work than the engines in the latter case.

The principle of results in work performed is, taking duly into consideration all the conditions under which it is performed, that on which all calculations and comparisons should in fairness be based. This principle cannot, unfortunately, be precisely applied without more detailed information than Railway Companies generally supply. The true elements for calculation are the receipts and cost per passenger per mile, and per ton per mile. These are available for the Grand Trunk Railway, and I have been in the habit of referring to them at half-yearly meetings, but they are not furnished by the Great Western Company. Such information is not furnished by any of the railways of the United Kingdom; and in collating for annual publication the statistics of those Railways, as I did at the Board of Trade for a series of years, I was obliged to content myself with the ordinary English mode of computation and comparison per train mile. No one has had, therefore, more experience of the fallacy of such comparisons. Extraordinary differences, as regards maintenance of road and rolling-stock, are annually shown on the different English lines, which, with every allowance for differences of conditions, defy all attempts at explanation, and are no doubt in a great measure attributable to the defective nature of the test applied. The differences are still greater in America. The train load on some American lines is double, or treble, of that on other lines. In the absence of the passenger-mile and ton-mile tests, the next best to which I can resort for the present purpose, though it has its defects, is the test per car-mile; that is to say, the relative cost and consumption of fuel and the relative cost of repairs per engine and per car for every car hauled one mile; and this is the test which I shall mainly adopt in this memorandum. It is by no means precise, and should not be too much relied on, especially if passenger car-miles be not separated from freight car-miles; but it is, from the want of more detailed information as to the operations of other lines, the only one which can be practically applied so as to show work performed.

FUEL.

Dealing first with the question of fuel:—Prior to 1873, coal was but little used on the Grand Trunk Railway, chiefly for the reason that the broad-gauge rolling-stock was not adapted to burn it economically, the locomotive engines having for the most part small fire-boxes built especially for wood burning, and not capable, except at a large and unprofitable expenditure, of being altered.

But wood as a fuel has many disadvantages, and is not well adapted for working a first-class road where efficiency of service as well as economy must be considered. It is of a bulky nature; much time is occupied in the running of trains, from frequent stoppages to take supplies; and the quality varies to such an extent

that no reliable comparisons can be arrived at in ordinary working. It is more liable than coal to pilferage and waste, and is an element of danger in the matter of fire. Necessarily placed, as it is, close to the line, it may easily be set on fire by passing engines; and in using it there is more danger, than with coal, from sparks which escape through the smoke stacks and not unfrequently set fire also to fences, buildings, &c., contiguous to the railway. There is no doubt that in its use as a fuel it causes less wear and tear to the locomotives than either coal or peat, but the balance of evidence has been generally against it in point of practical results. When the change of gauge of the line involved the purchase of new engines, the subject of fuel was necessarily re-considered; and in view of the growing scarcity and expense of wood, owing to the clearing of the country, as well as the advisability of checking the monopoly created by the use of wood, and looking at the ultimate necessity of sooner or later burning coal, it was considered with good reason that a large proportion of the new engines purchased at the latter end of 1873 should be expressly adapted for this purpose.

The first part of the road on which coal was exclusively used was the Central Division, between Montreal and Toronto; and it was at the same time employed in some of the broad gauge stock on the Atlantic section. The reduction in the price of coal, and the opening of the International Bridge, made it further possible economically to obtain a supply of it by rail, and the use of coal was therefore extended west of Toronto.

Wood is still used, however, on the following districts—

Rivière du Loup to Richmond. Gorham to Richmond. Montreal to Rouses Point and Province Line. Stratford to Sarnia. Port Huron to Detroit Junction. Stratford to Goderich.

Whilst Coal is used on the districts—Portland to Gorham. Montreal to Stratford. Buffalo to Stratford. Two trains per day each way from Stratford to Sarnia. Two trains per day each way from Port Huron to Detroit Junction.

As far back as the year 1876, the total amount of coal used was 181,483¼ tons, against 151,659½ cords of wood, at an average cost per ton (2,000 lbs.) of $4.79, and per cord of $4.02, which include first cost, freight and handling, and represent, in fact, the cost delivered upon the tender of the engine ready for use. The total net cost for that year was $1,304,314, being 40 per cent. of the expenses of the Locomotive and Car Departments, and 19½ per cent. of the total working cost of all departments. The respective quantities in later half-years, is given in the published reports of the Company. During the year ending June, 1878, the total consumption of coal was 174,480 tons, and of wood 149,203 cords, at a total expense of £236,800, which was 46 per cent. of the Locomotive Department, 35 per cent. of the whole Mechanical Department, and 17 per cent. of the gross working expenses.

CORDWOOD.

The following is the method adopted in letting contracts for Cordwood :—The quantity of wood likely to be required having been determined by the General Manager and the departmental officers about the first week in September of each year, printed advertisements are posted up at all the stations on the districts of the line where cordwood is used, inviting tenders, and forms of tender are supplied to parties applying for them.

These tenders are in all cases enclosed in sealed envelopes, addressed to the General Manager, and are kept under lock and key until the date appointed, when they are opened by the Treasurer and the Fuel Agent, who prepare a summary of the various offers, which, together with the tenders, is handed to the General Manager for examination, and a list of the tenders proposed to be accepted is then prepared and submitted at the next meeting of the Executive Council for approval.

The lowest offer is invariably accepted, provided the person tendering is a responsible man. In doubtful cases security is taken for the due fulfilment of the contract. When the tenders have been accepted for the whole of the wood required, contracts, drafted by the Company's solicitor, are prepared for execution by the parties.

The Company are amply protected against damages resulting from a breach of agreement by the contractor, inasmuch as an amount equivalent to 10 per cent. of the total amount of the contract is withheld until its completion, and payment for the wood is not made until two months after delivery. This plan results in a sum of money equal to about 25 per cent. of the total contract being always in the Company's possession and liable to forfeiture for non-completion of contract.

As a matter of fact the instances are few in which the obligations of contractors for cordwood have not been faithfully carried out.

The deliveries of the wood contracted for commence in the early part of the winter, and are generally completed by the end of April in each year. The greater part of the wood has to be chopped in the bush, and hauled to the railway over distances which vary according to locality, and it can only be got out when the frost has made the swamps passable, and good continuous snow roads have been formed.

The wood is stacked in piles at the place of delivery, and examined periodically by the wood inspectors of the different districts.

These Inspectors make estimates of the quantities delivered, which estimates are returned to the Fuel Agent's office each month, and form the basis for the payments to the Contractors. These estimates are credited to each Contractor as they are rendered, but it is not possible until the surrounding snow has disappeared to make an exact measurement of the wood. As early in the spring

as practicable after the completion of the contracts, the final measurement is made by the inspectors, and the result is reported to the Fuel Agent, by whom the Contractors' accounts are adjusted.

The methods adopted to secure the delivery of the full quantity of wood paid for, and to check any improper use of it, are :—

Officers from other departments are selected by the general manager, who go over all the districts of the line where cordwood is used as fuel, and measure up and make a return of the quantity on hand,—and this without any knowledge of the quantities which may be standing upon the Company's books; and their reports, when sent in, are checked against the quantities standing upon the fuel stock-ledger, to be accounted for at each station.

Each station is, of course, debited with all wood delivered by Contractors, and credited with all wood used in engines, stations, or elsewhere, from time to time; and the accounts having been accurately kept and the business honestly conducted, the quantity remaining on the books should agree with the quantities found to be on hand at each stock-taking.

The work of taking stock is done in the month of June in each year, which is found to be the most convenient period for the purpose.

The stock was taken in June last, and the result showed a small quantity of cordwood on hand in excess of the quantity standing at debit on the Company's books.

Regular returns are rendered to the head-quarters of the fuel department of all wood received and issued. For all wood issued a voucher is required to be given.

Enginemen are supplied with tickets, which they deliver to the person in charge of the cordwood, on every occasion and at every point when and where they take a supply.

These tickets are sent in to the head office of the fuel department in Montreal with the accounts. The engine drivers, in addition, make a return to the accounting office of the Locomotive department of the tickets delivered by them at the various stations. The Locomotive department thus exercises a complete check over the debits of the fuel department for cordwood supplied at stations, and the natural desire of the head of the locomotive department (who is entirely independent of the head of the fuel department) to keep down the expenditure in his department, and to show as satisfactory results as possible, leads to a very careful examination of the consumption of fuel.

To check any disposition to waste or use an unnecessary quantity of fuel, a monthly statement is prepared in the mechanical department, showing the quantity used by each engine. The statement is exhibited at all locomotive stations and is eagerly examined by the engine-drivers themselves, and in this way there is created a healthy spirit of rivalry in performing their work with as small a consumption of fuel as possible.

The circumstances in which the Grand Trunk Company have

always to pay a high rate for their supply of wood-fuel have been repeatedly explained. The line is constructed for considerable distances by the side of the St. Lawrence river and the Canadian lakes, and consequently runs through the best settled portions of the country, where the woods have been cleared, and cordwood has, therefore, to be hauled for long distances, being generally obtained from points remote from stations, necessitating either longitudinal haulage or the receipt of it at places between stations, where the subsequent cost of handling is largely increased. Where the railway is built alongside the St. Lawrence or the Lakes, the water is entirely prohibitory of a supply of cordwood from that side.

The Great Western have the advantage of being able to obtain a supply of the harder descriptions of wood, and nearer to the points of consumption than the Grand Trunk. The new lines which that Company has opened in recent years into comparatively new territory—such as the London, Huron and Bruce, and the Wellington Grey and Bruce—have afforded them a supply of excellent wood which can be economically sawn and handled.

Our supply has continuously been receding further and further from the Railway, necessitating extra haulage, and in most cases extra labour.

We have always debited our supply of cordwood with (1) all expenses of maintaining wood sheds, (2) the use of engines and cars employed in moving it from the point of delivery to where it is consumed, (3) the expense of cutting it into proper lengths, and (4) piling and putting it on the tenders of the engines.

These charges added about $1·20 per cord to the first cost of our cordwood for the year ended June 30th, 1878.

The Great Western either do not incur these charges to the same extent (and on much of their supply there is no reason why they should incur the whole of them) or they debit them in some other way in their accounts. At all events, a comparison of the issue price of that Company's cordwood, as shown in their accounts, with the probable price which they pay for it in the districts in which they purchase, would lead to this conclusion.

COAL.

The following is the system adopted for obtaining supplies of coal :—

Tenders are advertised for in the principal newspapers in Canada, and in those parts of the United States which are contiguous to mines. They are addressed to the General Manager and opened on a fixed date by the Treasurer and the Fuel Agent, by whom they are summarised and handed to the General Manager, who, after conferring with the departmental officers, recommends to the Executive Council the acceptance of such of the offers as seem most favourable. Various circumstances have

to be taken into account in determining the offers which should be accepted. The actual and comparative relation of price to quality has to be ascertained, and the prices of the coal at various points of delivery have to be considered in reference to the cost of haulage over the railway to the depots where it is stored for use.

The coal purchased for storage at Montreal (apart from that which is imported from England, when it is economical to do so), can only be advantageously obtained from the Lower Provinces, and it has hitherto not been found practicable to transport it otherwise than by water during the summer months. At Brockville and Belleville coal is delivered by schooners which load at Cleveland and other ports on the American side of Lake Erie. At Toronto the supply is obtained partly by water in summer, and partly by rail viâ the International Bridge. The deliveries by the latter route continue all the year round, and this coal is used as far east as Belleville. By obtaining coal in this way it has been possible considerably to reduce the stocks kept on hand. At Detroit Junction the deliveries are also by rail. At Portland we have lately found it cheaper to purchase Nova Scotia coal, notwithstanding the duty of 75 cents gold per ton imposed by the United States. It is shipped from the mines by schooners in summer and stored.

Contracts are drawn up with the parties supplying coal, and although no percentage is retained we take two months' credit, so that the deliveries of coal are always considerably in advance of payments, and the moneys in the Company's possession due to the Contractors are a guarantee against non-fulfilment of contracts. Coal is weighed as it is received by the Company in all cases. In Montreal, where delivery is made by carts, it is passed over a machine and a regular check is kept upon the quantity delivered. That which is brought in by cars is also passed over a machine, and as the points of delivery are always at important stations there is no difficulty in keeping a proper check upon the quantity for which the Company pays.

The methods adopted to secure a check upon the issue are precisely the same as those taken in dealing with the cordwood.

The Grand Trunk Company are at a disadvantage when compared with the Great Western Company as regards their supply of coal, for the following reasons:—

The supplies of all the coal which the Great Western Company use are obtained at points where it is cheaper than anywhere on the line of the Grand Trunk Railway, with the exception of Buffalo and Detroit, the nearest points for the supply of American coal.

The Grand Trunk Company obtain for use at these points a comparatively small proportion—less than one-sixth—of their supply, and at every other point on the Grand Trunk system the cost of coal is more or less increased.

There is no coal in Canada proper. Coal obtained at Buffalo

and carried by rail competes with coal brought across Lake Ontario, and delivered at Toronto and Belleville. To the price we pay at Buffalo (the same practically as the Great Western) on all our consumption there has to be added the cost of transportation,

To Stratford (115 miles distant),
„ Toronto (203 miles distant),
„ Belleville (316 miles distant).

The Great Western, on the other hand, are able to obtain at London, their midway station, through Port Stanley, such coal as they require, at a rate as low as, or lower than it can be obtained at Buffalo or Suspension Bridge. For their supply at Hamilton, a comparatively small quantity, they pay probably a slightly higher price.

At Montreal, our coal has cost us from 70c. up to $1·00 per net ton more than at Buffalo, and there are heavy charges for cartage and handling to be added, owing to the inconvenient connections between the wharves and the railway. Our supply there has, of course, to be laid in during the short summer season. We have cheapened the cost of carting and handling our coal at this point by (30c.) thirty cents per ton since 1874, and it is anticipated the time is not very distant when we shall be able to discharge from vessels at a point where our engines can take their supplies as wanted, which will save us probably a further sum of 15c. per ton.

At Brockville, the next coaling station west from Montreal, our whole supply has to be laid in during the summer. The price there has of late years been very nearly the cost of carriage from Montreal (125 miles) in excess of the Montreal price.

At Portland, our next coaling point east of Montreal, the price has been as much as $1.00 per net ton more than at Buffalo, there being an import duty on English and Lower Province Coal of 75c. per ton.

It will thus be seen that we have to pay a higher price for coal than the Great Western Company, not merely as the result of our geographical position, but, further, because the greater portion of our supply being water-borne, it has to be laid down in the summer, causing double handling of a large quantity of it, and entailing a loss in weight from exposure to the atmosphere, with a loss in steaming power estimated at no less than 10 to 15 per cent.

Again, our practice is to add all charges for transportation, handling, storing, putting upon the tenders, and wages of men employed, as well as the cost of repairs of sheds, wharves, &c., for its reception and protection, to the first cost of the article.

There was added to the first price of our coal in the year ending June, 1878, for these various charges, the sum of 51c. per net ton, whilst the addition to the first cost of the Great Western Company's coal appears to have been somewhere about 30c. per ton. They have, of course, no necessity to incur the same

expense as we do. Situated much nearer to the source of supply, they have less necessity to stack coal, and can take a much larger percentage of what they use direct from the cars, without incurring any such extra charges.

COMPARATIVE CONSUMPTION OF FUEL.

It needs no lengthened argument to show, as already stated, that a comparison of the consumption *per engine mile* on two different roads is next to valueless. The engines on one road do a different amount of work as compared with the engines on the other. There is a preponderance of Passenger trains on one road, and a larger shunting, piloting, &c., mileage on the other, all seriously disturbing elements in a comparison of this kind. In like manner a comparison on the basis of *train mileage* is worthless. One train mile may represent a movement of 900, another of 200 tons. Of course the consumption of fuel must differ in the two cases.

If we could get exact facts in each case we might arrive at sound conclusions, but this would require that—

The difference in gradients should be accurately ascertained.

The calibre of the engines on each line should be taken into account.

The relative qualities of the wood and coal should be considered.

The difference in climatic influences should be allowed for.

The exact quantity of work done on each line should be stated.

The mode of making up the accounts should be the same.

All these conditions cannot for the purposes of this memorandum be obtained and made available, nor can the number of tons moved one mile by all trains on the Great Western Railway, which would be the best test, be obtained.

A comparison of the results per car mile, the next best test available to us, would not be altogether fair to the Great Western, for the simple reason that they run a larger proportion of passenger train miles than we do; and such trains, being composed of fewer carriages than the ordinary freight trains, show, of course, a larger consumption of *fuel per car* per mile.

Another mode of dealing with the subject, although not a perfectly accurate one, is to convert the entire mileage, including shunting, piloting, &c., into *equivalent* freight car miles on both lines, by estimating the comparative consumption of each class.

Our passenger trains have consumed in fuel about two and a half ($2\frac{1}{2}$) times the quantity per car of our freight trains per car.

The consumption of fuel per mile by our shunting, piloting, &c., engines is equal to about the quantity consumed in the movement of 11 freight cars a mile.

The passenger trains on the Great Western, as shown by details obtained in 1875, consumed per car only about twice as much fuel as was used by their freight trains per car, the result of their hauling a larger average of cars.

The shunting, &c., mileage on the Great Western appears to be, as regards fuel consumption, equal to the moving of about 11 cars per mile, the same as on our own line.

Reducing to a common basis of coal, on the same scale in respect of the consumption on both lines, and dealing with fuel actually used in working trains (not the figures in some of the reports, which include that used in trains conveying Company's material) the following is the result :—

Railway.	Year ending.	Equivalent Freight Car Miles.	Tons.	Cost of Fuel for Engines.	Cost per Ton.	Lbs. of Coal per Car Mile.	Cost per Car Mile.
				£	s. d.	lbs.	d.
G.T.R.	June, 1878	199,614,936	265,243	236,800	17 10½	2·657	0·285
G.W.R.	July, 1878	84,538,770	95,703½	70,028	14 7½	2·260	0·199

This would show an excess consumption on the Grand Trunk of 17½ per cent. in lbs. per car mile ; an excess in the cost per ton of 22 per cent. ; and a total excess cost per car mile of 43 per cent.

This mode of comparison has not been chosen, as may be seen from the results, with any desire to favour the Grand Trunk view of the case, but simply as the fairest test which the circumstances permit. As we have not the element of tonnage to guide us, it is hardly possible to obtain a perfectly sound basis of comparison.

The following figures, showing the cost of fuel per train mile, per traffic engine mile, and per car mile on the two systems for the years 1875, 1876, and 1877, further illustrate the misleading character of any mileage test, which does not take into account the loads hauled.

	Per train mile. d.	Per traffic engine mile. d.	Per car mile. d.
1875.			
Grand Trunk	8·59	6·52	·55
Great Western and Branches	5·72	4·46	·41
Great Western, less	2·87	2·06	·11
,, percentage ...	33%	32%	20%
1876.			
Grand Trunk	7·93	6·09	·47
Great Western and Branches	5·16	4·14	·36
Great Western, less	2·77	1·85	·11
,, percentage ...	35%	30%	23%
1877.			
Grand Trunk	7·15	5·55	·42
Great Western and Branches	4·26	3·50	·30
Great Western, less	2·89	2·05	·12
,, percentage ...	40%	37%	29%

It would thus appear that, whilst the cost of fuel per train mile was on the average about 36 per cent. more on the Grand Trunk during these years, the difference per car mile was only 24 per cent.; but though there is this relative difference in the cost, owing to the circumstances already mentioned, it is satisfactory to find, in comparing the working of the two Companies since 1874, when the present Grand Trunk management commenced, the cost of fuel per car mile has been reduced on the Grand Trunk in a greater degree than on the Great Western, mainly the result of increased loads moved by our engines.

The following comparison of the cost per car mile of the two systems, for the June and December half-years, and also for the whole years, 1874 to 1878 inclusive, shows that in June last the cost per car mile on the Grand Trunk had been decreased ·29d., as compared with June, 1874, whilst on the Great Western the decrease had been ·18d.; and for the December half-year the decrease had been ·19d. on the Grand Trunk against ·16d. on the Great Western. For the year 1877, as compared with the year 1873, the decrease was on the Grand Trunk ·24d., or nearly ¼d.; whilst on the Great Western it was ·16d., or say one-sixth of a penny.

	Grand Trunk.		Great Western.	
	Cost of fuel per car mile. d.	Decrease. d.	Cost of fuel per car mile. d.	Decrease. d.
Half-year June 1874 ...	·66	—	·43	—
1875 ...	·63	·03	·44	+ ·01
1876 ...	·50	·13	·35	·09
1877 ...	·48	·02	·32	·03
1878 ...	·37	·11	·25	·07
Decrease, June half-year ...		·29		·18
Half-year December 1874 ...	·57	—	·43	—
1875 ...	·48	·09	·37	·06
1876 ...	·44	·04	·36	·01
1877 ...	·38	·06	·27	·09
Decrease, December half-year		·19		·16
Year 1873 ...	·66	—	·46	—
1874 ...	·61	·05	·43	·03
1875 ...	·55	·06	·41	·02
1876 ...	·47	·08	·36	·05
1877 ...	·42	·05	·30	·06
Decrease, year		·24		·16

As regards the relative quantities of fuel for different half-years, it will be seen that there were consumed on the Grand Trunk Railway—

	Tons of coal.	Cords of wood.	Car miles.
in June, 1877 ...	86,042	75,893	producing 66,079,000
in June, 1878 ...	82,547	73,435	producing 70,853,000
Decrease of consumption ...	3,495	2,458	
Increase of work done			4,774,000

a result which very plainly shows increased economy in the use of fuel; and, looking at the continual efforts which are being made to improve the mode of handling fuel and in other respects, there is no doubt that the cost will, if there be no increase in first cost, be still further reduced.

Comparing the annual periods since 1874, when the change of gauge was finally accomplished, and we commenced to burn large quantities of coal; and converting all the mileage run into *equivalent* freight car mileage, on the basis before explained, and the fuel into *equivalent* tons of coal, the following is the result:—

Year Ending	Equivalent Freight Car miles.	Total consumption by Engines reduced to tons of Coal.	Total cost of fuel used by Engines.	Cost per Ton.	Lbs. of Coal per Car mile.	Cost per Car mile.
June.	Miles.	Tons.	£	s. d.	lbs.	d.
1874	160,256,393	217,081	288,702	26 7	2,709	0·430
1875	172,991,376	250,501¼	305,530	24 4¼	2,890	0·424
1876	186,958,937	259,500¼	288,916	22 1¼	2,776	0·368
1877	189,656,143	264,901¼	268,009	20 3	2,793	0·339
1878	199,614,936	265,243	236,800	17 10¼	2,657	0·285

Our net car loads increased in the same period from 5·18 to 6·06 tons, or 17 per cent.

As an instance of the large discrepancies between the cost of coal per train mile on many of the English lines, I quote a few of them:—

	d.
South Eastern ... ...per Train mile	3·70
Metropolitan District	3·80
Furness	3·61
Great Northern (of Ireland)	3·18
London, Chatham and Dover	3·23
Sheffield and Lincolnshire	1·68
Great Western	1·51
Midland	1·84
London and North Western...	1·88
Caledonian	1·55
North British	1·69
Glasgow and South Western	1·67

Of course the explanation in most instances will strike anyone acquainted with the conditions under which these different companies work; but as regards the sources of their supplies of fuel, the difference in distance between those of any two of the companies mentioned is not equal to the difference in distance between the source of the greater portion of our supply and that of the supply of the Great Western Company.

GRADIENTS.

In considering further the causes of our larger consumption and cost of fuel on the Grand Trunk Railway, the gradients, curves, climate, and other conditions of the two roads should be discussed in greater detail.

We are constantly enlarging our experience, as the subject of our fuel expenditure is a matter of continuous watchfulness and inquiry.

We made experiments last summer by running an engine loaded to its full capacity from one end of the Grand Trunk to the other, under conditions as nearly similar as it was possible to get them, with the following results:—

Fuel used in moving a ton one mile on the following sections of the Grand Trunk.

District.	Consumption per Mile. lbs. of coal.
Detroit to Port Huron	·0748
Sarnia to Stratford	·1169
Stratford to Toronto	·0733
Toronto to Belleville	·1076
Belleville to Brockville	·0904
Brockville to Montreal	·0751
Montreal to Richmond	·1106
Richmond to Island Pond	·1431
Island Pond to Gorham	·0738
Gorham to Portland	·0616
Richmond to Point Levi	·0957
Stratford to Fort Erie	·0742

These results are sufficiently diversified to prove, if proof were necessary, that the question of gradients and curves has not a little to do with the consumption of fuel, and to illustrate their effects on different sections of our railway.

We have no table of gradients on the Great Western Line, but we know that the air line of that Company has no gradient in excess of 35 feet to the mile. This line forms 145 miles out of a total distance of 229 miles. We also know that an engine (16 in. cylinder) can move 28 loaded cars out of Windsor going eastward on the Great Western, whilst an engine (17 in. cylinder,

or 10 per cent. more power) can only move from Sarnia up to Stratford, on the Grand Trunk, a maximum load of 21 cars. All our eastbound through traffic has to pass over this district—not our worst altogether as regards gradients, but on which we have several long stretches of gradients varying from 52 to 55 feet per mile. On the Buffalo and Lake Huron section there are gradients as steep as 60 feet to the mile.

We have information as to how much coal one of the engines of the Canada Southern Railway consumes, and how many cars it hauls between Amhertsburg and Fort Erie; and the result shows similarly the advantage of the favourable gradients on that line. This engine was built by the same firm, and is similar to the engine we used to run the experimental trips over the Grand Trunk. These figures further illustrate the fallacy of making comparisons per train or per engine mile, without taking into consideration the work performed.

	lbs.
The Canada Southern consumption per train mile (consumption 10 tons, load 45 cars), 229 miles	87·33
The Grand Trunk consumption per train mile (consumption 5 tons, load 21 cars), Sarnia to Buffalo, 190 miles	51·60
The Canada Southern consumption per car mile...	1·94
The Grand Trunk consumption per car mile ...	2·46

It may be added that our engines would, if placed on the Canada Southern or Great Western Line, perform just as satisfactory work as the engines of those Companies.

CLIMATE.

With respect to the effect of the climate, it must be remembered that almost the whole of the Great Western system lies between 42° and 44° N. latitude, whilst the Grand Trunk at Montreal is between 45° and 46° N. latitude, and at Riviere-du-Loup close upon 48° N. latitude; and it must also be borne in mind that the Arctic current impinges on the north-eastern coast of North America, and causes a condition of temperature in winter almost Arctic as compared with any weather experienced in the United Kingdom, or with the winter in the Peninsula of Ontario, the severity of which is tempered by the great lakes which surround it.

Even our line west of Toronto is less favourably situated than the Great Western Company's main line. At Stratford—603 feet above Lake Huron (at Sarnia)—we are 20 miles north of the Great Western main line, and run along an elevated plateau.

And further, the Grand Trunk Line is 29 miles longer between

Detroit and Buffalo, than the Great Western Line; but we have to make the same time connections, and consequently to run at a much higher rate of speed, which is another source of increased cost.

The following is a copy of an official statement issued by the Montreal Observatory for the year 1875, which was one of ordinary conditions, and it shows the mean, maximum, and minimum temperature for that year.

Month.	Thermometer.		
	Mean.	Max.	Min.
January	5·44	29·5	*—13·2
February	9·02	43·4	—24·0
March	21·61	41·0	—10·3
April	35·70	61.3	11·4
May	53·11	82·2	30·0
June	64·58	84·4	39·8
July	67·83	80·2	49·8
August	68·67	87·0	51·0
September	55·19	86·8	54·0
October	40·88	58·0	26·9
November	25·12	41·0	—17·9
December	16·73	54·0	—22·5
Mean	38·65	62·40	12·92

The total fall of snow during that year was 115 inches.

The extreme cold of winter and the obstruction caused by snow have a very great effect upon the expenditure for fuel, as may be gathered from the half-yearly reports; and the following figures show the variations in the cost per car mile in different conditions of weather from January, 1875, to June, 1878.

		Fuel per Car Mile.
1875.	January ...	... 16·87 cents.
„	May ...	... 11·22 „
1876.	August ...	... 10·24 „
„	December ...	... 14·64 „
1877.	January ...	... 14·82 „
„	June ...	... 8·83 „
„	December ...	... 11·61 „
1878.	January ...	... 12·29 „
„	June ...	... 7·38 „

The following table also illustrates the effect of climate upon the consumption of fuel, in lbs., for the different months of the different years mentioned:—

*— Means below Zero Farenheit.

	1875.		1876.
	Wood per Engine mile.	Coal per Engine mile.	Consumption of Coal per Car mile.
	lbs.	lbs.	lbs.
July	91·47	43·48	2·88
August	93.35	43·63	2·63
September ...	98.15	45·65	2·99
October	107·46	49·75	3·21
November ...	102·06	53·79	3·34
December ...	126·21	57·61	4·50
	1876.		1877.
January	125·78	57·41	5·42
February ...	133·22	60·32	4·27
March	128·48	60·13	4·01
April	118·18	53·31	3·41
May	104·30	48·99	3·16
June	98·57	45·57	3·10

In working out the consumption of fuel in the months of January and July last on the western and central sections of our own road, the results were as follows :—

On the line west of Toronto, the consumption of coal per car mile in January over July was	36%
On the line east of Toronto, and up to Montreal, the consumption in January over July was	62%
East of Montreal and down to Gorham the excess of wood consumption per car mile in January over July was	52%
We happen to have the means of comparing the consumption per Freight car mile on the Great Western in a recent year, in the month of August with the month of January. The excess for January was ...	10·4%

These figures may not be perfectly accurate. They have been collected from a mass of details. But they are sufficient to indicate that our total consumption of fuel *is largely increased* by the severity of the climate, and that, in this respect, we are much worse off than our neighbour.

LOCOMOTIVE EXPENDITURE.

I have now to notice certain remarks which have been made on the subject of the Company's locomotive expenditure.

In comparing the locomotive expenditure of the Grand Trunk with that of the Great Western Company, the *engine mileage* test has been abandoned for the still less reliable test of expenditure *per engine*. But it is manifest that the expenditure upon an engine must be influenced by the amount of the work which it performs, and also by the character of that work, and no impartial critic ought in dealing with the subject to neglect to take these conditions into consideration.

Now, if the returns of the Grand Trunk and the Great Western Companies are examined, it will be found that the Grand Trunk engines for the year which ended on the 31st December, 1877, ran 27,012 miles each, whilst those of the Great Western ran only 23,877 miles each, on the average.

A Proprietor has made the following observation with regard to the relative cost of renewing or repairing engines on the two lines :—"There has been some alteration in the mode "of keeping the Great Western accounts. Turntables and "tanks have been transferred since July, 1875, to maintenance "and renewal of way. But reckoning them in allowing for "renewals in 1877 and 1878, I find that, per engine, the Grand "Trunk spent in 1875, £97 more, or £42,000 in the year; in "1876, £110 per engine, or nearly £48,000 for the year; in "1877, £107, or £46,000 in the year; and in 1878 (half-year) "£65. 10s. per engine, or at the rate of £56,000 for the year."

The only way in which he could arrive at the preceding figures must have been by ignoring important items of Great Western expenditure. Two statements have been drawn up showing the expenditure during the years ref[illegible] for the repairs of locomotives on the Grand Trunk, includ[illegible]t of renewals, and the similar expenditure on the [illegible]rn, including the charges to the renewal fund in lieu [illegible] renewal of engines. These statements show that instead of the Grand Trunk expenditure being more than the Great Western for the year 1875, the Grand Trunk for that year spent only £174 per engine as against £223 on the Great Western; and in 1876, £215 as against £235 on the Great Western; whilst it appears that the charges during the year 1877 and the first half of 1878 were greater on the Grand Trunk, arising simply from the fact that the usual charges to the renewal fund during the first half-years of 1877 and 1878 were omitted by the Great Western. The result, however, of a comparison of the expenditure for the 4½ years from 1874 to 30th June, 1878, shows that the average cost for the repair and renewal of engines on the Grand Trunk was £103. 18s. 3d. per half-year, as against £103. 8s. 5d. on the

Great Western, or a difference of rather less than 10s. per engine.

It has been entirely overlooked that the cost of repairs of engines ought to bear a close relation to the amount of work done by them, and it will be found from the following statements that the engines on the Grand Trunk have moved, on the average, no less than 22·66 per cent. more cars than the Great Western engines. The figures are :—

GRAND TRUNK.

Miles moved per Locomotive.

Half-year ending	Train Miles.	Traffic Engine Miles.	Car Miles.
June, 1875 ...	8,949	12,027	131,811
Dec., 1875	9,652	12,476	159,515
June, 1876	9,664	12,719	162,834
Dec., 1876 ...	10,106	13,055	171,376
June, 1877	9,375	12,174	152,257
Dec., 1877	10,677	13,660	186,590
June, 1878 ...	9,794	12,569	163,257
Total	68,217	88,680	1,127,640

GREAT WESTERN.

Miles moved per Locomotive.

July, 1875 ...	8,700	11,129	121,879
Jan., 1876	8,335	10,676	116,972
July, 1876 ...	8,823	11,019	127,654
Jan., 1877	9,221	11,449	132,800
July, 1877 ...	8,610	10,555	119,806
Jan., 1878 ...	9,882	11,938	147,273
July, 1878 ...	9,890	11,831	152,955
Total	63,461	78,596	919,339
Grand Trunk excess over Great Western	4,756	10,084	208,301
Per centage excess	7·50	12·83	22·66

The Great Western Company do not, in their accounts, give the total mileage run by their engines prior to the half-year ended January, 1876 ; but, taking the accounts for the years from the 1st July, 1875, to the 1st July, 1878, it will be found the Grand Trunk engines have run on an average 3,500 miles, or 15 per cent. per annum further than the Great Western engines.

This comparison over an extended period, which is the only fair mode of dealing with the subject, shews conclusively that not only has the cost of repairing the locomotives on the Grand Trunk been nearly the same as that on the Great Western, but further, that the Grand Trunk locomotives have relatively done considerably more work.

The figures of the Great Western Company's expenditure are evidently quoted (in the criticism above referred to), less the expenditure on the leased lines, so that the comparison therein contained is, for practical purposes, simply valueless.

No inconsiderable charges for turntables, repairs of workshops, &c., are on the Grand Trunk charged to the Locomotive Department, and on the Great Western to the Permanent Way Department.

In the Great Western Accounts for one half-year (July, 1878), to which reference is made, there is a credit for old material actually in excess of the whole charge for new material.

It is not possible to obtain from the accounts of the Great Western Company the expenditure for repairs charged against the leased lines. Taking, however, as the only reasonably fair comparison available, the total expenditure in repairing and working the locomotives of the two Companies, minus the expenditure for fuel already referred to, the result is for the year 1877—

	d.
Grand Trunk expenditure, per engine mile	5·24
Great Western expenditure, per engine mile	5·32

If the comparison is made on the basis of car mileage the result is—

	d.	
Grand Trunk	·400	per car mile.
Great Western	·448	„

This latter is, for reasons already stated, hardly a fair comparison, and is only given as an illustration. As already stated, the Great Western run proportionately more passenger train miles; the Grand Trunk has more piloting, shunting, and light running to do in proportion to its mileage. It is hardly possible for the purposes of this comparison to separate these elements of difference.

The following figures *per train mile* are given simply for the purpose of illustration. Taking account of the shunting, &c., mileage, the results were—

	d.	
Grand Trunk	5·49	per train mile.
Great Western	5·52	„

Others have compared our expenditure with that of English lines, but they have also fallen into the error of dealing with the expenditure per engine without reference to the work performed. The returns of English lines do not give the car mileage, and that standard of comparison is not therefore available to us. But there is this further difference between all English and American and Canadian railways, and it is important. In England, a very large proportion of yard shunting is done by horses. In Canada no horses are employed on such work. In addition to the train miles run in the half-year ending June, 1878, our engines did 1,205,000 shunting, piloting, &c., miles.

CAR EXPENDITURE.

The relative cost of repairing the car stock of the two Companies has also been referred to in the following terms:—

"The charge for repairing passenger cars is equally high. "At the same rate as the Great Western we should have "saved in 1875 at least £15,000, in 1876 £22,000, in "1877 £27,000, and in 1878 at the rate of £30,000. In "freight cars I find that if we had worked as cheaply, we "should have saved in 1875 £14,000, in 1876 £17,000, in "1877 £18,000."

There seems no ground whatever for these statements.

It is, unfortunately, impossible from the form of the Great Western accounts to compare precisely the expenditure for passenger and freight cars, as the amounts charged by the Great Western to renewal fund in lieu of renewal charges are not apportioned between the two descriptions of cars. On the other hand, the charges on the Grand Trunk show the cost of repairing both descriptions and include the full cost for renewals; and, as was reported at the recent half-yearly meeting, the rolling-stock of the Grand Trunk then included some sixty-eight duplicate cars, paid for out of revenue, in excess of the number borne on the official books and reported in the half-yearly accounts.

Whilst, under these circumstances, it is impossible to make a separate comparison of the cost of repairing each class of stock, it may be observed that even a comparison based on a division of the expenditure upon passenger car stock by the numbers of such stock is not a fair one, seeing that a much larger proportion of the Great Western passenger car stock consists of baggage and post-office cars (of much inferior value to the cars used for the conveyance of passengers), as the following statement shows, viz.:—

	1st & 2nd class passenger cars, dining cars, &c.	Post office, baggage, &c.	Total car stock.
Great Western ...	165	111	276
Grand Trunk (including hired cars) ...	303	84	387

Being unable to make a comparison of the cost of repairing the two classes of cars (passenger and freight), we must compare simply the cost of repairing the whole car stock of the two companies.

The result of such comparison is to show that for the 4½ years from 1874 to 30th June, 1878, the cost of the repairs has been £8. 18s. 3d. per car per half-year on the Grand Trunk as against £8. 1s. 3d. on the Great Western, whilst the cost *per car per mile per half year* during the same period was only ·28d. on the Grand Trunk against ·37d. on the Great Western. This is owing to the fact that, taking the whole car stock of the Grand

Trunk, including foreign cars, each car has run during the three years 1875, 1876, 1877, and the half-year to June 30th, 1878, no less than 54,841 miles, against a total distance on the Great Western of only 39,578 miles per car.

Looking, therefore, at the cost of repairing cars for a reasonable period of time, it is clear that the charges are less *per car per mile* on the Grand Trunk, the difference in the proportion of *work performed* being very much in favour of the Grand Trunk Company.

The comparison of the expenditure upon cars on the Great Western and Grand Trunk lines, on the basis of expenditure *per car*, is, therefore, as well as the comparison *per engine*, previously referred to, simply misleading; and any comparison to be of value can only be made after a full examination of work performed per car in haulage, and into the methods on which each Company makes up its returns, and of how far these are affected by the use of foreign cars. All classes of cars, as a rule, are repaired in the same shops, and a divergence in the methods of apportioning the shop expenses, superintendence, lighting, &c., as between the two classes of cars, will make an important difference in the expenditure upon each, as shown in the half-yearly accounts.

Again, one company may have an excess of cars, and be collecting hire upon them from other companies; and the other company be in the reverse position of paying for the use of the cars of foreign companies running over its system. The manner of dealing with these receipts or payments in the accounts must of necessity seriously affect the expenditure per car. Hire of cars necessarily includes interest on capital as well as cost of maintenance and renewal. In the matter of passenger cars, our position and that of the Great Western differs considerably. They have certain cars of other companies running over their road as between Detroit, Suspension Bridge and Buffalo. The Grand Trunk have no such cars.

Sufficient has been said to demonstrate that comparisons of particular items in these accounts, without taking into consideration the whole expenditures of particular departments, and all the circumstances under which the two companies operate their respective lines, and frame their accounts, can only result in misleading conclusions. Dealing with the total expenditure for the maintenance and repairs of cars as shown in the accounts of the two companies, we may select the year 1878 as an example, without going through the labour of working out the statistics for other periods, and we may adopt the following mode of arriving at results, viz.:—Taking the total expenditure of the two lines—adding thereto the amount paid for use of cars of foreign companies (which is heavier on the Grand Trunk than it is on the Great Western), and crediting nothing to the Grand Trunk for repairs and maintenance of workshops (which expenditure is, however, included in our car expenses, and apparently not in those of the Great Western) —crediting the passenger car miles run upon the Grand Trunk to

the general account at the rate per car mile expended upon the Great Western cars, and shown in that company's accounts,—and dealing with the balance of the expenditure as being applicable to the freight cars, the results will be found to be—

	d.
Grand Trunk passenger cars per mile	0·464
Grand Trunk freight cars per mile	0·269
Great Western passenger cars per mile	0·464
Great Western freight cars per mile	0·268

This is a comparison which is manifestly unfair to the Grand Trunk Company, for this reason: we pay—as would appear from the accounts—a much larger sum for the use of foreign companies' cars than the Great Western. These payments for use of cars include, as already remarked, interest on capital as well as the cost of their maintenance. On these cars, whilst they are on the line of the Grand Trunk, a certain amount of work has also, in accordance with general custom, to be done.

These figures are certainly no proof of extravagant expenditure on the Grand Trunk, or of neglect of the interests of the Company.

CONCLUSION.

In fairly comparing the fuel expenditure of the Grand Trunk with that of the Great Western Railway Company, the geographical positions of the two railways, and many other circumstances, must, then, be taken into account. Even west of Toronto, the conditions of the two lines are very different as regards climate, length, and gradients, though they are in some respects similarly situated; the Grand Trunk extending from Toronto and the International Bridge on the one side to Detroit and Goderich on the other, whilst the Great Western extends from Toronto and the Suspension and Buffalo Bridges on the east, to Sarnia and Windsor on the west. Within the above area, the Grand Trunk and Great Western Companies, as far as regards first cost, buy their fuel at nearly the same price. Last year at Suspension Bridge and Black Rock (Buffalo Bridge), the Great Western paid $3 and $3.10 per net ton, and the Grand Trunk at Black Rock (Buffalo) $3 and $3.05 per net ton. At Detroit, the price paid by both Companies was exactly the same—$2.85.

But, whilst Toronto is the most easterly point of the Great Western system, the central and most important district of the Grand Trunk lies between Toronto and Montreal, a distance of 333 miles; and from Toronto, the most easterly point of the Great Western, to Portland, the most south-easterly point of the Grand Trunk, the distance is 630 miles; and to Riviere-du-Loup, the most north-easterly point, the distance is 616 miles. It is upon this portion of the Grand Trunk Road, east of the Great Western, that about five-sixths of the whole consumption of fuel takes place.

The nearest points of production for coal over the whole of this

distance are, on the western side, the coal fields from which the Great Western is supplied; and on the eastern side, the coal fields of Nova Scotia, distant more than 1,000 miles by sea, or such supplies as can be obtained from England in competition with Nova Scotia coal.

Last year, coal at Portland cost $4 per ton alongside the wharf, and at Montreal, $3.75 per ton, delivered on the wharf, and the supply required for the section from Montreal westward for a considerable distance was necessarily obtained at that port. The wood fuel on the eastern section of the Grand Trunk, where it is principally used, is unfortunately soft wood, and its relative value is much less than the wood purchased on the section west of Toronto. As an illustration, I may say that on the central district, when wood was used, a cord produced 461 car miles, whilst the same quantity on the eastern section only produced 334 car miles, the difference arising mainly from the inferior steam producing properties of the wood.

The chief causes of the differences between the cost of fuel on the Grand Trunk and Great Western may be summarised as follows:—

(1.) The greater first cost of fuel.
(2.) The additional cost of hauling long distances, and of handling at different points.
(3.) The quality of the wood.
(4.) The effect of the climate on consumption on different parts of the line.
(5.) The loss from stacking coal, necessarily obtained in the open season, and for long periods in advance.
(6.) The gradients on some portions of the line.
(7.) The extra shunting necessary on a single line of so great a length, and the proportion of double and single line working.

In Mr. Trevithick's report of July, 1868, he stated: "That he "was unable to discover any evidence, or even fair inference, "that it (the issue price) involves an undue expenditure on the "part of the Grand Trunk Company, or that, if it were possible "to establish a thoroughly legitimate comparison, it would tell "against the Grand Trunk," and my own enquiries have led me to the same results. At the same time, he pointed out then, what is the case now, that the different modes of dealing with the cost of haulage, and with the apportionment to departments of the cost of handling, did result in some differences in the issue price of fuel,—that is to say, as regards one company, the cost of fuel was apparently increased by these charges, whilst, as regards the other company, the same charges appeared under different items of expenditure.

Instead of the results of the working for the last three and a half-years on the Grand Trunk comparing disadvantageously with the Great Western, a fair comparison of the results leads

to an entirely opposite conclusion. The Grand Trunk has had to work under the disadvantages of higher cost of fuel, greater distance from sources of supply, necessity for stacking, worse gradients, longer single line, and far worse climate; and yet the whole expenditure for working the line has, during the period referred to, been at a lower percentage of the gross receipts than on the Great Western; although in previous years, owing to the more favourable position and circumstances of the Great Western Company, the percentages of expenditure have been greater on the Grand Trunk.

I attach four statements A, B, C and D. (A) being a statement of gross receipts and working expenses, &c., of the Grand Trunk Company, for seven half-years commencing with June, 1875, and ending with June, 1878; (B) being a similar statement for the Great Western Main Line, and (C) for the Great Western Main Line and Branches for the same period; and (D) being a comparative statement of the total working expenses and actual car mileage on the Grand Trunk and Great Western systems with Branches, respectively, for the same seven half-years.

Epitomising the figures, the following is the result—

	Working expenses.			
	Percentage of Gross Receipts.	Per Train Mile.	Per Traffic Engine Mile.	Per Car Mile.
		d.	d.	d.
Grand Trunk	77·85	41·11	31·62	2·49
Great Western Main Line	79·88	46·86	37·40	2·98
Great Western Main Line and Branches... ...	81·37	46·70	37·67	3·22
Excess on G. W. Main Line	2·03	5·75	5·78	0.49
Excess on G. W. Main Line and Branches ...	3·52	4·59	6·05	0·73

It will thus be seen that under each of the above heads the Grand Trunk has been worked at a considerably lower rate, both in comparison with the receipts and with the work done, than the Great Western.

To put the matter simply, had the working expenses of the Grand Trunk for the seven half-years to June, 1878, been as high in proportion to the gross receipts as the working expenses (1) of the Great Western Main Line, or (2) of the Great Western Main Line and Branches. Then in the former case a sum of £130,000, and in the latter case of £230,000, would have been added to the Grand Trunk working expenses.

The relative positions which the two Companies occupied in the year ended June, 1873 and 1878 are illustrated in the following figures :—

In 1873* the expenditure of the Great Western was at the rate of 66·30 per cent. of their receipts.

In 1878 on the Main Line and Branches it was at the rate of 73·33 per cent. of their receipts.

The Grand Trunk Company's expenditure in 1873 was at the rate of 82·72 per cent. of their receipts.

For the year which ended on the 30th June last it was at the rate of 75·35 per cent.

There was therefore an actual increase in the ratio of the expenditure of the Great Western Company, whilst in that of the Grand Trunk Company a decrease was effected in the face of a reduction in the receipts per ton per mile for freight of over 45 per cent.

These figures certainly do not justify the language used by those who in criticising our expenditure speak of "waste and "extravagance being allowed to run riot," and "plunder," &c. But they point to the conclusion that to some extent our higher expenditure in fuel in comparison with the Great Western arises from a divergence in the methods of charging it in the accounts. If not, then in other respects the Great Western Company's expenditure must be extravagant, which I do not for a moment believe. On the contrary, I give their officers, as well as our own, full credit for honest and economical administration.

It will be observed then, that when all the conditions are fairly weighed and considered, and when the only true test—of work performed—is applied, the comparison—made in the fairest manner that the circumstances allow—is satisfactory as regards the Grand Trunk Company. We must always, as will have been observed, be at a disadvantage, in comparison with the Great Western Company, as to the rate at which we are able to charge out fuel for consumption on by far the greater portion of the Grand Trunk Railway. But this disadvantage has, in fact, been hitherto neutralized by careful management, and other conditions, inasmuch as our percentage of working expenses is less than that of the Great Western Company, and the working per car mile is less on the Grand Trunk than on the Great Western Railway. But we must not remain satisfied with that advantage. The most important question with which, after all, we are concerned is, not whether we have been better or worse than others in the past, but how much we can ourselves work more economically and more efficiently in the future. Fuel is the most telling article of our expenditure. It counts even now for 17½% in the total of our working expenses. Wood will become still more expensive, and more difficult to obtain of good quality, and less effective for producing steam on portions of our line. We must proceed with the conversion of our

* NOTE.—The expenditure on the Great Western Companies "Branches" is not given in full in the accounts of that Company in 1873.

engines, and, if the price is not raised by exceptional or artificial causes, employ a larger proportion of coal. We must construct more fuel sheds, and improve the connections at Montreal, and the means of handling at that and other points of coal supply and coaling stations. We must endeavour to further improve our rolling stock, and to reduce our passenger train and car mileage in proportion to the number of passengers carried. We must, in fine, leave no stone unturned further to reduce the cost at which fuel can be charged out for consumption, and to increase the proportion of work which can be obtained from its employment.

H. W. TYLER.

21, OLD BROAD STREET,
LONDON, E.C.,
February, 1879.

A

GRAND TRUNK RAILWAY COMPANY OF CANADA.

STATEMENT OF GROSS RECEIPTS AND WORKING EXPENSES, &c., for the Years 1875-6-7, and Half-year to June, 1878.

Half-year ending	Gross Receipts.	WORKING EXPENSES.				
		Total Expenses.	Percentage of Receipts.	Per Train Mile.	Per Traffic Engine Mile.	Per Car Mile.
	£	£		d.	d.	d.
June, 1875 ...	893,148	701,460	78·54	43·34	32·25	2·94
December, 1875 ...	1,023,858	818,408	79·93	46·89	36·28	2·84
June, 1876 ...	936,359	733,947	78·38	42·00	31·91	2·49
December, 1876 ...	893,882	716,640	80·17	39·21	30·36	2·31
June, 1877 ...	860,386	664,467	77·23	39·19	30·18	2·42
December, 1877 ...	1,025,260	769,160	75·02	39·84	31·14	2·28
June, 1878 ...	881,003	667,252	75·73	37·67	29·36	2·26
	6,513,896	5,071,334	77·85	41·11	31·62	2·49

B

SIR

	6,513,896	5,071,334	77·85	41·11	31·62	2·49

B

GREAT WESTERN RAILWAY COMPANY OF CANADA.

MAIN LINE.

STATEMENT OF GROSS RECEIPTS AND WORKING EXPENSES, &c., for the Years 1875-6-7, and Half-year to July, 1878.

Half-year ending	Gross Receipts.	WORKING EXPENSES.				
		Total Expenses.	Percentage of Gross Receipts.	Per Train Mile.	Per Traffic Engine Mile.	Per Car Mile.
	£	£		*d.*	*d.*	*d.*
July, 1875	411,187	393,793	95·77	57·30	44·36	3·83
January, 1876	436,087	343,543	78·77	52·76	40·62	3·49
July, 1876	394,769	331,362	83·94	48·83	38·67	3·10
January, 1877	401,628	333,941	83·15	47·38	37·78	3·02
July, 1877	370,514	275,716	74·41	42·79	34·43	2·82
January, 1878	467,237	317,604	67·97	42·32	34·72	2·61
July, 1878	377,485	287,650	76·20	38·01	32·45	2·26
	2,858,907	2,283,609	79·88	46·86	37·40	2·98

C

GREAT WESTERN RAILWAY COMPANY OF CANADA.

MAIN LINE AND BRANCHES.

STATEMENT OF GROSS RECEIPTS AND WORKING EXPENSES, &c., for the Years 1875-6-7, and Half-year to July, 1878.

Half-year ending	Gross Receipts.	WORKING EXPENSES.				
		Total Expenses.	Percentage of Gross Receipts.	Per Train Mile.	Per Traffic Engine Mile.	Per Car Mile.
	£	£		d.	d.	d.
July, 1875	461,710	450,531	97·58	57·87	44·98	4·10
January, 1876	488,423	391,948	80·25	52·25	40·79	3·72
July, 1876	456,363	386,731	84·74	48·70	38·99	3·37
January, 1877	458,728	390,790	85·19	47·53	38·28	3·30
July, 1877	426,838	323,104	75·70	42·08	34·33	3·00
January, 1878	532,732	377,325	70·82	42·82	35·45	2·87
July, 1878	437,124	333,906	76·39	37·51	31·36	2·42
	3,261,918	2,654,335	81·37	46·70	37·67	3·22

D

STATEMENT OF TOTAL WORKING EXPENSES AND ACTUAL CAR MILEAGE ON THE GRAND

	3,291,918	2,654,335	81·37	46·70	87·67	3·22

D

Comparative Statement of Total Working Expenses and actual Car Mileage on the Grand Trunk and Great Western Railways for Three years and a half ending June and July 1878.

Half-year ending	Total Working Expenses, including Branches.		Actual Car Mileage.		Rate of Expenses per Car Mile.		Excess against Great Western.	
	G. T. R.	G. W. R.	G. T. R.	G. W. R.	G. T. R.	G. W. R.	Per Car Mile.	On Grand Trunk Mileage.
	£	£			*d.*	*d.*	*d.*	£
June, 1875 ...	701,460	450,531	57,206,067	26,325,773	2·94	4·10	1·16	276,000
December, 1875	818,408	391,948	69,231,209	25,265,827	2·84	3·72	0·88	253,000
June, 1876 ...	733,947	386,731	70,669,935	27,573,225	2·49	3·37	0·88	259,000
December, 1876	716,640	390,790	74,377,513	28,419,276	2·31	3·30	0·99	301,000
June, 1877 ...	664,467	323,104	66,079,647	25,638,505	2·42	3·00	0·58	159,000
December, 1877	769,160	377,325	80,979,929	31,516,365	2·28	2·87	0·59	199,000
June, 1878 ...	667,252	333,903	70,853,627	33,038,297	2·26	2·42	0·16	47,000
Total ...	5,071,334	2,654,335	489,397,927	197,777,268	2·487	3·220	0·733	£1,494,000
Average per Half-year	724,476	379,191	69,913,989	28,253,895	...	...	...	£213,428

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