THE TAXATION OF MOTOR VEHICLES

THE TAXATION OF MOTOR VEHICLES.

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts, in the Department of Economics and Political Science, Faculty of Arts and Science, McGill University, Montreal.

John Buchanan Rollit

1 9 3 2.

THE TAXATION OF MOTOR VEHICLES

BY

JOHN BUCHANAN ROLLIT

The writer discusses the relation between the motor vehicle and total highway costs and presents a method of distributing this cost among motor vehicles in such a manner that each vehicle contributes directly in proportion to the amount of use which it makes of the highways. The underlying principle of the method is in the measurement of highway wear and tear in terms of impact force on the highway. From impact force, slightly modified by highway space occupied and a limited application of the 'ability to pay' canon of taxation, a schedule of relative ratios showing the proportional place that different vehicles should occupy in the scale of contributions is evolved. Using this schedule, actual figures of highway costs are taken to show how the method may be worked out into a compensating system of registration fees and gasoline taxes. The concluding chapters attempt to prove that competing systems of transportation - by rail and highway - should be dealt with as a co-ordinated unit.

C O N T E N T S.

Chapter I.

THE PROBLEM

Road building and maintenance was one of the few activities which the proponents of the doctrine of laissez-faire conceded to be within the proper sphere of government. The national highways, like the administration of justice, the maintenance of law and order and protection against foreign aggression, were an expense incurred in the common interest of all and were accordingly paid for out of general taxes. There was no means, except the toll road, of assessing a vehicle directly for the 'amount of use' which it made of the highways. Toll roads were never popular and had practically disappeared before the development of motor vehicle traffic. Road building was left largely to the smallest governmental unit, the municipality, and funds were raised by an assessment against real property. As the area over which a vehicle could operate was limited, this meant that those who used a particular road were the ones who paid for it.

The motor vehicle appeared when the doctrine of laissez-faire was passing into oblivion. Governments may now with propriety assume countless activities. Publicly owned railroads, gas works, water works and hydro electric plants are generally accepted. It is conceded that a government, far from distributing its gas or electric power free, should charge each customer for what he uses and possibly make a certain profit on the transaction.

At first, the motor car enjoyed the free use of the highways. Early registration fees were simply for purposes of record. The gasoline tax began as a means of raising revenue for governing[1.] authorities who had little concern with road building. Gradually, however, the levies on motor vehicles began to resemble payments made for the use of the roads. At the present time, the government may be said to build highways and rent them to highway users just as it builds power plants and sells power to consumers. This idea has developed slowly. For a long time governments clung to the old doctrine and insisted that highways should be maintained out of general taxes. The municipality, the unit responsible for road building, had, in most cases, no power to impose special taxes on motor vehicles or on gasoline. The provincial or state governments, which had the power to impose such taxes, used the proceeds for their own purposes. In the old days, road building was comparatively inexpensive. The annual assessment for roads was rarely burdensome. Many farmers could pay it easily by working on the roads with their teams for two or three days each year. With the coming of the motor vehicle, the old gravel and macadam roads broke down almost overnight. Expensive new roads and road building equipment became a necessity.

---

1. The gasoline tax first appeared in 1919, when the states of Oregon, Colorado and North Dakota imposed a tax of one cent a gallon. Its universal adoption followed almost immediately.

An orgy of road building began and the municipalities did not hesitate to assume bonded indebtedness for periods up to forty years. If the highways built at this time had been permanent, all would have been well. However, it seemed that as fast as highways were built, motor vehicles would destroy them. It was impossible for the municipalities to go on piling up huge debts, so the provincial or state governments began the practice of making grants for road building. The climax was reached when certain provincial and state governments took over all public roads except paved streets within incorporated cities and towns.[1] This did not mean that rural municipalities could abandon the real property assessment for road building. It will be a generation before most of them are free of the burdens they assumed to provide the first good roads.

The expense of road building was not the only consideration which made the smaller municipalities demand relief. A motor vehicle can operate over a very wide area. This meant that the great bulk of traffic using the roads of a particular municipality was no longer the traffic of the taxpayers in that municipality alone.

---

1. In 1927 the Province of Quebec took over "all improved roads and those to be improved in future," See Statistical Year Book of Quebec, 1930, p. 359.

Cars from California appeared on the rural highways of Quebec. Delivery trucks from Montreal operated regular routes within a radius of sixty miles from the city. Townships which had perhaps as few as twenty motor vehicle owners on their tax rolls found that thousands of other motorists were using their roads. At the same time, the common carrier autobus and truck turned the highways into a right of way for themselves and began to build up private businesses carried on/public property. The greater weight and size of these vehicles caused much damage to highway surfaces. At first the railways ignored them but when they began to feel this competition, joined their protests to those of municipal authorities and demanded heavy taxes.

The old difficulty of assessing a vehicle directly for the 'amount of use' which it makes of the highways has disappeared. The gasoline consumption of a vehicle is a measure of the number of highway miles it runs. Hence, a tax on gasoline corresponds to a rate for electric power as measured by the meter in a consumer's house. Registration fees and licenses may be used to compensate for any deficiencies in the gasoline tax.

The governments are now confronted with two problems. First, they must decide to what extent the highways are an expense incurred in the common interest of all and consequently what proportion of the total highway bill should be paid for by general taxes. Second, they must distribute the balance equitably among the various classes of motor vehicles.

Although motor vehicles constitute an overwhelming percentage of the vehicles using the public roads, they are not the only users. Horse drawn vehicles, bicycles, handcarts and pedestrians are still with us. It is true that the wear and tear on the roads attributable to persons and non-motor vehicles is practically negligible,[1] but at the same time they also benefit by the existence of roads. It is just as impractical to tax these other road users directly for 'amount of road use' as before, but, on account of them, and on account of the 'common benefit to all' in the existence of roads, it is equally unjust to make moter vehicles pay the entire highway bill.

The proportion of highway costs that should be borne by the public in general is a matter of some dispute. To discuss it fairly, local factors must be taken into account. A proportion that would be equitable in an area of dense traffic would be most unjust in a large area with a lighter volume of traffic. It is possible by making an exhaustive study, to determine exactly what the value of the highways is to the general public in any given locality.

---

1. Steel tires on carriages and on heavy wagons cause more wear and tear in proportion to gross weight than do motor vehicles operated on any kind of rubber tire equipment.

The English Royal Commission on Transport[1] made such a study and concluded that motor vehicles should pay two-thirds of the cost of road building and maintenance, the remainder to be met from general taxes. In a country like Canada this ratio cannot be rigidly maintained. It must of necessity be smaller.

Most taxing authorities have not bothered to work out scientifically any proportionate figure fitted to their own peculiar conditions. The tendency has been to increase the motor vehicle fees and gasoline taxes progressively and to make up any difference out of general taxes without questioning the justice of the arrangement. In certain of the American States this has already resulted in receipts from motor vehicle licenses, fees and gasoline taxes which have equalled and even exceeded highway expenditure. In these few cases the government begins to reap something like a monopoly profit - the benefit going to the public at large, who are relieved of their contribution in general taxes. The moral right of any government to exact such a profit deserves attention when we come to consider the question of fair competition between motor vehicles and other forms of transportation. In fact, however, the cases in which receipts traceable to motor vehicles exceed highway costs are so rare that they are chiefly of interest as examples of the climax to the upward trend in road fees noted above.

---

1. Royal Commission on Transport, Report No. 3., this ratio is also quoted and used by Mr. A.D. Ferguson in his "Equitable Taxation of Motor Vehicles," p. 5.

The expenditure of a provincial or a state government on highways is a very different thing from the total highway bill. In the public accounts of a provincial or state roads department there is no mention of the vast sums which large cities and incorporated towns spend each year on paving. Over 37% of the total number of motor vehicles registered in the Province of Quebec[1] are those of citizens of the City of Montreal. Although it is true that these vehicles are often operated outside the city limits, the great majority of them are used mainly within the city itself. Their owners pay the same registration fees and gasoline taxes as other motorists and at the same time pay for the upkeep of the city streets through assessments on their real property. The Province makes no grants to the City for paving purposes, so that Montrealers see themselves paying wholly for the cost of Montreal streets and in addition, 37% of the cost of highways outside of the city altogether. This state of affairs is generally accepted because the city, as a distributing centre, benefits from good roads in the area from which it draws its market. But, when the amount which the incorporated cities and towns spend on roads equals the provincial highway bill, moter vehicles are not paying their fair share if they simply pay two-thirds of the provincial highway bill.

---

1. Statistical Year Book of Quebec, 1930., p. 370-371.

Thus, receipts from motor vehicles which exceed a provincial or state highway bill should be forthcoming and are not to be considered as evidence of too high or unfair levies on motor vehicles.

As a matter of fact, most governing authorities are satisfied if they obtain enough revenue to meet their own particular expenditures. Hence, provincial or state governments tend to neglect the paving bills of the incorporated cities and towns when calculating motor vehicle licenses and fees, In these cases where huge debts were piled up by the province or state in the period of experimental road building, motor vehicles are taxed to the limit of what they can bear to pay the provincial highway bill alone. To ask them to contribute to the paving bills as well would be impractical. For these reasons, which date back to causes over which the present day governments had no control, it is impossible to apply power plant methods to highways all at once. Rigid formulas must often bow to expediency. The best results are obtained when each government gradually works toward the goal of highway fees on a rational cost of service basis. The achievement of this end becomes increasingly important as the highways are more and more used for competitive business.

We referred above to a 'monopoly revenue' which the government obtains when receipts from motor vehicles are greater than highway expenditures. This, a compulsory levy imposed by a government is a true tax - " a compulsory contribution from the person to the government to defray the expense incurred in the common interest of all, without reference to special benefits conferred - "[1] as distinct from the fee charged for highway services rendered. Since governments rarely receive such a monopoly revenue, it would appear that motor vehicles as such are under taxed. That is, any payments they make to the government are purely for services rendered and nothing is left to go into the fund for the common benefit of all, out of which the general expenses of government are provided for. This remains true unless a particular vehicle or class of vehicles is paying more than its fair share of the highway bill. A private car may be paying more in proportion to the use it makes of the highways than a truck pays , inwhich case it is paying a true tax equivalent to the difference between the amount of road fee it does pay and the amount it should pay under an equitable distribution of the highway bill. When a motor vehicle is purchased, a certain percentage of its cost to the purchaser represents a true ecomonic tax paid to the government. From this time on, no true economic tax is paid except in the two cases just noted.

---

1. Professor Seligman's definition.

We mention this point to clear up a misunderstanding that often arises in discussions of the fair taxation of common carrier motor vehicles. The complaint that common carrier trucks and busses pay no taxes is frequently heard. It is just as reasonable to say that railways pay no taxes either. Railway taxation is not based on the number of locomotives and cars that a railway owns, so why should common carrier motor vehicle taxation be determined in this way ?. A railway is taxed as a corporation. Since it owns landed property it pays local assessments on its property. Motor transport companies also pay assessments on such landed property as they own. True economic taxes are collected from each on their corporate income, through the sales tax and customs and excise duties, just as for any other business. The sum of the payments made by a railway to the government consists of one thing, true economic taxes; that of a common carrier motor transport company represents the addition of two separate and distinct items - (i) true economic taxes, (ii) fees or rentals paid for the use of the roads.

The complaint that common carrier motor vehicles are not paying their fair share of highway maintenance and construction costs is a very different matter. The question of motor and rail competition is of such national importance that it must be considered at length later on. For the present we are chiefly interested in the proper distribution of the road rental, so we shall deal with the common carrier simply as a highway user and with the proper amounts which

it should contribute to the highway maintenance and construction fund.

In the same way the ordinary motor vehicle pays no true economic tax; its owner makes contributions to this tax fund as a citizen, not as a motor vehicle owner. Motor vehicles are not fit subjects for such taxation any more than other property. They could be reached by a personal property tax, but justice would then demand that all forms of personal property should be taxed at the same rate. In recent years the personal property tax has been largely discredited and has tended to disappear. It would be unjust discrimination to preserve it for motor vehicles alone, while other kinds of personal property are exempt from taxation.

Once the total amount that motor vehicles should pay has been determined, the next step is to distribute it equitably among them. Vehicles vary in weight, size, carrying capacity and physical equipment. Their passage over the road has a varying effect on the road surface. Some vehicles use the road much more than others. In rate making, the railways are accustomed to charge 'what the traffic will bear' or according to its 'ability to pay'. The same principle can be applied in more limited degree to highway rate making. All of these factors must be taken into account. The ideal road rental is directly proportional to the number of highway miles a vehicle travels. The rate per mile on a particular vehicle is based on its wear and tear on the highway, on the amount of highway space it occupies, and on its 'ability to pay'.

The 'ability to pay' criterion must be treated very carefully. The other elements in the ideal road rental may be determined through the application of concrete scientific principles. The calculation of 'ability to pay' depends in large measure on the individual judgment of the one who makes it. In the past, it has often been used as a pretext for unfair discrimination against certain vehicles. If the need to raise revenues for highway purposes were not so great, it would probably be better to neglect it altogether.

Chapter II.

THE CLASSIFICATION OF MOTOR VEHICLES

We have so far considered motor vehicles 'in the mass'. They must now be divided into classes as a preliminary to determining what road rentals a particular vehicle should pay. The first classification is for purposes of identification. It is purely physical and takes account of differences in make, model and method of propulsion. It separates motor vehicles as follows:

1. The Motor Bicycle or Motorcycle - A two-wheeled vehicle propelled by a gasoline motor. It has two further subdivisions: (i) The Motor Bicycle with passenger sidecar attached.

(ii) The Motor Bicycle with delivery body attached.

2. The Passenger Automobile - A motor vehicle equipped for the transportation of persons, not more than seven at a time. It includes the taxicab, the jitney, the ambulance and the hearse.

3. The Truck - A motor vehicle equipped for the transportation of goods.

4. The Autobus - A motor vehicle equipped for the transportation of persons, more than seven at a time.

5. The Tractor - A motor vehicle equipped with a motor, but with no apparatus for carrying a load.

6. The Trailer - A vehicle (not a motor vehicle)equipped with apparatus for carrying a load, but with no motor for propulsion. Although not a motor vehicle, the trailer must be mentioned here because it is designed to be attached to a motor vehicle and uses the highways as part of one.

7. A Miscellaneous Class - Motor vehicles equipped with a motor which are designed for some special service other than carrying goods and passengers - snow plows, fire engines, service cars, etc.

Each of these classes may be further subdivided:

(a) According to the make of the vehicle - Ford, Buick, Chevrolet, etc. This is of importance for identification only.

(b) According to the method of propulsion (i) by a gasoline motor, (ii) by steam, (iii) by electricity stored in the car itself.

(c) According to the capacity of the vehicle for bearing a load - 'a five passenger car'. 'a two ton truck', etc.

The next classification is one of function. It separates vehicles according to the nature of the business in which they are engaged and establishes a nomenclature to distinguish between vehicles which are operated purely for hire and those which are maintained for the use of the owner alone.

1. The Pleasure Vehicle - A motor vehicle used for the transportation of passengers, not more than seven at a time, such transportation to be affected for no pecuniary consideration.

2. The Taxi - A motor vehicle used for the transportation of passengers, not more than seven at a time, for hire. This includes the taxicab, the jitney, the ambulance and the hearse.

3. The School Bus and Hotel Bus - Motor vehicles equipped for the transportation of passengers, more than seven at a time, such transportation to be effected for no pecuniary consideration.

4. The Autobus - A motor vehicle equipped for the transportation of passengers, more than seven at a time, and which effects such transportation for a pecuniary consideration.

5. The Farm Vehicle - A motor vehicle equipped for the transportation of persons and merchandise, belonging to a farmer, used exclusively for the transportation of the products of his farm and of the persons who occupy such farm. It is usually limited as to weight and capacity. The special class allotted to farm vehicles in many highway acts represents a concession to the farmers, most of whom are already paying directly for the use of the roads through the road tax on their farm lands, which tax amounts to more, proportionally, than that paid in like manner by other motor vehicle users and owners.

6. The Service Vehicle - A motor vehicle equipped to carry supplies for and repair or tow, motor vehicles which, following an accident, cannot be operated upon the public highway without its aid.

7. The Private Truck, or Commercial Vehicle - A motor vehicle equipped for the transportation of merchandise and which effects such transportation without any pecuniary consideration.

8. The Contract Carrier and the Common Carrier Truck - A motor vehicle equipped for the transportation of merchandise which effects such transportation for a pecuniary consideration.

9. Motor vehicles equipped neither for the transportation of persons nor merchandise, but which have special equipment to enable them to perform special services - thus, fire engines, steam rollers and snow plows.

It is a peculiar property of motor vehicles that thay may be readily adapted to purposes other than those for which they are primarily intended. A so-called 'pleasure vehicle' may be used to carry eggs to market. On Sundays trucks are frequently loaded with picnic parties quite regardless of the fact that they are 'vehicles equipped for the transportation of merchandise'. This becomes of great importance when we try to make a distinction between common carriers and other vehicles in order to assess road rental fees. Autobuses which maintain a regular service over a specified area and which accept passengers on the same terms as the railways, undoubtedly are common carriers. Motor transport companies which are formed for the sole purpose of carrying other people's freight, and taxicabs which are licensed to operate for hire, are also easily distinguished as belonging to the common carrier group. From here on the distinction shades off until it is impossible to decide just what the vehicle is.

As it happens, the classes mentioned above handle but a small part of the motor transportation business. Mr Larue, of St-Polycarpe, has a small farm, also an ancient truck. Frequently he makes trips to Montreal, and, if paid for it, will take Mr Bonhomme's package too. Mr Leduc finds it possible to employ Mr Larue at least once a week to haul his weekly shipment of fowl to a Montreal hotel. In fact, Mr Larue may expect to pick up quite a little extra money in this way. He charges what he thinks proper. As I am a particular friend of his my packages go for less. You, being a stranger, would probably pay more. Mr Lefebvre, who is not popular with Mr Larue, pays twice as much.

Is Mr Larue a common carrier ? By all our older definitions he is not. He maintains no regular service, has no fixed tariff of rates and is not compelled to carry for everybody who is willing to pay for the service. Possibly he might be fitted into the new class now known as 'contract carriers'. The term 'contract carrier' applies to a trucking company or truck owner who makes a contract with one customer to carry his goods either for one trip or for a number of trips. The usual example is that of a contract made by a large store or manufacturer who wishes regular delivery of supplies or merchandise made in another city. It could probably also be applied to a moving company which, for a lump sum, will move my belongings from Montreal to Toronto. Here again distinctions are difficult to make.

In the meantime, Mr Larue, with his old truck, is taking business away from the railways. He can do this simply because he gives better service. My home at St-Polycarpe is six miles from the railway station. If legislation forced Mr Larue out of business, I should have to hire a team of horses to haul my goods to the station and another team to get them at the station in Montreal. The cost of cartage to and from the station alone would probably equal what I now pay Mr Larue for the whole trip.

Mr Larue is not legally a common carrier. He does not and could not pay even the lowest taxes which we now impose on common carriers. Yet, if we do impose very heavy special taxes on common carriers, they can no longer compete with either the railways or Mr Larue. Most of their business would probably go to Mr Larue anyway. He can give service for which the public is willing to pay a little more.

Owing to the competition of the small proprietor with low overhead, large common carrier trucking companies necessarily operate on a small margin of profit. They have no equation of common costs such as neutralises much of the competitive effort of great railway companies. The physical uniqueness of the business calls for a very small difference, if any, between maintenance taxes imposed on a common carrier and on a privately owned truck.

Passenger autobusses, as distinct from other motor vehicles, are easily reached by special tolls for the privilege of being common carriers. It would seem unfair indeed to this form of motor transport to insist that it should bear a more than proportional part of maintenance costs - all the more so when motorbusses are not the most destructive vehicles on the highway. Certain authorities have sought to compensate for the high road rental fees on autobusses by imposing ridiculous restrictions on competition. In a neighbouring province it is illegal for four friends driving daily to work in a fifth's car to divide among them the cost of the gasoline consumed !

How to handle Mr Larue and the five friends driving to work is a real problem. Restriction may be attempted and penalties be imposed, but contrabrand common carrier transport is bound to continue.

We have now separated motor vehicles into broad classes. To establish a relation between these classes and to distinguish between the vehicles in a particular class, it is necessary to make a further subdivision on the basis of certain features common to all vehicles.

1. The Weight of the Vehicle - This may be measured either as 'net weight', the weight of the vehicle alone, or 'gross weight', the weight of the vehicle plus its capacity load. In general, it is true that any motor vehicle is capable of bearing a load equal to its net weight, so that the maximum gross weight of any vehicle may be taken as twice its net weight.[1] Thus, when we speak of a 'two-ton truck', we

---

1. In the case of passenger vehicles, it is more usual to calculate

mean a vehicle capable of bearing a load of two tons and having a gross weight of four tons.

2. Engine Horsepower.

3. Tire Equipment - There are four kinds of tires, balloon, pneumatic, cushion and solid. These may be of varying sizes, 6-inch, 8-inch, etc.

4. The Number of Axles.

5. The Number of Wheels.

6. The Amount of Highway Space Occupied.

The varying effect on road surfaces of the passage of different vehicles is of great importance in calculating the road rental to be paid by any particular vehicle. We must now consider a means of measuring the 'amount of wear and tear' attributable to any vehicle and treat the question from the point of view of the highway engineer.

---

gross weight as net weight plus seating capacity multiplied by 150 lbs.

Chapter III.

HIGHWAY DESIGN AND WEAR AND TEAR

It is only within the last year that accurate scientific information respecting highway wear and tear has become available. Since 1922, the United States Bureau of Public Roads has been conducting experiments to show the physical effect on the highways of the operation of motor vehicles. Embodied in the testimony of Dr. Thomas H. MacDonald, Chief of the Bureau, given before the Interstate Commerce Commission at the hearing on Co-ordination of Motor Transportation, in March, 1931, the results of these experiments materially change the outlook.

In the past, the importance of stress in highway design has now always been sufficiently recognized. Just as a bridge or building is designed to support a predetermined stress, so must a highway be designed. If a bridge is subjected to a greater stress than it is designed to carry, it breaks down; so will a highway. Highway stress is proportional to impact - the blow with which the wheels of a vehicle strike the road as they pass over it. The measurement of impact thus becomes of prime importance in calculating wear and tear and hence road rentals.

Contrary to popular belief, it is not the gross weight of a vehicle, but the distribution of weight on the wheels of the vehicle that is the most significant factor in determining impact. Impact is not proportional to gross weight, but to the weight borne by a particular axle. This again is affected by the area of contact

between tire and pavement. As the area of contact increases, the impact is spread over an increasing space and its stress on any particular part of the pavement is correspondingly decreased.

Thus, larger tires, and a reduction of the weight borne by any one axle through increasing the number of axles, makeit possible to carry heavy gross loads without increasing impact and highway stress beyond the limit which it is safe for the highway to bear if it is not to break down under the strain.

This may be illustrated by reference to the accompanying table, in which the impact figures are taken from the tests made by the U.S. Bureau of Public Roads, and published in September, 1930.[1]

PNEUMATIC TIRE EQUIPMENT - VEHICLES OPERATED AT 20 m.p.h.					
Class of Vehicle	Rear Wheel Load (lbs)	Max. Impact Force (lbs)	Tire Size (inches)	Area of Contact Sq. In.	
				Net	Gross
7-Pass. Car.	1750	5100	Sing. $7\frac{1}{2}$	35	35
2-Ton Truck.	4400	7900	Dual 6	58	106
3-Ton Truck.	5600	9200	Dual 7	70	112
5-Ton Truck.	9000	12500	Dual 8	104	177
$7\frac{1}{2}$-Ton Truck.	11000	14600	Dual $10\frac{1}{2}$	134	210

1. See Tables I & II, Appendix, for complete chart.

A glance at this table shows that the rough and ready formula, so often used by advocates of high registration fees, that impact may be calculated as increasing in proportion to the square of the gross weight, has no application to motor vehicles. When the tire size, and with it the area of contact, is increased in proportion to an increase in the weight of the vehicle, we find that there is a constant difference of 3500 to 3600 pounds between the rear wheel load and the maximum impact force. That is to say, under these given conditions of tire equipment, highway wear and tear, as represented by impact forces on the highway, may be assessed at a fixed rate per pound rear wheel load and not at an increasing r a t e per pound rear wheel load. An even more equitable distribution is reached by levying on the maximum impact force calculated in pounds.

This last method is just and simple. Once the rate is determined, all that is necessary is a table showing impact forces corresponding to different types of vehicles and tire equipment. While no attempt is made here to give any such complete table as would be required for the practical application of the method, the following, also taken from the figures prepared by the U.S. Bureau of Public Roads, will serve to demonstrate the idea we put forward.

Class of Vehicle.	Rear Wheel Load (lbs).	Max. Impact Force (lbs).	Tire Size (inches)	Area of Contact Sq. In.	
				Net	Gross.
NEW CUSHION TIRE EQUIPMENT - VEHICLES AT 20 m.p.h.					
5-Ton Truck	9,000	13,400	Dual 7	82	113
7½-Ton Truck	11,000	15,500	Dual 8	92	130
NEW SOLID TIRE EQUIPMENT - VEHICLES AT 20 m.p.h.					
5-Ton Truck	9,000	15,300	Dual 6	58	81
7½-Ton Truck	11,000	17,400	Dual 8	98	121

We note that, when new solid tire equipment with dual 8-inch tire size is used, the maximum impact force in pounds of the 7½-ton truck with 11,000 pounds rear wheel load is increased from the 14,600 pounds which it had when pneumatic tires were used, to 17,400 pounds. There would thus be an increase measured by 2800 pounds impact force in wear and tear on the highway.

It is obvious that a highway designed to support the stress of 5100 pounds impact force given by a 7-passenger car would need to be greatly strengthened in order to support the stress of 17,400 pounds impact force given by a 7½-ton truck operating on solid tires.

It does not follow that to be three times as strong the highway must be three times as expensive. Highway strength increases in proportion to the square of the thickness. Each new layer increases the strength of the whole by an amount equal to the square of its own strength.

In highway design there is a certain minimum thickness which is necessary to carry the lightest kind of traffic. As the thickness is increased to support heavier traffic, it is only just that this heavier traffic should pay the cost of the increased thickness. It is in the measurement of this extra cost that, in most cases, much unfairness to heavier vehicles, and in a few cases, unfairness to lighter vehicles, has been common in the past.

Experience has shown that the waterbound macadam road is not economical in the end for even the lightest of motor vehicles. As a matter of fact, narrow wheeled buggies were already proving its frailty before motor vehicles appeared. To-day, a standard highway consists of "a rigid base with a bituminous asphalt mix or a brick or stone block top or a concrete slab without other covering."[1]

---

1. See Interstate Commerce Commission, Docket 23400, "Co-ordination of Motor Transportation", testimony of Thomas H. MacDonald, p.1.

The impact force of the lightest of motor vehicles is not the only factor in calculating the minimum road thickness as the following excerpt from Dr. MacDonald's testimony shows:

"We would not build roads much less than 7-inches at the edge and 6-inches in the centre, no matter what kind of loads we were going to carry. If we built thinner surfaces they would curl up like tissue paper in the rays of the sun. They would warp; the frost heave would destroy them. So we have a certain minimum thickness of road that it is necessary to build if there were nothing heavier than the ordinary passenger cars and farm trucks to use the road, and the whole question of the heavier busses and heavier trucks therefore begins with a certain minimum thickness of road which is necessary regardless of whether they existed or not"[1].

Dr. MacDonald's figures show that a road of minimum thickness is capable of carrying pneumatic tired vehicles as heavy as a 3-ton truck[2]. A 5-ton truck makes an increased thickness of 8% necessary ÷ a $7\frac{1}{2}$-ton truck a 15.4% increase. We have already stated that these heavier vehicles should pay the cost of this increased thickness. To what point can this premise be carried ? Obviously, it is not possible to build highways capable of carrying 20-ton trucks, if such existed, and then to expect the limited number of 20-ton trucks to pay the increased cost. We would then have registration fees two or three times as large as the cost of the vehicle itself.

---

1. Ibid p. 2.
2. Ibid p. 2.

It is necessary to set a maximum thickness for our roads and to prohibit their use by vehicles which exert an impact force greater than the roads can bear.

In Dr. McDonald's opinion, the maximum highway thickness should be that capable of bearing a 9,000 pound rear wheel load - the load of a 5-ton truck operating on pneumatic tires. If this is taken as a standard, the heavier vehicles must either disappear or else become equipped with additional axles which reduce impact force to the 12,000 pound level of the 5-ton truck.[1]

As a matter of fact, cushion and solid tire equipment is rapidly going out of use.[2] Within the next few years it is probable that it will no longer be manufactured. We may prophesy that eventually all heavier vehicles will be equipped with balloon tires which give less impact force than the pneumatic tires used in the foregoing experiments. When threatened with high road rentals on their products, manufacturers have shown their adaptability. If impact force were used as a standard for reckoning registration fees, manufacturers would bend their efforts to designing vehicles which give the minimum impact force in proportion to carrying capacity.

In the above tables, the rear wheel load is taken as being 80% of the gross load. Few vehicles indeed are so designed that the rear axle bears as much of the load as this.

---

1. Ibid p.2.

2. See Appendix, Table III.

In the case of the trailer, for instance, the gross weight is perfectly distributed between axles.

If the road is built on the standard plan, i.e., capable of supporting an impact force of 12,500 pounds, it is 8% thicker and 8% more expensive than is necessary for the lightest of motor vehicles. That is to say, 92.6% of the total highway cost is necessary if only the lightest vehicles were to use the road. The remaining 7.4% of the total cost must be met by a special fee on heavier vehicles. Since the number of heavy vehicles is limited, the road rental fees paid on a particular vehicle will rise rapidly once the 9,200 pound impact force limit is passed. This represents a change from the accustomed practice. Common carrier registration fees are often several times as great as those on 3-ton trucks, but we can find no instance in which heavier privately owned commercial vehicles even begin to pay a registration fee which increases rapidly once a certain limit is passed.

As is well known, there are many vehicles heavier than the 5-ton truck. It would be impractical to legislate these vehicles out of existence altogether. It is practical, however, to discourage their use by high registration fees. The standard road is capable of bearing a few of these heavier vehicles without undue damage. For a long time to come, their number, in proportion to the total number of motor vehicles, will necessarily be few. It is only possible to operate them economically when there is a large and steady volume of goods to be moved. Experience shows that they usually confine them-

selves mainly to certain roads. Thus, the main highway between two important towns would have a considerable amount of heavy traffic, while on other roads this traffic would be negligible. Under these circumstances it is justifiable to strengthen the main highway and charge it up to the heavy vehicles. This plan has been followed in several of the American states[1], where the roads are constructed in varying thicknesses according to the volume of heavy traffic that uses each road.

When a highway is constructed with due attention to impact forces and climatic and soil conditions, maintenance costs will be greatly reduced. Up to within a few years ago, before scientific methods of determining stress were applied in highway design, it was almost accepted as inevitable that motor vehicles would destroy the roads as fast as they were built - that new construction and heavy maintenance charges must go on endlessly. This impression was confirmed by the disintegration of some concrete roads, thought to be everlasting. The fact that concrete is not of uniform strength was forgotten. Like anyother compound substance, concrete must be mixed in certain proportions to produce a given strength. Thus, when calculating stress, it is not possible to generalise, saying that all concrete of uniform thickness can bear the same impact force. For highway purposes, strict attention must be given to this point. When

---

1. And also in the provinces of Ontario and British Columbia.

highway building was farmed out to independent contractors, as it has been in the past, most governments have been content to specify a certain thickness and to take the quality of the concrete for granted. When these roads broke down, heavy motor vehicles were blamed.

The amount of traffic using a road is a relatively unimportant matter if the stress limit of the road is not exceeded. In this connection our authority says - "Material of any character can be fatigued if there are a sufficient number of applications of maximum load applied continuously, perhaps, but in the tests that have been made up to 50,000 continuous applications of loads which stressed the concrete, for example, to 50% of its modulus of rupture, have not fatigued the material. The material will not fatigue within any practical basis of the application of these heavier loads. The roads are more destroyed really by climatic and soil conditions than they are by any use that is made of them by the public"[1].

A vehicle travelling at a high speed, far from being more destructive on the road, as is so commonly supposed, actually exerts less impact force than a vehicle travelling at a low speed. It is possible to skate quickly over thin ice without breaking it, while to stand still would be disastrous. In the same way, a vehicle at rest is harder on the road than a moving vehicle.

---

1. MacDonald, Op. Cit. p. 12.

Chapter IV.

THE GASOLINE TAX.

In the first chapter we outlined an ideal road rental for motor vehicles, basing the rate per mile to be paid by a particular vehicle on its wear and tear on the highway, on the amount of highway space it occupied and on its 'ability to pay'. The total rental was to be directly proportional to the number of highway miles the vehicle travelled. This scheme presupposes some ready means of measuring highway mileage - found in the gasoline consumption of the vehicle. Gasoline consumption is valuable as more than a measure of mileage alone. It varies with the weight of the vehicle, with the speed at which it moves, with the tire equipment and with the ability of the driver to economise on the gas. Thus, a tax on gasoline has definite advantages:

1. It is easily collected.
2. It taxes heavier vehicles more than light.
3. It is directly proportional to the highway mileage of the vehicle.
4. It taxes vehicles maintaining an excessive rate of speed more than others.
5. It taxes vehicles using solid or cushion tire equipment more than those using balloon or pneumatic tires.
6. It encourages economy of design.
7. It taxes touring or visiting cars which would otherwise use the highways free.

Simplicity of collection is of some importance from the point of view of governing authorities. For this reason they are in favour of gasoline taxes perhaps with little consideration of their other advantages. The gasoline tax may be handed over to the wholesaler for collection. Once he is properly bonded, the government has nothing to do save accept the money he pays them. The wholesaler maintains a special staff to handle the gasoline tax and deducts a commission, usually of from 2 to 3% on all taxes paid. There have been many complaints from oil dealers that this commission does not cover the cost of collection, but in the last year one or two provincial governments have found it possible, under protest, to decrease the commission percentage. Another method is to collect the tax, not from the wholesaler, but from the retailer. This method is not without its disadvantages and, though still in use in the United States, has been abandoned in Canada.

Until recently, there was little room for evasion of the gasoline tax. As it was gradually increased, the profits which unscrupulous dealers could make from successful evasion became considerable and certain American writers have classed the 'bootleg' gasoline industry as one which is rapidly assuming the tremendous proportions of the 'bootleg' liquor industry. Evasion is possible in several ways. If one state or province has a higher gasoline tax than its neighbour, it pays a not too conscientious retailer to smuggle

his gasoline in from the neighbouring province or state and sell it to the consumer at the same price as he would have charged had the proper gasoline tax been paid. Here there is an opportunity for additional evasion. The gasoline tax is levied as a road rental on motor vehicles using the roads within the jurisdiction of a particular governing authority. Thus, the wholesaler in one province or state does not collect a tax on gasoline which is to be 'exported' to another province or another state. The tax evader may send his tank truck into a neighbouring province or state, claim that the gasoline is for export, pay no tax to this government and then sell the gasoline at home without paying any tax to his home government either. The tax is thus completely evaded and the wholesaler is protected - he sold 'for export'. Recognizing this, one or two governments refuse to allow 'export' except under bond.

An unscrupulous wholesaler may fail to make the proper returns to the government and either collect the tax for himself or share the profit with a retailer. In the State of Indiana an investigation disclosed that one company alone had withheld $125,000[1] in gasoline taxes - an amount that would have provided about 2½ miles of hard surfaced roads. Twenty-eight oil companies in California have appropriated, over a period of years, nearly $2,500.000 that should have been paid in gasoline taxes. Other governments have uncovered cases of fraud equally bad.

---

1. See John T. Flynn, "Bootleg Gasoline", in Collier's, the National Weekly, December 5. 1931.

When the tax is collected from the retailer, another system of evasion is followed. Taxes are collected quarterly and 60 days grace after the end of the quarter are allowed before settlement. Thus, a retailer may retain in his possession taxes for a period of over five months. The man who opens a small filling station for the summer months will have, by the end of August, taxes for April, May, June, July and August. The total sum in taxes represents about four times as much as he has made in profit on his gasoline. There is every temptation for him to walk out of his filling station and disappear, to crop up again under a new name in a different part of the country, next season. The risk of capture by the police is no greater than in any other kind of law breaking and the profits are sure. In this case, the state not only loses the gasoline tax, but also has the additional expense of searching for the criminal. It is not surprising then, that most states are abandoning the collection of gasoline taxes from the retailer.

The gasoline vendor who is anxious to evade the gasoline tax and still remain within the law, has one other means at his disposal. Gasoline may be diluted with certain distillates which are tax free. Some of these distillates improve the gasoline as motor fuel, while others weaken it. The first and crudest method was to pump pure water into the tank and keep it sufficiently churned to preserve some sort of mixture. Customers who bought such a concoction once rarely returned to the filling station which sold it. Other distillates, however, notably alcohol, while more expensive, improved the gasoline. A mixture of this kind pays a tax only on its gasoline content

and the tax paid to the government is reduced in proportion to the percentage of distillate in the gasoline. The obvious remedy for this is to tax the distillate. But when this is done the differential in price between an expensive but untaxed distillate and highly taxed gasoline disappears, The motorist must then revert to the use of pure gasoline. The tax thus means that commercial use of the distillate is no longer possible.

It is seldom that the profits of gasoline tax evasion are handed on to the final consumer, except in so far as those who handle 'bootleg' gasoline are themselves gasoline users. The consumer pays the full amount, happily ignorant that he is supporting a racket. Occasionally a dishonest dealer does try to increase his sales by lowering his prices slightly. In a business so highly competitive as that of retailing gasoline, where legitimate profits are down to a competitive minimum, such an action is bound to evoke suspicion. The dealer who sells for a cent or two less than the normal price per gallon will have the police wondering how he is able to do it and must needs watch his step.

It is claimed that illicit gasoline refineries are operating under somewhat the same conditions as illicit stills and that their product is sold by retailers through tanks which purport to contain well known brands. As a rule, the poor quality of this product makes it easily recognisable and the matter then passes into the hands of the police department. The extent of this 'racket' is not known, but it is probable that, notwithstanding the publicity which it has been given during the past year, it is somewhat less than is popularly supposed. In any case, the question is one for the police rather than the highways department.

The problem of tax evasion is one of real importance in assessing the road rental. The final road rental is far from equitable if the government does not receive a good proportion of it. Fortunately, the opportunities for gasoline tax evasion are, despite the long list cited above, much less than the opportunities in any similar field of taxation. These faults in collection can be rectified through the application of proper methods. In this connection it is interesting to note a suggestion for increasing the provincial revenue from the gasoline tax, and also the certainty of collection, which was recently made in the provincial legislature of Quebec.

Investigators discovered that there was a considerable spread between the wholesale and retail prices of gasoline. Apparently someone was making a rather large middleman's profit. The Province was finding difficulty in raising sufficient revenues from motor vehicles, not so much to meet its highway expenses as to satisfy the demands of those who claimed that motor vehicles were insufficiently taxed and were offering unfair competition. The manner in which the Province has handled the wholesale liquor trade is a source of great pride to the legislators. It was claimed that if the government were to take over the wholesale distribution of gasoline, it would itself realise the middleman's profit and thereby double the provincial revenues from gasoline without increasing the present cost to the gasoline consumer.[1]

---

1. This suggestion was brought forward by Dr. Gaspard Fauteux, M.L.A. for St-Mary's Division, Montreal, on December 15. 1931.

From the practical point of view, this proposal is undoubtedly sound. It would certainly be a means of raising additional revenue. On the other hand, has the government the right to legislate the wholesalers out of existence altogether ? This government, twelve years ago, legislated both wholesale and retail sellers of distilled liquor out of existence by an overwhelming popular referendum. Here the conditions were different. Liquor control was a mild form of prohibition. It was designed to prevent the promiscuous sale of distilled liquors at low prices, without making them unobtainable altogether. Accordingly, whiskey which formerly sold at $1.00 a bottle now costs $4.50,and the government makes a huge profit, though its primary motive is not financial but social. Gasoline control would be purely for financial reasons - an attempt to secure for the government a disproportionate profit which now goes to the wholesaler middleman. It thus becomes a question of the amount of state interference in business which the people are willing to support. If the government takes control of the wholesale gasoline trade, one more activity is removed from the field of private endeavour and,incidentally,the public at large receives any profits which hitherto went into private hands. In the past, expediency has been the real test for state interference. Governments reluctantly took over shaky railways, or began power developments when private enterprise had shown itself backward. Or else, as in the case of the liquor trade, social reasons prompted interference. It would be a new departure for a government to take over a business simply to secure additional revenues and to protect the public from profit grabbers.

Accordingly, we find that this suggestion is attacked by those opposed to any further measures of state interference or government control, and, naturally, by those in the wholesale oil business. In certain quarters, other arguments are brought forward against it. To some, it is seen as inevitably leading up to a government monopoly of oil refining as well.[1] This, it is maintained, would lead to extremely unfortunate results. A government which carried on an oil refining business would naturally use its products in road building - we should have bituminous road surfaces only. No matter what improvements were made in highway design, the province would go on building roads surfaced with oil compositions. As a matter of fact, at the present time the highway authorities of the Province of Quebec do favour bituminous in preference to concrete road surfaces. To have control of the raw material used in highway construction should decrease highway costs considerably and so lower the road rental which motor vehicle users are called upon to pay.

In theory at least, it is the duty of a government to serve the best interests of the citizens who have created it. In the case of the motor vehicle, a necessary partnership exists between the government and the motor vehicle user. The vehicle user pays for and has a right to expect the best possible service from his government. The government should supply him with adequate roads at a fair cost or else it is no better than the much decried private monopolist. Up to a certain point the government

---

1. See the protest of Chas. M. Black, President of the Royal Automobile Club of Canada, in the Montreal Gazette of December 19. 1931.

can perform this service without interfering with private business. Beyond this point, to improve the service which it is giving the vehicle user, it must necessarily interfere with private enterprise to some extent. The extent to which the government may interfere to improve service rests with those who create the government - with those who are also motor vehicle users. Thus, in the end, motor vehicle users are themselves the determinants of whether or not the government shall take over control of such undertakings as the wholesale gasoline trade, or oil refining. It may be that such a step would prejudice the interest of citizens apart from their particular interests as motor vehicle users. The fact remains, however, that as motor vehicle owners, the citizens would benefit from government control. Whether the government will adopt such a system is another question.

For the present, our interest in the gasoline tax lies in the extent to which it more or less fulfills the conditions which we laid down for an ideal road rental. On page 31 we listed its characteristics. The first of these, ease of collection, we have already considered. The second is that it taxes heavier vehicles more than light. Our discussion of wear and tear has shown that weight, while not the only factor, partly determines the impact force with which the wheels of a vehicle strike the road surface and hence its wear and tear on the highways. We may then compare the gasoline consumption of vehicles of different weights with the impact forces of these vehicles (i) when equipped with pneumatic tires, (ii) when equipped with new cushion tires,(iii) when equipped with new solid tires, and so discover the relation which gasoline consumption bears to wear and tear.

Mr. A.D. Ferguson, of the Bureau of Economics, Canadian National Railways, has deduced an ingenious formula for determining the gasoline consumption of any vehicle of known gross weight for any mileage.[1]

$$G \text{ (in gals.)} = \text{Miles } (0.0695 + 0.2617 \times W) \div 10$$

where W is the gross weight of the vehicle in tons,

and G is in imperial gallons.

This, it must be understood, is a very general formula. It is designed to give an average, not an exact figure for any particular vehicle. We pointed out above that gasoline consumption varies not only with the weight of the vehicle, but also with the speed at which it travels, the kind of tire equipment, and with the ability of the driver to economise on gasoline. Taking account of all these factors, it was found that, on the average, gasoline consumption varies directly with the weight of the vehicle though for particular cases this relation does not always remain true.

Using the formula, we may calculate the <u>average</u> gasoline consumption per mile for any vehicle. Beginning with the 2-ton truck, which has a gross weight of 4 tons, we find that its gasoline consumption is .11 gals. per mile; the 3-ton truck, .16 gals.; the 5-ton truck, .27 gals.; and the $7\frac{1}{2}$-ton truck, .40 gals. If we give the gasoline consumption of the 2-ton truck a value of 1, then the value given to that of the 3-ton truck will be 1.5; to that of the 5-ton truck, 2.5; and to that of the $7\frac{1}{2}$-ton truck, 3.6.

---

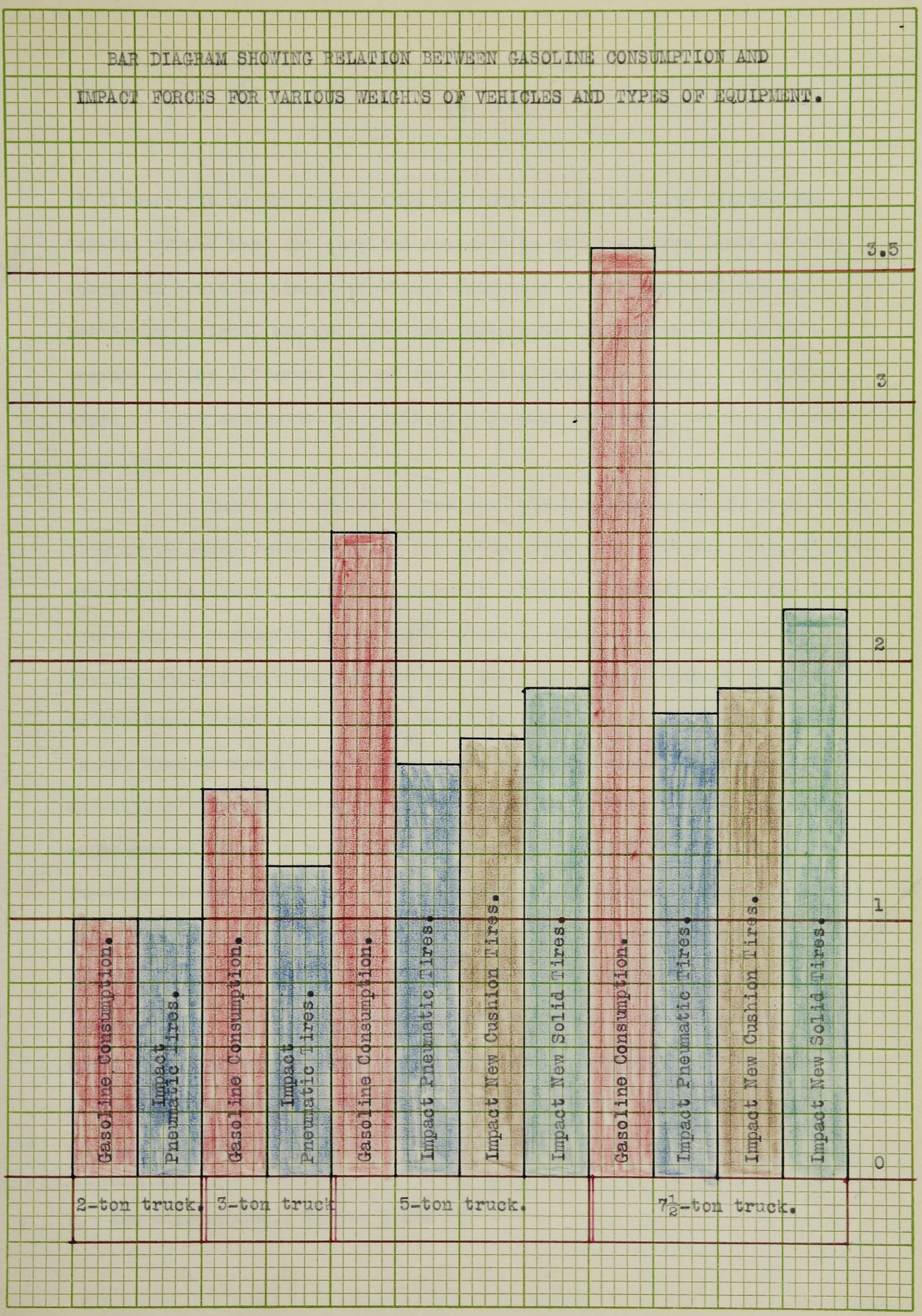
1. A.D. Ferguson, "The Equitable Taxation of Motor Vehicles," an address delivered before the General Committee of the American Railway Association, in June, 1931.

Now, referring back to the tables of impact forces on pages 22 and 24 we see that the impact force of a 2-ton truck equipped with pneumatic tires is 7900 pounds. Giving this a value of 1, the value for the impact forces of the other vehicles will be:

Vehicle.	Impact Force (lbs)	Value.
	(Pneumatic Tire Equipment)	
2-ton truck	7900	1
3-ton truck	9200	1.2
5-ton truck	12500	1.6
7½-ton truck	14600	1.8
	(Cushion Tire Equipment)	
5-ton truck	13400	1.7
7½-ton truck	15300	1.9
	(Solid Tire Equipment)	
5-ton truck	15300	1.9
7½-ton truck	17400	2.2

In the bar diagram on the next page we have a graphical presentation of these figures. It shows that gasoline consumption increases much more rapidly with the gross weight of the vehicle than does highway wear and tear as measured by impact. Since our formula for gasoline consumption is a general one, the diagram does not show the differing gasoline consumption of vehicles using different types of tire equipment. I am told that while a slight difference does exist, it is so small as to be unimportant.

BAR DIAGRAM SHOWING RELATION BETWEEN GASOLINE CONSUMPTION AND IMPACT FORCES FOR VARIOUS WEIGHTS OF VEHICLES AND TYPES OF EQUIPMENT.



If it were put on the graph using the same scale, the line joining the termini of the bars for gasoline consumption for the three kinds of tire equipment would be almost vertical. From this it follows that for any particular weight, the gasoline consumption of the vehicle is not a measure of the different impact forces resulting from the use of different types of tire equipment. We shall have to make allowance for this in some other way.

In the last chapter we saw that the minimum practical road thickness[1] would carry vehicles up to the 3-ton truck, and that our standard road was built 8% thicker than this to carry vehicles as heavy as a 5-ton truck operating on pneumatic tires. The expense of this extra thickness was to be divided amongst vehicles heavier than the 3-ton truck. That is to say, up to the 3-ton truck, road rentals would increase directly with the impact force. Then we would have to take a new basis and from it increase road fees directly with impact force up to the 5-ton truck. Here a third basis is necessary and from it road fees are again increased directly with impact force up to the limit which we will allow on the highways. This gives road fees which are increasing faster than the impact force attributable to the vehicle. Referring to our bar diagram, we find that gasoline consumption increases more rapidly than impact force and hence a tax on gasoline has a trend in the direction which is required by the conditions of our ideal road rental. We may then examine the extent to which this trend conforms to our requirements.

---

1. See also Appendix Tables I and II.

Only 1.45% of the total number of motor vehicles registered is heavier than three tons.[1] This 1.45% must bear 7.4%[2] of the total highway bill, and, in addition, its fair share of that percentage of the total highway bill which represents the cost of a road of the minimum practical thickness, i.e., 1.45% of 92.6% of the total highway bill. This gives 8.7% of the total highway bill that should come from vehicles heavier than the 3-ton truck, leaving 91.3% of the bill to be paid by the remaining number of vehicles. It then follows, by mathematical calculation, that the <u>average</u> vehicle in the heavier than three tons class would pay 6.4 times as much road rental as the average vehicle in the less than three tons class.

The average gross weight of vehicles lighter than the 3-ton truck is two tons.[3] That of vehicles heavier than the 3-ton truck is ten and one-half tons.[4] The gasoline consumption per mile of a vehicle whose gross weight is two tons is .06 gals.,[5] that of a vehicle of gross weight 10.5 tons, .28 gals.[6] Expressed as a ratio, the average vehicle in the greater than three tons class consumes 4.7 times as much gasoline per mile as the average vehicle in the less than three tons class.

---

1. Calculated from Tables IV. and V. in Appendix.
2. Page 28.
3. & 4. Appendix, Tables IV. & V.
5. & 6. Using the Ferguson formula.

After such lengthy discussion of ratios, relatives, and averages, it is interesting to diverge for a moment into actual figures, and find out what the yearly road rental in dollars and cents for our average heavy truck would be. In 1930 the total highway bill of the United States was 1600 millions of dollars.[1] Total motor vehicle registration was 26,523.779.[2] Of this, 1.45% or, roughly, 385,000 motor vehicles were heavier than three tons, net. These 385,000 motor vehicles should be responsible for 8.7% of the 1600 millions, totalling 139 millions of dollars. Accordingly, our average heavy truck should pay $361.00 annual road rental. If its annual mileage were 10,000 miles, since its gross weight is ten and one-half tons, its annual gasoline consumption would be 2817.35 gallons.[3] When a tax of seven cents a gallon is charged, it pays $197.21 in gasoline taxes alone, leaving $163.79 which must be made up in some other way.

The average annual mileage travelled by motor vehicles varies considerably. In the Northern States and in the Canadian Provinces, it is much less than in the Southern States, where year round operation has always been practised. Of recent years, as more and more highways are kept open for winter traffic, the average annual mileage in these northern parts has been increasing rapidly. A figure for the year 1925 is quite useless to-day.

---

1. Appendix, Table VI.
2. Appendix, Table V.
3. Using the Ferguson formula.

The private passenger automobile probably averages between 4,000 and 10,000 miles per annum.[1] The figures of the Western States Traffic Survey carried out under the direction of the U.S. Bureau of Public Roads show that the average daily trip mileage of commercial trucks is one hundred miles.[2] Supposing the trucks to be in use only three hundred days a year, this gives very nearly 30,000 miles per annum. The same authority also calculates that the average common carrier truck or autobus uses the highways about four times as much as the average privately owned truck.[3] The average annual mileage of 30,000 miles includes common carrier mileage as well, so the figure is slightly higher than if privately owned trucks alone were taken.

While our standard road is designed to support the impact force exerted by vehicles as heavy as a 5-ton truck operating on pneumatic tires, it is also capable of bearing a limited amount of traffic which exerts a greater impact force than this.[4] A fair road rental on such traffic is difficult to determine. The proportion of highway costs that may be ascribed to it is a matter of opinion. At first glance there would seem to be little justification for charging this traffic an amount equal to the cost of roads specially strengthened to carry it, when such roads are not built. On the other hand, since these vehicles are vastly more destructive than lighter vehicles because they are operated on a road surface which is not designed to carry them, they should certainly pay a higher rate.

---

1. Mr. A.D. Ferguson's estimate.
2. Appendix, Table VII. also Interstate Commerce Commission, Docket #23,400, Op. Cit. p.4.
3. Ibid p.4.
4. See page 28.

Some kind of compromise is necessary - a higher rate, but not so high as it would be were these roads built. This result may be achieved by distributing that part of the total highway bill that is to be made up from motor vehicles among them in the same proportions as they would be expected to pay did it include the extra cost of specially strengthened roads. The average gross weight of the very heavy class of motor vehicles is about fifteen tons.[1] If our heavy vehicle uses pneumatic tires it is similar to the 7½-ton truck which we noted in Chapter III[2] as making mecessary an increased highway thickness of 15.4% over the minimum practical thickness for the lightest class of motor vehicles. If we take 115.4% of the minimum practical thickness as a basis, we get new ratios for the distribution of the total highway bill, viz., 87%, 6.9%, and 6.1%. Only .29 of 1% of the total number of motor vehicles registered is heavier than the 5-ton truck. To this must be added the relatively small number of 5-ton trucks, barely .01 of 1% of the total[3], using cushion or solid tires. Thus heavy trucks should pay (a) .30 of 1% of 87% of the bill, plus (b) 20% (trucks heavier than five tons are 20% of the total number of trucks over three tons net)[4] of 6.9% of the bill, plus (c) 6.1% of the bill. This gives a total payment of 7.7% of the bill of 1600 millions of dollars or $123,200,000 to come from trucks weighing over five tons. On this basis the average heavy

---

1. Calculated from Tables IV. and V. in Appendix.
2. Page 26.
3. .01 of 1% of the total number of motor vehicles registered.
4. Appendix, Table IV.

truck would pay $1550.00 annual road rental. Using the same method, trucks in the three to five tons class would pay (a) 1.1% of 87% of the bill, plus (b) 80% of 6.9% of the bill, making a total of 6.5% of the total highway bill. That is to say, 6.5% of 1600 millions of dollars, or $104,000,000 would come from vehicles weighing from three to five tons net. Our average truck in this class would thus pay $337.00 annual road rental as compared to the $361.00 which we previously calculated for all vehicles weighing over three tons. The lightest class of motor vehicles would pay 98.55% of 87% of the bill, or 1374 millions of dollars and the average vehicle in this class would pay an annual road rental of $53.00, only $3.00 less than our previous calculation.

These three sums, $53.00, $337.00, and $1550.00 represent the <u>total</u> amounts in actual money payments that the average vehicle in each of these three classes, travelling the average number of miles per annum for each class, should pay. We have already pointed out that the average annual mileage varies considerably for these three classes. Very heavy vehicles must be in constant use to warrant the expense of their purchase. They average close to 30,000 miles per annum[1], whereas the private passenger car makes from 4,000 to 6,000 miles per annum. The heavier vehicle uses the roads more, but it pays dearly for the privilege of being on the roads at all. We have already subsidised the lighter vehicles by making the heavier vehicles pay an amount proportional to what they would have to pay were stronger roads built, thereby reducing the amounts that lighter vehicles

---

1. Appendix, Table VII.

pay.For purposes of equalisation and to prevent the road rental on heavier vehicles from becoming absolutely prohibitive, we have some justification for neglecting the principle of payment directly in proportion to 'amount of road use' as between these three classes.

Thus, we may calculate the amount of annual road rental to be made up 'in other ways' for the lightest class of motor vehicles by subtracting the amount contributed in gasoline taxes on an average of 4,000 to 6,000 miles per annum, while for the heaviest class of motor vehicles we may calculate it by subtracting the amount contributed in gasoline taxes on an average of 25,000 to 30,000 miles per annum.

We are thereby allowing the heavy truck to use our highwaysfive times as much as the light vehicle. At first glance this does not seem right. Objections disappear when we consider the other factors in the case. For the privilege of using the highways five times as much as the light vehicle, the heavy truck or autobus pays nearly thirty times as much road rental. Five light vehicles, which would contribute only $240.00 in road rental, would take up three times as much highway space as a heavy truck or autobus which contributes $1550.00 in road rental in travelling the same distance. When we make allowance for highway space occupied, there are streng arguments for an appreciable reduction in the road rental for heavy vehicles which we have just arrived at by other means.

This brings us to the third advantage of the gasoline tax - that it is directly proportional to the highway mileage of the vehicle.

We have already seen that gasoline consumption is not an adequate measure of the highway wear and tear element in our road rental. In the first stages, where light vehicles are concerned, it increases much faster than the impact force on the highway attributable to a vehicle. If it were not necessary to divide vehicles into three classes to provide for the extra expense of stronger roads, the gasoline tax would have to be counter-balanced by a fee system which was higher for light vehicles and lower for heavy vehicles. As it is, the gasoline tax must be supplemented by other payments which are graduated to make up for its deficiencies as a measure. The first step is to calculate the total road rental that the average vehicle should pay. From it is subtracted the amount paid through the gasoline tax. The remainder is made up in other ways. For a particular class of vehicles, the amount deducted for gasoline taxes is calculated from the <u>average annual mileage</u> of the vehicles. This ensures that the total amounts paid in will equal the required quota for this class. Individual amounts paid in may be greater or less than the average road rental and will vary directly with the highway mileage travelled.

The government thus adopts a system which may be compared to the practice of certain smart restaurants which charge a 'cover charge' for the privilege of entering the establishment and then further in proportion to what the guest has to eat and drink. Here the total amount is determined by the guest's appetite, taste and ability to pay (if the amount of money spent by patrons in a restaurant <u>is</u> an indication of their ability to pay).

The fair road rental should bear as close a relation as possible to the actual amount of highway use, that is to say, to the actual mileage travelled by the vehicle. Hence, the amounts contributed through the gasoline tax should form as large a proportion as possible of the total road rental paid. Some have advocated that the lightest class of motor vehicles should pay nothing but gasoline taxes and that fees or licenses should only be imposed on heavy vehicles. Our discussion has shown that this would be inequitable, because gasoline consumption increases faster than wear and tear as measured by impact, so that the heaviest vehicles in the lightest class would be discriminated against if such a method were employed. There may be some gounds for the contention that, as far as the private passenger automobile, or pleasure vehicle, is concerned, since gasoline consumption increases more or less in proportion to the size of the car, and hence with its cost, this system would constitute an equitable means of measuring 'ability to pay', that more expensive makes should pay considerably more than the cheaper cars and that all would be satisfied if this were done through the gasoline tax.

In the first place, the great majority of trucks also fall into the light vehicle class. An average two to two and one-half ton truck consumes more gasoline per mile than most expensive private passenger cars. There is little relation between the 'ability to pay' of a $1,000.00 2-ton truck and a $10,000.00 limousine, though their gasoline consumption may be about equal. When a tax on gasoline is imposed, it is impossible to discriminate. No government could successfully levy a tax of five cents a

gallon on gasoline sold to a truckman and ten cents on that sold to a millionaire's chauffeur.

The whole question of ability to pay is dangerous. There is always the risk that a high fee on a particular car will be taken as an evidence of unfair discrimination against their product by its manufacturers, to say nothing of its owners and operators. On the other hand, social considerations make some provision for ability to pay necessary. The gasoline tax offers little help in our efforts to measure this elusive factor in our road rental, which properly belongs to the next chapter when we will deal with the registration fee.

We have stated above that since the gasoline tax is the measure of highway mileage travelled, it should form as large a proportion of the total road rental as possible. Other payments take the form of differentials to even up the inequalities of the gasoline tax. This gives us a basis for calculating the amount of tax that should be levied per gallon of gasoline and at the same time the amounts that should be made up from other sources. If our theory is followed too strictly, it leads at once to practical difficulties.

Thus, if A, AB, AC ..... etc. are the total annual road rentals on different classes of vehicles, and X, XY, XZ ..... etc. the total annual gasoline consumption of these vehicles when travelling the annual mileage, and P, PQ, PR ..... etc. the amounts that must be made up from other sources, and T is the tax rate per gallon of gasoline, we get the following equations:

A	=	TX	=	P
AB	=	TXY	=	PQ
AC	=	TXZ	=	PR
etc.....				.etc.

Our ideal value of T would give P, PQ, PR, etc. as small a value as possible, the limit being that in no case may the terms in the right half of the equation be less than zero. As it happens, the total annual road rental was computed on the basis of highway wear and tear. Our investigations showed that, for all vehicles lighter than the 3-ton truck, gasoline consumption increased more rapidly with the size of the vehicle than did highway wear and tear as measured by impact.[1] Thus, the proportion between $\frac{AB}{A}$ is less than that between $\frac{XY}{X}$. This would result in making PQ less than P, that is to say, heavier vehicles in the less than three tons class would have less to pay 'in other ways' (in registration fees and licenses) than lighter vehicles in the same class.

Human nature being what it is, it would be difficult to persuade light car owners that they must pay higher registration fees than those who own heavier vehicles. The gasoline tax is extracted painlessly, bit by bit, whereas the registration fee is paid in a lump sum. A motor vehicle owner is more concerned over lump sum payments than over payments which, though larger in the aggregate, are spread out. One probable result of this system of registration fees would be that persons who now buy new Fords would buy secondhand Buicks instead. The Austin, which gets forty or more miles from a gallon of gasoline would pay a registration fee bigger than itself.

---

1. See page 42.

Owing to these reasons, the maximum value of our T is limited to a figure which would counterbalance the fact that $\frac{XY}{X}$ is greater than $\frac{AB}{A}$, and give values of PQ and PR which are greater than P. When the bogey of ability to pay again interferes with our calculations, we may find it possible to adopt a larger T and charge a higher road rental on certain types of vehicles than strict attention to the highway wear and tear principle would warrant.

The remarkable facility with which the gasoline tax produces a revenue has led some observers to proclaim it the ideal means of paying for the highways. They believe that if the inconvenience of lump sum payments in the shape of registration fees were done away with, motorists would gladly agree to its small inequalities. To us, these small inequalities seem altogether too important to be neglected. The highways have become carriers of competitive commerce. The travelling salesman's automobile operates in direct competition with the railway lines which formerly carried the travelling salesman. The merchant's rural delivery truck is a competitor of the express company. The autobus and common carrier truck are more obviously in competition with the railway. Given these conditions, it is absolutely essential that highway transportation should be placed on a sound cost basis. It is not fair to either type of transportation to adopt any 'approximate' method of levying road rental costs. The operating efficiency of the travelling salesman's automobile is measured against the steam railway in the travelling salesman's eyes. The dice are heavily loaded in favour of the automobile if the road rental fee is lower than a strictly accurate distribution would allow and vice versa.

The gasoline tax began with a levy of one cent per gallon, and has steadily mounted since, a cent at a time. With each increase, legislators, so assured by the motorists' clubs, firmly believed that they had reached the limit of what the trade could bear. Surprisingly, gasoline consumption increased by leaps and bounds. The automobile industry grew, quite regardless of the tax. Each additional cent went to swell a growing revenue. North American legislators touched the four cent level tentatively, stopped for breath, and then promptly levied five cents. In Tennessee, one county levied its own tax to bring the total up to seven cents. The rest of the world was unimpressed. Strange things have happened in Tennessee, Florida, where the tax was largely paid by non-residents, had an excuse to raise it to seven cents. The other States, and the Canadian Provinces, are looking on in admiration, but are dubious. Three other States, which had hitherto kept pace with Florida, began 1931 with a tax of six cents. Pennsylvania became nervous at its own daring after trying a four cent tax for two years and so reverted to three cents.[1] The New England States got as far as two cents and stuck there, satisfied to have built the best highway system on the Continent. In Canada, the tax went up rapidly once the first nervousness was past. Fresh from an overwhelming victory at the polls, the Liberal Party in the Province of Quebec raised its tax to six cents. The oil dealers were "resigned, but admitted the necessity -"[2] the revenue from the liquor trade had fallen off, visitors had less money to spend. The Province of Ontario, hoping that its oil dealers and motorists would also be "resigned",

---

1. See Appendix, Tables VIII and IX.

2. Montreal Gazette, December 18.1951.

decided to follow.[1] In other countries the governments have been more daring. Australia manages to get away with fourteen cents tax and levies much smaller registration fees than in North America. The English tax of eight cents is not entirely for road purposes, while Chile and Perú, where the taxes are twelve and thirteen cents, are mountainous countries and road building is considerably more expenisve. In Bolivia, where gasoline is sold in tins, and costs fifty-seven cents per U.S. gallon, motorists feel that live horse-power is better than taxed gasoline. Even this is an improvement over 1929, when the Bolivians paid sixty-five cents a gallon wholesale for gas.[2]

These higher taxes in foreign countries have certainly tended to encourage economy of design. America, with its low gasoline taxes, became the home of the standardised heavier car. In England, almost from the first, the high cost of 'petrol' and high taxes on it resulted in "tiny cars which darted in and out of the traffic dodging the tax as they went."[3] It is perhaps of some significance that the establishment of branch factories in the American Union for the manufacture of these tiny cars came just recently when higher gasoline taxes were being imposed.

---

1. Nova Scotia is now (April, 1932) up to six cents, New Brunswick up to seven!
2. Appendix, Table X.
3. Dr. Stephen Leacock, lecturing to his class on the "Economic Development of the British Empire", March, 1930.

Highway space occupied is fast assuming a more important place in the road rental. Smaller cars reduce traffic congestion. A New York rush hour made up of Austins would be the traffic policeman's paradise and the heaven of the motorist in search of parking space. As city streets become more and more congested there is added reason for penalising the man who rides to work in a seven passenger or even a five passenger car. In a democracy such as ours, sixty people in a crowded tram would be glad to see ten people in ten motor cars which slow up the tram's passage pay dearly for the privilege.

In Europe, economy of design has not taken the form of economy of space occupied alone. French engineers have applied principles of airplane design to motor vehicle bodies. The American boast of an all steel car is met with a light weight duralumin body, stream lined, mounted on a steel chassis. High pressure balloon tires give it a coefficient of friction with the road surface sufficiently high to produce the required adherence to the road surface which a vehicle travelling at a great speed or up a steep hill must have. At the same time they reduce both shock and drop impact force appreciably. The engine is built with all the attention to power in proportion to weight that goes into the designing of airplane engines. As a result, Americans who want the best are accustomed to go to Europe for their cars. This has been achieved with the minimum of advertising, sure enough evidence of the superiority of the product.

It would be interesting to see what mass production of these cars could accomplish. The American idea has apparently been to reduce the initial cost of the car as much as possible and to make accessories and spare parts cheaply and readily obtainable. Attention to operating costs has been only incidental (except in advertisements) until quite recently, when competition forced it upon the notice of manufacturers. So far, no one in America has produced an expensive car which, through its durability, and economy of gasoline consumption, is a better investment than less expensive makes. The American car has an average life of seven years and rarely remains in the hands of its original owner for half that period. The European expects his car to stay with him, not till it wears out, but until it goes out of fashion after ten years or more of service. Even then, he will probably send it to his country place or give it to his children to play with rather than sell it. The vehicle becomes a family fixture. An aged Parisian has become famous all over the world for the daily trips which he makes in his car, purchased in 1903. It is doubtful whether any American car of this period exists outside of a museum for historical relics.

The European car is designed to give lifetime service to its owner, and, in some cases, to please the fancy of the wealthy foreigner. Americans who bought Rolls-Royces in England ten or twelve years ago, and paid the stupendously high import duties on them, are willing to admit that they have certainly received full value for their money. This has also been true of the cheaper European cars. They started with more economical design and greater durability and have kept the lead.

In our road rental we are forced to set a limit to the total impact force which may be allowed on the highways. A manufacturer who could so design an autobus or a heavy truck that the present relation between gross and net weight was reduced would most assuredly find a market for his product. Economy of design is of vital importance from the standpoint of highway wear and tear. To the extent that the gasoline tax encourages it, we are all for high gasoline taxes. It must not be forgotten, however, that high gasoline prices in Eurpoe had an equal influence with high gasoline taxes in encouraging the spread of vehicles designed to give more miles per gallon. Registration fees, too, which are levied with some attention to wear and tear, are bound to result in economy of design, even though their effect is not so direct.

A too literal application of the law of diminishing returns has led some observers to declare that the gasoline tax is an ideal means of penalising motorists who maintain excessive rates of speed, since to do so entails greater consumption of gasoline than travelling at a more moderate rate. They bring to the support of this argument the well known fact that 'flyer' trains consume more coal than others. When the sky is the limit to the possible excessive rate of speed, the old law does come into play. Highway conditions make actual conditions more nearly conform to the law of the economy of mass production. Actual tests show that a private passenger motor vehicle is operating most economically at a speed of between twenty-five and thirty-five miles per hour. It takes more

gasoline to maintain a speed of under ten miles an hour than to maintain between forty and fifty miles. On few highways is it safe or legal to travel more than forty miles an hour. Many people, once or twice in a lifetime, enjoy a speed of eighty-five miles an hour just to say that they have done so, but few average more than forty-five at the most. Hence, once or twice in a lifetime, the motorist who travels at an excessive rate of speed is penalised by the law of diminishing returns operating through the gasoline tax. The rest of the time, the gasoline tax penalises him if he does not operate at what is approximately the maximum legal speed.

The gasoline tax is the only practical means of reaching touring or visiting motor vehicles which would otherwise use the highways free. When the greater proportion of the road rental comes from gasoline taxes, this works most equitably for all concerned. A motorist who comes from New York State, where the tax is two cents per American gallon and the registration fees are lower than in Quebec, may feel that he is paying heavily for the privilege of being a tourist when he hands over six cents per Canadian gallon to the Quebec government. On the other hand, Quebec roads are used by a proportionally greater number of tourists than are New York roads. It is only just that the visitors should pay their way and the only alternative to a high gasoline tax would be to charge a fractional registration fee when the automobile entered the Province. Spain actually does this by means of the famous "circulation tax;" Canada finds it better business not to.

We may now leave the gasoline tax for the time being and turn to the practical aspects of the registration fee and license. We have already delimited the registration fee by setting it at an amount just large enough to balance the total road rental after allowing for the fact that, up to a certain point, gasoline consumption increases out of proportion to the increase in the total road rental and that beyond this point it increases more slowly. We shall now carry this proposition further, inquire into the methods of levying registration fees, and discuss ability to pay and highway space occupied in relation to the total road rental.

Chapter V.

REGISTRATION FEES AND LICENSES

In the first chapter we tried to place our road rental on motor vehicles in a somewhat different class from other revenues received by a governing authority and to make it approximate to the charges made for other public utilities operated by governments. The terminology we are forced to use goes back to a time when roads and road rentals were not regarded in the same light as they are to-day. Thus we find ourselves using the words 'gasoline tax' to describe the meter rate for road use which we levy on motor vehicles, though it bears no resemblance to a true tax in any sense of the word.

Strictly speaking, the fee is "a charge made for a special service rendered to the individual by some governmental agency. The amount of the fee is supposed to be based upon the cost of the service rendered, or at least on the special cost involved in maintaining and operating the office or bureau by which the service is performed. No account is taken of the varying ability of different recipients to pay. In practice many fees are arbitrarily adjusted without regard to the present cost of the service and their amounts are frequently matters of historical accident."[1]

Our registration fee is purely and simply a part of the road rental. We would be more exact if we called it a 'cover charge', or a 'balancing charge.' By it we mean that part of the total road rental which is not paid in gasoline taxes.

---

1. Lutz, Public Finance, p. 232.

Licenses are outside of the road rental altogether. They more nearly approach a true fee than do our registration fees. Under the general heading of licenses may be included the payments made for making a formal record of a motor vehicle in the books of the highways and police departments and for the number plates which serve to identify the vehicle. The driver's license is a personal thing. It has no connection with the vehicle, and is designed as a safety measure to prevent unauthorised persons from operating vehicles upon the public highways. It is really a certificate showing that its owner is qualified to operate a vehicle, understands the traffic regulations, and should also carry a full description of him for purposes of identification.

The automobile license is usually in the form of a receipt for the payment of registration fees. It costs nothing, since it means no extra expense to the government. The serial number plates which go with it may be treated as accessories to be supplied at cost price. The driver's license should entail an examination to ascertain the applicant's ability to drive and so represents an additional expense to the government. Under most conditions its amount should be just sufficient to cover the cost of this examination. If we consider that motorists ought to contribute to the upkeep of the state or provincial highway police, there are some grounds for introducing the true tax element into licenses and raising them above the cost of service level. Most governments are so interested in simply paying for their highway systems, that highway traffic police, on account of the

multitudinous other duties which they perform, are put down as 'an expense incurred in the common interest of all,' and are maintained out of general taxes.

For some obscure reason, many governments divide motor vehicle operators into four classes and charge different amounts for the driver's license for each class.

1. Operators who drive their own vehicles.
2. Operators who are one of two or more in the same family who drive the same vehicle.
3. Operators who drive somebody else's vehicle for wages.
4. Operators who drive common carrier vehicles either for themselves or for an employer.

Such a classification is simply a confusion of the road rental with the license; an attempt to make the license conform to the same standards as the road rental. Carried to its logical conclusion, we would expect the driver's license to vary with the type of vehicle which the licensee was to drive. The distinction between the first two classes was made purely as a political gesture and was an attempt to cover up the fact that driver's licenses were too high - out of proportion to the cost of the service. The third classification is based on the assumption that the employer pays his chauffeur or truck-driver's license, and, being sufficiently affluent to be able to employ people, was therefore able to pay more. The fourth is a mixture of two equally out of date ideas. First, it is a heritage from the days when only persons who were to be charged with the safety of the sacred public life and limb were examined as to their

ability to drive. Second, it reflects the sincere conviction of legislators, who were hazy about the proper method of attacking the problem, that common carrier motor transport services should pay more and pounced with relief on any means of attaining this object. When we keep the road rental and the license quite separate, confining each to its own sphere, the necessity for such a classification disappears.

The bases from which registration fees may be computed are legion.[1] Nearly all of them are connected with the classification of vehicles which we discussed in Chapter II. Bearing in mind that our objective is a registration fee which will adequately reflect highway wear and tear, highway space occupied and ability to pay, we will now consider the various methods which are used by governments to-day, or have been used in the past, and pick out those which will most nearly give us the equitable registration fee.

1. The Flat Rate.- This method is a survival from the days when motor vehicles were not expected to pay for road use. It began as a payment made for the registration of the vehicle for purposes of identification only. It took no account of the differences between vehicles and treated all alike. As the idea that motor vehicles ought to contribute to the upkeep of the roads gained ground, it was slightly altered. Different rates were charged for trucks and passenger vehicles. These rates were arbitrarily levied. The difference in rates between two classes of vehicles was not based on any definite relation of weight or cost between them and no differentiation was made between vehicles in the same broad class. It has

---

1. See Appendix, Tables XI. and XII.

largely disappeared from use, and, where it does exist, is usually in combination with some other method. In a few cases, it is not really a registration fee at all, but an automobile license, and consists of the payments made for recording the vehicle for purposes of identifiation and for the serial number plates. In these cases, the governing authority has adopted the gasoline tax as its main method of raising revenue.

2. Horsepower - Several governing authorities use the horsepower of the vehicle as one of the factors in determining registration fees. It bears some relation to nearly all of the elements in our ideal registration fee. It varies to some extent with the size of the vehicle, with the highway space it occupies, with the work which the vehicle is capable of doing (i.e. the load which it is capable of carrying,) and with the cost of the vehicle, through which it is connected with ability to pay. In no case is this relation definite enough to afford a basis which will be applicable to motor vehicles in general. For private passenger cars, engine horsepower may furnish a rough guide to ability to pay - where it is desired to levy according to ability to pay without making this too apparent. In the minds of many people, horsepower is connected with potential speed. It seems fair and just to them that a vehicle with a greater potential speed should pay more for road use than a vehicle with a lesser. This idea is bound up with that of safety - that there should be some penalty imposed on the possession of greater potential speed. On the whole, the importance of horsepower in computing registration fees is rather small.

3. Cost Price, Manufacturer's List Price, Factory Price and Value - Each of these is used as a partial basis for registration fee computation by many governing authorities. They give us a ready means of measuring ability to pay. When a man buys a car, we presuppose his ability to pay for it, and the man who buys a Buick has evidently got a greater ability to pay than the man who buys a Ford. The millionaire who buys a Ford, and the man who, to keep up with the neighbours, buys a Buick which he can't afford, are the exceptions which prove our rule. If one man has the ability to pay more for a car than another, there is every reason to believe that he also has the ability to pay more road rental than another and that this greater ability to pay road rental may be measured in proportion to the difference in what is paid for the cars. The first three of these bases, Cost Price, Manufacturer's List Price and Factory Price, amount to the same thing. They make possible a differentiation between new cars. The fourth, Value, introduces another element. Cars do not stay new forever. As they grow older, they deteriorate in value and frequently change hands, bringing their sellers less than they cost them. When a man buys for $500.00 a car that, three or four years ago, cost its first owner $2,000.00, how are we to measure his ability to pay ? Obviously, it is not reasonable to suppose that he can afford to pay as much as the man who paid $2,000.00. Some governments allow for this by revaluing the car each time it changes ownership on the basis of the price paid. When this system is used, very sharp business men could do nicely by selling their cars all around the

family until the selling price was down to a dollar or two, out of all proportion to the value of the car. One or two governments have a system whereby they themselves assess the value of a vehicle when it is brought to them for registration. The position of assessor must be a far from enviable one. In combination with the following basis for registration fee computation, the merits of the value measure of ability to pay may be preserved without any of its demerits.

4. The Number of Times the Vehicle is Registered - This basis is never used by itself alone. It pretends to measure nothing but the ability to pay element in the registration fee by allowing for the depreciation of the car. Like the pitcher that has been many times to the well, the old car is less valuable each time it is presented for registration. When it has changed hands, its new owner's ability to pay may be reckoned by the price he has paid for it. If it has not changed hands, and if these were normal times, if October 29, 1929, were not an important date in business history, we would have grounds for supposing that a motor vehicle owner was just as well able to pay the same registration fee the fourth and fifth season he uses the same car as he was the year he bought it. We have here raised a very nice question in taxation theory. Is the ability to pay element in the road rental to be based on the vehicle itself, or on the owner's financial standing ? There are no analogies, either in taxation or in private business, which may be fitted to the peculiar conditions of this particular case. Throughout this discussion we have continually invoked the principle of justice or equity. It now affords a way out

of this difficulty which, fortunately, coincides with the practice of governing authorities in the past. The purchase price paid for a motor vehicle may be taken as an evidence of the purchaser's ability to pay for the whole period during which he retains possession of the vehcile. When a vehicle changes hands, the new purchase price may be taken as evidence of the new owner's ability to pay, and the ability to pay element in the registration fee reckoned from this basis on the next registration date.

5. Highway Space Occupied - Up to the present time, no governing authority in North America has taken account of highway space occupied in computing motor vehicle registration fees. For our purpose this factor is important in two ways, first, as a relative measure as between motor vehicles; second, from the point of view of safety. We have already discussed how modern conditions have placed highway space at a premium in many instances and hence allowance should be made for the relative amounts of highway space occupied when assessing registration fees. Safety considerations impose definite limits on the maximum size of vehicle which may be allowed on the highways. Here, the width of the vehicle is the most important feature and 'driver psychology' has hitherto played a large part in penalising wide vehicles. It is a curious but well established fact that the driver of a light motor vehicle is almost invariably inspired with uneasiness, not to say a mild form of terror, every time he meets a heavy vehicle on the highway. It has become commonplace to hear drivers exclaim that they would prefer to pass twenty passenger cars rather than one heavy

truck or autobus. The carefree way in which drivers of heavy vehicles assume that they have a right to the centre of the road and that lighter vehicles must pass them with one wheel in the ditch has not made them more popular in the eyes of their lighter road fellows. When the highways are properly marked off into strips and stiff fines meted out to those who ignore them, this feeling against heavy vehicles, often richly deserved, should disappear. The height of a vehicle may be a factor influencing safety when it interferes with vision, but is relatively unimportant. So long as a vehicle is moving in one direction, its length is negligible in so far as safety is concerned. When the vehicle turns, however, the situation is different. Very long vehicles require a larger area on which to turn than do smaller ones and hence infringe on space which does not belong to them. This whole question of safety should not enter into the registration fee at all. It is ridiculous to measure road rental by the varying degrees of safety which may be attributed to motor vehicles. Safety simply lays down a maximum size of vehicle; the registration fee assesses these 'safe' vehicles in proportion to the amount of valuable highway space which they occupy.

6. Pounds or Tons Gross or Net Weight - The majority of governing authorities use the weight of the vehicle as a basis for computing registration fees. Weight is one characteristic common to all motor vehicles and more nearly takes account of all of the elements in the ideal road rental than does any other single basis which we have so far discussed. It was

long believed that highway wear and tear could be calculated more or less accurately from the gross weight of a vehicle. Some governments decided that wear and tear increased in proportion to the square of the weight of a vehicle and levied a rate which increased geometrically according to gross weight. Others, unhampered by an elementary knowledge of physics, were content to levy a rate which increased in simple arithmetic progression with gross weight. Still others, who had more lawyers than engineers on their rate boards, worked out complicated schemes, with countless provisions of whereases and whereifs, setting up schedules of surtaxes as long as a modern tariff and just as unintelligible to all but those who made them. Since highway wear and tear is proportional to impact and impact varies absolutely neither with gross weight nor with the gross weight squared, we are forced to reject both of these as being in themselves inadequate bases for computing our registration fee. The gross weight of the vehicle still remains as an important factor, for it is used, along with other factors, in the calculation of impact, and impact, as the measure of wear and tear, is the primary basis from which we compute the greater part of the road rental.

7. Pounds or Tons Capacity, Chassis Weight Capacity - This basis is merely a variation of the preceding. Its great drawback is that it does not afford adequate means of allowing for the weight of the vehicle itself. In several of our calculations, following established practice, we have used the rough and ready formula that gross weight is equal to twice net weight. While true in general, this proportion does not always apply

in particular cases. Vehicles may be so designed that they are capable of carrying a load heavier than their own weight. If we levy on the basis of capacity, these vehicles, although they exert a lesser impact force on account of their lesser weight, would pay the same registration fee as less economically designed vehicles. On the other hand, if we levy according to gross weight and calculate gross weight as twice net weight, economically designed vehicles pay less registration fee than a strictly equitable apportionment demands. Of these two evils, the second is undoubtedly the lesser, since it is obviously better to encourage economy of design than to penalise it. As our distribution of the road rental is based on the strict exactitude required by the competitive conditions of the industry, we cannot allow a subsidy or penalty in any form and must use a basis which makes possible a more definite application to particular cases.

8. Kind of Tires - Our discussion of impact in relation to highway wear and tear has shown that tire equipment is important indeed as a partial basis from which to compute the equitable registration fee. Some governments have already recognised it and have varying rate schedules for the four main types of tire equipment. So far, no scientific attempt has been made to relate tire equipment exactly to wear and tear. The fact that a relation does exist is understood and each governing authority levies according to its own ideas on the subject. In one or two instances, the rate varies directly with tire size. Two trucks of the same gross

weight may be using different tire sizes, say 6-inch and 8-inch duals. The truck equipped with 6-inch duals pays less than the one equipped with the 8-inch duals, although the impact force it exerts on the highway surface is appreciably greater due to the smaller area of contact between tire and pavement. Fortunately, such glaring injustices are rare.

9. The Number of Wheels - Like the kind of tire equipment, the number of wheels which a motor vehicle has also affects impact force and so may be used as a partial basis to compute our registration fee. It was long believed that extra wheels, (extra axles, really) far from reducing impact force actually increased it, and, where the number of wheels or axles was considered at all, it was only to penalise the vehicle which possessed extra ones.

The highway wear and tear element is undoubtedly the greatest single element in determining the road rental. When vehicles are assessed directly according to the varying degrees of wear and tear which they exert on the highway, no vehicle owner has grounds for complaint. The other factors, highway space occupied and ability to pay, are supplementary. Our total road rental reflects highway wear and tear, slightly modified by the consideration of highway space occupied and ability to pay.

In our investigation of the best means of computing the registration fee, we therefore turn our attention first to those bases which will enable us to calculate wear and tear. Wear and tear is measured in terms of impact force on the pavement or road surface. Impact force is

proportional to the sum of a number of different elements. The relative value of any of these elements varies with the vehicle. The first element in determining impact force is the gross weight of the vehicle. Since we must have an exact gross weight, the old formula that gross weight is simply twice net weight must be discarded. In calculating gross weight we shall use the net weight plus pounds or tons carrying capacity. The next consideration is the distribution of the gross weight on the wheels or axles of the vehicle. We have already pointed out that widely different distributions of gross weight are possible.[1] The impact force on the basis of which vehicles are assessed is that exerted through the wheel or axle which bears the greatest part of the gross weight. Our aim is to decrease impact force on the highways as much as possible, hence it is necessary to encourage the design of vehicles based on this principle by calculating the maximum wheel load exactly in the case of each vehicle. It is not sufficient to make a rough generalisation, saying that the rear axle always bears 80% of the gross weight - this gives no incentive towards the designing of vehicles in which the rear axle bears less. Our ideal registration fee must be delicately attuned to any differences in design which affect impact force if we wish to get results.

Tire equipment is the next factor in the determination of impact. A vehicle of the same design, same gross weight and the same distribution of gross weight on its axles, will exert very different degrees of impact force on the road surface according to whether it is equipped with balloon,

---

1. Page 28.

pneumatic, cushion or solid tires. Thus the 5-ton truck which we used in our previous calculations, when equipped with solid tires exerts an impact force of 22% over what it exerts when equipped with pneumatic tires.[1] Other things being equal, we would therefore expect it to pay 22% more road rental than the pneumatic tired vehicle. Since the number of axles affects the distribution of the gross weight, we must not neglect to mention it as one of the physical characteristics which is used as a partial basis from which to compute the registration fee.

It is a very easy matter to calculate gross weight; any public scale will serve. The calculation of impact requires a little more effort and some knowledge of mathematics. Gross weight appeals to governing authorities on account of its apparently foolproof simplicity. They have long been accustomed to draw up lists of gross weights for every type of vehicle with the assurance that even the least intelligent of their license issuing agents will be able to understand and apply them. Governing authorities would be apt to object to the use of impact as a measure on account of its complexity and the additional work which it involves. As it happens, impact is not nearly so complex as it appears to be. A list of impact forces for distribution among license issuing agents would be no more bulky than the present lists of gross weights modified by tire equipment, value, horsepower or cubic inch displacement, with which they are now furnished.

---

1. Appendix, Table I.

So far as I have been able to discover, no governing authority actually weighs a vehicle of each particular class to determine officially its gross weight. They are quite content to take the figures supplied them by the manufacturer. Since this is so, there is really no reason why they should not accept figures for impact force supplied them by manufacturers. In most cases manufacturers are required by law to deposit with the government complete specifications of their products. It would not be too much to ask them to include impact force in their annual deposition. If any government agent was inclined to suspect a manufacturer of being guilty of miscalculation in the impact force returns, it is an easy matter to check them in a few minutes with pad and pencil.

This brings visions of a new era in automobile advertising. We can see some lucky manufacturer proudly proclaiming; "The impact force exerted by the new Superb model is 20% less than that of any vehicle now offered in the heavy truck range ! " 'SPEED' and 'PERFORMANCE' would be relegated to the lesser headlines, what a relief to those of us who have been literally bowled over by the hit-and-run Speedy Performance in all the jauntiness of its sport-model wavy lettering each time we have opened a magazine for the last ten years ! Thoughtful people would welcome it as conclusive evidence that care of the highways was at last becoming of some importance to automobile manufacturers.

Up to the present we have not considered ability to pay and highway space occupied in relation to the total road rental. In the last chapter we calculated the total road rental that would be paid by the average vehicle in the three weight groups if we assessed them solely on the basis of impact force. When we allow for the other two factors these figures will be appreciably changed. The first step is to determine the relative value with reference to the total road rental which must be given to each of our three factors. To do this, we are forced to depend more or less on rule of thumb methods. We have agreed that the highway wear and tear element is the most important of the three and should therefore be given the most prominence. Next in importance is the ability to pay element. It must form a sufficiently large percentage of the total to produce significant differences in the total road rental paid by different vehicles when there are significant differences in their values. The highway space occupied must be taken into account but is not of the same importance as the other two. It should not be allowed to make any great difference in the total.

With these considerations in mind, we suggest that a suitable ratio between the three factors is, highway wear and tear 60, ability to pay 25, and highway space occupied 15. There is nothing sacred about this ratio. We use it simply because it seems to fulfill as closely as may be the conditions of the case. At least 25% of the total road rental is necessary if ability to pay is to be adequately reflected. We could not allow much less than 15% if highway space occupied is to have any significance in the road rental at all.

When we used impact force as a basis, the average vehicle in each of the three classes paid $53.00, $337.00, and $1550.00, respectively.[1] That is to say, the average vehicle in the three to five tons class paid 6.4 times as much and the average heavy vehicle paid twenty-nine times as much, as the average vehicle in the lightest class. Thus, for 60% of the total road rental our ratios are 1, 6.4 and 29.

Both impact force and value bear some relation to gross weight. In the case of highway space occupied, the relation is almost negligible. A truck carrying a ton of bread takes up as much highway space as a truck carrying four and five tons of iron or gravel. After comparing the overall measurements of representative vehicles in the three capacity fields,[2] we find that the respective amounts of highway space occupied are 92.5, 160.5 and 190.5 square feet. Then, for the 15% of our road rental which is calculated on the basis of highway space occupied, we have ratios of 1, 1.7 and 2, respectively.

If anything, these ratios are unduly hard on the heavy vehicle. They make but tentative allowance for the differing densities of the products carried in the three weight groups. A very important factor which we hinted at in the second chapter,[3] but have since neglected, is the use of vehicles for purposes other than those for which they are primarily designed. A light truck, equipped with stake body, may have a carrying capacity for one ton of eggs in crates, or of other goods which are comparatively light in proportion to bulk. When loaded with eggs in

---

1. See page 48.
2. Specifications furnished by General Motors Products of Canada Limited, Truck Division.
3. Page 16 et seq.

crates the vehicle has a gross weight of approximately two tons, and fits into our picture very nicely. A hardware dealer or scrap iron dealer finds that the 1-ton truck equipped with stake body is a vehicle of convenient size for his purposes and proceeds to load onto it three or four tons of heavy goods. The springs flatten out into rigid buck-board axles, the tires are so strained that blowouts seem to be all in the day's work. The brakes are just so much useless mechanism and the vehicle becomes a menace to safety wherever it goes. For two or three years it clatters heavily over the roads and then, prematurely old, is left on the junk heap. The average life of these vehicles is only one-third that of vehicles which are used for the purposes for which they are designed. In the meantime, great impact forces are exerted through small areas and highway wear and tear is increased many times beyond what it would be were the same loads carried in the proper vehicles. Like insult added to injury, such vehicles pay the same tax as the legitimate 1-ton truck.

Motor salesmen employed by the heavy vehicle manufacturers try to point out the false economy of buying a cheap vehicle which must soon go to the scrap heap, when heavy vehicles would pay in the end in economy, service and safety. The argument goes well until the question of taxes is brought up. Then the sale is lost. No prospective purchaser is so concerned with the care of the roads that he is willing to pay heavy road rentals to conserve them, when he can get along so much better by destroying them through using low taxed, light vehicles for heavy duty!

I happened to be in a heavy truck show room after just such an occurrence. The salesman's observations were interesting indeed. A little later I inadvertently accepted a ride in a light truck that had been used for heavy duty for two years. That will not happen again! It is safer to be a capitalist in Russia or an anti-Fascist in Italy than the driver of such a vehicle.

Heavy truck salesmen tell us that about half the light trucks equipped with stake bodies are greatly overloaded most of the time. The observations of the man in the street would support this contention. There are two ways of overcoming this abuse. One is to tax all vehicles a flat rate so that it is no longer economical to use light vehicles for heavy duty, which is of course out of the question. The other is to prohibit the loading of vehicles beyond their carrying capacity - something that it is easy to talk glibly about, but more difficult, though not impossible, to put into practice. When regarded from the standpoint of safety, overloading takes on the appearance of a serious crime. Under the best conditions highways are potentially dangerous enough zones as it is, without the added risk of overworked and too weak brakes and tires. If we approach it from this angle, it ought not to be too difficult to check up on flagrant abuses.

We must now leave the problem of overloading for the present and will refer to it again in the next chapter. To complete our road rental the ability to pay element alone remains. Since ability to pay is

to be assessed for secondhand vehicles on the basis of the price paid when the vehicle changed hands, it is necessary to take the actual cost in dollars and cents to the purchaser when he drives a new vehicle out of the show room, taxes, insurance, and freight all included. The 'drive it away' prices in Montreal of the three representative vehicles used in our calculations are $900.00, $4500.00 and $5900.00 respectively.[1] Expressed as a ratio, for 25% of the road rental we have the relation 1, 5, 6.5.

Now to sum up:

Highway Wear and Tear, 60% of the road rental, ratios of 1, 6.4 & 29.
Highway Space Occupied, 15% " " " " " " 1, 1.7 & 2.
Ability to Pay, 25% " " " " " " 1, 5, & 6.5.

The next step is to calculate a single ratio for the whole 100% of the road rental. Simple enough. Suppose the total tax on the average vehicle in the lightest class of motor vehicles to be 100 units. Then, for each 60 units paid by the average vehicle in the lightest class, the average vehicle in the three to five tons class would pay (60 x 6.4) units, and the average vehicle in the heaviest class would pay (60 x 29) units. For each 15 units paid by the average vehicle in the lightest class the others pay (15 x 1.7) units, and (15 x 2) units, respectively. For each 25 units paid by the average in the lightest class they would pay (25 x 5) units, and (25 x 6.5) units, respectively. If we add up our units we get:-

---

1. The use of Montreal prices, which were the ones most readily obtainable by the writer, does not change the value of our argument when applied to American highway bills, as the ratio between American prices of vehicles in these three classes remains the same.

Average Vehicle. Lightest Class.	Average Vehicle. Three to Five Tons.	Average Vehicle. Over Five Tons.
60 units	384 units	1740 units
15 "	25.5 "	30 "
25 "	125 "	312.5 "
100 "	534.5 "	2082.5 "

To reduce this to a ratio in which the road rental on the average vehicle has a comparative value of 1, all that remains to be done is to put in the decimal point, and we get 1, 5.3, and 20.8. In other words, for every dollar paid in road rental by the average vehicle in the lightest class, the average vehicle in the three to five tons class pays $5.30, and the average vehicle in the heavy class pays $20.82. Thus, if the tax on the average vehicle in the lightest class remained at $53.00, which is the amount obtained when impact alone is considered, the other vehicles would pay $280.90, and $1102.40 respectively, instead of $337.00 and $1550.00, at which we formerly assessed them. If this plan is followed, we find ourselves several million dollars short in our total. A new basis is necessary. We have established a relation between the average vehicle in the three weight groups. Let us next see what actual tax in dollars and cents it is necessary to impose in order to raise the 1600 millions of dollars which represents the total highway bill of the United States.

The percentage grouping of motor vehicles is:-

Under Three Tons	-	98.55%
Three to Five Tons	-	1.15%
Over Five Tons	-	.30% [1.]

In actual numbers:-

Under Three Tons	-	26.112,000 vehicles
Three to Five Tons	-	305,000 "
Over Five Tons	-	73,000 "
TOTAL:	-	26,500,000 " [2.]

On the average, each of the 305,000 vehicles in the three to five tons class must pay 5.3 times as much as the average vehicle in the less than three tons class. This is the same as saying that these 305,000 vehicles must be responsible for as much as (305,000 x 5.3) or 1,616,500 vehicles in the light class, and the 73,000 vehicles in the heavy class responsible for as much as (73,000 x 20.8) or 1,518,400 light vehicles. Thus, for taxing purposes, the 26,500,000 motor vehicles of all classes in the United States have the same taxable value as (26,112,000 plus 1,616,500 plus 1,518,400) or 29,246,900 vehicles of the less than three tons class. Dividing this into 1600 millions, we find that the average

---

1. See p. 44 et seq.

2. See p. 44 et seq.

vehicle in the less than three tons class must pay $55.00. Hence, the average vehicle of from three to five tons should pay ($55. x 5.3) or $291.50; and the average heavy vehicle, ($55. x 20.8) or $1144.00 annual road rental.

Too much importance must not be attached to the results I have obtained through the use of actual figures in dollars and cents. They are used simply to illustrate the method I suggest for the equitable distribution of a highway bill. In the huge mass of available statistics dealing with motor vehicles, all data necessary for the proper application of this scheme are not to be found. Conditions differ in each locality. Each governing authority has its own statistical methods and its own particular problems. A small army of trained statisticians could work for months and still be unable to present a complete picture. The dollars and cents distribution of the highway bill will be very different in each locality. It will vary with the amount of money to be raised and the proportion of heavy vehicles to light vehicles which is never the same for any two places. Each province and each state is responsible for its own highways. The Province of Quebec and the State of New York may be using exactly the same method of distributing their highway bills, but we would still expect to see a considerable difference in the actual amounts paid by the same type of vehicle in the two areas, since Quebec has only 170,000 vehicles while New York has over 2,300,000.

Bearing in mind that the tax relation which we have established between motor vehicles is but an approximate one, it is interesting to see how it compares with the relation actually existing to-day. In the 1931 edition of Highway Tax Costs, by John E. Walker, former Special Assistant on Taxation to the Secretary of the Treasury, published by the National Automobile Chamber of Commerce,[1] the following table is given:-

	Special Taxes.	Times Private Car.
Private Passenger Car	$25.52	1
Average All Trucks	53.78	2
Privately Operated 3-ton Truck	161.27	6-1/3
Common Carrier 3-ton Truck	458.78	18
Common Carrier Bus	575.00	22-1/2

It will be seen that there is a considerable spread between the figures in this table and our own calculations. The chief reason for this is that our calculations were based on the supposition that motor vehicles would pay the whole 1600 millions of dollars which represent the total annual highway bill of the United States, whereas at the present time they contribute but $1,000,388,000[2] towards this fund. That is to say, if we accept the findings of the English Royal Commission on Transport,[3] motor

---

1. Op. Cit. p.5.

2. Facts and Figures of the Automobile Industry, 1931, p.59. Published by the National Automobile Chamber of Commerce. See also Appendix, Table VI.

3. See p. 6.

vehicles are paying just a little under the two-thirds of the total highway bill which they may reasonably be expected to pay. Besides the 1600 millions of extra-urban highway bill, throughout the United States about 600 millions of dollars is spent annually in paving the streets within incorporated cities and towns.[1] If we include this in our total highway bill, it mounts up to 2200 millions of dollars, of which less than half comes from motor vehicles . We stated in the beginning that in our opinion street paving within incorporated cities and towns could not reasonably be charged to motor vehicles when such huge amounts are required for the maintenance of extra-urban highway systems which so undoubtedly benefit both urban and rural citizens alike. On the other hand, there is every reason why motor vehicles should be able to pay at least the 1600 millions of the total extra-urban highway bill. If each motor vehicle in the United States, regardless of its size, in addition to what it already pays, contributed another $18.00 annually, the amount would be brought up to the required 1600 millions. If the average road rental on <u>all</u> trucks is at present but $53.78, while the average for a privately owned 3-ton truck is $161.27, there is obviously something wrong. Very light trucks are getting off too easily, while the 3-ton truck, itself of moderate weight, is certainly paying more than a fair proportion. According to our calculations, the average vehicle in the three to five tons class should pay 5.3 times as much as the average light vehicle. In actual fact, the

---

1. Appendix, Table VI.

3-ton truck, which properly belongs to the light vehicle class, pays 6-1/3 times as much as the private car, although the difference in the impact forces exerted by the two is as 1.8 to 1! When we remember the overloading of light vehicles which exists to-day, the gravity of the situation becomes only too apparent. For the present we will not consider the common carrier truck which pays 18 times as much, nor the common carrier bus which pays 22-1/2 times as much, as the private car.

The 1600 millions of dollars of the total United States highway bill is not really so stupendous a figure when the total number of motor vehicles is taken into consideration. If we divide it amongst the 26-1/2 million motor vehicles registered, each vehicle would have to pay but $60.38 annual road rental. In 1930, the United States consumed 15,761,400,000[1] gallons of gasoline. A tax of a little over ten cents a gallon would produce enough revenue to pay the highway bill. Let Americans, accustomed to two and three cent taxes, remember that in other countries, less fortunate, motorists have been paying twelve to seventeen cent taxes for years, in addition to registration fees.

The present tendency is to clamour for high road rentals on common carriers and heavy vehicles, to talk of the taxpayer's burden, while in the meantime the light vehicles, most numerous, are happily sailing over the highways, confident that no one will ever touch them. Governing authorities, when searching for more revenue, might do well to remember than an increased tax of one dollar on the light vehicle will produce over twenty-six millions of dollars, and cease their efforts to raise a mere one

---

1. Facts and Figures of the Automobile Industry, 1931, Edition, p.57.

million dollars by charging 73,000 heavy vehicles an extra ten or twelve dollars apiece.

If every motor vehicle were not to some extent in competition with other forms of transportation, there are grounds why the division of vehicles into three classes according to extra road thickness and expense directly attributable to these classes should be done away with and a road rental scheme based simply on a graduated impact force scale used to take care of the highway wear and tear element in the road rental, while highway space occupied and ability to pay were assessed as we have already set forth. A still simpler means could be adopted. In our bar diagram on page 42 we showed that gasoline consumption increases much faster than impact force, but does not increase quite fast enough to take adequate account of extra highway thickness and consequent expense attributable to vehicles in different impact force groups. If we could afford to neglect the fullest application of the principle of payment in proportion to increased highway thickness, we could secure a partial application of it by levying our road rental through the gasoline tax alone. Thus, we would be charging a $7\frac{1}{2}$-ton truck 3.6 times as much as a 2-ton truck, although its impact force is but 1.8 times that of the 2-ton truck. As already mentioned, a ten cents a gallon tax would take care of this. We could throw our laborious methods of calculating road rentals into the discard, dispense with our polite requests to automobile manufacturers to measure impact for us and make a bonfire of the thick

books which we send out to license issuing agents to enable them to levy registration fees. Alas for such pleasant dreams of unattainable simplicity! In the first place, other forms of transportation demand that competing motor transport shall be taxed in strict accordance with the cost of service principle. As these other forms of transportation are essential to national welfare, we cannot very well refuse to listen to their complaints. Again, while our plan for a simply graduated impact force scale would allow for economy of design and proper distribution of the load carried by motor vehicles, a gasoline tax, of itself, would not. Badly designed vehicles would be paying the same road rental as their fellows which were responsible for less highway wear and tear.

Before continuing with the registration fee proper, which we have neglected now for several pages, there is one more point in connection with the private passenger car or 'pleasure' vehicle' which is worthy of our consideration. As its name implies, the 'pleasure vehicle' is not used for commercial purposes. Its owner is Mr. Citizen, Mr. Taxpayer, or, better still, Mr. Consumer. Modern economic writers tell us that Mr. Consumer, born in the days of Adam Smith, a 'lusty infant' in the time of Ricardo, flourishing, fullgrown and bearded with J.S. Mill, is now dead. So much the better. He need concern us no more. Still, as the phantom owner of the 'pleasure vehicle', we may still steal gold from his lifeless hands. The commercial vehicle, common carrier or otherwise, is the only vehicle which must be assessed strictly in proportion to cost of highway

service. It is, in most cases, a business necessity. The pleasure vehicle is something of a luxury. Notwithstanding the often repeated hope of the American motor magnate who looks forward to a day when every American old enough to hold a steering wheel will have one car to drive on week days and another one put away with his good suit to be brought out on Sundays, the man who owns a car, no matter what his occupation, is no longer one of the proletariat. He at least belongs to the lower middle class. It would be heresy of the worst order to tax the pleasure vehicle more than its fair proportion in order to lower the taxes on the heavy vehicles, or even on commercial vehicles in general. What might be done is first to calculate the fair share of the total highway bill that a pleasure vehicle should pay and then add to this a surtax to be applied on the intra-municipal paving accounts. It would do the sixty people whom we left riding in a crowded tram in the last chapter good to see the fat millionaire in his expensive limousine paying considerably more than the driver of a 1-ton or 2-ton truck, even though the fat millionaire already pays a little more through the ability to pay canon applied through value. On the whole, small trucks cost more than small pleasure vehicles. The pleasure element in the possession of a pleasure vehicle is not appreciably diminished if the owner pays about four dollars more per annum for his pleasure, such payment to be spread over a year - about thirty-four cents a month, or a little more than eight cents a week. Such a levy would mean 100 millions of dollars towards the 600 millions of dollars required for paving.

Let us now return to the registration fee itself. Before the discussion of the value which was to be given to the highway space occupied and ability to pay elementsin the total road rental, we had got as far as the bases from which the registration fee was to be computed and had concluded that we should need to know the following facts about a vehicle in order to assess a registration fee for it:-

1. Net Weight.
2. Maximum Capacity Load.
3. Number of Axles and Wheels.
4. Kind of Tire Equipment.
5. Distribution of Gross Weight on Axles.

From these five factors, the manufacturers were to calculate the maximum impact force exerted through the wheel or axle which bears the greatest part of the gross weight.

Next we need to know:-

6. Highway Space Occupied.
7. Price Paid by the Present Owner for the Vehicle.
8. Average Annual Gasoline Consumption for this Type of Vehicle.

Our registration fee consists of the total road rental less the amount contributed in gasoline taxes. Hence we must know both the total road rental and the amount contributed in gasoline taxes, before we can calculate the registration fee. To take a concrete example, the $7\frac{1}{2}$-ton

truck operating on pneumatic tires is expected to pay a total annual road rental of $1144.00. Based on an average of 25,000 miles per annum, it consumes 10,000 gallons of gasoline annually.[1] If a seven cent tax is imposed, it would pay $700.00 through the gasoline tax, the remainder, $444.00 to be made up by the registration fee. This is all very well so far as the 7½-ton truck is concerned, but what we want is a relation which will enable us to determine quickly the registration fee on a 5½-ton truck, or on a 10-ton truck, or on any vehicle in the heavy class. In other words, we need a rate per pound impact force, a rate per dollar of value, and a rate per square foot of highway space occupied, applicable to all vehicles in the heavy class.

Our $1144.00 annual road rental on this 7½-ton truck which we took as the average for all vehicles over five tons, is made up of three factors. Each of these three factors was calculated separately from the corresponding factors of the average vehicle in the less than three tons class. The $1144.00 represents 2082.5 units (see table page 82). Of these 2082.5 units, 1740, or $956.00 represent impact force; 30, or $17.00 represent highway space occupied; and 312.5 or $171.00 represent value.

The impact force attributable to a 7½-ton truck operating on pneumatic tires is 14,600 lbs., so our rate per one hundred pounds impact force is $6.55. The highway space occupied by our average vehicle in the heavy class is 190.5 sq.ft.,[2] so our rate per one hundred square feet of

---

1. Using the Ferguson formula.

2. See Page 78.

highway space occupied is $8.90. The 'drive it away' price of our average heavy vehicle being $5900.00, the rate per $100.00 of value is $2.90.

From this it is an easy matter to calculate the registration fee for any vehicle over five tons. The forms used by the governing authority in calculating a particular registration fee will look something like the following:

(1) Model .....

(2) .....hundred lbs. impact force at $6.55 per 100 $ .....

(3) .....hundred sq.ft. highway space occupied at $8.90 per 100. $ .....

(4) $.....purchase price paid by present owner at $2.90 per $100.00. $ .....

(5) TOTAL: $ .....

(6) Less amount contributed in gasoline taxes at .....¢ per gallon on average annual mileage of.. ....miles. $ .....

(7) REGISTRATION FEE $ .....

All but one of these amounts will be filled in by the governing authority, so that the issuing agent will have only one calculation to make - the value variable which depends upon the purchase price paid by the present owner of the vehicle. For example, let us take the 5-ton "Superb" model truck equipped with stake body, but using cushion tires, which place it in

the heavy vehicle class. In this vehicle, sad to relate, the gross weight is very badly distributed, a full 80% is borne by the rear axle alone, so it exerts an impact force of 13,400 pounds on the highway.[1] At the rate of $6.55 per 100 pounds impact force, it pays $877.70. The highway space it occupies is 123 sq. ft.,[2] and at the rate of $8.90 per 100 sq. ft., it pays $10.95. Calculated on an average annual mileage of 25,000 miles, and a seven cent tax on gasoline, the amount it contributes through the gasoline tax is $472.50.[3] Thus, before we allow for value, the registration fee is $877.70 plus $10.95, less $472.50, or $416.15.

When the owner of such a truck brings it to be registered, and to pay the registration fee, the issuing agent simply looks up "Superb' model, 5-ton, dual 7" cushion tires," and finds the figures, "Registration fee $416.15, plus $2.90 per $100.00 purchase price paid by present owner," and the job is done. The government gets the money and the truck owner drives away, probably deciding that the next truck he buys will be equipped with balloon or pneumatic tires so that his registration fee will be lower.

In the same way the rates for vehicles in the other two groups may readily be calculated. It is unnecessary to risk trying our patience too much by doing it here. The method is plain enough.

---

1. See tables on page 24.
2. Calculated from a representative vehicle in this class.
3. Using the Ferguson formula.

Such a plan could not be put into execution all at once. Before it is attempted at all, each governing authority must collect the required data dealing with the motor vehicles which are actually in operation on its highways. From this data the proportion of the total highway bill that is to come from each class of motor vehicles could be determined. Authorities who at the present time collect huge masses of statistics concerning motor vehicles, much of them irrelevant for their own purposes, should not shy at the not too difficult task of co-ordinating and fitting them to practical uses in the field of taxation. If it means a few extra officials for the time being, so much the better; what a boon to the white collar unemployed and what a satisfaction to our legislators who talk even in their sleep about "work, not doles!" This would be one form of unemployment relief work which would prove of lasting value if it did anything towards relieving the present vexed question of motor vehicle taxation.

An added reason why our scheme could not be put into practice all at once is that it probably entails some considerable differences in the road rentals now paid by certain types of vehicles. If these differences represent reductions,so much the better. No motor vehicle owner would object to a reduction in the rates he how pays. If, on the other hand, they entail any substantial increases, it is not fair to vehicle owners, many of whom have been influenced to buy their present vehicles by duly considering the question of taxes, to increase road rentals suddenly to any great extent.

In cases where an increase is called for, it must be a gradual one if undue hardship is to be avoided.

We have not finally settled the question of registration fees or even of the total road rental. They will each be qualified by the considerations introduced in the following chapter.

Chapter VI.

LIMITATIONS PLACED ON MOTOR VEHICLES

Almost all governing authorities have limits to the gross weight and the linear measurements of vehicles on the public highways. It is rarely indeed that the actual limitation is the same in any two instances. They may, however, be classified under the following general headings:-

1. Limitations which apply on all public roads, highways, paved streets or lanes within the jurisdiction of a governing authority and which take no account of the different strength of these roads.

2. Limitations which apply only on roads outside the boundaries of inderporated municipalities. In most of these cases the municipality is allowed to make its own limitation if it so desires. In passing it should be pointed out that very few municipalities do bother to set limitations. Large cities frequently allow heavier traffic within their own limits, whereas in smaller municipalities the question does not arise. It would not pay an operator to buy a heavy vehicle when he was only allowed to use it within the narrow borders of his own municipality, so he naturally remains governed by the provincial or state limitation.

3. Limitations which vary according to the strength of particular highways. As previously mentioned, many governing authorities have built specially strengthened highways in areas of dense traffic. On these highways they permit the operation of heavier vehicles.

4. Limitations which vary with the seasons. In certain seasons of the year, the wear and tear on many types of roads d u e t o the passage

of motor vehicles is greater than in others. Even after allowing for the fact that in winter the highways are more or less protected by a coating of snow and ice, the use of chains by most motor vehicles more than counteracts this. In the spring, a stream of motor vehicles travelling a muddy gravel road will send a large part of the gravel covering into the ditch and generally hasten deterioration. The result of this form of limitation is that the winter or spring limit usually becomes general for all seasons. Most vehicle owners to-day require the year round operation of their vehicles. They do not care to purchase equipment which may only be used for part of the year.

The accompanying tables show the limitations in force in the different states and provinces at the time of writing.[1] Let us first look at the limitations on gross weight. The standard road of the United States Bureau of Public Roads is designed to support a load of 18,000 pounds per axle, when a vehicle is operated on pneumatic tires.[2] Assuming that 80% of the gross weight is borne on the rear axle of the vehicle alone, this would allow a maximum gross weight of 22,500 pounds per vehicle, which is about the gross weight of a 5½-ton truck loaded to capacity. Referring to the table of limitations in force in the United States, we find that, of the forty-five states listed, only two, New Mexico and West Virginia, take axle load into account at all. Of these two, New Mexico sets its limitation at the standard 18,000 pounds rear axle load approved by the

---

1. Appendix, Tables XIV and XV.
2. Interstate Commerce Commission, Docket No. 23400, Testimony of Thomas H. MacDonald, p.3.

best available authority on highway engineering, the United States Bureau of Public Roads, West Virginia allows a little more, 22,400 pounds. Of the remainder, sixteen states refuse to permit the operation of vehicles as heavy as the 5½-ton truck operating on pneumatic tires; in other words, their limitation is lower than the 18,000 pounds rear axle load approved for the standard road. The twenty-seven other states included in the survey allow gross weights ranging from 23,000 up to 40,000 pounds. The average for the whole is 23,500 pounds.

In Canada the maximum gross weights allowed are much lower. The two most important provinces, Quebec and Ontario, take axle weight into consideration, but in both cases the maximum axle weight allowed is less than 18,000 pounds. The main reason for this is that the average Canadian highway is not built as strong as the standard road. With few exceptions, most improved Canadian highways consist of a waterbound crushed stone or semi-macadam base covered with a bituminous asphalt mix.

Canada is just emerging from the experimental period in highway building. Fortunately for us, the experiment has not proved so costly as some disciples of gloom would have us believe. When the provinces first became interested in highway building, their interest took the form of handing money over to local authorities to use as they saw fit. Members of the provincial legislatures were often judged by their ability to get grants for their home counties from the provinces. This was the heydey of the local contractor. He simply slapped crushed stone and asphalt over

the existing roads without any attention to dangerous curves and grades. No attempt was made to widen highways which had been built for horse traffic. All local roads led to the local village or county town. In those provinces where the county is the road building unit most of these grants went into improving the various approaches to the county seat. It thus happened that a farmer driving to market was sure to get improved roads part of the way at least. Under the township system, when a village was lacking, the road went wherever the town council thought it would look best.

The result was that isolated areas of more or less good road were acattered all over the province. In the early days no one expected to travel by road very far beyond the boundaries of his own county. It was enough that the residents of St-Peter County could get to St-Polycarpe, the county seat. If any one was so ambitious as to wish to get to St-Nicodemus, county seat of the neighbouring county of St-Paul, he had to take a roundabout route, four or five miles longer at least. With the advent of the motor vehicle, provincial grants made possible improved roads at the approaches to both St-Polycarpe and St-Nicodemus. To get to one place from the other, however, a motorist still had to take a roundabout route, much of it over almost unspeakable roads. The terrible roads were the first complaint, so the next provincial grant went into improving the worst sections. In most cases the idea of building a direct route, instead of wasting money on one four or five miles longer than

was necessary, did not occur to those in charge. Improved roads zig-zagged all over the province. It was possible to go from one place to another a hundred miles or so away, by travelling one hundred and twenty-five miles and passing through every considerable village or town for a radius of ten miles either side of the route as the crow flies.

When the provinces actually began road building on their own account, their first concern was to build trunk lines between important centres, utilizing existing right of way as much as possible. A mistake that was almost universal was the failure to build the new roads wide enough and to eliminate dangerous curves and unnecessary gradients. To-day,a large proportion of the annual highway bill goes into widening and into the expropriation of sites for new right of way to eliminate curves and gradients, when these sites have acquired additional value from the improved highway which formerly curved by them. In many parts of Canada abandoned sections of improved highway are a familiar spectacle.

When we consider the expense involved in carrying out new construction and in paying for our past mistakes, it is not surprising that the average Canadian highway built to-day is not designed to support very heavy traffic. Most of the provinces have carefully prepared highway programs which are to be carried out over a period of years. The first part of these programs has to do with improving the existing roads - 'improving' being taken to include widening, the elimination of curves, gradients and level crossings in so far as is

practicable, as well as resurfacing. All highways must be brought up to a certain level before the additional expense of specially strengthened main routes may be indulged in. It would be a fine thing to have a four strip concrete highway between Montreal and Toronto, but it is not a practical thing until we have eliminated the muddy dirt and gravel roads which would feed such a highway. When the foundations of a good highway system have been laid, the creation of stronger main roads is simply a matter of extra surfacing to be applied at any convenient time. For the present it is necessary to limit the gross weight of vehicles to what the existing highways can bear.

So it comes about that in Canada heavy vehicles are definitely excluded from the extra-urban highways. Such heavy vehicles as we have are confined within the limits of their own city or town. The road rentals paid by motor vehicles are used wholly for the maintenance of the extra-urban highways. In most cases, not one penny from this fund is ever handed over to municipal authorities for intra-municipal paving. How then are we to assess the heavy vehicle, even supposing that the provincial government has the right to assess it ?

The right of a provincial government to assess heavy vehicles, while at the same time withholding from them the privilege of using the extra-urban highways, is well established by law and custom. To interfere with this right in any way would produce serious complications. At the present time, from thirty-five to fifty percent of all motor vehicles

registered[1] are the property of urban owners. By far the greater part of the annual mileage of most of these vehicles is entirely intra-urban - light vehicles belonging to urban owners have the right to use the extra-urban highways, but they do not exercise it to any great extent. Thus, between town and country there is a certain amount of unavoidable subsidy. City taxpayers pay for city paving, and, in addition, contribute to the extra-urban highway bill. Hitherto, the cities have not complained. They are, on the whole, well able to take care of their own paving bills. They have accepted the view that a good highway system in the area around them is essential to their own welfare. Any subsidy they may give is all in their own interests - a free will gift to the countryside from which they draw their market, and on which they depend for an important part of their food supply.

Following this principle, we may admit the right of a provincial government to tax heavy vehicles for the maintenance of the extra-urban highway system, but it does not follow from this that the amount of the annual road rental should be assessed in the manner which we set down in the preceding chapters for the taxation of heavy vehicles; namely, that heavy vehicles should pay an amount equivalent to the increased cost of roads specially strengthened to carry them.

Heavy vehicles operated wholly within the limits of a city are in a slightly different category from other vehicles. They are performing services for the community, either directly, or indirectly through private channels. Some of them are the property of the city itself - used in

---

1. The percentage varies with each state and province but is usually within this range.

street construction, snow removal and other municipal undertakings. Motor busses are more and more used for intra-city routes, and as such constitute a real public utility. A large number of very heavy trucks and other vehicles are used in the building trades for excavation work. The remainder exist because the economical performance of certain services requires them.

If a very high road rental is imposed on these vehicles, the residents of the city have a genuine grievance. It raises the price of intra-city transportation, increases construction costs and adds to the burden of municipal taxes. At the same time, though a burden on the heavy vehicles, the revenue so obtained by the provincial government is not very considerable. It could be made up by an additional levy of a dollar or two on other vehicles.

The heavy vehicles operated wholly within the limits of an incorporated city or town fall into three main classes:

1. Vehicles which are the property of the municipality itself.
2. Motor busses used for intra-city bus lines.
3. Privately owned vehicles.

Motor vehicle taxes on the first two of these classes have a direct effect on the citizens of the municipality. In the case of municipally owned vehicles this is reflected in the municipal taxes; for intra-city motor buses, in the fares charged. Since the citizens of the

city are already paying so large a share of the extra-urban highway bill, it seems only just that they should be relieved of any extra burden,and that these two classes of vehicles should pay no road rental to the provincial government. They might pay a small license to cover the cost of recording them for purposes of identification, and of the license plates. This, of course, involves the return of amounts paid through the gasoline tax. The local public service commission, or whatever local authority it is that controls the franchise of the street bus company, could see to it that this benefit was handed on to the citizens through the fares charged them.

Privately owned heavy vehicles would still be expected to pay road rentals to the provincial government. There is no reason why they should be put into a special class and made to pay a supertax. We may balance the proposition that they would, in theory, make necessary an increased highway thickness against the fact that they are not allowed to use the highways, and, having satisfied our conscience in this respect, might assess them at the same rate per one hundred pounds impact force as we use for vehicles of from three to five tons.

If the limitations as to gross weight,which are at present in force,bear any real relation to highway strength, this method of taxing heavy vehicles should apply in sixteen states of the American Union and in seven of the nine provinces of Canada. The difficulty is that the limitations have often been made without considering highway strength.

Sometimes governing authorities guess at the strength of their highways and set a limitation accordingly. In a few cases, pressure brought to bear by the representatives of other forms of transportation has succeeded in fixing it at a ridiculously low figure. On the other hand, some form of restriction or regulation is better than none and the excessively high figure set by one or two of the American states is worse than no limitation at all - it puts ideas into manufacturers' heads and leads them to build vehicles up to the gross weight allowed by law, when no highway ever built could possibly support such loads.

A glaring fault in many of the existing limitations is the failure to take any account of axle load, or adequate account of tire equipment. Thus, several authorities have set the gross weight limitation for their highways at 22,000 pounds. A 7½-ton truck equipped with two rear driving axles and dual 10½-inch tires is thereby automatically excluded from the highways, whereas a 5½-ton truck with one rear axle and dual 8-inch tires is allowed.

The 7½-ton truck has a gross weight of approximately 30,000 pounds. The two rear driving axles mean that the maximum load per axle is 12,000 pounds, even supposing that the two rear axles are bearing 80% of the gross weight. The single rear axle of the 5½-ton truck supports a load of 17,600 pounds. In one case this load is exerted through 10½-inch dual tires, in the other, through 8-inch dual tires. The relative amounts

of impact force exerted by the two vehicles can well be imagined. We have a good authority to tell us that the two rear driving axles of the 7½-ton truck will divide the impact force exerted by the vehicle; "Our tests show that in the application of wheel loads to the road, if the wheels rest as much as 36 to 40 inches apart, if the point of contact of one wheel is 30 inches ahead of the next wheel, there is no overlap of stresses in the road structure. In other words, the road has to carry only the weight of each particular wheel. The stresses do not pile up. Therefore, if we had a load to move on the roads that would take more than 18,000 pounds on the rear axle, it should be solved by placing two 18,000 pound rear axles with four wheels in place of two wheels."[1]

If limitations are to have any significance, they must be based, not on gross weight modified by tire equipment alone, but on pounds impact force. Expressed as gross weights, limitations are as antiquated as the stage coach and just about as useful for modern purposes as the stage coach would be.

Governing authorities who allow heavy motor vehicles to operate on their roads do so at their own risk. As has been pointed out before, a limited amount of heavy vehicle traffic may use any road without undue damage to the road surface.[2] In the cases where this is permitted, there is every reason for taxing these vehicles a percentage of the highway bill

---

1. Interstate Commerce Commission, Docket No. 23,400, testimony of Thomas H. MacDonald, p.3.

2. See page 28.

proportional to the cost of roads specially strengthened to carry them. But when a government excludes heavy vehicles from certain roads altogether and permits them to use only the specially strengthened roads, the extra road rental on these vehicles should be determined only by the actual additional cost of strengthening the highways which they <u>are</u> allowed to use.

In our opinion, the ideal system would be to adhere rigidly to the limits imposed by the actual strength of the roads and only to permit heavier vehicles when roads of the required strength have been built.

Limitations imposed on the length and width of vehicles are not of primary interest from the standpoint of taxation. So far as we are concerned, a vehicle or train of vehicles might be a mile long, provided it paid in proportion to highway space occupied and value as well as in proportion to impact force. The real reasons for limiting vehicles as to length and width are considerations of safety. They require one limitation for the maximum length of any one vehicle and a different limitation for a train of vehicles.

It is not our place to deal with width limitations, which are governed solely by the width of the highway itself. The necessary limitations on length imposed by safety considerations raise a new problem for us in taxation - that of the trailer. Beyond a certain length, it is not possible to have a vehicle all in one piece. On the average road it would

never be able to turn a corner and would need a public square to turn around. Most people are familiar with the very long ladder wagons of the city fire brigades. The wheels on each axle may be turned independently. To make a right turn, the vehicle must first go to the centre of the road, the front part then crosses to the left side of the cross road, the front wheels are turned to the right, and, as the turn is completed, the rear wheel just scrape by the curb on the right hand side of the main road. If the vehicle is long enough, they will, at one point in the turn, touch the curb on the left of the main road. Of course this is a very extreme case; even allowing for this it would not be practical to give every vehicle the same right of way as we give the fire fighting apparatus. Therefore, it is necessary to limit the length of a vehicle all in one piece to a length which allows for convenient and safe turning which may be accomplished without undue danger or overcrowding of other traffic.

If, instead of ladders, we wished to transport sacks of potatoes, it would not be necessary to have our vehicle all in one piece. We could break it up into sections, so that each individual section would turn, more or less, on the same ground as the first section. This works well up to a certain point. The trouble is that the following sections do not turn on exactly the same ground as the leading section. Each section will edge a little closer to the curb than the preceding.

If we have enough sections, the last ones will try to take a shortcut across lots, instead of going around the corner. Moreover, while this is happening, the very last will slew over to the opposite side of the road before they proceed to take the shortcut. To avoid this, we have to limit the total length of vehicles in a motor train, though a motor train may be considerably longer than a single vehicle.

How should the separate sections in such a motor train be taxed ? The standard practice to-day is to treat them as separate vehicles and to impose on each a separate tax. Usually, this tax is levied in the form of a flat rate, without any consideration whatsoever of impact force, value, or ability to pay. Such a method does not fit into a carefully balanced scheme for the distribution of the road rental. There are trailers and trailers, from the one for the family tent and baggage used by tourists to vans for furniture.

Treated as a separate unit, apart from the vehicle which draws it, the trailer has a greater operating efficiency than any other type of motor vehicle. A motor truck is a box on wheels, with the first third of the box permanently marked off for the engine and driver's cab and only two-thirds remaining to carry a load. A trailer is a box on wheels with the whole box available to carry a load. The net weight of the motor truck includes the weight of the engine and of the driver and his cab. The net weight of the trailer is solely that of the apparatus which carries the load. Added to this, the distribution of weight on the axle or axles

of a trailer is as nearly perfect as may be - either altogether carried on a single axle, or, in the case of a four wheeled trailer, equally divided between the two axles. The impact force exerted through each of the wheels is exactly the same. The one criticism which the highway engineer has to make of the trailer is its tendency to swing slightly from side to side, thus slightly increasing highway wear and tear. As a matter of fact, when the trailer is heavily loaded and properly attached to the vehicle which draws it, the swing is an almost negligible quantity.

When the trailer can do the work of the second truck, it is better from every point of view to have a truck with trailer attached than two trucks. So far as the highway is concerned, the truck and trailer, as opposed to the two trucks, represent a saving in highway space occupied and a reduction in impact force in proportion to the pay loads carried. That is, in carrying the same quantity of goods, the truck and trailer will cause less highway wear and tear. They have eliminated not only the extra weight of the engine, cab, and driver of the second truck, but also the unequal distribution of the gross weight on the axles of the second truck. From the point of view of the truck owner, he saves the difference between the cost price of the second truck and the cost price of the trailer, the wages of the second operator, and a certain amount of gasoline (for the truck and trailer, while using more gasoline than a single truck will use less than the two trucks would).

In our opinion, the logical means of assessing the road rental on the trailer is to treat it exactly as we have treated other motor vehicles. Let it pay at the same rate per one hundred pounds impact force, per one hundred dollars of value, and per one hundred square feet of highway space occupied, as the vehicles in the impact force group to which it belongs. Thus, a four wheeled trailer could have a gross weight of 18 tons — 36,000 pounds. Each of its axles bears 18,000 pounds, so, provided the tire equipment is right, the vehicle would fall into the same class as the 5-ton truck operating on pneumatic tires and would be able to use the standard road. Incidentally, it would pay the same amount of road rental for highway wear and tear as the 5-ton truck, though the total road rental would be different, on account of the difference in the value of the two vehicles, and the highway space they occupy.

In this case the trailer gets all the benefit of its economy of design, and, since economy of design in motor vehicles is something that governing authorities are anxious to promote, the trailer deserves to benefit. As with other vehicles, the registration fee on the trailer is simply the difference between the total road rental and the amount contributed in gasoline taxes, which is calculated from the extra gasoline consumed by the truck in order to draw the trailer.

Nervous motorists need not tremble with fear lest the highways, should this method be adopted, suddenly become covered with huge trucks, each with one or two 18-ton trailers attached. The cases in which the use

of trailers, with all their attendant economies, is possible are very few, only when there is a large and steady volume of goods to be moved in the same direction. The common carrier, the next phase of motor transport with which we have to deal, does fulfill this condition.

See Appendix, Supplement C, page 259 for a representative schedule governing the use of motor trains.

Chapter VII.

COMPETITION BETWEEN RAIL AND MOTOR TRANSPORTATION

When the city of London began to spread out from the banks of the Thames and take on breadth as well as length, the river boatmen sent a petition to the King asking for a prohibitive tax on the newfangled hackney coach which was ruining a monopoly enjoyed by them for hundreds of years. Two centuries later, the owners of the canal barges and stagecoaches looked on in impotence while the railways, the transportation phase of the Industrial Revolution, pushed them into an oblivion almost as complete as that of the hand weavers. The railways enjoyed nearly a century of uninterrupted monopoly in inland transportation. Such competition as they had to face came from other railways, governed by the same economic laws as they themselves. Confident, secure in their seemingly unassailable position, railways sprang up everywhere. In Canada they entered new territory far in advance of the first settlers, knowing that their very existence would cause the growth of a market to support them. Sometimes this over confidence ended in disaster. The great industry was beset by a crowd of parasites which sucked its lifeblood. Promoters, contractors and legislators,attracted by the easy profits, made huge fortunes by saddling the railways with colossal debts and have passed into history as railway kings, captains of industry, nation builders. Unscrupulous people did not hesitate to begin a railway with the intention of letting it go bankrupt before a single train was run and then buying it back at a fraction of the construction cost. Others relied on the never failing supply of government loans and

subsidies. Such methods built many great railways on this continent and also many impossible ones to compete with those built on solid financial foundations from the beginning.

In the United States, there are only two great railways which have not been, at some stage in their career, in liquidation. In Canada, the same would have been true, with possibly one small exception, had not the government come forward from time to time with loans to prevent it. We do not know of a single railway on this continent which has not enjoyed some form of government subsidy, whether cash, land grants, or the guaranteeing of interest on bonds.

On the other hand, our national debt to the railways is incalculable. Without them, Europe might possibly have continued to exist - as central China does to-day - on an agricultural basis with a small industrial development limited by the difficulty of obtaining food to support an industrial population, as well as the difficulty of finding a market for manufactured goods. America, as we understand it to-day, would never have been born. The Great Central Plain would still be but a playground for the Indian and the buffalo. It would not be practical to carry wheat by horse and wagon to the headwaters of the Great Lakes. A network of canals to serve the West cannot be visualised. If the railways have cost the country a lot of money, they have made it whatever it is to-day and are the real foundation of our whole economic structure.

Up to the present, nothing has superseded them in this proud place, though a new factor has appeared to take over certain of the services which they have hitherto performed.

At the close of the nineteenth century the motor vehicle was still something of a toy,[1] its practical value and commercial significance as yet not understood. During the next thirty years it worked a revolution in transportation as complete, if not as spectacular (it has not opened up any new continents), as that of the railways in the preceding century. This revolution has not been entirely to the disadvantage of the railways. They are now able to draw freight from centres distant from their right of way and formerly without transportation facilities of any kind. New settlement to-day need not wait for the railway branch line. All it needs is a good highway to connect it with the main line. Before it got both, and, eventually, paid for both. Now it can save the capital cost of one. The railway is relieved of the necessity for the often non-paying branch line, while it retains the valuable long-haul traffic. Each year the railway revenues are swelled by the carriage of millions of dollars worth of freight for the motor vehicle industry; rubber, steel, manufactured parts, equipment, up to the finished product and the gasoline which propels it.

Against this, and far overwhelming it, is the loss in revenue due to the private passenger car and the commercial vehicle. This loss

---

1. Although the first gasoline driven motor vehicle appeared in 1892, none was actually sold until 1898.

is a permanent one. The railways will never again carry the goods and passengers which the motor vehicle now carries. No man who owns a pleasure car is likely to leave it in the garage and take a train when he wishes to spend the weekend in the country. No manufacturer can afford to add to the market price of his commodity by paying three separate transportation charges when he sends it to the next town.

At the present time, short-haul traffic, passenger and freight, is divided between three forms of transportation:

1. The railway.
2. The common carrier motor vehicle.
3. The non-common carrier motor vehicle.

It is a disputable question as to which of the three carries the most traffic. The railways and the common carriers know how much they carry,[1] but there is no way of telling how much they don't carry, that is, how much goes to the privately owned motor vehicle and the 'unofficial' common carrier. Of the three, the common carrier motor vehicle probably gets the least, though it is fast gaining ground on the railway. Considered from the angle of the competition which the motor vehicle is offering the railway, the issue is further complicated by the fact that the motor vehicle has created for itself a great deal of short-haul traffic which the railways never had and never would have had. How many passengers in the pleasure cars on our rural highways are there because they

---

1. Many of the estimates of the volume of traffic carried by licensed common carriers are only estimates and cannot be verified.

have the privilege of riding in a pleasure car ? How many people who go out of town by a motorbus which drops them at their very destination, would, lacking the motorbus, take a train which drops them four or five miles from their destination ?

The extravagances of past generations and the cut-throat competition between themselves have placed the railways at a disadvantage in competing with the common carrier motor vehicle. Moreover, railway transportation is an industry of constant costs. About 55% of the operating expenses and 64% of the total expenses go on regardless of the volume of traffic carried.[1] A railway enjoys a monopoly on its right of way and must hence maintain this right of way itself. The common carrier motor vehicle is not governed by the law of constant costs to nearly the same extent. It shares its right of way with other vehicles and so shares the cost of maintenance.

The railway freight car does not go to the shipper's door and cannot deposit consignments on the consignee's doorstep. To carry goods from one point to another by rail requires two terminal or handling charges which are identical whether the goods are carried ten miles or a thousand. Over a short haul the motor vehicle enjoys an undisputed advantage. By the elimination of terminal and handling charges, through the time it saves, it more than makes up for the fact that motor transportation per mile is more expensive than railway transportation.

---

1. Jackman, "Economics of Transportation," p. 81.

A loaded freight train, consisting of a locomotive and 100 cars, with a crew of five men, can carry the same amount of coal as 1000 5-ton trucks each with its own operator.[1] The cost of the railway rolling stock used in such a train would be approximately $300,000. The monthly salaries of the crew at the established wage rates would total $1000.00. The 1000 trucks would cost $5,000,000. The monthly wages of the 1000 operators would be at least $125,000.[2] Obviously, if freight always moved in such bulk, the motor vehicle would never be able to compete with the railway. It simply would not try to. It is not every freight train that is able to procure a load of 5000 tons of coal every time it gets up steam. When the same locomotive, with the same crew and two heavy cars is forced to content itself with fifteen or twenty passengers and two or three tons of freight, it is doing the work of one motorbus and one truck and the difference in operating costs is just as much in favour of the motor vehicle as it was in favour of the railway in the previous case. When the available traffic is limited or seasonal, if free competition is allowed to take its course, the railway cannot possibly hope to compete with motor transport.

Does it follow that the railways should therefore hand over short-haul traffic to the motor vehicle, abandon many of the branch lines, strive to cut down operating expenses and content themselves with

---

1. Bulletin of the National City Bank of New York, January 1932,p.10.

2. Figures of comparative costs supplied by Mr. E.C. Richardson, of Drysdale & Pease, Consulting Engineers, Montreal.

long-haul traffic alone ? Roger W. Babson, in a bulletin of September, 1931, predicts four great trends which the next twenty-five years will see in transportation:[1]

" 1. The almost complete domination by high speed buses of commuter travel direct from suburban homes to city offices and stores.

2. Abandonment by the railroads of short-haul freight traffic to motor trucks which will operate over specially constructed highways.

3. The concentration of railroads on long-haul freight traffic for which they are best suited and most efficient.

4. Continued growth of high speed airplane passenger and light express travel."

Up to within the last few years the railways told us that passenger traffic and short-haul traffic never paid them anyway. To-day we are told that the continuance of this traffic is necessary to their very existence. Can a railway be operated as a paying proposition through long-haul traffic alone ? They have not even got the assurance of a monopoly of long-haul traffic itself. The airplane has entered the long-haul passenger field, and, as its ability to give safe and economical transport is increased, the time which it saves leaves the railways at a serious disadvantage. It has even begun to tap the most lucrative source of railway revenue, light express traffic.

---

1. Montreal Daily Star, September 18. 1931.

It is difficult to visualise a present day railway operating at a profit through long-haul traffic alone. The railways now built were built to handle all traffic and even to handle traffic which has never been theirs. In Canada, the railway builders looked forward to a time when the national growth would provide traffic for them. Not only has the national growth been slow, but such as there was has been counter-balanced by the rise of the privately owned motor vehicle. If the railway is to confine itself to long-haul traffic, much of the present right of way will needs be scrapped. It is a case of retrenchment rather than consolidation. Invested capital is bound to suffer. This has happened before. The owners of the stagecoach and the canal barge suffered alone. The world was too busy building railways to give them sympathy. The investors who built the North American railways saw their capital disappear in the periodic liquidations. Has the time of the present day railway investor come at last ?

From a national point of view, a more serious consideration is that of long-haul rates. To what extent has short-haul traffic made possible the low rates on our raw products ? Canada, as an exporting country, depends for its very life on cheap rail rates on grain. The same is true, though in a lesser degree, of the United States. Granted that invested capital is ruthleesly cut down, that operating expenses are reduced to a minimum, can long-haul traffic alone preserve the low rates on which we are so utterly dependent to preserve our place in the world markets ?

Is it possible to let freight cars stand idle nine months out of twelve in order to take care of our huge seasonal shipments ?

It has long been a principle of railway economics to base rates on what the traffic will bear, to charge one product more than another on account of the difference in their value. Railways were willing to carry certain types of freight for an amount only sufficient to cover the extra cost of handling it. Such freight was not asked to make any contribution towards the constant costs of operating the railway. More valuable freight paid more than its share but a balanced economic development was made possible. If the motor vehicle, to quote the railways, skims off the cream of valuable freight and leaves only the skim milk to support the railway, the skim milk will have to pay more. Most likely it will not move at all, but will turn sour and be fed to the stock.

Informed opinion is not agreed as to whether it would be possible, provied that all reasonable economies are practised, for the present low rates to be maintained if the railways gave up the short-haul business altogether. If anything, the weight of opinion goes to the side that says they would not. The benefits arising from common carrier motor vehicles are very considerable. Low railway rates are a national economic necessity. How to reconcile the two, preserving the advantages of both, presents a problem which, gradually growing during the last few years, is to-day acute and of paramount importance.

The railways have adopted three methods of meeting motor vehicle competition. Any one of these methods, if successful, would solve the railway problem, but they are not of equal value as solutions of the present day transportation problem in general.

The first method, one which has received the greatest degree of publicity, is to continue operating the railways in the same old way while clamouring to the governments for the taxation of the common carrier. If all the money, time and energy wasted in propaganda of this sort had been saved and used in the proper business of the railway, railway deficits would have been smaller this last year or two. Every broadside from the railways has been the signal for a corresponding broadside from the motor vehicle associations. Printers and newspapers have thrived on it. Economists have been employed to gather statistics; politicians and lawyers to lobby and counter-lobby. Distinguished experts have talked before public meetings and government commissions. Any statement which was favourable to one side or the other was circulated throughout the land. The side not favoured solaced itself by saying that the distinguished expert had been paid for his address or evidence. A whole group of parasites has supported itself on the controversy - an expense which the transportation industry can ill afford. The climax of pernicious propaganda was reached when certain railway unions, appalled by the dark spectre of cut-throat motor vehicle competition, organised themselves into separate associations under

cover of which they inserted paid advertisements in the public press urging the citizens to use the railways and so preserve work for the railway employees and place purchasing power in their hands.

Thus it happens that the public gets a most distorted view of the whole situation. So far, the railways appear to be getting the best of it. Public opinion seems to be in their favour, while the same public travels by motorbus and ships by truck.

The railways have claimed that the common carrier motor vehicle is offering them unfair competition because it does not pay a sufficient road rental to the government for the use of the public highways as a right of way; in a word, that it uses the highways 'tax free.' They are confident that they would be able to compete easily with the motor vehicle if the latter paid anything approaching a fair tax. Their idea of a fair tax on common carrier motor vehicles is apparently a prohibitive tax which would destroy all the natural economic advantages possessed by motor transport. They point out that, whereas they must maintain an expensive right of way on which they pay taxes to the government, the common carrier motor vehicle uses the public highways, maintained in part by the proceeds of railway taxation, 'tax free.'

The words 'tax free' were introduced by the railways very early in the controversy. They have been causing trouble ever since. No one seems to be sure of their exact meaning. They have certainly proved an invaluable catchword for the railways who have not bothered to explain just what they do mean. At first the champions of the common

carrier motor vehicle interpreted them as a reference to too low registration fees, licenses and gasoline taxes. Accordingly, great masses of figures were brought forward to show just how much the common carrier did pay. The 'tax free' claims still persisted until the common carriers, seeing a great light, interpreted the words to mean that the common carrier was not paying a real property tax on the highways, over and above the road rental, similar to the real property tax paid by the railways on their right of way. They could then prove, to their own satisfaction, just how ridiculous such a claim was. In this sense, it is quite true that the motor vehicle uses the highways 'tax free,' but is there any justification for imposing a tax solely to counterbalance an economic advantage possessed by one industry over another ?

On the other hand, this advantage is not a natural economic one. It is the result of legislation. Moreover, the assessments on railway right of way in rural districts are usually of two kinds only, school tax and road tax. The railway taxes go to the upkeep of a right of way for their competitors, which is obviously unjust. Under our ideal system this would not occur, since revenues from motor vehicles are expected to cover the total extra-urban highway bill, so the necessity for an extra-urban road tax disappears. The railways would still be expected to pay the school tax - a contribution for the general benefit of all which is counterbalanced by the fact that the motor vehicle also makes such a contribution when it turns over to the country free of charge a system of extra-urban highways.

In the meantime, until this happy state is reached, some change is necessary. The railways should not be asked to continue paying taxes for the support of extra-urban roads. In our opinion, the municipal extra-urban road tax on real property should be abolished altogether. Since the War, on this continent, there has been a steady decline in the relative returns from agriculture as compared with industry. The standard of living which it is possible to maintain on the average farm may not have fallen, but it has not kept pace with the rise in the general level. Twenty years ago, when an industrious farmer died he had money in the bank. To-day, his heirs would have to borrow from the bank to pay his funeral expenses. The real property assessments on farm lands have increased enormously. In many cases it is no longer possible to 'work out your taxes,' or even a part of them. It would be a practical step in the direction of farm relief to reduce farm taxation by abolishing the rural road tax. Incidentally it would be a form of railway relief also. The necessary revenues might be obtained from the profit of state-operated undertakings such as the Provincial Liquor Commissions, or other services which profit most from the tourist trade.

As for right of way and real property owned by railways within incorporated cities and towns, it does not seem reasonable to exempt it from taxation altogether so long as it is private property. In any case, fair competition between rail and motor transport does not require such an exemption.

The main brunt of the railways' argument is directed against the common carrier motor vehicle alone. With the exception of Mr. Ferguson's valuable pamphlet, "The Equitable Taxation of Motor Vehicles," already quoted, there is hardly a single example of any concerted attempt on the part of the railways to deal with the greater problem of motor vehicle competition in the broader sense. Seeing that only 5-1/2%[1] of the total number of motor trucks using the highways are licensed as common carriers, this is rather surprising and significant. Does it mean that the railways are willing to hand over to the private motor vehicle almost without protest so large a volume of the traffic they have hitherto handled and are satisfied to fight for the almost insignificant amount now handled by the common carrier ? Or, on the other hand, does it mean that by directing attention to the common carrier motor vehicle the whole question of motor vehicle taxation will come under review ? Owing in no small measure to the railways' efforts during the last few years, the taxes on the average common carrier motor vehicle in the United States are now 22-1/2 times those on the average pleasure vehicle.[2] On the face of it this seems unduly high. Is there some very special benefit inherent in the privilege of being licensed as a common carrier that should be paid for to this degree ?

---

1. Facts and Figures of the Automobile Industry, 1931 Edition, p.38, 5½% of the total number of trucks registered are common carriers, 8.7% are contract operated, only 1½% of the total number of motor vehicles registered are common carriers - Interstate Commerce Commission,Docket #23400, pages 4 and 10.

2. See page 85.

It is not to be inferred that we believe the common carrier motor vehicle has always paid its way, any more than the privately owned vehicle pays its way. We have already shown that the road rental, as we know it to-day, began as an emergency measure; that it resulted from the necessity for raising more revenue for highway purposes long before the postulate that the motor vehicle should actually bear the expense of highway building and maintenance was established. The present relatively high taxes on motor vehicles are of recent growth. It therefore follows that the motor vehicle at one time did receive a considerable subsidy from the government. It is possible that certain types of motor vehicle are still receiving some form of subsidy. In any case, where subsidies, past or present are concerned, the railways, of all branches of industry, can ill afford to say much.

At this point it is convenient to introduce certain Canadian figures into our discussion. Since complete and authentic statistics for 1931 are as yet unavailable, we are forced to use the 1930 figures published by the Dominion Bureau of Statistics in "The Highway and the Motor Vehicle in Canada, 1930," which appeared in December 1931. The grand total of capital expenditure on provincial and provincially subsidised roads was $70,000,000, the maintenance charges $23,000,000, making a total of $93,000,000.[1] The total provincial highway debenture debt outstanding on December 31, 1930, was $326,658,000.[2] Allowing for interest on this debt at 5% (though several provinces borrow for less)

---

1. Appendix, Tables XVI and XVII.

2. Appendix, Table XVIII.

and adding in the capital and maintenance expenditures, the Canadian highway system cost $111,750,000 in 1930. The revenues from registration fees and gasoline taxes were $43,000,000.[1] In other words, taxation at the 1930 rates produced enough revenue to cover the cost of maintenance and interest on the provincial highway debenture debt, with almost nothing left over to apply on the annual capital expenditure. If capital expenditure were to increase at the same rate, the highway debenture debt can be seen as piling up so rapidly that national bankruptcy from the highway programme alone is not such an impossible eventuality. In addition to the provincial debts, the bonded debt of the rural municipalities and the paving bill, for which we have nothing but more or less hit or miss estimates, must also be taken into account.

From the consideration of these figures, the railway claim that motor vehicle transport in Canada is too heavily subsidised, i.e., under-taxed, appears to be well founded. Motor vehicles are not paying their way. When we are dealing with the competition between rail and motor transportation, the question of just how much of the present provincial highway debenture debt should be transferred to the general public debt as losses incurred in the experimental period of highway building which may not reasonably be charged to motor vehicles, is a delicate and debatable one to bring up. There do seem grounds for making allowances, though the amounts are a matter of opinion which will probably be solved finally, by expediency rather than strict equity.

---

1. Appendix, Tables XIX & XX.

The railways deserve some thanks from the people of Canada for drawing attention to the highway situation as it stood in 1930. Many things have happened since then. Gasoline taxes have gone up and registration fees have been more than doubled on many types of vehicles. If anything, the present upward movement is in danger of going to extremes. It has certainly been very one-sided as between different vehicles. Reckless highway building without regard for capital costs has been similar to the reckless railway building in which this country indulged between 1838 and 1919.

A sane highway financial policy for Canada would be to cease altogether from increasing the present provincial highway debenture debts and adopt a pay as you go policy. The 1930 and 1931 highway programmes increased our provincial highway debenture debt to roughly $400,000,000, which is about as far as we can safely go. At the rate of 5% on this debt, we thus have a fixed unproductive annual expenditure of $20,000,000. Supposing maintenance and new capital costs to remain about the same as in 1930, our annual highway bill would be $113,000,000, with no provision made for reducing our debenture indebtedness. Now, if we take the two-thirds, one-third ratio for the division of the total highway bill between motor vehicles and general taxes as being too high for a country such as Canada, and adopt an arbitrary 50-50 ratio for the time being, motor vehicles would be required to contribute $56,500,000., an increase of $13,500,000., or 30% over what they contributed in 1930. If the increases

enacted by the provincial legislatures since 1930 had been proportional, instead of bearing unduly on certain classes of vehicles, this amount would have been more than realised. A considerable sum would be left over to reduce the contribution from the general tax fund.

This is the general situation in Canada as a whole. As between the provinces, some are in a much more favourable position than others. Thus, the Province of Quebec, Canada's largest province territorially, and second largest in population, had, in 1930, a provincial highway debenture debt of $36,225,000.[1] The maintenance charge was $5,108,000.,[2] while the capital expenditures, provincial and municipal, were $10,092,000.[3] Adding in interest on the provincial debenture debt, the total annual expenditure on highways comes to $17,000.000. The revenue from motor vehicles was $9,373,000.[4] In this province, even in 1930, the motor vehicle was contributing more than half of the total highway bill. The Province of Quebec was the first governing authority in North America to take charge and defray the cost of maintenance of all improved roads and those to be improved in the future within its boundries. Thus, under the heading provincial highway debenture debt, appear amounts which in other states or provinces would be charged against the local municipality. In addition

---

1. Appendix, Table XVIII.
2. Appendix, Table XVII.
3. Appendix, Table XVI.
4. Appendix, Table XIX.

to this, the Province has also made funding arrangements with the municipalities to relieve in some degree the burden of highway debt incurred by them before 1927. Although the Province is in such a favourable financial position, the existing highway system, when compared with some others, still leaves much to be desired.

The existing highway system in the neighbouring Province of Ontario is a source of considerable pride to its citizens, but its cost is causing the government some anxiety at the present time. The provincial highway debenture debt stood[1], in 1930, at $147,000,000. With maintenance charges of $7,600,000[2], and new capital expenditure of $20,000,000[3], allowing for interest on the debenture debt, the annual cost for 1930 was $35,000,000. Towards this motor vehicles contributed $16,325,000[4], or less than half. In 1930, Ontario had alittle over three times as many motor vehicles as Quebec[5], but from them obtained a revenue less than twice as great. If she had used the same means of assessing the road rental as Quebec used, her revenues would have been approximately $28,000,000, or four-fifths of the annual highway cost.

---

1. Appendix, Table XVIII.
2. Appendix, Table XVII.
3. Appendix, Table XVI.
4. Appendix, Table XIX.
5. Appendix, Table XXI.

The obvious conclusion from the study of these figures is that in Ontario motor vehicles have undoubtedly been receiving a considerable subsidy, up to 1930 at least. Since 1930, Ontario has made drastic increases in her registration fees and has also increased the gasoline tax by one cent. In our opinion, these increases have been one sided. The spread between the road rental on the lightest class of vehicle and that on the heaviest class is too great. The bulk of the revenue from motor vehicles comes from the lightest and most numerous class. An increase of 20% on these vehicles does not amount to a crushing burden on the individual vehicle, while it swells the total revenue very considerably. For the heavy class of common carrier, Ontario actually raised the road rental from 65 to 100% during 1931. One vehicle owner saw his license fees for the same vehicles go up from $2300.00 to $4500.00 in one jump.[1] Even admitting that the $4500.00 represents a better distribution of the road rental, one which more nearly follows the principles we set down for the taxation of heavy vehicles than does the $2500.00, it is not reasonable or just to make such a huge increase all at once. It appears to us that the heavy vehicle owners in Ontario have good cause for complaint at the treatment meted out to them by the provincial government during 1931.

The financial situation of the Canadian highway system is not too dismal. The country now realises just where it stands. The jolt which the 1930 figures gave us did us good. The Quebec statistics prove that

---

1. Bus and Truck Transport in Canada, December 1931, p.7.

Ontario can work out a reasonable balance between motor vehicles and general taxes to take care of its highway bill - that motor vehicles in Ontario can well afford to pay more than they have hitherto been paying. With the exception of the cases just cited, the increases since 1930 should be adequate to cover the motor vehicle portion of the highway bill and are not an excessive burden on the bulk of motor vehicles. Now that the heaviest motor vehicles have survived the first shock of the great increases, it might be as well to let these increases stand for a while - to satisfy ourselves by raising the general level on lighter vehicles slowly until the proper proportions are established. In this way the 50-50 ratio will be gradually changed, until the standard two-thirds, one-third ratio is reached. Our chief concern at the present time should be to readjust the distribution of the highway bill until it conforms to the principle required by the competitive conditions of motor transport.

Let us return to the railway claim that motor vehicle transport, and common carrier transport in particular, have been unfairly subsidised. If we may presume to express an opinion on so controversial a subject, our conclusions would be as follows:

1. That up to within very recent years the motor vehicle did not pay an adequate road rental to the government for the use of the highways.

2. That at the present time, the common carrier motor vehicle, by virtue of the much higher registration fees and licenses which it pays, is paying at least its fair share of the highway bill and probably more. This may be subject to qualifications in certain particular cases.

3. That the new taxation introduced since 1930 will result in sufficient revenue to more than cover the fair proportion of the total highway bill that motor vehicles can equitably be expected to pay.

4. That in most cases the existing distribution of the total highway bill among motor vehicles is inequitable, resulting in unfair subsidies to certain types of vehicles and unjust discrimination against others.

5. That the subsidies hitherto accorded to motor vehicles are no greater than the subsidies hitherto accorded the railways.

The second method which the railways have adopted to meet the competition of motor transport is to improve their services. In some cases this has only been to the extent of reducing rates on passenger traffic and on the types of freight most usually carried by motor vehicles. A more successful policy, one which offers great hopes for the future, is to incorporate into the railway as many of the economic advantages of the motor vehicle as possible. As we have seen, the chief economic advantage of the motor vehicle over the railway is the lower operating cost on the short-haul for the carriage of limited quantities or numbers of goods or passengers. One of the earliest railway efforts went into a reduction of terminal or handling costs, which they attempted to do by means of "containers."[1] The shipper loaded his pieces of small freight into a steel container on a motor truck and a crane transferred this container to the freight car. In this way, the amount of handling was reduced and damage

---

[1] Of 18,000 shippers in New York only 120 use containers.

to freight was decreased. The container represents a step in the desired direction, but it was not enough to offset the time advantage enjoyed by the motor vehicle. With the idea of reducing short-haul operating costs and increasing speed, an oil-burning electric engine, capable of drawing one or two cars of the standard model, was tried out but it has not met with any great success and has made few friends either among railwaymen or the general public.

Accordingly, some of the railways tried to perfect a motor vehicle with two sets of wheels, which would run with equal facility on either rail or highway. Mechanical defects have not made this a particularly successful proposition, though it is still used to a limited degree both in England and in the United States. The mechanical defects were twofold. The double wheel arrangement was clumsy. In some types it was a lengthy job to change over from one set to the other. In attempts to overcome this, a quickly changeable mechanism was devised, but failed because the alternate set of wheels, owing to jolting and continued shocks incurred in operation, persisted in working loose and trying to compete with the other set to the obvious embarrassment, not to say danger, of all concerned. An added reason why the earliest of these vehicles were unsatisfactory was because, following the old railway practice, they attempted to use steel wheels with which to run on the rails. Now the coefficient of adhesion of steel wheels on the rails is very low and decreases rapidly as the speed of the vehicle increases. The standard railway car overcomes this

by its great weight. A light motor vehicle with steel tires would simply stand still while its wheels spun around on the rails. It could not get sufficient traction power to go ahead. Moreover, "The steel tires, owing to their rigidity, transmit without any diminution all the shocks produced by the inequalities of the track, especially at the rail joints; this leads to utilizing an extremely strong and as a consequence very heavy construction in order to resist these very important dynamic forces."[1] In other words, a motor vehicle equipped with steel tires would be out of the picture altogether.

The use of pneumatic tires completely changes matters. They give a much higher coefficient of friction between tire and rail or road surface making possible the operation of a light vehicle at high speed. They also absorb much of the shock due to inequalities in the surfaces over which they pass. Without the pneumatic tire, the motor vehicle could never have attained its present development. It would have encountered the same difficulties which we have just discussed with reference to light vehicles on the rails.

---

1. G. Delanghe, Ingénieur des Arts et Manufactures, Chef de Travaux, à l'Ecole national supérieure de l'Aéronautique, "L'ADAPTION DU BANDAGE PNEUMATIQUE aux automatrices ferroviaires (les Michelines)," an article in Le Génie Civil, Paris, issue of August 1st., 1931.

It is a curious fact that Thompson, who in 1845 took out the first patent covering the principles which later were developed in the pneumatic tire, talks of " a band cast in rubber, filled with air, in order that the wheels may constantly present a pneumatic cushion when in contact with the earth, to the rails of railways, or on all other media on which the wheels would roll."[1]

Thompson's invention, years after the death of the inventor, was first applied to the rubber tired carriages, then to the bicycle, afterwards to the automobile and the airplane, and, within the last three years, to the railway. The most successful attempts to perfect a motor vehicle which may be operated on the rails of a railway come from France. In 1929, the Michelin Company began experiments to devise a gasoline driven motor vehicle adapted to railway use alone, and embodying all the economic advantages enjoyed by motor vehicles operated on the highways.

Their first concern was with the tire equipment; how to devise a pneumatic tire which would permit the safe operation of a light vehicle on rails. They were faced with the difficulty that the standard rail offers only a very narrow bearing width for a pneumatic tire. That is to say, the tire would have an extremely narrow tread. Hence the total weight

---

1. This is a quotation from Delanghe, not Thompson's exact words. Delanghe says: "Il déclare, en effet, qu'il emploie, de préférence, un cordon creux en caoutchouc, gonflé d'air, de façon que les roues présentent constamment un coussin pneumatique au sol, aux rails de chemin de fer ou à tous autres corps sur lesquels elles peuvent être amenées à rouler."

which the vehicle could bear was necessarily limited by the strength of this narrow tread tire. An additional problem to be surmounted was the very slight inequalities in the width between the rails, unimportant for a heavy car but in the case of a light one liable to cause oscilliations sufficient to make it leave the rails.

The difficulties were finally overcome and a perfected type of tire and wheel resulted. M. Delanghe describes it as follows: "The studies of the Michelin Company have led them to adopt a removable disc wheel in pressed steel of the design usual for automobiles; the inner edge of the rim, however, carries a beaded flange which extends beyond the tire and bears against the inner face of the rail head, thus playing the part of the standard flange used in regular railway practice. The tire casing, as in the "straight side" type is held on the rim by a movable ring."

Our subject will not allow us to elaborate further on the interesting mechanism of this newest departure in transport. Let us see how it affects the vehicle as a whole. In an attempt to reduce total weight as much as possible for the sake of the necessarily narrow tread tires, the inventors applied airplane principles to the body design. Since the use of pneumatic tires absorbs much of the shock, percussion and vibration, and since the rails present a much more uniform surface than does the average road, the vehicle, though light, is even more durable than a motor vehicle designed for the highway. Whereas a steam driven train requires a space of 1000 metres in which to come to a full stop from a speed of 80 kilometres per hour, the new vehicle can do it in

100 metres. Similarly, in starting from rest, a steam locomotive must travel 1500 metres before it can reach a speed of 80 kilometres. The new vehicle attains the same speed in 600 metres. In this connection M. Delanghe tells us that in actual tests, "On a run of 28 km. with nine stops of thirty seconds each, they were able to maintain an average speed of 53 km. per hour, practically double the speed of a light steam train working under the same conditions." Moreover, "A Michelin can travel at high speed on track, the condition of which would necessitate the ordinary trains slowing up. "

[1] [2]

This new invention possesses all the advantages of the ordinary motor vehicle save one. It cannot be operated off the railway track. To compensate for this, it is able to travel at rates of speed not allowed on public highways. The uniformity of the rail surface as opposed to the road surface permits a car of light construction and so gives economy of gasoline consumption. As it uses its own right of way it pays no gasoline tax to the government. When it is used exclusively on certain small branch lines the railway can dispense with many of its safety devices, signals and operators alike. The driver has an unimpeded view of the track before him, He can slow down when approaching a level crossing or if he finds an obstacle in his path. The danger of collision between two 'Michelines' is almost negligible, even supposing that two cars should find themselves disputing the right of way. Each car may be operated by a crew of one man as opposed to the legal crew of four men required by the steam railway.

---

1. Ibid.
2. Ibid.

The 'Micheline' or 'rail-car' seems to offer a practical means whereby the railway may improve its branch line service and at the same time cut down very considerably on operating expenses. The advantage of time saved and lower operating costs would give it a slight edge on common carrier motor transport.

The vehicle is now being produced on a commerical basis in France. For demonstration purposes one was sent to America in December 1931, and has created widespread interest . It is believed that the Michelin Company is now making arrangements to have it manufactured in America.[1]

The attention of Canadians was first drawn to the vehicle by Mr. W.F. Drysdale, M.E.I.C., of the firm of Drysdale & Pease, Consulting Engineers, Montreal. Appearing before the Royal Commission on Transportation at its Montreal sitting on January 14, 1932, Mr. Drysdale urged that the Canadian railways should give it a trial. He said in part: "It will be possible very shortly to purchase for about $12,000.00 a fifty passenger rail-bus, which is a complete unit in itself with baggage compartment carrying one ton of freight. This is only a fraction of the cost of the present equipment which it will replace, and as these rail-busses run on pneumatic tires, they will accelerate and decelerate much quicker than any piece of equipment so far introduced. The fuel consumption will be much less, for the cars are very light, being made largely of aluminum.

---

1. The Firestone Company has also been experimenting in this direction. So far as I know, they have not yet built a bus, but have used a 7-passenger car for experimental purposes. In a recent test it was able to maintain eighty-five miles an hour.

The wear and tear on the road bed will be at a minimum. Special cars can readily be constructed to accomodate milk cans, etc., thereby doing away with the present inconvenience of the passengers having to wait at the station while the cans are being loaded or unloaded. These rail-busses use the ordinary grades of gasoline, and have small standard automobile motors, the cars ride much more easily than any other rail car so far developed, and as the pneumatic tires absorb the shocks between rail and car, the construction of all the rolling parts is made much lighter than is the case where steel wheels run on steel.

"We recommend that the Commission seriously consider converting the Montreal (Tunnel) Ottawa line to rail-bus service exclusively and that all the economies in reduced personnel (one man can operate the rail-bus if necessary), elimination of automatic signals and despatching, reduction of cost by eliminating checking of baggage, etc., should be tried without delay. This system can be extended to other areas with corresponding economies. It is considered that six rail-busses would suffice to start with on this line."

It is to be hoped that this suggestion will receive from the railways the careful attention which it deserves. In France and England public opinion has hailed it as "the railway of to-morrow."[1] It may just as easily be the salvation of the railway of to-day.

---

1. See "La France", '100 pour 100 Francais' column, issue of October 14. 1931. - Probably the greatest saving of the rail car would be in the reduction of maintenance of way and structure costs - from approximately $500.00 per mile per annum to $100.00.

The third method adopted by the railways to compete with common carrier motor transport is to enter the field themselves, either buying out existing lines or setting up a duplicate service in direct competition. In America one or two of the great railway systems have met with conspicious success at their own expense. The motor transport lines are making money while the steam lines are suffering from a reduced revenue. In the present controversy between the rail and motor interests, the position of these dual corporations is rather amusing. Although the earnings go into a common fund, one publicity department is clamouring for high taxes, while the other is using figures supplied by its representatives in the railway bureau of economics to show just how unjust this would be. A general meeting of the corporation's departments, with both the railway champions and the motor transport champions present is anything but a happy family gathering. At the same time, the attitude taken by the heads of railways operating bus and track lines is much less uncompromising than that of the other railways. They seem to be agreed that co-ordination of services offers a way out of the difficulty.

In England, the railways are in a worse position. They felt that it was absolutely necessary for them to enter the motor transport field. They did so and found that the same regulation of hours of labour and rates of pay imposed by the railway unions, much of it practically established by law, was applied to their motor transport activities. Their competitors, the motor transport companies unaffiliated with railways, were unhampered by any of these restrictions and got the business. The attitude of the

British railway unions has been subjected to a great deal of criticism, much of it apparently well founded, at the hands of other trade unions as well as the 'vested interests'.

At the close of the war, when the British export trades were facing the severest competition in their foreign markets, the railway unions alone found their bargaining power unimpaired. Despite the fact that the railways themselves were not making money, the unions steadfastly refused to accept wage cuts which would make possible the reduction in rates which was felt to be absolutely necessary to assist the export industries in recovering their markets. Accordingly, the workers in the export trades bore the whole brunt and rightly blamed the railway unions.

Those exporters who could make use of motor transport at less than railway rates did so, to the great detriment of the railways as a whole. The application of railway regulations and restrictions to railway operated motor transport has not made it any easier for the railways to recover this lost business.

In Canada there has been almost no attempt made by the railways to enter the motor transport field although they have been repeatedly urged to do so. As long ago as 1926, the Canadian Manufacturers' Association appointed a sub-committee to its Transportation Committee to investigate motor vehicle transport. The Committee recognised the advantages which the flexibility of service offered by the motor vehicle presented for members of the Association and were chiefly concerned with regulation of the carriers for the protection of the shipper.

The extent to which they have succeeded may be judged from the following extract from the Report of the Transportation Committee, C.M.A., discussed in an article in "Industrial Canada," organ of the Association, [1] in the October 1931 issue.

"As a result of negotiations extending over a period of years the Transportation Committee was glad to announce at the last annual General Meeting that all of the provinces had enacted legislation dealing with this question and while complete uniformity was not secured yet most of the essential fundamental conditions have been adopted. These are briefly as follows:-

(1) The requirement that all operators of motor vehicle services for hire, pay or gain must secure a special license to operate such service.

(2) That some form of insurance must be carried by the operator, so that in cases of loss or damage he will have available sums which can be used to pay claims for loss or damage. Some of the acts require insurance against property damage or damage to persons, while others require insurance against the cargoes carried.

(3) That a bill of lading must be issued for each shipment carried by such operators. In some of the provinces, Ontario and Alberta, a uniform form similar to that for rail shipments has been adopted.

---

1. Op. Cit. pages 41 and 44.

-. See also Appendix Supplement "A", page 255.

(4) That rates or tolls must be filed and adhered to, also that such tolls are subject to revision by the tribunal or other authority authorised to deal with this subject.

(5) That a special fee or tax in addition to other fees usually paid for licenses is required from operators who are giving a service for hire, pay or gain."

Before these regulations were enforced, the motor transport industry was hindered by lack of capital and intelligent business foresight. A small operator purchased a truck and used it until it wore out, without making any allowance for depreciation or creating a reserve fund with which to buy a new vehicle. When his truck went to the scrap heap he went out of business and his place was taken by another small operator who likewise performed the service while his vehicle lasted. By making it more difficult to become a licensed common carrier, much of this unintelligent competition was eliminated. The operator who was prepared to offer a continuous service with full protection for the shipper was able to make headway to the detriment of the railway interests. Recognising the importance which a sound railway system plays in the national development and desirous of retaining the advantages of motor transport, the C.M.A. Committee was led"..... to believe that the rail carriers could not successfully compete with this new form of transportation without some radical change in their methods of handling freight; in fact, <u>it is believed that the rail carriers should have developed this new service themselves</u>. On many occasions, informally,

suggestions of this nature have been advanced by members of the Transportation Committee and the Manager of the Department to railway officials, but they apparently, until recently, have not been impressed with the situation.

"Within the last six months the rail carriers have attempted to meet this new competition, which is growing every day, by reduction in rates on specific commodities between specific points and also by the handling of freight on passenger trains. The reductionsin rates are not only applied to freight shipments but the express companies have taken similar action: as to whether or not this will solve the rail carriers' problem of loss of traffic to motor vehicle carriers remains to be seen. The Transportation Committee prefers to withhold its opinion until the matter has progressed a little further, <u>but it is still believed that the rail carriers should go into the motor vehicle service in some form</u>."[1]

Representations were also made by members of the Canadian railway unions, suggesting that certain branch lines be discarded and the service maintained through the use of motor busses and trucks. They met with a cold reception and the unions then joined the general propaganda campaign against the 'unfair competition' of the motor vehicle in the manner already described. The attitude of the railways seems to be that they are already sufficiently involved with the maintenance of

---

1. Op. Cit. p. 44.

   The italics are my own.

hotels, steamboats, and pleasure parks, to say nothing of competition between themselves, to take on any new responsibilities.

Mr. Bernard Allen, B.Sc., Assistant Economist in the Bureau of Economics, Canadian National Railways, in an address before the Canadian Railway Club in Montreal on November 9, 1931, argues for the limited use of busses and trucks by the railways in the interests of their service:[1]

"In the freight traffic field we should make use of the highway vehicle in every case where the railway can determine that it has superiority over the rail method and that a profit can be made by its operation. By this I do not mean that the railway is to operate trucks in a general 'over the road' trucking business but that these machines should be the terminal handling agency and possibly should move goods for a short distance from their terminals. Trucks might be used in place of certain trains now operated; if one or two trucks can perform the work of a train, it would certainly be cheaper than operating the train. Several United States Roads have gone into the highway trucking and attempted to move the traffic by the highway alone. I cannot find any experiences of this nature which have paid a reasonable profit to the operator."

---

1. The address was published in pamphlet form by the Club, See" 'The Railways and Commercial Highway Operations,' to be read by Bernard Allen, B.Sc., Assistant Economist, Bureau of Economics, Canadian National Railways, At the Regular Meeting in the Windsor Hotel, Monday, November 9, 1931," p.10.

In Canada it has become trite to say that the railway situation is desperate. Competition between the two great railway systems themselves was working enough havoc before the present depression, to say nothing of the rise of motor transport, practically brought about their ruin. The Royal Commission which is now (March 1932) preparing its Report is expected to make interesting suggestions involving drastic changes.

It seems obvious that there is not enough traffic or even enough potential traffic in Canada to warrant three competing and duplicate transportation services. Two competing railway systems gave us a bad enough problem. Two competing railway systems plus a competing highway system put the country in the position of the boy who ate too much cake. In a great many fields of economic endeavour competition has ceased to be the little tin god we once thought it. We accept either publicly owned or privately owned monopolies under the supervision of a public service commission for street railways. Why can we not extend this principle to the national transportation services?[1]

It is certain that by amalgamating our railway systems we could decrease both operating expenses and constant costs very considerably. By the use of the rail-car alone, the railways could make up much of the revenue they have lost to the motor vehicle; but why

---

1. See Appendix p.257 for two interesting press comments on this question.

stop here ? Transportation is a public utility in a peculiar way. Is it not possible to visualise all common carrier transportation by land co-ordinated into one system ? Let the very factors which made low long-haul rates possible be reintroduced. Co-ordinate rail and motor transportation under one head, so that more valuable goods contribute more than their share, that our basis national products may be carried for less.

It is in the interests of our welfare as a people that our rail rates should be as low as possible. If co-ordination and amalgamation can accomplish this, are we incapable of surmounting the classic difficulties in the way of government ownership or of defending our interests should the decision be to create a monopoly under private control ?

Although this would undoubtedly be the most economic solution, we shall probably have to fall back on half measures. There must of necessity be a certain amount of co-ordination unless our transportation system is to break down altogether. The railways have three alternatives:

(1) To abandon most of the short-haul traffic to the motor vehicle. The railway, as at present functioning, has shown itself unable to compete at a profit.

(2) To reduce operating costs and fixed charges alike by employing more economic operating units such as the rail-car.

(3) To use motor vehicles as adjuncts to their own services[1].

1.See Appendix, page 264, for the new attitude of Canadian railwaymen with respect to the use of busses and trucks in their business.

The idea of co-ordination is not new. It was foreshadowed long before the competition between the two forms of transportation had reached its present acute state. Canada's leading authority on railway economics, Professor W.T. Jackman, of Toronto, discusses it in his "Economics of Transportation,"[1] published in 1926.

"The day when the motor vehicle was thought of only as a competitor is passing, and both the railways and the motor vehicle operators are getting another view of the instrumentality of traffic..... The railway companies, too, are beginning to revise their view regarding the motor vehicle, to understand its limitations and to see its potentialities as an associate in rendering the transportation service required by the country. The fact is that the motor vehicle is being studied as an engineering product and as an economic agent, with the object of fitting it into the transportation mechanism so as to render the most effective service.....

"From our deeper understanding of the respective fields of the railway and the motor vehicle, the field in which each can render the best service, it is becoming increasingly clear that these two, while rivals for certain classes of traffic, should be co-ordinated so as to furnish a more complete and well rounded transportation service.... It would seem to be the essence of economy that these two should render service which

---

1. Op. Cit. pages 782 and 783.

See Appendix, page 262, for Interstate Commerce Commission Findings on Co-ordination.

is complementary, rather than that the motor vehicle should seek to invade the field which is especially appropriate to the railway companies."

Professor Jackman's observations were made when common carrier motor transport was still in a disorganised condition - in the era of the small independent operator. Had the railways acted then, their task would have been comparatively easy. They could have had the same monopoly as is now enjoyed by the motor transport companies who bought up the franchises of the small operators and welded them into an efficient service. To get control now will cost them a considerable sum of money or a bitter competitive struggle on the highways. Indeed, where the motor transport companies are already well established and are performing a service which is attracting the patronage of satisfied users, they have a right to demand protection from "unfair" railway competition. Can we allow the railways, ruined more by competition with themselves than by motor competition, to enter territory already served by services which are standing on their own feet ? This is an additional duplication which we can well dispense with. In any case, most of the motor transport lines are protected by monopoly franchises. If the railways want them now, they must buy them out. The motor vehicle companies can set their own price, unless the government feels disposed to expropriate them.

We now turn to the taxation of the common carrier motor vehicle, treated as a public utility which should pay its way on the highways, not as a profit making industry which should be curbed in the interests of our railways.

CHAPTER VIII.

THE TAXATION OF THE COMMON CARRIER MOTOR VEHICLE.

In the first chapter we pointed out that the sum of the payments made to the government by the owner of a common carrier motor vehicle represents the addition of two separate and distinct items:[1]

(i) True economic taxes - compulsory contributions to the government to defray the expense incurred in the common interest of all without reference to special benefits conferred.

(ii) A road rental paid for the use of the roads.

With the true economic taxes we are not very much concerned. They interest us only in so far as they modify our point of view with regard to the road rental which should be paid by the common carrier motor vehicle. Our task was to achieve an equitable distribution of the highway bill among motor vehicles and this we attempted to do on the basis of highway wear and tear, highway space occupied, ability to pay and highway mileage travelled. Our results apply equally to all vehicles. Every vehicle is responsible for a certain amount of highway wear and tear, occupies a certain amount of highway space, has some ability to pay and travels a certain number of miles. None of these factors is affected by the use which is made of the vehicle. A 5-ton truck is a 5-ton truck whether it is used to carry its owner's goods or the goods of somebody else who pays the owner for their carriage. Notwithstanding the fact that a common carrier is physically no different from any other vehicle and that the actual use which it makes of the highways is exactly the same, it is commonly believed that a common carrier motor vehicle

---

1. See pages 9 to 11.

should pay a higher road rental, that is, should make a greater contribution to the highway bill than a privately owned vehicle. It is with the amount of this extra road rental that we have to deal. Should the common carrier pay more ? If so, why ? And how much ? The theorem that they should pay more is so universally accepted to-day that few people, even the common carrier interests themselves, ever stop to question it.

The distinction for road rental purposes between privately owned and common carrier motor vehicles goes back to the time when the amounts contributed by motor vehicles were regarded as license fees for <u>permission</u> to use the roads and not as payments based on the cost of service as we think of them to-day. Within municipalities it was customary to charge the old horse drawn cabs a license while the private carriage was untaxed. This license approximated to a business tax and bore no relation whatsoever to a highway maintenance fee. Early attempts to tax motor vehicles preserved this principle. The common carrier assessments were higher because they were a combination of an elementary form of road rental and business tax. Closely linked to this idea we have two others. One is the application of the 'benefit' theory of taxation. The common carrier should pay more because it benefits more from highway use.than does the privately owned vehicle. The other idea is the misconception that the road rental is the only means of making the common carrier contribute to the true economic taxes. The fact that the railways pay large sums in real property taxes on their right of way, whereas the common carrier motor vehicle using the public highways

as a right of way makes no such contribution, has led many to believe that the common carrier road rental should be higher.

We can see no reason why the road rental should be used as a means of levying true economic taxes. The common carrier motor vehicle contributes to this fund in the same way as a railway train, through the taxes levied on the corporation or persons who own it. A railway company pays real property taxes on its right of way because that right of way is private property. The common carrier motor vehicle has the economic advantage of operating on a right of way shared with all other vehicles.

The modern highway is coming to be a public utility operated by the government in somewhat the same manner as is a power plant. The government builds a highway and sells the right to use it to motor vehicle owners just as it builds a power plant and sells power to consumers. The power consumer pays directly in proportion to the amount of power he uses. The motor vehicle pays directly in proportion to the 'amount of highway use.' The payments for power are a simple calculation of power units consumed. The payments for 'amount of highway use' are more complex as they involve highway wear and tear, space occupied, mileage travelled and ability to pay. In the case of power, it is customary to give consumers who buy large quantities a lower rate. Motor vehicle taxation practice tends to charge the larger consumers a higher rate.

When this stage is reached there seem to be no grounds for charging the common carrier motor vehicle a higher road rental than the privately

owned vehicle unless it can be proved that the common carrier has a greater ability to pay than our method of calculating this factor from value allows for. As it happens, the highway systems have not yet been placed on a power plant basis. We have still to allow for the 'common benefit to all' element inherent in the highways and for the fact that most governments find it difficult to make up from the limited number of motor vehicles under their authority sufficient sums to meet the maximum amounts that motor vehicles may equitably be expected to pay.

In other words, motor vehicle transport is not yet on a cost of service basis in so far as paying for its right of way is concerned. If we charge the common carrier motor vehicle the same road rental as the privately owned vehicle it becomes a business undertaking which is subsidised in respect of its right of way. As a business undertaking operating in competition with other transportation agencies it should pay a road rental which is calculated as its fair share of the cost of providing this right of way, irrespective of whether other non-competing vehicles pay their share or not. But if we do this we are simply penalising the common carrier vehicle and allowing the privately owned vehicle to enjoy a subsidy. We find ourselves in a serious dilemma. Justice to competing common carrier agencies demands that common carrier motor vehicles should pay for their own right of way. Justice to common carrier motor vehicles demands that they should be on a competing basis with the privately owned vehicles. Otherwise, Mr. Larue of St-Polycarpe and his friends with their old trucks will put the legitimate common carrier vehicle out of business.

When a common carrier vehicle enjoys a monopoly of common carrier motor transport traffic in a given area it appears to be reasonable that it should pay for this monopoly privilege, but how is the amount to be determined ? Some governing authorities have answered this question in so far as it concerns passenger traffic by charging a fixed rate per passenger mile. Motor busses maintaining a regular service are assessed on their passenger seating capacity times the number of bus miles travelled. About the only thing in favour of this method is that it produces a revenue. It is difficult to find a corresponding method of taxing common carriers used to transport goods. When definite routes are established it is possible to arrive at a fairly close estimate by charging a special common carrier rate per ton per mile. In Quebec, for instance, the 'public delivery car' is assessed at the rate of one-tenth of a cent per ton per mile.[1] A 5-ton truck travelling 30,000 miles would thereby contribute $150,00 annually in this way. The system works well enough in these cases where quantities of parcel freight are being moved on timetables similar to those of the railways, but the essence of much common carrier traffic lies in flexibility. Vehicles will move wherever and whenever they get the goods. It would not pay a common carrier company to operate a regular service between a city and some small village in the neighbourhood, but it does pay them to move a load of furniture under contract whenever the opportunity offers. In this case the enforcement of the 'per ton per mile' rate is necessarily left in the operator's hands. He will pay it or not as he pleases. The common carrier

1. "An Act Respecting Motor Vehicles,"Quebec,1925. O.C. No. 518 as amended by O.C. No. 562 published in the Gazette Officielle de Quebec, 5 Avril, 1930.

adhering to a set route may be more easily assessed and pays the whole thing. When used in the limited field where it is sure to be collected, this method may be helpful as a means of distributing the road rental over the whole year. The operator could pay the registration fee at the beginning of the season, the gasoline tax as he consumes gasoline and the rate per ton per mile either quarterly or at the end of the season, thereby reducing the amounts in lump sum payments which he is called upon to pay at any one time. If we regard amounts which are contributed in this way as amounts which are to be deducted from the total road rental required from any given vehicle it has the additional advantage of making the total vary with the 'amount of highway use' in the same manner as the amounts contributed through the gasoline tax.

In the previous chapters we worked out certain road rental scales applicable to the same vehicle under different conditions. Our first scale assumed that motor vehicles would pay the total extra-urban highway bill and in addition it divided vehicles into two groups, those which could use a road of the minimum practical thickness and those which required an increased highway thickness. The second scale assumed the same contribution to the total highway bill but divided vehicles into three classes, under three tons, from three to five tons and over five tons, setting different road rentals to correspond to the highway thickness required for each class. At the present time, in most instances the common carrier vehicle is the only vehicle which pays a road rental approximately corresponding to the

amount we calculated for a vehicle of its class when assuming that motor vehicles would pay the total extra-urban highway bill.

In the cases where limitations are imposed on motor vehicles by forbidding a gross weight greater than the standard road can bear, we have no third class of very heavy vehicles and hence no reason for marking these non-existent vehicles off and creating a high scale of assessments for them. Yet it is customary for governing authorities to charge the common carrier vehicles on their roads road rentals which, notwithstanding the fact that these vehicles are within the limitations imposed by law, correspond closely to the amounts we calculated for the heaviest class of vehicles when they were placed in a separate class. This seems to be a most unjust discrimination. These legitimate common carriers, subject to various regulations for the safety of their passengers and freight, contribute more than their share towards the cost of their right of way and suffer from the competition of Mr. Larue whose old truck, under the existing tariffs, even if it were confined to its legitimate use as a privately owned commercial vehicle does not pay its full share towards the right of way.

Under ideal conditions, the extra-urban highways, as avenues of commerce, should be entirely paid for by the revenues received from motor vehicles. When this is done there can be no question of any subsidy whatsoever going to motor vehicles. The division of this cost among the various classes of motor vehicles is an easy enough matter as the foregoing discussion has shown. The common carrier could contribute as a vehicle, not as a

common carrier and pay strictly for the 'amount of highway use.' In about half the states of the American Union and in Ontario, alone among the provinces of Canada, there are a sufficient number of motor vehicles to pay the total extra-urban highway bill without undue or prohibitive levies on any particular class of vehicle. In the remaining states and provinces it will be a gradual development. On this continent we have been nursing 'infant industries' for a hundred and fifty years or more. Numerically, in many parts of the Continent, motor vehicles are still infants. If we tax them unduly now they will stop growing and we will never have enough of them to pay our highway bills.

For example, the Province of Ontario has now more than three times as many motor vehicles as has Quebec, though her population is only one and a quarter times as great. It is reasonable to suppose that if the present rate of growth continues within the next few years Quebec should have at least as many motor vehicles as Ontario has now. But if Quebec should suddenly attempt to raise enough revenue from her present small number of motor vehicles to pay her highway bill, we would expect to see a decline in the number of vehicles. Our example is somewhat ill chosen. It is just a question whether the higher road rentals which have been charged in Quebec almost from the beginning do not account in no small measure for the fewer motor vehicles in this Province as opposed to Ontario, where the road rentals have, until recently, been only about one-third as high.

In the states and provinces where the total extra-urban highway bill can be met from motor vehicle revenue, the problem of common carrier

road rentals is comparatively simple. The common carrier should pay for service rendered, that is, for amount of road use alone. When it does pay strictly on this basis it contributes a much larger amount than is commonly supposed. It is estimated that the average common carrier vehicle uses the roads from three to four times as much as the privately owned vehicle belonging to the same group. Our scale of amounts contributed through the gasoline tax used when we deducted gasoline tax contributions from the total road rental to obtain the registration fee, was based on the mileage of the privately owned commercial vehicle. Thus, if the common carrier pays the same registration fee as the privately owned vehicle, the total amounts it contributes are increased by gasoline tax contributions three to four times as great. In our opinion this is quite enough. Any additional levies seem uncalled for.

It is more difficult to assess a road rental for the common carrier in the states and provinces where it is impractical to obtain sufficient revenue from motor vehicles to cover the total extra-urban highway bill. In this case the dual competition we noted above becomes particularly acute. As before, we have to steer a middle course set for us by expediency rather than a rigid adherence to the cost of service principle. In any governmental unit, the road rental on a particular vehicle is determined by the number of vehicles registered as well as the total highway bill of the unit. If we assess the common carrier vehicle on the assumption that motor vehicles are to bear the total highway bill while we assess the privately owned vehicle

on theasumption that they are to bear fifty to sixty-six and two-thirds percent of the bill, we have satisfied those who claim that common carriers should pay their whole share of the cost of their right of way, but at the same time have placed the common carrier at a serious disadvantage in competing with the privately owned vehicle and the unofficial common carrier. In some cases this would result in charging the common carrier ridiculous annual rentals, perhaps as much as $3,000, per annum and the vehicle would disappear.

We are assured that the amount of traffic using a particular road is relatively unimportant provided the road is strong enough to bear it.[1] In other words, it does not make very much difference in highway wear and tear whether one vehicle or one hundred vehicles pass over a road when the road is properly built. Highway mileage travelled is a small factor in the actual expense of road building and maintenance. Accordingly, the road rental amounts we calculated in the various scales represent totalities which are subject to variation for the particular vehicle only to compensate for the varying amount of road service of which vehicles avail themselves. Thus, any class of vehicle which pays a total sum representing its share of the actual cost of road building and maintenance may be allowed some latitude in the amount of road service of which it avails itself. The common carrier uses the highways about four times as much as the average privately owned vehicle. With a seven cent tax on gasoline, a 5-ton common carrier travelling 80,000 miles per annum and a 5-ton private truck travelling 30,000

---

1. Interstate Commerce Commission, Docket #23400, p. 12.

miles per annum would contribute $1495.20 and $560.70[1], respectively, through the gasoline tax. This is as it should be provided the two vehicles are assessed on the same basis of contribution to the total highway bill. The common carrier would then be paying equitably for the extra amount of road service of which it avails itself.

For example, let us suppose that we are dealing with a state or province in which the number of motor vehicles is so small that the average annual road rental on the 5-ton truck required to pay the total highway bill amounted to $1500.00. The registration fee would be $1500.00 reduced by the amounts contributed through the gasoline tax by the average vehicle in the five tons class, that is, $1500.00 less $560.70, or $939,30. The common carrier would pay this registration fee and would also contribute $1495.20 in gasoline taxes, making a total road rental payment of $2434.50. No governing authority could possibly charge a privately owned 5-ton truck a registration fee of $939.30, because no truck owner could possibly pay it. The government would probably be satisfied if it could obtain enough revenue to meet half of its total highway bill. The privately owned vehicle would then contribute only $750.00 and would pay a registration fee of $750.00 less $560.20, or $189.80. On a 5-ton truck even $189.80 in registration fees is high. Fortunately, our example is greatly exaggerated, as there are no states or provinces where the equitable distribution of the total highway bill would demand so heavy a road rental as $1500.00 from the 5-ton truck.

---

1. Using the Ferguson formula.

When the privately owned vehicle is treated so generously, it is obviously necessary to do something for the common carrier. Even the harshest of its critics would scarcely expect it to pay $2434.50 unless they wished to get rid of it altogether. If it pays $1500.00 per annum it is making a full contribution to the cost of highway building and maintenance and is paying for its own right of way. If we can equitably get more than $1500.00 from it to allow for the fact that it uses the highways more, so much the better. If we charge it the same registration fee as the privately owned vehicle, it will make a total payment of $189.80 plus $1495.20, or $1685.00, sufficient to pay the average contribution from a vehicle of its class required to meet the total highway bill, with a good amount left over. This seems to be the fairest way of solving the problem. As the number of motor vehicles in any given area increases, the percentage of the total highway bill which they will be able to pay also increases until they are paying it all. At the same time, the contributionsfrom the common carrier are gradually increasing over the amount required from the average vehicle in the class to which the common carrier belongs and come to approximate to payments for 'amount of highway service received' rather than for 'amount of highway wear and tear directly attributable.'

When we remember that the 5-ton truck equipped with pneumatic tires may be operated on the standard road and that the average total road rental required from the average vehicle in the three to five tons class to pay this vehicle's contribution to the total highway bill of the whole

United States was only $291.50, it is at once apparent that gasoline tax[1] contributions will certainly tend to preserve the principle of payment directly in proportion to the amount of highway use. The seven cents a gallon tax rate which is rapidly becoming a standard should do away with high registration fees altogether. When the common carrier vehicle contributes five times as much as is necessary to pay the average road rental in its class through the gasoline tax alone, before the registration fee is considered at all, we have grounds for saying that it is at least paying for its own right of way, either when compared with the lightest vehicles and considering their smaller mileage, or when compared with vehicles of its own class.

The seven cents a gallon rate is high. At the present time it is a valuable expedient to secure necessary revenues. It would be unfortunate though, if we were to lose sight of the real significance of the gasoline tax altogether. It represents direct payment for highway miles travelled. It should therefore be used to raise as large a proportion of the road rental as is possible. Since gasoline consumption does not vary exactly with the elements in our road rental, we have a delicate differential between gasoline taxes and registration fees which must be preserved if our road rental system is to remain equitable. This differential is not the same in any two instances. A gasoline tax fitted to conditions in New York could not be applied in Quebec. There is no such thing as a standard rate. Expediency may make high gasoline taxes necessary but this should be regarded as a temporary arrangement which will be readjusted from time to time.

---

1. See page 84.

Those governing authorities which will be forced to use them for several years to come would do well to consider means of gasoline control, such as have already been advocated[1], in the interests of lower prices for the citizen consumers.

We have already made it clear that there is no real reason why the common carrier should pay a higher rate for the highway service which it buys from the government than should the privately owned vehicle, provided it makes a sufficient payment to cover its fair share of the cost of the right of way. The common carrier does not increase highway costs. Take it away altogether and governments would still be forced to build roads just as thick and just as wide to carry private traffic. It exists solely because it is able to offer the public a service which they are willing to make use of. If we charge it unduly high road fees simply because it is a common carrier, a private business operated on public property, some of us have the satisfaction of seeing it disappear, to be replaced by Mr. Larue. Those of us who have come to depend on it are deprived of an accustomed service, or, if the vehicle does not disappear, are forced to pay rates which are maintained at an artificial level determined by the cost of providing the right of way.

In the past, governments have been too prone to regard the common carrier as an undesirable parasite. They have been backward about their responsibility to the people who use it. Instead of promoting the

---

1. Page 36 et seq.

growth of 'unofficial' carriers, they would have been better employed in regulating the legitimate carriers in the interests of the citizens. This does not mean that the whole mass of railway regulations should be applied to common carrier motor vehicle transport as some have advocated. Many of the existing railway regulations are ridiculous enough in the field for which they are intended. The five regulations asked for by the Canadian Manufacturers' Association[1] embody the essentials of what those who are to use the service require. To them we might add, at the risk of committing the crime of redundancy, as they are practically established by the carriers in their own interests, the requirement that in the case of passenger autobus lines, a set timetable schedule should be filled and adhered to. The additional expense of complying with these regulations should be enough penalty to cover the special benefit which the common carrier receives as a private business operated on public property.

At the present time, the question of rate regulation is not so important. Competition with the railways tends to keep motor transport rates down as much as possible. As a matter of fact, motor transports usually charge slightly higher rates than do the railways. They attract business chiefly on account of the flexibility of the service they offer, although it is true that in the cases where they operate door to door delivery systems the door to door rate is slightly lower than the rail rate plus terminal transportation charges. When the Canadian railways

---

1. Pages 145-146. Regulation 5 is necessarily qualified by the considerations introduced above.

decided to make drastic reductions in weekend passenger rates the auto-busses were unable to follow suit. This is not surprising. Most of the autobus lines have passenger rates based on the actual cost of transporting passengers alone. Railway passenger rates are subsidised and a low level maintained through the same principle which applies in the case of low priced but bulky goods, while more valuable freight pays more than its share. It is significant of the economic operating advantage of the motor bus that passenger traffic can be made to pay. If the railways had to depend on passenger traffic alone, the resulting rates would be prohibitive.

So far, we have no standard, such as the ten percent dividend of the Canadian Pacific Railway or the five and three-quarters percent rate fixed by the Interstate Commerce Commission in 1922, to serve as a guide from which the general level of motor transport rates may be determined. It is admitted, though, that the motor carriers are not making exorbitant profits. Caught between the railways and Mr. Larue, they do well when they stay in business at all. It is just another example of competition run 'amok.' The most beneficial regulation of all would not be in the direction of preserving fair competition. Under the circumstances, fair competition as between the two systems would be fair to neither, since they are complementary rather than competitive in their very essence. Rational government regulation should be directed chiefly towards co-ordination of the services.

In Canada, much has been made of the fact that the common carrier motor vehicle is unable to maintain its services properly during the winter. They maintain their schedules more or less exactly during less than nine months of the year, then close up altogether and their customers fall back on the railways who are forced by law to maintain their services. This does not seem fair. The cream of the passenger traffic moves during the summer months. The autobus and motor truck get this traffic and then stop running when the condition of the roads makes it impossible for them to continue. If the railways maintained a proper and convenient year round service we could not defend this practice. As it happens, they do not. For the residents of many of the country districts it would be a return to transportation barbarism to deprive them of the autobus.

The village of Hemmingford, for example, only forty-five miles from Montreal, is the terminal of a small branch line on the Champlain Junction division of the old Grand Trunk, now incorporated in the Canadian National Railways. It is also served by the autobusses of the Provincial Transport Company. I have had a personal experience on both of the village's transportation systems. One day in August, during an election campaign, I had to attend a small meeting about eight miles beyond the terminal at Hemmingford. The autobus left Montreal a little earlier than was convenient, so I took the train, which left the City at 4.55 P.M., Standard Time. For the first twenty odd miles things went beautifully. Then we were put off at a junction and changed to another train almost immediately. The second train

paused deliberately at every small station. At St-Remi, they took our locomotive away from us altogether and left us there, while freight cars were shunted around and the engineer rang his bell to encourage us. This continued for three quarters of an hour. We finally got to Hemmingford somewhere between eight and eight-thirty! On the train there were three passengers, the wife of a railway employe, travelling on a pass, a friend who had come out of sympathy, and myself. In addition, we carried some mailbags, the evening papers, and two small packages of freight. With a little crowding, the whole pay load could be transported in a 5-passenger car.

The next morning, I came home by autobus. We telephoned the bus terminal so the driver stopped at the door. I had time to finish a cup of coffee, collect my belongings and say good-bye, and was back at work in the City a little after nine-thirty.

In this particular case, the railway has adopted 'unofficial intimidation.' The people have been told that if they don't patronise the railway they will lose their winter trains. Some of them make a point of taking at least one trip by rail during the summer in a gesture of placation to the railway. The others are more interested in persuading the provincial Highways Department to keep the roads open all winter so that their busses will continue to run.

This is the most extreme example I have found of an unproductive railway branch line. Undoubtedly there are others. Even if the autobus

were legislated out of existence, this particular train would not pay. For many summer visitors, the attractionsof spending a weekend in Hemmingford are considerable, but scarcely sufficient to compensate for such a train service. With the existing railway equipment, particularly the right of way, it would be difficult to change matters appreciably. It is situations similar to this that prove the crying need of some form of co-ordination.

Those who are fond of looking into the future prophesy that we are fast approaching the time when common carrier motor vehicles will operate over specially constructed highways of their own. They are supported in this view by the motorists who have had their nervous systems deranged by the impolite habits adopted by heavy vehicle operators when passing a smaller vehicle and also by the persons who cannot conceive of a private business of any magnitude operated on public property. In our opinion the idea is utterly ridiculous. In the first place, even supposing that we scrapped the railways altogether, the volume of heavy traffic would not be great enough to make possible a distribution of right of way costs that would give us rates that were not prohibitive. There is absolutely no necessity for such a duplication anyway, no matter how great the density of traffic may become. Our present standard is the two strip highway. Soon we will have the three strip and finally the four strip, widened out to eight strips if necessary, at points where the traffic density warrants it. We need never face the prospect of a motor

train of one hundred cars moving along any highway, whether specially constructed for common carriers or otherwise. It simply can't be done. If the price of gasoline dropped to one cent a gallon, it would still be cheaper to move coal in carload lots by rail than by motor transport.

The growth of common carrier motor transport depends on the preservation of its most unique economic advantage - its ability to use a right of way in common with all other vehicles, sharing the cost of its construction and making it possible to achieve safety and speed with the minimum expense to each individual unit.

Before leaving the question of common carrier road rentals, there is one more point that should be mentioned. How are we to assess a fair registration fee for avehicle which operates regularly over the highways of more than one state or province ? The present day practice is that it pays the full amount required by each governing authority for a vehicle of its class. If any vehicle operated between Montreal and Florida,[1] it would pay registration fees to about fourteen governments. Consequently, the same vehicle does not operate over such an area, aside altogether from the fact that so long a haul is uneconomic in other respects. It is not uncommon for vehicles to operate between three or four states and four registration fees do mount up to a considerable total. If we are to preserve the strictest equity, there should be some allowance made. In the case of regularly established routes, it is an easy enough

---

1. In his 'Storm on the Post Road,' a short story which appeared in the Saturday Evening Post, issue of March 12,1932, Mr. Leonard H. Nason introduces "The Redwing, crack coach of the Larrimore Lines, Montreal to Miami,"

matter to determine just what proportion of a vehicle's mileage is within any particular state. Then, a fair arrangement would be that the vehicle should pay to each state government a proportion of that government's regular registration fee which corresponded to the proportion of the annual mileage within each government's jurisdiction. When this is done, it might be possible for those of us who don't own pleasure vehicles to choose our seat in Montreal and enjoy the scenic beauties of the highway route between Montreal and Florida from the same window.

---

into his plot.

It is now possible to purchase a through ticket for the bus trip between Montreal and Miami, but the whole journey is not made in the same vehicle.

Chapter IX.

GENERAL OBSERVATIONS - SUMMARY

The method of taxing motor vehicles which we have here outlined is primarily a scheme for raising revenue to pay our highway bills. In it we have incorporated the fundamental principles which govern the fair and equitable distribution of highway costs. The system is sufficiently elastic to be easily adapted to the varying needs of different governing authorities. It does not attempt to establish anything approaching a standard road rental applicable everywhere, but simply a standard method of arriving at the road rental. Apart from the revenue aspect, our scheme is arranged to promote the greatest efficiency in motor vehicle operation and design. It penalises the types of equipment which are most destructive on our highways and allows the widest possible latitude consistent with safety in the matter of maximum loads and sizes of vehicles.

Unsupported by intelligent regulation, the application of the system would result in glaring injustices in the amounts paid by different vehicles and in inconveniences to traffic on the right of way. Overloading must be checked. We can no longer afford to run the risks to life and limb which are forever present when vehicles are made to do work for which they are not intended. This is the most vicious possible form of subsidy. The overloaded truck is a potential death trap. In addition, it is responsible for more highway wear and tear, proportionally, than any other vehicle.

We have found a place on the highways for the heavy truck and the autobus and welcome them as substantial contributors to highway costs. If the motoring public is to accept heavy traffic, such traffic must be so regulated that it affords the minimum of inconvenience to other highway users. On the standard road there is ample room for two vehicles to pass one another without undue overcrowding. The trouble starts when a heavy vehicle feels itself entitled to two-thirds of the road. In the case of three strip highways this is not an over-serious matter. A Ford car can still do nicely on the third strip remaining. With the average two strip highway, such procedure tends to add undesirable words to the small car operator's vocabulary even if it does not send him to the hospital. The practice of simply marking a six-inch white band down the centre of the road is not sufficient. The heavy vehicle operator travels with his left side wheels directly on the band and still takes more than his share of the highway. This may be overcome by marking two parallel white bands with a neutral zone wide enough to allow a safe clearance between passing vehicles. When this is done, each vehicle may travel with its left side wheels directly on its own band and know that there is ample room.

The two strip highway will eventually disappear for all except secondary roads. The three strip is rapidly becoming a standard for the great trunk lines. Road building and improvement which attained such enormous proportions during the last twenty years must continue for decades to come. Our highway systems are still far from perfect. It is probable,though,

that the rate of expansion will be less rapid. It is ever increasingly important that we pay for new construction as we go. In most localities, the main effort in the near future will be largely directed towards eliminating the risks of highway travel. The day when surfacing was the only problem in highway construction has passed. We can no longer be satisfied with the winding roads of yesterday. Tortuous curves may be picturesque, pleasant variants in the slow monotony of the route in the old horse and carriage times, but with normal speeds of from thirty to fifty miles an hour they must be straightened out. Once a curve is eliminated, or a level crossing becomes a tunnel underneath, the work is permanent. After a few years, surfacing may again take its place as the most important item in highway expenditure. This will only be when we have made highway travel as safe as any other mode of transportation.

In the past, there was a curious lack of relation between the motor vehicle and the highway in the matter of transportation costs. Highway costs were one thing, motor vehicle costs quite another. The highway was built and the motor vehicle was designed but there was no attempt to fit the two together - to work out principles of highway design which were fitted to motor vehicle requirements and to design motor vehicles which were fitted to the roads. A macadam road is less expensive than a concrete road but it is not suitable for motor vehicles. A truck with single rear tire equipment is less expensive that one with dual, but it requires a much

stronger and hence more costly road. We can no longer think in terms of separate costs. The governments found this out to their sorrow when the first macadam roads broke down. They were forced to build their highways to meet motor vehicle requirements. It would be ridiculous to imagine motor vehicle gross weights limited and rear axles multiplied to produce an impact force small enough to permit motor vehicle operation on macadam roads. It is equally ridiculous to imagine roads constructed to carry 20-ton trucks on a single rear axle with single tire equipment.

The established government compromise is the Standard Road of the United States Bureau of Public Roads - with provision for variations where there is a reasonable volume of heavy traffic capable of bearing the cost. The government alone, through its method of assessing motor vehicles for road use, can take the final step and ensure that motor vehicle design will conform to the standards required for the most economical operation. It should no longer be possible for the difference between initial vehicle costs and road rentals paid to make it possible for a vehicle owner to operate a truck which exerts twice as much wear and tear on the highways as another of better design but slightly higher cost price.

Our method is intended to put the motor vehicle in its proper place with reference to highway costs. A road rental system based on highway wear and tear, space occupied, ability to pay and mileage travelled, carefully graded to allow for the differences in construction costs made necessary by different types of vehicles will ensure this.

As set forth herein, our method is at the best a very rough outline. The pertinent data at our disposal are pitifully inadequate. It is impossible to reduce a system to its fine points through the use of a single table of impact forces calculated for a single speed on one particular type of road surface. Nor can we arrive at definite results when engineers tell us that our figures for total maintenance costs do not represent the amounts that should really be spent to maintain our highways properly, but that they are simply the amounts that were available for this purpose.

In attempting to build up a taxation system based on the technical intricacies of highway and motor vehicle design, the economist is sadly out of depth. He must depend entirely on the engineer. The engineers have furnished a tantalising lead. In impact force attributable to vehicles they have given us a concrete starting point. Now we are able to outline a system and trust to the engineers to fill in the gaps in our technical information and to the statisticians to furnish us with the figures we require.

To those who are interested in preserving the principles of a regulated competition between transportation agencies, our method of taxing the common carrier motor vehicle will doubtless prove unsatisfactory. For this we make no apology. Under modern economic conditions no people can afford to pay the costs of duplicate and competing systems. The nation demands the flexibility and economy of service which motor transport offers. They have a right to this at fair rates. Governments have used the railways as equalisers of opportunity. They are forced to carry grain and other bulk

commodities at little more than out of pocket costs and are not allowed to adjust their rates to please themselves. They claim that on an actual cost basis the rails can beat the truck and highway for distances over seventy-five miles, but they are prohibited from using such a weapon as the cost of service basis because the farmers must be subsidised by low freight rates to keep them on the land.

Those who believe in preserving competition have two courses open. They may tax the common carrier until it disappears and its place is taken partly by the railways, partly by the unofficial common carriers, and mostly by private vehicles. On the other hand, they may take the view that all motor transport should be used as an equaliser of opportunity and tax the private vehicle so highly that it will be cheaper to ship by rail alone, and we are back where we started from in 1900. The premise that our transportation facilities are equalisers of opportunity cannot be maintained under competitive conditions in any other way.

No economic dogma and no transportation agency can go on forever unchanged. It is more important to the citizens of the countries of North America that they should be able to get their wheat to the sea-coast as cheaply as possible and enjoy the convenience of speedy and economical short haul service than they they should stick to the old traditional doctrine of laissez-faire or seek to preserve the transportation status quo of thirty years ago.

The savings due to railway amalgamation may not be as great as we imagine. Even so, any saving, however small, means something. The improvements in transportation service due to rationalisation and co-ordination cannot be overestimated. If the railway can actually beat the truck and highway for distances over seventy-five miles, goods going over seventy-five miles should be shipped by rail. If the trucks can give a cheaper service for shorter hauls, it is insane economics to use the rails. Competition means that railways will continue the short haul, motor vehicles the long haul, and the public pays the difference.

If transportation is to remain an equaliser of opportunities - the foundation on which our whole national economic structure was built, co-ordination offers the most reasonable means of furthering this end. Let there be a single authority controlling transportation - with power to cut out the non-paying railway short haul, the expensive branch line, and to do away with the futile expense of long haul motor traffic. Let the profits of the motor vehicle over the railway on the short haul and the profits of the railway over the motor vehicle on the long haul be turned into a common fund and a new schedule of equalised rates, lower than was ever before dreamed possible, should result. This is the natural means of taking advantage of all the facilities offered by motor transport, converting it from the destroyer of our established means of equalising opportunity into an efficient agent in furthering this object.

Since we are convinced that this is the proper place of common carrier motor vehicle transport, we therefore feel justified in applying exactly the same methods of assessing the road rental on it as we would use for the private vehicle. It should perform a greater service to the public than the mere carriage of their goods. It becomes an essential cog in the working of the national economic machine and should not have its usefulness hindered by uncalled for restrictions and super payments.

Like the Colonel's Lady and Susie O'Grady, all motor vehicles are the same under their paint. Each may be fairly assessed on the basis of highway wear and tear, space occupied, ability to pay and mileage travelled, following the principles we have here outlined.

.....

APPENDIX.

APPENDIX.

APPENDIX (Cont'd).

T A B L E I.

Design Data and Thickness of Concrete Road Slab Required for Motor Vehicles of Various Classes, Equipped with Pneumatic, Cushion, and Solid Tires and Operated at Certain Speeds over a Pavement of Smoothness Equal to Fair Sheet Asphalt (N Street, 2d to 1st. S.W., Washington, D.C.)

PNEUMATIC TIRE EQUIPMENT. VEHICLES OPERATED AT 30 MILES PER HOUR

Class of vehicle	Rear wheel load (lbs)	Max. impact force (lbs)	Tire size (inches)	Area of contact (sq.ins.) net	Area of contact (sq.ins.) gross	Radius of equiv.circular contact area (inches) edge	Radius of equiv.circular contact area (inches) centre	Slab Design Edge thickness (ins.)	Slab Design Edge stress (lbs. per sq. inch)	Slab Design Centre thickness (ins.)	Slab Design Centre stress (lbs. per sq. inch)	Index of relative thickness
7-pass.car	1750	5100	Sing. 7½	35	35	4.7	3.3	7	226	6	218	1.000
2-ton truck	4400	7900	Dual 6	58	106	8.2	5.8	7	280	6	290	1,000
3-ton truck	5600	9200	Dual 7	70	112	8.4	6.0	7	320	6	332	1,000
5-ton truck	9000	12500	Dual 8	104	177	10.6	7.5	7½	336	6½	358	1.077
7½-ton truck	11000	14600	Dual 10½	134	210	11.6	8.2	8	338	7	353	1.154

NEW CUSHION TIRE EQUIPMENT. VEHICLES OPERATED AT 20 MILES PER HOUR

5-ton truck	9000	13400	Dual 7	82	113	8.5	6.0	8½	348	7½	332	1.231
7½-ton truck	11000	15300	Dual 8	92	130	9.1	6.4	9	344	8	332	1.308

NEW SOLID TIRE EQUIPMENT. VEHICLES OPERATED AT 20 MILES PER HOUR

5-ton truck	9000	15300	Dual 6	58	81	7.2	5.1	9½	360	8½	323	1.385
7½-ton truck	11000	17400	Dual 8	98	121	8.8	6.2	10	341	8½	347	1.423

An edge thickness of 7-inches and centre thickness of 6-inches are minimum practicable values.
Computation of slab thickness and stress based on analysis by H.M.Westergaard (Public Roads, vol.7. no. 2. April 1926) assuming modulus of subgrade reaction 50 (soft subgrade).

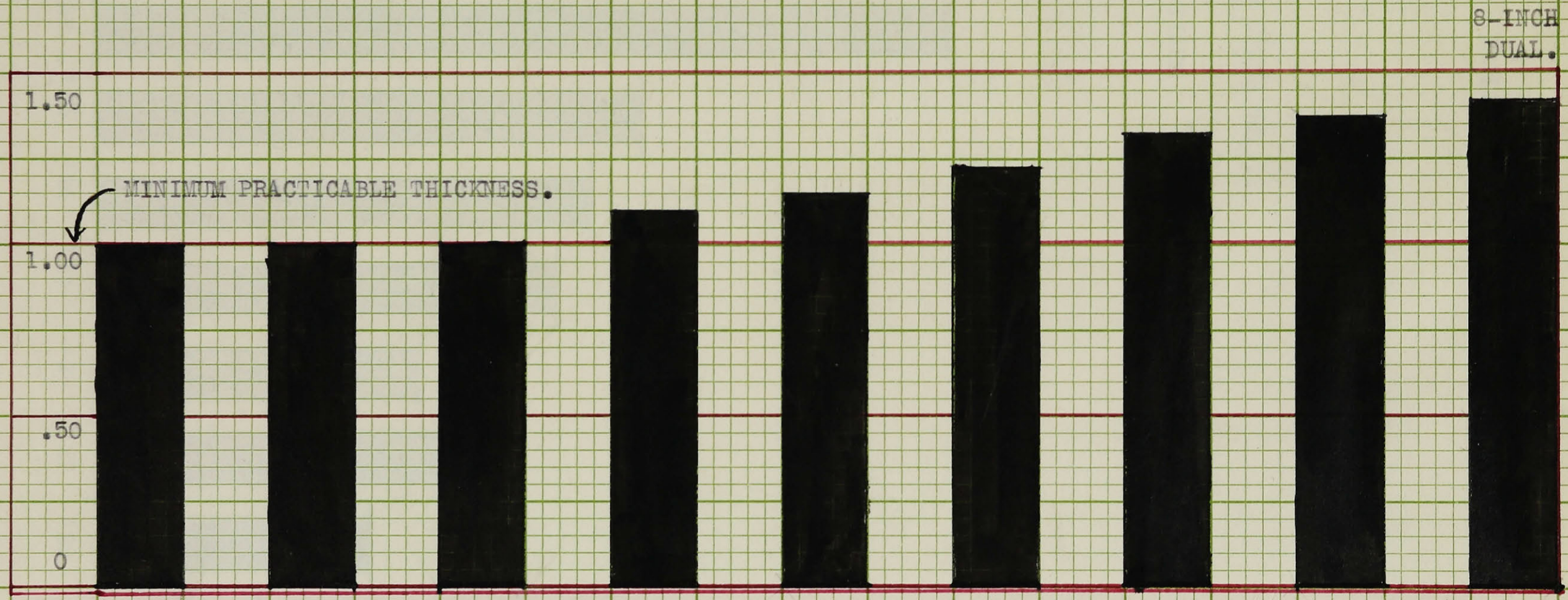
From,"Interstate Commerce Commission,Docket #23400," page 18.

TABLE II.

RELATIVE THICKNESS OF CONCRETE ROAD SLAB REQUIRED FOR VARIOUS CLASSES OF MOTOR VEHICLES.

BASE ON A SURFACE SMOOTHNESS EQUAL TO THAT OF A FAIR SHEET ASPHALT PAVEMENT

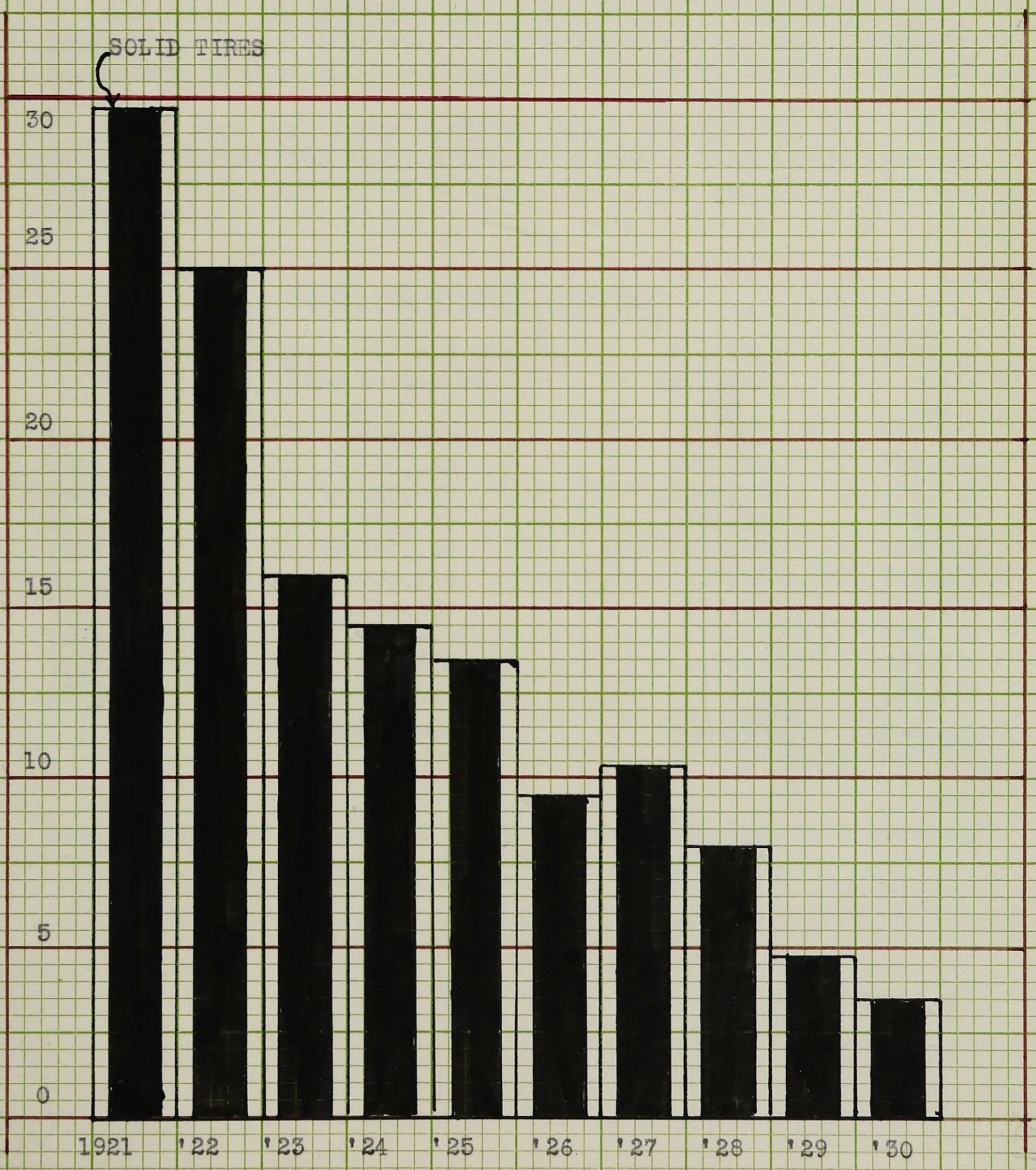
(N STREET, 2ND. TO 1 ST. S.W., WASHINGTON, D.C.)



FROM, "INTERSTATE COMMERCE COMMISSION, DOCKET #23400", Page 19.

TABLE III.

DECLINE IN USE OF SOLID TIRE EQUIPMENT



FROM, "FACTS AND FIGURES OF THE AUTOMOBILE INDUSTRY, 1931 EDITION"
PAGE 38.

TABLE III.

DECLINE IN THE USE OF SOLID TIRES ON MOTOR TRUCKS.

Use of solid and cushion tire equipment on new motor trucks showed a continued decrease in 1930.

Estimates indicate that only 3.6 per cent of the 1930 truck production had solid or cushion tire equipment whereas in 1921 the percentage of commercial vehicles so equipped amounted to 29.8 per cent.

Solid tire use is now confined almost exclusively to a limited field of specialized hauling including road construction, excavating and the transportation of structural steel and other extremely heavy loads.

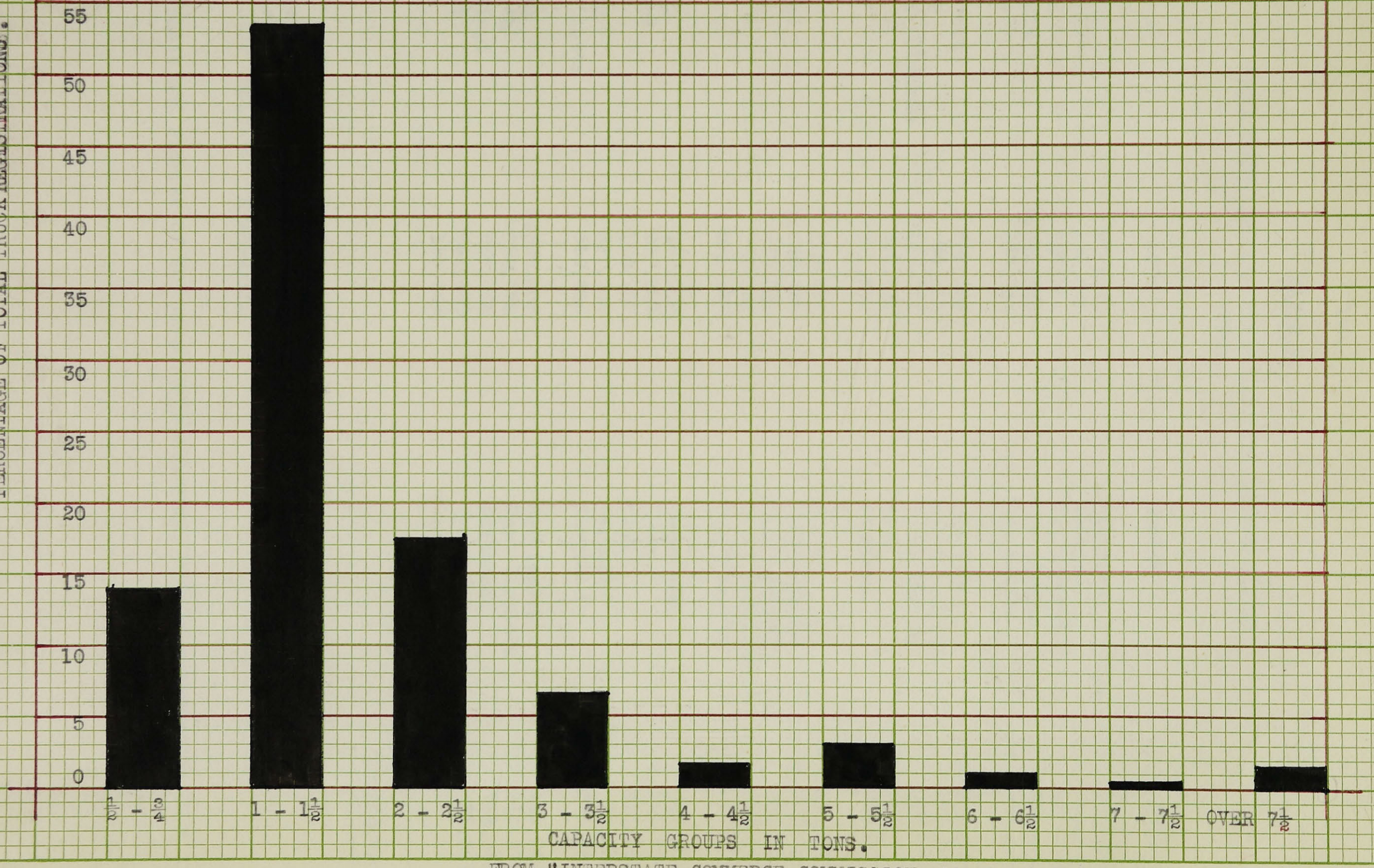
SOLID AND CUSHION TIRE USE.

Year.	Total Solid and Cushion Tire Shipments.	Original Equipment 25%	Replacement. 75%
1921	684,140	171,036	513,104
1922	965,060	241.260	723,700
1923	981,499	245,374	736,125
1924	898,072	224,520	673,552
1925	1,067,193	266,800	800,393
1926	733,316	183,330	549,986
1927	744,000	186,000	558,000
1928	683,470	170,870	512,600
1929	570,372	142,592	427,780
1930	313,420	78,352	235,068

From, "Facts and Figures of the Automobile Industry, 1931 Edition," Page 38.

TABLE IV.

PERCENTAGE DISTRIBUTION OF TRUCKS BY CAPACITY



FROM, "INTERSTATE COMMERCE COMMISSION, DOCKET #23400," PAGE 23.

TABLE V.

TOTAL MOTOR VEHICLE REGISTRATIONS, UNITED STATES 1930.

STATES	1930	STATES	1930
Alabama	277,146	Nebraska	426,229
Arizona	110,525	Nevada	29,645
Arkansas	220,204	New Hampshire	112,183
California	2,041,356	New Jersey	852,850
Colorado	308,509	New Mexico	84,150
Connecticut	331,026	New York	2,307,730
Delaware	56,109	North Carolina	453,241
Dist. of Columbia	156,676	North Dakota	183,019
Florida	327,801	Ohio	1,759,363
Georgia	341,580	Oklahoma	550,331
Idaho	119,077	Oregon	252,123
Illinois	1,638,260	Pennsylvania	1,753,521
Indiana	875,763	Rhode Island	136,423
Iowa	778,386	South Carolina	218,402
Kansas	594,523	South Dakota	205,172
Kentucky	331,002	Tennessee	368,259
Louisiana	275,283	Texas	1,365,896
Maine	186,157	Utah	113,997
Maryland	321,702	Vermont	86,624
Massachusetts	846,206	Virginia	375,889
Michigan	1,328,209	Washington	446,062
Minnesota	732,972	West Virginia	266.273
Mississippi	237,094	Wisconsin	782,562
Missouri	761,600	Wyoming	61,501
Montana	135,168		
			26,523,779

Passenger Cars	23,042,840
Motor Trucks	3,480,939
Total Motor Vehicles	26,523,779

From, "Facts and Figures of the Automobile Industry, 1931 Edition" pages 16 & 17.

TABLE VI.

(A)

HIGHWAY SUMMARY, U.S., 1930.

Total mileage in United States		3,030,000
State highway system	327,000	
County and local roads	2,703,000	
Mileage surfaced		700,000
State highways	223,000	
Local roads	477,000	
High type surface.		128,000
Mileage surfaced 1930 (Reconstructed surfacing included)		55,000
Expenditures - 1930.		$1,600,000,000
Street construction and maintenance.		$ 600,000,000

(B)

FEDERAL AID SYSTEM

Total approved miles	193,049
Total mileage completed with Federal Aid	84,013
Constructed 1930 (Fiscal year)	9,349
Total improved forest road mileage	4,357
Annual Federal Aid authorisation	$ 125,000,000
Federal Aid payments to states (1930 Fiscal year)	75,880,863

TABLE VI. (Cont'd)

(C)

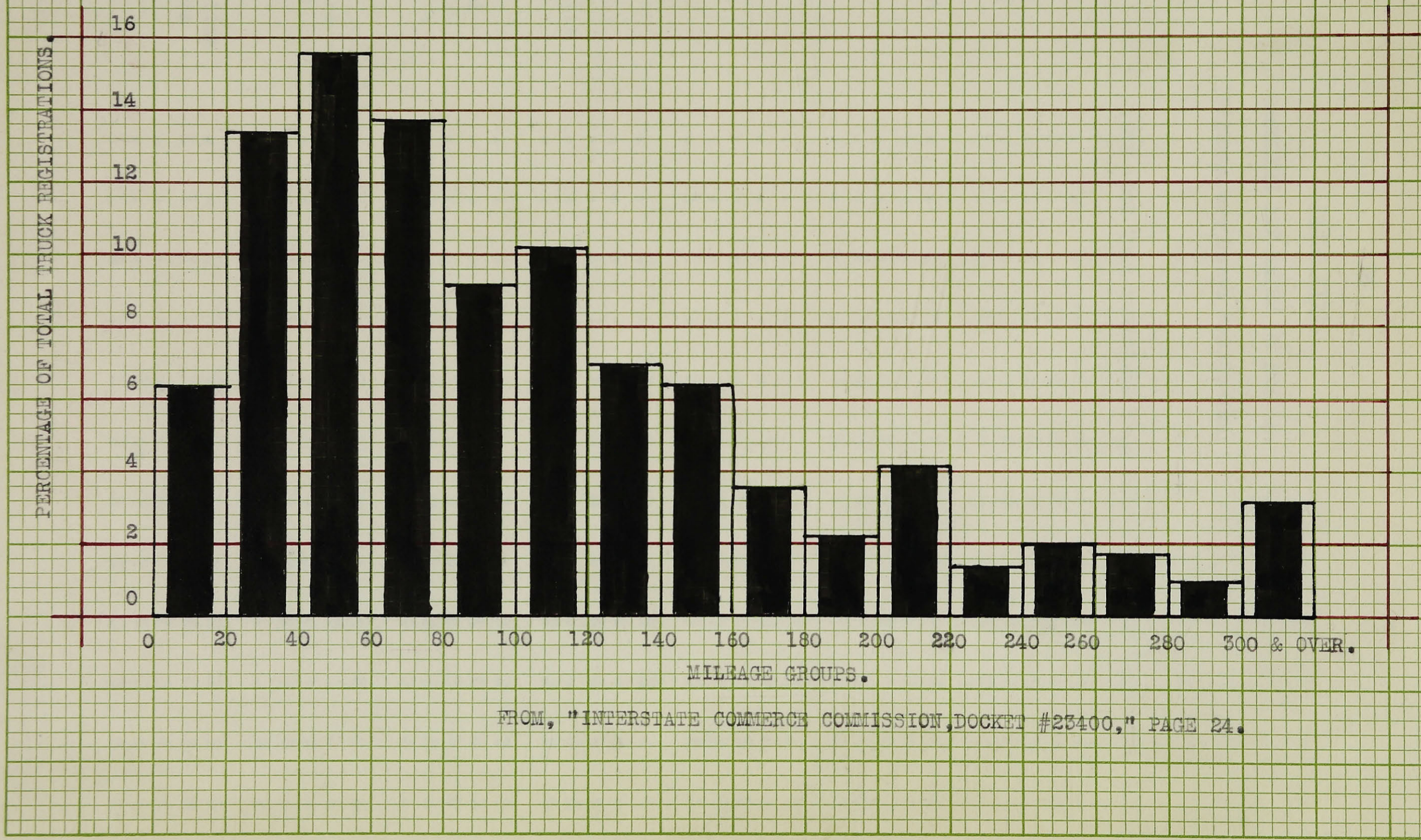
REVENUES FROM MOTOR VEHICLES, 1930
SPECIAL MOTOR VEHICLE TAXES

State - Registration fees		$355,704,860	
Gasoline tax		494,683,410	
		$850,388,270	$850,388,270
Municipal	-		20,000,000
Total Special Taxes			$870,388,270
Personal property tax			130,000,000
GRAND TOTAL	-		$1,000,388,270

From, "Facts and Figures of the Automobile Industry, 1931 Edition."
pages 45 and 59.

TABLE VII.

PERCENTAGE DISTRIBUTION OF TRUCKS BY DAILY TRIP MILEAGE.



FROM, "INTERSTATE COMMERCE COMMISSION, DOCKET #23400," PAGE 24.

TABLE V111.

GASOLINE TAX RATES BY STATES.

(Figures are Cents Per Gallon)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Alabama	.	.	.	.	2	2	2	2	4	4	4	4	4
Arizona	.	.	.	1	3	3	3	3	4	4	4	4	5
Arkansas	.	.	1	1	3	4	4	4	5	5	5	5	6
California	.	.	.	.	2	2	2	2	3	3	3	3	3
Colorado	1	1	1	1	2	2	2	2	3	3	4	4	4
Connecticut	.	.	1	1	1	1	2	2	2	2	2	2	2
Delaware	.	.	.	.	1	2	2	2	3	3	3	3	3
Florida	.	.	1	1	3	3	4	4	5	5	6	6	6
Georgia	.	.	1	1	3	3	3½	3½	4	4	6	6	6
Idaho	.	.	.	.	2	2	3	3	4	4	4	5	5
Illinois	.	.	.	.	.	.	.	.	2	2	3	3	3
Indiana	.	.	.	.	2	2	3	3	3	3	4	4	4
Iowa	.	.	.	.	.	.	2	2	3	3	3	3	3
Kansas	.	.	.	.	.	.	2	2	2	2	3	3	3
Kentucky	.	1	1	1	1	3	3	5	5	5	5	5	5
Louisiana	.	.	.	1	1	2	2	2	2	2	4	4	4
Maine	.	.	.	.	1	1	3	3	4	4	4	4	4
Maryland	.	.	.	1	1	2	2	2	4	4	4	4	4
Massachusetts	.	.	.	.	.	.	.	.	.	.	2	2	2
Michigan	.	.	.	.	.	.	2	2	3	3	3	3	3
Minnesota	.	.	.	.	.	.	2	2	2	2	3	3	3
Mississippi	.	.	.	1	1	3	3	4	4	5	5	5	5
Missouri	.	.	.	.	.	.	2	2	2	2	2	2	2
Montana	.	.	1	1	2	2	2	2	3	3	5	5	5
Nebraska	.	.	.	.	.	.	2	2	2	2	4	4	4
Nevada	.	.	.	.	2	2	4	4	4	4	4	4	4
New Hamshire	.	.	.	.	1	2	2	2	3	4	4	4	4
New Jersey	.	.	.	.	.	.	.	.	2	2	2	2	2
New Mexico	.	.	1	1	1	1	3	3	5	5	5	5	5
New York	.	.	.	.	.	.	.	.	.	.	2	2	2
North Carolina	.	.	1	1	3	3	4	4	4	4	5	5	6
North Dakota	1	1	1	1	1	1	1	2	2	2	3	3	3
Ohio	.	.	.	.	.	.	2	2	3	3	4	4	4
Oklahoma	.	.	.	.	1	2½	3	3	3	3	4	4	5
Oregon	1	1	2	2	3	3	3	3	3	3	3	4	4

TABLE VIII. (Cont'd).

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Pennsylvania	.	.	1	1	2	2	2	2	3	3	4	4ϕ	3
Rhode Island	.	.	.	.	.	.	1	1	2	2	2	2	2
South Carolina	.	.	.	2	3	3	5	5	5	5	6	6	6
South Dakota	.	.	.	1	2	2	3	3	4	4	4	4	4
Tennessee	.	.	.	.	2	2	3	3	3	3	5	5	5#
Texas	.	.	.	.	1	1	1	1	3	2	4	4	4
Utah	.	.	.	.	2½	2½	3½	3½	3½	3½	3½	3½	4
Vermont	.	.	.	.	1	1	2	2	3	3	4	4	4
Virginia	.	.	.	.	3	3	3	4½	4½	5	5	5	5
Washington	.	.	1	1	1	2	2	2	2	2	3	3	5
West Virginia	.	.	.	.	2	2	3½	3½	4	4	4	4	4
Wisconsin	.	.	.	.	.	.	2	2	2	2	2	2	4
Wyoming	.	.	.	.	1	1	2½	2½	3	3	4	4	4
Dist.of Columbia	.	.	.	.	.	2	2	2	2	2	2	2	2

ϕ Reverts to three cents July 1, 1930

\# Seven cent rate effective in one country.

NOTE - The above table is corrected as of April 1st, 1931.

From Facts and Figures of the Automobile Industry, 1931, Edition, p. 51.

TABLE VIII-A.

GASOLINE TAX RATES IN NORTH AMERICA, 1932.

STATES.	CENTS PER GAL.	STATES.	CENTS PER GAL.
Alabama	5	Nevada	4
Arizona	5	New Hampshire	4
Arkansas	6	New Jersey	3
California	3	New Mexico	5
Colorado	4	New York	2
Connecticut	2	North Carolina	6
Delaware	3	North Dakota	3
Florida	7	Ohio	4
Georgia	6	Oklahoma	4
Idaho	5	Oregon	4
Illinois	3	Pennsylvania	3
Indiana	4	Rhode Island	2
Iowa	3	South Carolina	6
Kansas	3	South Dakota	4
Kentucky	5	Tennessee	7
Louisiana	5	Texas	4
Maine	4	Utah	4
Maryland	4	Vermont	4
Massachusetts	3	Virginia	5
Michigan	3	Washington	5
Minnesota	3	West Virginia	4
Mississippi	5½	Wisconsin	4
Missouri	2	Wyoming	4
Montana	5	Dist. of Columbia	2
Nebraska	4		

C A N A D A.

Alberta	5	Ontario	5
British Columbia	5	Prince Edward Island	5
Manitoba	5	Quebec	6
New Brunswick	5	Saskatchewan	5
Nova Scotia	5		

(Cont'd) -

TABLE VIII-A. (Cont'd)

These figures were published in the form of a Gasoline Tax Map in the January-February, 1932 issue of the 'Imperial Oil Review,' a footnote reads: " Florida and Tennessee have the highest taxes. Georgia, South Carolina and North Carolina have a six cent tax. Except for the aforementioned States, the gasoline tax in the Province of Quebec is now higher than anywhere in the American Union."

We have since noted three increases, Ontario and Nova Scotia to six cents, New Brunswick to seven cents. British Columbia has also (April 1923) increased the tax to seven cents.

-

TABLE IX.

GASOLINE CONSUMPTION, 1930.

Province.	By motor vehicles	Average number of gallons per registered motor vehicle ϕ	For all uses #
	Gallons	Gallons	Gallons
Prince Edward Island	2,567,328	347	2,889,288
Nova Scotia	17,518,709	407	19,367,349
New Brunswick	13,982,400	401	15,043,515
Quebec	83,231,068	465	88,681,459
Ontario	239,058,108	423	305,829,114
Manitoba	21,627,672	273	33,468,467
Saskatchewan	31,248,449	248	76,630,024
Alberta	35,789,985	349	50,744,600
British Columbia	34,530,673	349	37,865,180
Total -	479,554,392	387	630,518,996

ϕ These are affected by the purchases for local cars and also purchases by touring motorists from other provinces and the United States.

Includes gasolene consumed by farm tractors, stationary gasolene engines, industrial use, etc., on which the gasolene tax was refunded.

From, "The Highway and the Motor Vehicle in Canada, 1930," p. 26.

TABLE X.

WORLD GASOLINE PRICES BY COUNTRIES
(Figures from Minerals and Transportation Divisions, Department of Commerce)
THIRD QUARTER 1930 AND LAST QUARTER 1929

In making comparisons among countries due consideration should be given to factors making for inequalities of prices, such as, distance from source of supply, quantity consumed, transportation costs, import duties, excise taxes, distribution and marketing costs and quality of product.

Country and City.		Cents per U.S. gallon 1930.
1. U.S., Av. 50 cities (tax 3.78)		19.2
2. Porto Rico, San Juan(tax 6 cts.)	¢	20.0
3. Canada, Toronto.(tax 5 cts.)		23.3
4. Norway, Oslo		23.4
5. Netherlands, The Hague.		24.0
6. Japan,Tokyo.	#	24.0
7. Spain, Madrid.		24.6
8. Austria, Vienna.	¢	25.5
9. Irish Free State, Dublin.	¢	25.8
10. Rumania, Bucharest.		26.1
11. Sweden, Stockholm	¢	26.5
12. Mexico, Mex. City (road tax 6.3 cts.)	¢	26.5
13. Cuba, Havana (duty 10 cts.)		27.0
14. Argentina, Buenos Aires	#	28.0
15. Belgium, Brussels.	¢	28.1
16. Denmark, Copenhagen	¢	28.5
17. United Kingdom (tax 8 cts.)	¢	28.6
18. Finland, Helsingfors.	¢	29.6
19. Switzerland, Zurich	¢	29.9
20. Bulgaria, Sofia.	¢	30.1
21. Czechoslovakia, Prague.		30.5
22. China, Shanghai.	¢	32.7
23. France, Lyon.	#	32.7
24. Philippines, Manila (tax 7.6 cts.)		34.1
25. Ecuador, Guayaquil.	#	36.0
26. Peru, Lima (tax 13 cts.)	¢	36.0
27. Poland, Warsaw		36.1
28. Egypt, Cairo.	#	36.4
29. D.E. Indies, Batavia (tax 10.4 cts.)	¢	36.5
30. India, Calcutta.	#	39.0
31. Italy, Naples.		39.1
32. Brazil, Rio de Janeiro	¢	39.7

TABLE X. (Cont'd).

Country and City.		Cents per U.S. gallon, 1930.
33.	South Africa, Durban.	ϕ 40.0
34.	Germany, Av. 3 cities.	41.0
35.	Persia, Teheran	# 42.7
36.	Chile, Santiago (tax 12 cts)	43.5
37.	Australia (tax 14 cts.)	ϕ 43.9
38.	Columbia, Bogota (tax 6 cts.)	47.2
39.	Bolivia, La Paz.	# 57.0

.. . .

Prices are retail except where indicated by ϕ or #.

ϕ Sold in bulk # Sold in tins.

(--): Gasoline or road tax included in price.

From, "Facts and Figures of the Automobile Industry, 1931, Edition," p.80.

TABLE XI.

METHOD BY WHICH REGISTRATION FEES ARE COMPUTED IN DIFFERENT STATES (JANUARY 1, 1931)

STATE.	PASSENGER CARS.	COMMERCIAL CARS. (Not Common Carriers)
Alabama	Horsepower.	Tons capacity.
Arizona	Flat rate.	Flat rate and pounds unladen weight and kind of tires.
Arkansas	H.P. and pounds gross weight.	Tons capacity and kind of tires.
California	Flat rate.	Flat rate and pounds unladen weight and kind of tires.
Colorado	Cost price.	Tons capacity.
Connecticut	Cubic inch displacement.	Tons capacity and kind of tires.
Delaware	Pounds gross weight.	Pounds gross weight.
Florida	Pounds gross weight	Pounds net weight and kind of tires.
Georgia	Pounds gross weight	Tons capacity.
Idaho	Pounds net weight and number of times registered.	Chassis weight capacity and kind of tires.
Illinois	Horsepower.	Pounds gross weight.
Indiana	H.P. and pounds net weight.	Tons capacity.
Iowa	Value and pounds net weight.	Tons capacity and kind of tires.
Kansas	Flat rate and pounds gross weight.	Tons capacity and kind of tires.
Kentucky	H.P. and pounds net weight.	Pounds capacity.
Louisiana	Horsepower.	Horsepower and pounds capacity and kind of tires.
Maine	H.P. and pounds net weight.	Pounds capacity and kind of tires.
Maryland	Horsepower	Pounds capacity and kind of tires (H.P. if on pneumatic tires).
Massachusetts	Horsepower	Pounds gross weight.
Michigan	Pounds net weight	Pounds unladen weight.
Minnesota	Value	Value and tons capacity.
Mississippi	H.P. and pounds gross weight.	Tons capacity and kind of tires.
Missouri	Horsepower	Tons capacity.
Montana	Net weight.	Tons capacity and kind of tires.
Nebraska	Pounds net weight.	Pounds capacity.
Nevada	Pounds gross weight.	Pounds gross weight.
New Hampshire	Pounds gross weight.	Pounds gross weight and kind of tires.
New Jersey	Horsepower	Pounds gross weight.
New Mexico	Pounds net weight	Chassis weight and kind of tires.

TABLE XI. (Cont'd)

STATE.	PASSENGER CARS.	COMMERCIAL CARS. (Not Common Carriers)
New York	Pounds net weight	Pounds net weight.
North Carolina	Horsepower	Tons capacity and kind of tires.
North Dakota	Factory price,net weight,H.P. and times registered.	Factory price,net weight, H.P. and tons capacity.
Ohio	Horsepower	Pounds unladen weight.
Oklahoma	Manufacturers'list price.	Pounds capacity and times registered.
Oregon	Pounds net weight.	Net weight and kind of tires.
Pennsylvania	Horsepower	Pounds chassis weight and kind of tires.
Rhode Island	Pounds gross weight.	Pounds gross weight and kind of tires.
South Carolina	Pounds net weight.	Tons capacity and kind of tires.
South Dakota	Pounds net weight	Tons capacity.
Tennessee	Horsepower	Horsepower and tons capacity.
Texas	Pounds net weight.	Pounds gross weight, kind of tires and number of wheels.
Utah	Horsepower.	Tons capacity and kind of tires.
Vermont	Pounds net weight	Pounds gross weight.
Virginia	Pounds net weight.	Tons capacity.
Washington	Pounds net weight.	Pounds net weight and pounds capacity.
West Virginia	Flat rate, pounds net weight.	Tons capacity and kind of tires.
Wisconsin	Pounds net weight	Tons gross weight and number of wheels.
Wyoming	Horsepower.	Tons capacity and kind of tires.
Dist.of Columbia.	Flat rate.	Flat rate.

From Facts and Figures of the Automobile Industry, 1931 Edition, p. 41.

....

TABLE XII.

FEES FOR REGISTRATIONS AND LICENSES OF MOTOR VEHICLES IN EFFECT IN PROVINCES AND CANADIAN NATIONAL PARKS, 1930.

(A)

PRINCE EDWARD ISLAND.

PASSENGER.	Cwt. unit, 70¢ each
COMMERCIAL TRUCK.	Ton capacity unit. 1 ton or under - $14.00 1 to 1½ tons - 19.00 1½ to 2½ tons - 33.00 2½ to 3½ tons - 83.00 $1.00 for markers. Registration fee of $2.50 when registered for first time.
MOTOR CYCLE.	$6.00
CHAUFFEUR.	$5.50
OPERATOR.	$1.00
GARAGE	Not issued
DEALER OR MANUFACTURER.	$50.00 for permit with 3 sets of markers; additional markers, $15.00 per set

. . . . . .

TABLE XII. (Cont'd)

(B)

NOVA SCOTIA.

PASSENGER.	90¢ per cwt. or fraction thereof, minimum $15.30.
COMMERCIAL TRUCK.	Per cwt. Up to 3,000 pounds - $0.90 3,000 to 4,000 " 1.00 4,000 to 5,000 " 1.25 5,000 to 6,000 " 1.50 6,000 to 7,000 " 2.00 7,000 pounds and over 2.50 Minimum fee 17.00
MOTOR CYCLE.	$7.20
CHAUFFEUR.	$5.00
OPERATOR	$1.00
GARAGE.	Not issued
DEALER OR MANUFACTURER.	$25.00 for one permit and one set of plates; $10.00 for each set additional.

.....

TABLE XII. (Cont'd)

(C)

NEW BRUNSWICK.

PASSENGER.	85¢ per cwt. Registration fee $5.00
COMMERCIAL TRUCK.	Commercial vehicles of gross weight up to 3,000, 6,000 and 8,000 pounds. $1.15, $1.75, $2.00 per cwt. respectively when equipped with pneumatic tires, and $1.75, $2.25, $3.00 per cwt. respectively when equipped with non-pneumatic tires. Registration fee $5.00.
MOTOR CYCLE.	$3.00 registration, $5.00 tax.
CHAUFFEUR.	$2.00 Registration fee $2.00
OPERATOR.	$1.00
GARAGE	$5.00
DEALER OR MANUFACTURER.	$50.00 license 2 sets plates; $15.00 each additional set.

.....

TABLE XII. (Cont'd)

(D)

QUEBEC.

PASSENGER.	¢ Cwt. unit -- Pleasure $ 0.70 Service 1.00 Autobus 1.50
COMMERCIAL TRUCK.	¢ Cwt. unit depending upon character of tire(1). Pneumatic tire, per cwt. Three tons and under $1.25 Exceeding 3 tons .. 2.50 Non-pneumatic tire - Two and a half tons and under ... .. 1.50 Exceeding two and a half tons 3.00
MOTOR CYCLE	¢ Same as passenger cars, 70¢ per hundred pounds or fraction.
CHAUFFEUR.	$5.00
OPERATOR	$5.00
GARAGE.	$20.00 in Montreal, Quebec, Westmount, Outremont, Verdun and Maisonneuve; $10.00 in other cities; $5.00 elsewhere.
DEALER OR MANUFACTURER.	Same as for garage.

TABLE XII. (Cont'd)

(E)

ONTARIO.

PASSENGER.

To 25 h.p.	..	$ 5.00 (X)
to 35 h.p.	..	10.00
Over 35 h.p.	..	20.00

COMMERCIAL TRUCK.

Ton weight #	If equipped wholly with pneumatic tires.	If equipped wholly or in part with solid tires.
Up to 3 tons	$15.00	$24.00
More than 3 tons and up to 4	24.00	36.00
" " 4 " " " " 5	40.00	45.00
" " 5 " " " " 6	54.00	60.00
" " 6 " " " " 7	63.00	70.00
" " 7 " " " " 8	72.00	80.00
" " 8 " " " " 9	90.00	117.00
" " 9 " " " " 10	100.00	130.00
" " 10 " " " " 11	132.00	154.00
" " 11 " " " " 12	144.00	168.00
" " 12 " " " " 13	156.00	
" " 13 " " " " 14	168.00	
" " 14 " " " " 15	180.00	

MOTOR CYCLE. $3.00

CHAUFFEUR. $2.00 original.
$1.00 renewal.

OPERATOR $1.00

GARAGE. Class A $10.00
Class B 5.00

DEALER OR MANUFACTURER. Passenger - $20.00 per set of markers.

Commercial- based on combined weight and carrying capacity of the largest truck dealt in, Minimum $20.00;additional markers per set, $20.00 (minimum)

....

TABLE XII. (Cont'd)

(F)

MANITOBA.

PASSENGER.	Wheel base of 100", $9.00; each 5" additional, $2.50; over 9 years old and 100" wheel base, $9.00.
COMMERCIAL TRUCK.	Ton unit. Fee. One ton and under .. $10.00 Each additional ton .. 10.00
MOTOR CYCLE.	$5.00
CHAUFFEUR.	$2.00
OPERATOR.	$1.00
GARAGE.	No fee
DEALER OR MANUFACTURER.	$20.00 for one set of plates; $15.00 for each additional set of plates.

.....

TABLE XII. (Cont'd)

(G)

SASKATCHEWAN.

PASSENGER.	Wheel base of 100", $10.00,each additional 5 ins. $2.50; exceeding 135" $30.00.
COMMERCIAL TRUCK.	Gross weight basis. General trucks - $12.50 to $150.00 Urban trucks and farm trucks - $12.50 to $ 35.00 Trailers - $ 2.50 to $ 30.00
MOTOR CYCLE.	$6.00 Motor attachment bicycle, $3.00
CHAUFFEUR.	$5.00
OPERATOR.	Issued to owners free. 50¢ to others.
GARAGE.	Livery / $8.00 per vehicle over regular fee.
DEALER OR MANUFACTURER.	$40.00 in three chief cities, $30.00 in other cities; $25.00 in incorporated towns; $20.00 in other places; $20.00 for additional markers.

. . . . . .

TABLE XII. (Cont'd)

(H)

ALBERTA.

PASSENGER.	Wheel base of 100", $10.00; each 5" additional - 2.50; exceeding 135" - 30.00.
COMMERCIAL TRUCK.	Same as passenger car.
MOTOR CYCLE.	$5.00
CHAUFFEUR.	$3.00
OPERATOR.	$0.50
GARAGE.	$5.00
DEALER AND MANUFACTURER.	$10.00 and $20.00 for each motor vehicle which can be used.

.....

TABLE XII. (Cont'd)

(I)

BRITISH COLUMBIA.

PASSENGER.	Weight added to value, 2,500 units, $16.90; for each 100 units additional 67½¢.,plus $10.00 registration fee for first registration only. License fee reduced quarterly.
COMMERCIAL TRUCK.	Same as passenger car.
MOTOR CYCLE.	$5.65 and $5.00 first registration.
CHAUFFEUR.	Class A - $7.50 Class B - 6.00 Class C - 4.00
OPERATOR.	Driver's license $1.00 (Duplicates 25¢)
GARAGE.	Not issued.
DEALER OR MANUFACTURER.	$25.00 for one set of markers; $10.00 for each additional set.

.....

(J)

YUKON.

PASSENGER.	$10.00
COMMERCIAL TRUCK.	$10.00
MOTOR CYCLE.	$ 3.00
CHAUFFEUR.	Not issued.
OPERATOR.	Not issued.
GARAGE.	Not issued.
DEALER OR MANUFACTURER.	$1.00 for each set of number plates.

....

TABLE XII. (Cont'd)

(K)

CANADIAN NATIONAL PARKS.

PASSENGER.	Same as fees of province in which located.
COMMERCIAL TRUCK.	Same as fees of province in which located.
MOTOR CYCLE.	Same as fees of province in which located.
CHAUFFEUR.	$1.00.
OPERATOR.	Transient season $4.00. One day-three weeks $1.00.
GARAGE.	Not issued.
DEALER OR MANUFACTURER.	Same as fees of province in which located.

.....

ϕ Plus $1.00 for markers.
(X) Buses 1/20 of a cent per passenger per mile on provincial roads. 1/30 of a cent on all other roads in addition to registration fee.
Trailers under 1 ton, $3; 1-2 tons,$6; 2-3 tons, $15; 3-4 tons,$20; 4-5 tons $25; 5-6 tons,$30; 6-7 tons, $42; 7-8 tons, $48; 8-9 tons, $54; 9-10 tons, $60; 10-11 tons, $88; 11-12 tons $96;; 12-13 tons $104; 13-14 tons, $112; 14-15 tons,$120.
/ Every liveryman is declared by statute to be a "common carrier" who shall furnish reasonable and adequate service at just and reasonable rates during such hours as may be reasonably required for the accommodation of the public.
(1)Pleasure vehicles for hire included with commercial vehicles.

From,"The Highway and The Motor Vehicle in Canada, 1930."pages 41 to 43.

TABLE XIII.

STATE TAXES AND FEES ON MOTOR BUSES.

ALABAMA.

Not Common Carriers.

5 persons or less	-	$37.50
6 to 10	-	50.00
11 to 15	-	75.00
16 to 20	-	100.00
21 to 40	-	150.00

And in addition, 3% of gross income from all business done within State.

Common Carriers.

In addition to the above--1% of gross income and flat fee $10.00 per vehicle. When seating capacity exceeds 8, 50¢ for each additional seat. Combination passenger and property carriers pay either the passenger or tonnage rate charged property carriers, whichever is higher. Jitney buses (route under 15 miles) pay special fees.

ARIZONA.

Not Common Carriers.

Less than 1,600 lbs.	-	$ 5.00
1,600 to 2,999 lbs.	-	10.00
3,000 to 5,999 lbs.	-	20.00
6,000 to 9,999 lbs.	-	30.00
10,000 or more	-	40.00

Common Carriers.

In addition to the above--2% of gross receipts (payable monthly).

TABLE XIII. (Cont'd)

ARKANSAS.

Horse Power and Gross Weight.

12½ cents per h.p. plus the following:

	Per 100 lbs.
3,500 lbs or less -	55¢
3,501 to 4,500 lbs. -	60¢
Over 4,500 lbs. -	65¢

And in addition:

$2.50 for each passenger carrying capacity plus 4% of gross receipts.

CALIFORNIA.

Not Common Carriers.

Flat rate -- -	$ 3.00
plus following fees:	
Net weight 3,000 lbs. to 5,999 lbs.	8.00
Net weight 6,000 lbs. to 9,999 lbs and limited to a gross weight of not exceeding 22,000 lbs. -	40.00
Net weight 10,000 lbs. or more and limited to a gross weight of not exceeding 22,000 lbs. -	50.00
Net weight 6,000 lbs. or more and entitled to a gross weight exceeding 22,000 lbs. -	70.00

Common Carriers.

4-1/4% of the gross receipts derived from operating passenger carriers, in lieu of all other taxes, except the gas tax.

COLORADO

Not Common Carriers.

1/2 of 1% of original cost price f.o.b. factory. 30% reduction after 5th year; 50% reduction after 8th year.

Minimum fee - $ 5.00.

And in addition:

Seating Capacity	
Seating 9 persons or less	$20.00
Each additional seat	1.00

TABLE XIII. (Cont'd)

COLORADO

Common Carriers.

1/2 of 1% of original cost price f.o.b. factory. 30% reduction after 5th year; 50% reduction after 8th year. Minimum fee - $5.00

And in addition:

1 mill per passenger mile.

CONNECTICUT.

Cubic Inch Displacement.

Per cubic inch of displacement	$0.08
Minimum fee	15.00

And in addition:

Seating Capacity

7 persons or less (buses 5 or less)	$15.00
Each seat additional from--	
8 to 20 - -	2.00
21 to 40 - -	5.00
Over	10.00

In addition to the above fees the following franchise tax:

Class A (operation wholly intrastate), 3% gross receipts.

Interstate.

Class B (operation partly intra-state, partly interstate), 1 cent per bus mile within State.

Class C (some operations wholly intrastate and some operations inter-state), 3% gross receipts on wholly intrastate operations and 1 cent per bus mile (on Connecticut highways) on interstate operations.

TABLE XIII. (Cont'd)

DELAWARE.

Gross Weight.

Per 500 lbs. - -	$2.00

Measured by sum of weight of vehicle plus seating capacity times 125 lbs.

FLORIDA.

Gross Weight plus Seating Capacity
Not Common Carriers.

Seating capacity less than 7.75¢ per 100 lbs. plus $5.00 each passenger capacity. Over 7 passengers, $1.50 per 100 lbs; plus $10.00 per passenger capacity up to 16. Over 16 passenger capacity, $1.50 per 100 lbs;plus $15.00 per passenger capacity.

Common Carriers.

Gross Weight.

Per 100 lbs.	$0.50

And in addition:
10 passengers or less, 1/2¢ per bus mile; over 10 but not over 20 passengers, 3/4¢ per bus mile; over 20 passengers, 1¢ per bus mile.

GEORGIA.

Gross Weight plus Seating Capacity plus Miles of Route Operated.

$25.00 per annum for vehicle weighing less than 5,000 pounds and not exceeding 7 passengers where one-way route does not exceed 50 miles, graduated up to $800.00 per annum where route is over 100 miles for first 12,000 lbs. of vehicle weight, increased by 10% for each additional 1,000 lbs. of weight, increased 2½% for each additional passenger in carriage capacity above ten.

TABLE XIII. (Cont'd)

IDAHO.

Passenger Capacity plus Gross Receipts.

Per passenger seat	-	$8.00

And in addition:
1% of gross operating revenue.

ILLINOIS.

Horse Power

Capacity of 7 or less passengers:

25 h.p. or less	$8.00
Over 25 to 35	12.00
Over 35 to 50	20.00
Over 50	25.00

Capacity of over 7 passengers:

Gross Weight.

5,000 lbs. or less	$12.00
Over 5,000 to 12,000 lbs.	22.50
Over 12,000 to 16,000 lbs.	75.00
Over 16,000 to 20,000 lbs.	100.00
Over 20,000 lbs.	150.00

And in addition:
$1.00 per 100 lbs. gross weight, allowing 125 lbs. per passenger.

INDIANA.

Seating Capacity.

$6.00 per person at rated capacity, allowing 16 inches per seat. If operated wholly within limits of city or town, one-tenth of above fees. (Municipalities may charge additional fee.)

Interstate.

If operated exclusively in interstate commerce, fees shall be $10.00 per person at rated carrying capacity, allowing 16 inches per seat.

TABLE XIII. (Cont'd)

IOWA.

Value plus Net Weight.

1% of value plus 40¢ per 100 lbs. or fraction thereof.
After 5th registration fee based on value shall be 1/2 of 1%.
Minimum annual fee, $10.00.
(Executive Council annually fixes basing value and weight for computing fees)

And in addition:
1/4¢ per ton mile.
Estimated in following manner:
Ton mile equals maximum seat capacity at 150 lbs. plus weight of vehicle times number of miles travelled; sum thus obtained to be divided by 2,000.

KANSAS.

Flat Rate plus Gross Weight.

Flat rate	-	$8.00
Over 2,000 lbs. per each 100 lbs.		.50

And in addition:
Passenger Capacity
Between fixed termini or over regular routes:

7 passengers or less	-	40.00
7 to 12 passengers	-	90.00
12 to 18 passengers	-	140.00
18 to 24 passengers	-	180.00
Over 24 passengers	-	230.00

And in addition 1/2 mill per gross ton mile.

If operated wholly within a city and for fare of 10¢ or less and on a 20-minute schedule or less, 1/2 of above fees. Cars with capacity of 4 or less exempted.

TABLE XIII. (Cont'd)

KENTUCKY.

Horse Power plus Net Weight.

Per h.p.	-	19¢
Plus each 100 lbs. net weight		30¢

And in addition:

If operated over irregular routes and not between fixed termini:

$1.50 per passenger.

If operated over regular routes or between fixed termini, per 100 lbs. gross weight, $0.50 plus.

Five or less passengers, $5.00 per seat plus $10.00 for bus tag.

Six to 20 passengers, $10.00 per seat plus $25.00 for bus tag.

Twenty to 30 passengers, $15.00 per seat plus $50.00 for bus tag.

Interstate.

Interstate passenger carriers between fixed termini and between two or more municipalities over route 10 miles or less within State pay 1-3 of above fees.

LOUISIANA.

Common Carriers.

Horse Power plus Passenger Capacity.

Per h.p.	-	$0.68
Plus $2.00 per passenger up to 8.		
$5.00 per passenger up to 29.		
$7.00 per passenger over 30.		
Minimum, $25.00.		

MAINE.

Seven-Passenger Capacity or Less Horse Power plus Net Weight.

Per h.p.	-	$0.50
Per 100 lbs.(pneumatic)	-	.50
Per 100 lbs.(solids)	-	1.00
Minimum fee		20.00

Over 7-Passenger Capacity.

In addition to the above:

Plus $2.50 for each seat in addition to 7.

TABLE XIII. (Cont'd)

MARYLAND.

Not Common Carriers.

Per h.p.	-	$0.32
Holders of "Employee Certificates," per year in addition to regular registration fees.		$3.00

Common Carriers.

1/18¢ per passenger seat times total number of miles.

MASSACHUSETTS.
Seating Capacity.

Seven persons or less, $1.20 each seat.
Over 7 persons, $1.50 each seat.
Minimum fee, $6.00.

MICHIGAN.
Lbs. Weight.

$1.55 for each 100 lbs. weight of each vehicle employed in the business.

MINNESOTA.
Value

10% of value.

Minimum fee.

Over 5 to 15 seating capacity, inclusive	-	$250.00
Over 16. capacity	-	350.00

10% depreciation allowed for each year after first year, up to and including seventh year.
70% allowed for eighth year.
80% allowed for ninth year.
90% allowed for tenth year.
Subsequent years, the minimum fee.

TABLE XIII. (Cont'd)

MISSISSIPPI.

Horse Power plus Gross Weight.

Per h.p.	- -	$0.10
Per 100 lbs.	- -	.40

Gross weight of car as shown by manufacturer's rating:

Minimum fee	- -	$10.00

If weight is over 2,500 lbs. must pay in each county where operating $2.00 for each passenger carrying capacity.

MISSOURI.

Horse Power.

Less than 12 h.p.	- -	$7.50
12 under 24 h.p.	- -	10.50
24 under 36 h.p.	- -	16.50
36 under 48 h.p.	- -	22.50
48 under 60 h.p.	- -	25.50
60 under 72 h.p.	- -	37.50

Municipalities may levy fees up to 1/3 of State fees.

And in addition:

Intrastate Carriers.

Over regular routes:
$10.00 per passenger seat.
Not over regular routes.
$ 5.00 per passenger seat.

Interstate Carriers.

When total mileage of an interstate operator is not more than 10 miles in Missouri, the fee is one-third the above. Otherwise the full rate is paid.

TABLE XIII. (Cont'd)

MONTANA.

Net Weight.

Up to 2,700 lbs.	-	-	$10.00
2,701 to 4,500 lbs.	-	-	15.00
Over 4,500 lbs.	-	-	25.00

And in addition:

Special Fees.

In accordance with size and weight, not to exceed $10.00 per vehicle.

NEBRASKA.

Flat Rate plus Seating Capacity.
Operating Outside Municipal Limits.

Per vehicle.	-	-	$25.00

Plus $7.00 per passenger carrying capacity.

Operating Within Municipal Limits.

Less than 7 passengers pay above rates.

Over 7 passengers:		
8 to 13 passengers.	-	$ 8.00
14 to 20 passengers	-	12.00
21 to 26 passengers	-	18.00
27 to 33 passengers	-	25.00
34 and over	-	25.00

Plus $10.00 for each 1,000 lbs. capacity over 5,000 lbs. (Each passenger 150 lbs.)

NEVADA.

Not Common Carriers.

Gross Weight.

Per 100 lbs.	-	-	$ 0.30

Factory advertised weight plus 125 lbs. per person vehicle accommodates.

Common Carriers.

Flat rate, $50.00 plus $10.00 per passenger capacity (Allowing 16 ins. per passenger)

Combination passenger and property carriers pay:

Flat rate, $50.00 plus $10.00 per passenger capacity(16 ins. per passenger) plus $2.00 per 100 lbs. capacity obtained by deducting weight of passenger capacity (125 lbs per passenger) from total weight capacity of vehicle.

TABLE XIII. (Cont'd)

NEW HAMPSHIRE.

Gross Weight.

Up to 4,000 lbs., 35¢ per 100 lbs. of total; 4,001 to 6,000 lbs., 45¢ per 100 lbs. of total; 6,001 to 8,000 lbs., 50¢ per 100 lbs. of total; over 8,000 lbs., 60¢ per 100 lbs of total.

Minimum fee, $10.00.

Passenger figured at 150 lbs. each, times seating capacity.

Local authorities may fix special license fees.

NEW JERSEY.

Passenger Capacity.

5 passengers or less	-	-	$15.00
6 to 8 passengers	-	-	17.50
9 to 12 passengers	-	-	20.00
13 to 17 passengers	-	-	25.00
18 to 22 passengers	-	-	30.00
23 to 26 passengers	-	-	35.00
27 to 30 passengers	-	-	40.00

Plus $2.00 per seat in excess of 30. 5% gross earnings to cities through which route runs. To be divided among them in proportion to number of miles of route in each city. (Gas tax not applicable to buses paying this franchise tax.)

Interstate.

Interstate buses to pay 1/2¢ per mile on mileage covered in State.

NEW MEXICO.

Flat Rate plus Carrying Capacity.

Not Common Carriers.

Flat rate	-	-	$50.00

Plus $5.00 for each passenger carrying capacity.

Common Carriers.

One-half the above registration fees. In addition the following mileage tax:

Capacity.	Per Bus Mile.
7 or less	1/4¢
8 to 12	1/2¢
13 to 18	1¢
19 to 25	1½¢
Over 25.	2¢

TABLE XIII.(Cont'd)

NEW YORK.

Seating Capacity.

5 passengers or less	-	-	$15.00
6 to 7 passengers.	-	-	24.50
8 to 10 passengers	-	-	30.50
11 to 16 passengers	-	-	43.00
17 to 20 passengers	-	-	52.00
21 to 22 passengers	-	-	55.00
23 to 26 passengers	-	-	61.50
27 to 30 passengers	-	-	67.50

For each passenger over 30 passengers, $2.00 each.

Schedule not applicable to omnibuses operating within municipality under franchise granted by said municipality. The registration fee for any such omnibus is flat rate of $10.00 in addition to municipal fees.

NORTH CAROLINA.

Not Common Carriers.

All passenger carriers for hire(including buses) not operating on Certificate issued by the Corporation Commission pay the following:

25 h.p. or less	-	-	$18.75
Over 25 h.p. to 30 h.p.	-	-	30.00
Over 30 but less than 35 h.p.		-	45.00
35 h.p. or more	-	-	60.00

If more than 12 passenger capacity, $2.00 per passenger over 12 in addition to above.

Also $5.00 per seat, except where operating on definite schedule with 75% of line of operation in municipality or adjacent municipalities, $1.00 per seat.

Common Carriers.

6% of gross receipts.

TABLE XIII. (Cont'd)

NORTH DAKOTA.

Factory Selling Price, Net Weight and Horse Power.

First Registration:			
Per $1.00 value	-	-	$0.01
Per each 100 lbs.	-	-	.20
Per each h.p.	-	-	.10

Second Registration:
10% reduction.

Third Registration:
25% reduction.

All Other Registrations:
40% reduction.
Minimum fee in all cases, $5.00.

Over Regular Routes
or Between Fixed Termini.

Pay $5.00 per passenger capacity (16 ins. to seat) to Motor Vehicle Department.
In addition, pay not less than $15.00 nor more than $30.00 to Railroad Commission.

Not Over Regular Routes or
Between Fixed Termini.

Pay $5.00 per passenger capacity (16 ins. to seat) to Motor Vehicle Department.
Pay to Railroad Commission:
Passenger capacity 8 or less--$10.00
Over 8 and not more than 15, per
passenger in excess of 8 .50

OHIO.
Passenger Capacity.

Between Fixed Termini or Over Regular Routes.

7 passengers or less	-	-	$40.00
7 to 12 passengers	-	-	90.00
12 to 18 passengers	-	-	140.00
18 to 24 passengers	-	-	180.00
Over 24 passengers	-	-	230.00

TABLE XIII.(Cont'd)

OHIO.

Not Between Fixed Termini or Over Regular Routes.

7 passengers or less	-	-	$20.00
7 to 12 passengers	-	-	50.00
12 to 18 passengers	-	-	90.00
18 to 24 passengers	-	-	115.00
Over 24 passengers	-	-	150.00

OKLAHOMA.

Manufacturer's List Price.

First $500 of price - - $12.50
Over $500.00, $1.50 for each $100.00 in excess of $500.00.
Reduction of 20% each year for 3 years.
Minimum fee, $8.00.

And in addition:
Class A (carriers over regular routes between fixed termini)--

Passenger Capacity.			Per Bus Mile.
7 or less	-	-	3 Mills.
8 to 11	-	-	5 mills.
12 to 17	-	-	7 mills.
18 to 23	-	-	9 mills.
24 to 29	-	-	11 mills.
30 to 36	-	-	12-5/10 mills.
Over 36	-	-	15 mills.

(Mileage tax based on scheduled mileage and trips and 30 days per month.)

Class B (carriers not in Class A):

Passenger Capacity.	Flat Fee.	Per Bus Mile.
7 or less	$25.00	1/4¢
7 to 16	50.00	1/2¢
16 to 25	75.00	3/4¢
Over 25	100.00	1¢

(Mileage tax based on actual mileage,payable monthly.)

Both Class A and B pay $100.00 to the Corporation Commission on filing application for certificate.

TABLE XIII.(Cont'd)

OREGON.
Regular Fee

Net Weight.

1,700 lbs. or less	-	-	$10.00
Over 1,700 to 3,000 lbs., per 100 lbs.	-	-	.90
Over 3,000 to 4,500 lbs. per 100 lbs.	-	-	1.00
Over 4,500 lbs. per 100 lbs.	-	-	1.10

And in addition:

Class 1 (carriers over regular routes, between fixed termini), 1/2 mill per seat mile, allowing 20" per seat.

Class 2 (carriers operating for hire "on call"), weighing 4,500 lbs., or less, 50% of regular fee. Over 4,500 lbs. 100% over regular fee.

Class 3 (carriers for hire doing a local livery business), same as Class 2.

Number of miles travelled on unimproved highways may be deducted from total number of miles.

PENNSYLVANIA.
Seating Capacity.

5 or less	-	-	$25.00
6 to 8	-	-	30.00
8 and over.	-	-	40.00

Plus $4.00 per seat over 7 to 26; and $10.00 per seat over 26.

RHODE ISLAND.

Gross Weight.

2,500 lbs. or less	-	-	$16.00
Over 2,500 to 3,000 lbs.	-	-	18.00
3,000 to 3,500 lbs. $20.00 plus $4.00 for each 500 lbs. up to and including 6,000 lbs.			
Over 6,000 lbs.	-	-	46.00

Gross weight includes passenger load.

TABLE XIII.(Cont'd)

SOUTH CAROLINA.

Gross Weight.

Gross weight less than 13,000 lbs., 1/50 of 1¢ per passenger seat times number of miles travelled annually (150 lbs. per passenger seat).

Gross weight over 13,000 lbs., 1/40¢ per passenger seat times number of miles travelled annually.

Above fees are subject to following minimum limitations:

Passenger Capacity.

Not over 7	-	-	$30.00
Over 7 to 12	-	-	40.00
Over 12 to 17	-	-	50.00
Over 17 to 22	-	-	60.00
Over 22 to 27	-	-	75.00
Over 27.	-	-	90.00

Not Operating Over Regular Routes or Between Fixed Termini.

Same as above, except estimate should be made of number of miles travelled, minimum 20,000 miles.

Not Common Carriers.

(Privately Employed for Specific Trip and Not Soliciting or Accepting Patrons Along Route). Up to 2,000 lbs., $15.00. For each additional 500 lbs. or fraction thereof $5.00

Common Carriers.

In addition to the above fees:

Net Weight.

2,000 lbs. or less	-	-	$ 9.00
For each additional 500 lbs. or fraction thereof over 2,000 lbs.	-	-	3.00

Vehicles used exclusively for transporting school children pay a flat rate of $1.00 per vehicle.

TABLE XIII.(Cont'd)

SOUTH DAKOTA.
Net Weight.

Less than 2,000 lbs.	-	$13.00
2,000 up to 3,000 lbs.	-	17.00
3,000 up to 4,000 lbs.	-	20.00
4,000 and over	-	35.00

And in addition:

Gross Receipts.

Classes A and B pay 3% of gross earnings. If carrying more than 7 passengers, pay $2.00 per passenger in excess of 7.
Class A vehicles operate between fixed termini.
Class B do not operate between fixed termini.

TENNESSEE.

Horse Power plus Tons Capacity.

Per h.p., 50¢ plus the following:

1/2 ton to 2 tons, inclusive.	-	$15.00
2½ to 3½ tons, inclusive.	-	20.00
4 to 4½ tons, inclusive.	-	30.00
5 to 5½ tons, inclusive.	-	40.00
6 tons and over.	-	50.00

And in addition:

Passenger Capacity.

2 passengers	-	$ 4.00
5 passengers	-	10.00
7 passengers	-	14.00

Over 7 passengers, $2.00 extra for each extra passenger.

Passenger Trucks.

Per h.p., $0.50 and $2.00 per passenger.

TABLE XIII.(Cont'd)

TEXAS.

Not Common Carriers.

Gross Weight.		Per 100 lbs.
1 to 4,000 lbs.	-	$1.10
4,001 to 6,000 lbs.	-	1.15
6,001 to 8,000 lbs.	-	1.30
8,001 to 16,000 lbs.	-	1.40
16,001 to 28,000 lbs.	-	1.40
28,001 lbs. and up	-	4.00

Six-wheel vehicles gross weight 26,001 to 30,000 lbs. pay $1.60 per 100 lbs. ("Gross weight" includes 150 lbs. per passenger seat.)

Common Carriers.

In addition to the above, $10.00 per vehicle and $1.00 per passenger seat.

UTAH.

Horse Power.

25. h.p. or less	-	$5.00
Over 25 to 40	-	7.50
Over 40 to 50	-	10.00
Over 50	-	12.50

And in addition:

Passenger Miles Travelled.

2-1/2 mills per passenger mile on hard-surfaced highways.
1 mill per passenger mile on all other highways.
Passenger miles determined by multiplying actual number of passengers carried by number of miles travelled.

VERMONT.

Gross Weight.

Per 100 lbs.	-	$1.00

Allowing 150 lbs. for each passenger seat.
Minimum fee, $30.00.

TABLE XIII.(Cont'd).

VIRGINIA.

Lbs. Weight plus Percentage
Gross Operating Revenue
Over Regular Routes.

70¢ per 100 lbs. net weight plus 1½% gross operating revenue. Operator hereunder may use any of his vehicles of more than 12 passenger capacity for infrequent trips for transporting special parties on payment of $15.00 annually for each vehicle so used.

Not Over Regular Routes.

$5.00 for each revenue producing seat plus regular registration fees for private passenger cars.

Educational or Sightseeing Tours.

70¢ per 100 lbs. net weight plus 1½% gross operating revenue.

Interstate.

Interstate operators in either of above classes taxed at same rate as those operating within state, except that gross receipts tax is based on portion of total mileage operated within state.

WASHINGTON.

Net Weight plus Passenger Capacity.

1,500 lbs. or less, $20.00, in addition $3.00 per passenger carrying capacity.
Over 1,500 lbs., $20.00
Plus 60¢ per 100 lbs. in excess of 1,500 lbs., plus $3.00 per passenger of carrying capacity.

Auto Stages.

1,500 or less, $25.00 plus $3.00 per person carrying capacity.
Over 1,500 lbs., same plus 60¢ per 100 lbs. in excess of 1,500 lbs.

TABLE XIII.(Cont'd).

Auto Stage Trailers

1,500 lbs. or less, $10.00 plus $3.00 per passenger carrying capacity. If over 1,500 lbs., same plus 60¢ per 100 lbs. in excess.

And in addition:

Also special fees sufficient to pay cost of supervision and regulation not to exceed 1% of gross operating revenue, fixed by Director of Public Works, paid quarterly.

WEST VIRGINIA.

Passenger Capacity Times Number of Miles.

If operating between fixed termini or over regular routes:

Class H-1, 1/15¢ per passenger seat times total number of miles travelled.

Minimum fee, $75.00.

Not Operating Over Regular Routes.

Class H-3, flat rate of $75.00 yearly per vehicle.

WISCONSIN.

Gross Weight
Not Common Carriers.

Buses or other motor vehicles having a passenger carrying capacity of more than 7 persons:

Gross Weight.

1½ tons or less	-	-	$30.00
Over 1½ to 2¼ tons	-	-	45.00
Over 2¼ to 3 tons	-	-	60.00
Over 3 to 4 tons	-	-	90.00
Over 4 tons	-	-	135.00

Plus $5.00 for each 1/4 ton or fraction thereof over 5 tons.

Passengers rated at 150 lbs. each. Interburban buses pay 25% additional.

TABLE XIII.(Cont'd).

Common Carriers.
Net Weight.

1,600 lbs. or less	-	-	$10.00
Over 1,600 to 1,800 lbs.	-	-	11.00
Over 1,800 to 2,000 lbs.	-	-	12.00
Over 2,000 to 2,400 lbs.	-	-	13.00
Over 2,400 to 2,800 lbs.	-	-	14.00
Over 2,800 to 3,200 lbs.	-	-	16.00
Over 3,200 to 3,600 lbs.	-	-	18.00
Over 3,600 to 4,000 lbs.	-	-	20.00
Over 4,000 to 4,500 lbs.	-	-	22.00
Over 4,500 to 5,000 lbs.	-	-	24.00
Over 5,000 lbs.	-	-	26.00

If in operation 5 years or over, 75% of above fees.
And in addition:
1/10¢ per ton mile(150 lbs.per passenger) plus flat fee of $40.00 for each vehicle.
25% reduction in fee for vehicles equipped with 6 wheels.

WYOMING.
Not Common Carriers.
Horse Power.

22 h.p. or less	-	-	$ 8.00
Over 22 to 30	-	-	12.00
Over 3o to 40	-	-	16.00
Over 40 h.p.	-	-	20.00

For passenger cars in excess of 7 passengers, same fee as above plus $1.00 additional for each seat over 7.

Common Carriers.

In addition to the above:
10 passengers or less, with an engine rating of 30 h.p. or less, $15.00.
Seating capacity in excess of 10 with engine rating of over 30 h.p., $25.00.

DISTRICT OF COLUMBIA.
Flat Rate.

1 to 9 passengers.	-	-	$ 6.00
10 or more passengers	-	-	12.00

FROM, "Bus Facts for 1931," pages 40 to 47.

TABLE XIV.

STATE RESTRICTIONS ON COMMON CARRIER MOTOR VEHICLE

	Maximum Width (in)	Maximum Height (ft. in)	Maximum Length (ft)	Maximum Gross Weight Four Wheels Pneumatic Tires	Maximum Speed State Roads
Alabama	96	12-0	33	32,000	45
Arizona	96	12-0	30	23,000	35
Arkansas	96	14-6	33	22,000	35
California	(a)96	13-6	33	22,000	40
Colorado	..	....	..	28,000	35
Connecticut	96	....	40	30,000	..
Delaware	96	12-2	33	26,000	(b) 25
Florida	84	12-0	..	16,000	(b) 30
Georgia	96	12-6	35	12,500 load	(b) 25
Idaho	96	14-6	33	24,000	35
Illinois	96	....	..	24,000	40
Indiana	96	12-0	33	24,000	30
Iowa	96	....	..	18,000	35
Kansas	96	13-0	35	24,000	45
Kentucky	90	....	..	28,000	40
Louisiana	96	14-6	33	(c).....	45
Maine	96	12-6	..	24,000	35
Maryland	93	....	..	25,000	40
Massachusetts	102	....	(c)33	30,000	20
Michigan	96	14-0	40	(d).....	..
Minnesota	96	12-6	35	28,000	45
Mississippi	..	....	..	12,000 load	40
Missouri	96	12-6	33	24,000	40
Montana	..	....	..	.....	..
Nebraska	90	12-0	..	32,000	45
Nevada	..	....	..	25,000	50
New Hampshire	96	....	30	20,000	35
New Jersey	(e)96	(e)12-6	(e)28	30,000	40
New Mexico	96	14-0	33	18,000 axle	45
New York	(f)96	....	..	28,000	30
North Carolina	86	12-6	30	15,000	45
North Dakota	96	14-6	33	(c).....	35
Ohio	96	12-6	30	24,000	45
Oklahoma	90	....	..	20,000	35
Oregon	96	(g)....	(g)..	22,000	35
Pennsylvania	96	14-6	33	26,000	35
Rhode Island	102	12-6	..	28,000	35
South Carolina	90	12-6	33	20,000	45
South Dakota	96	....	..	20,000	40
Tennessee	96	....	..	20,000	..
Texas	96	14-6	35	22,000	40
Utah	96	....	..	20,000	(b)25
Vermont	96	12-0	..	20,000	25
Virginia	96	12-6	30	40,000	45
Washington	96	....	35	24,000	40

TABLE XIV. (Cont'd) -

	Maximum Width (in.)	Maximum Height (ft.in.)	Maximum Length (ft.)	Maximum Gross Weight Four Wheels Pneumatic Tires.	Maximum Speed State Roads.
West Virginia	96	12-0	33	22,400 axle	35
Wisconsin	96	....	33	(c)24,000	..
Wyoming	96	12-6	30	25,000	35
Dist. of Columbia	96	12-6	30	28,000	22

(a) 102 in. maximum for common carriers on highways exceeding 15 ft. in width. (b) Speed dependent on weight. (c) Dependent on type of highway. (d) Dependent on distance between axles. (e) Minimum body width, 84 in.; maximum, 96 in. ; minimum body length, 16 ft.; maximum, 24 ft. (f) Outside of New York City. (g) May be regulated by Highway Commission.

ϕ From MOTOR VEHICLE CONFERENCE COMMITTEE digest -- 1931 Edition. Corrected to May 1st.

Published in, "Bus Facts for 1931," p. 48.

TABLE XV..

SUMMARIES OF STATUTORY LIMITATIONS OF GROSS WEIGHTS PER VEHICLE, 1930.

Prince Edward Island.	Maximum gross, 4½ tons.
Nova Scotia.	Maximum gross, 6 tons.
New Brunswick.	12,000 lbs.pneumatic tires,10,000 lbs. non-pneumatic tires.
Quebec.	5 tons, on solid tires, and 6 tons on pneumatic tires. In cases of vehicles with two driving axles 4o tons per axle on solid tires; and 4½ tons per axle on pneumatic tires; 8½ tons for motor buses with dual tires on rear axle. This applies to vehicles used outside of cities and towns. Within limits of cities and towns there is no provincial restriction.
Ontario.	Maximum gross, 10 tons and 15,000 lbs. per axle if 8 ft, apart. 12,000 lbs. if less than 8 ft. on class A roads. 8, 6 and 5 tons respectively on class B roads.
Manitoba.	Restrictions may be enacted by a city or town limiting the weight of vehicles. See 23, Highway Traffic Act. ø
Saskatchewan.	Maximum gross 8 tons.
Alberta.	No restriction.

British Columbia.	Summer.	Winter.
Class 1 highways	12 tons max. gross.	12 tons max. gross.
Class 2 highways	10 tons max. gross.	7 tons max. gross.
Class 3 highways	7 tons max. gross.	5 tons max. gross.
Class 4 highways	5 tons max. gross	3½ tons max.gross.

Yukon.	No restriction.

From, "The Highway and the Motor Vehicle in Canada, 1930." p. 40.

(Cont'd).-

TABLE XV. (Cont'd).

ϕ Manitoba, Highway Traffic Act, 1931, Sec. 23 -

(1) The Lieutenant-Governor-in-Council may make regulations governing

(a) the weight of a vehicle which may be driven on a highway, the weight of the load which may be carried by such vehicle, and the gross weight thereof, and the ascertaining of such weight;

(b) the use by a vehicle of a highway or any part thereof, and of any bridge;

(c) the classification of highways with respect to the use that may be made thereof.

(2) Notwithstanding the provision of this Act the council of a city or town may make regulations limiting the weight of vehicles which may be driven on a highway over which such city or town has jurisdiction.

TABLES XVI & XVII.

CAPITAL AND MAINTENANCE EXPENDITURES ON PROVINCIAL AND PROVINCIALLY SUBSIDISED ROADS, 1930.

(A)

PRINCE EDWARD ISLAND

	p.c.	Capital $	p.c.	Maintenance
Main Provincial Highway	P.100	190,000	P.100	64,000
Secondary Provincial Highway	-	-	P 100	81,000
County and Market	-	-	-	-
Township and Local	-	-	-	-
Total all Roads	P.100	190,000	P.100	145,000
Ferries	-	-	-	-
Bridges	-	-	-	-
Grand Total	P.100	190,000	P.100	145,000

Capital	$190,000
Maintenance	145,000
Total Expenditure	$335,000

The letters 'P' and 'M' before the percentage figures denote 'Provincial' and 'Municipal,' respectively.

From,"The Highway and Motor Vehicle in Canada, 1930," pages 11 to 13.

TABLES XVI & XVII. (Cont'd).

(B)

NOVA SCOTIA

	p.c.	Capital $.	p.c.	Maintenance.
Main Provincial Highway	P.100	(1) 1,072,658	P.100	1,038.844
Secondary Provincial Highway	P.100	(2) 187,319	P.100	(3) 18,385
County and Market	P.100	1,461,635	P.100	282,148
Township and Local	-	-	P.100	436,164
Total all Roads	-	2,721,612	-	1,775,541
Ferries	-	14,234	-	-
Bridges	-	72,708	-	280,283
Grand Total	-	2,808,554	-	2,055,824

Capital	P. 100	2,808,554
Maintenance	P. 100	2,055,824
Total Expenditure	P. 100	$4,864,378

(1) Includes $196,843 for machinery, $51,790 for real estate and expenditures for administration, etc.

(2) Town approaches.

(3) Town approaches.

TABLES XVI & XVII.(Cont'd)

(C)

NEW BRUNSWICK.

	p.c.	Capital $	p.c.	Maintenance
Main Provincial Highway	P. 100	2,138,320	P.100	355,934
Secondary Provincial Highway	P. 100	3,931,176	P.100	236,000
County and Market	-	-	-	-
Township and Local	P. 100	790,961	P.100	55,623
Total all Roads	-	6,860,457	-	647,562
Ferries	-	-	-	-
Bridges	-	467,828	-	346,302
Grand Total	P. 100	7,328,285	P.100	993,864

Capital	P.100	$7,328,285
Maintenance	P.100	993,864
Total Expenditure	P.100	$8,322,149

TABLES XVI & XVII. (Cont'd)

(D)

QUEBEC.

		p.c.	Capital $	p.c.	Maintenance.
Main Provincial Highway		P. 65	3,400,150	-	-
		M. 35	1,830,850		
Sub-Total	-		5,231,000	P.100	2,502,138
Secondary Provincial Highway		-	-	-	-
County and Market		-	-	-	-
Township and Local		P. 50	1,656,303		
		M. 50	1,656,303		
Sub-Total	-		3,312,606	P.100	2,392,992
Total all Roads		P.	5,056,453		
		M.	3,487,153		
Sub-Total	-		8,543,606	P.100	4,895,130
Ferries		-	-	-	-
Bridges		P.	1,300,653		
		M.	248,022		
Sub-Total	-		1,548,675	P.100	213,560
Grand Total		P.	6,357,106		
		M.	3,735,175		
Sub-Total			10,092,281	P.100	5,108,690

	Capital	$10,092,281
	Maintenance	5,108,690
Total Expenditure		$15,200,971
of which	Provincial	11,465,796
	Municipal	3,735,175

TABLES XVI & XVII. (Cont'd)

(E)

ONTARIO.

	p.c.	Capital $	p.c.	Maintenance.
Main Provincial Highway	P.80	6,980,533	P.80	1,678,374
	M.20	1,745,133	M.20	419,593
Sub-Total -		8,725,666		2,097,967
Secondary Provincial Highway	-	-	-	-
County and Market	P.50	3,066,964	P.50	1,250,927
	M.50	3,066,964	M.50	1,250,927
Sub-Total -		6,133,928		2,501,854
Township and Local	P.30	862,659	P.30	852,038
	M.70	2,012,871	M.70	1,988,087
Sub-Total -		2,875,530		2,840,125
Total all Roads	P.	10,910,156	P.	3,781,339
	M.	6,824,968	M.	3,658,607
Sub-Total -		17,735,124		7,439,946
Ferries.	-	-	-	-
Bridges	P.	1,562,394	P.	97,547
	M.	751,979	M.	89,191
Sub-Total -		2,314,373		186,738
Grand Total	P.	12,472,550	P.	3,878,886
	M.	7,576,947	M.	3,747,798
Sub-Total -		20,049,497		7,626,684

Capital	$20,049,497
Maintenance	7,626,684
Total Expenditure	$27,676,181
of which Provincial	16,351,436
Municipal	11,324,745

TABLES XVI & XVII. (Cont'd)

(F)

NORTHERN ONTARIO.

		p.c.	Capital $.	p.c.	Maintenance.
Main Provincial Highway		P.	5,363,407	P.	1,706,694
		M.	92,922	M.	61,948
	Sub-Total -		5,456,329		1,768,642
Secondary Provincial Highway		-	-	-	-
County and Market		-	-	-	-
Township and Local		P.	353,876	P.	235,920
		M.	165,434	M.	110,291
	Sub-Total -		519,310		346,211
Total all Roads		P.	5,717,283	P.	1,942,614
		M.	258,356	M.	172,239
	Sub-Total -		5,975,639		2,114,853
Ferries		-	-	-	-
Bridges		-	-	-	-
Grand Total		P.	5,717,283	P.	1,942,614
		M.	258,356	M.	172,239
	Sub-Total -		5,975,639		2,114,853

		Capital	$5,975,639
		Maintenance	2,114,853
	Total	Expenditure	$8,090,492
of which	-	Provincial	7,659,897
		Municipal	430,595

TABLES XVI & XVII. (Cont'd)

(G)

MANITOBA.

	p.c.	Capital $	p.c.	Maintenance
Main Provincial Highway	P.100	2,039,665	P.100	705,020
Secondary Provincial Highway	P. 67	89,532	P. 67	19,538
	M. 33	45,093	M. 33	9,770
Sub-Total -		134,625		29,308
County and Market	P.	366,138	-	-
	M.	421,665		
Sub-Total -		787,803	-	-
Township and Local	-		-	-
Total all Roads	P.	2,495,335	P.	724,558
	M.	466,758	M.	9,770
Sub-Total -		2,962,093		734,328
Ferries	-	-	-	-
Bridges	P.	62,029	-	-
	M.	56,617		
Sub-Total -		118,646	-	-
Grand Total	P.	2,557,364	P.	724,558
	M.	523,375	M.	9,770
Sub-Total -		3,080,739		734,328

Capital	$3,080,739
Maintenance	734,328
Total Expenditure	$3,815,067
of which - Provincial	3,281,922
Municipal	533,145

TABLES XVI & XVII. (Cont'd)

(H)

SASKATCHEWAN

	p.c.	Capital $	p.c.	Maintenance
Main Provincial Highway	P.100	3,679,053	P.100 (1)	745,398
Secondary Provincial Highway	P.100	4,338,534	-	-
County and Market	P.100	961,407	-	-
Township and Local	-	-	-	-
Total all Roads	P.100	8,978,994	P.100	745,398
Ferries	-	(2) -	-	-
Bridges	P.100	458,013	-	-
Grand Total	P.100	9,437,007	P.100	745,398

Capital	P.100	$9,437,007
Maintenance	P.100	745,398
Total Expenditure	P.100	$10,182,405

(1) All Provincial Roads.

(2) Construction, Maintenance and Operation of Ferries charged to revenue for 1930 - $153,633.00

TABLES XVI & XVII.(Cont'd)

(I)

ALBERTA

		p.c.	Capital $	p.c.	Maintenance
Main Provincial Highway		P.100	1,901,876	P.100	932,683
Secondary Provincial Highway	P. 50		310,389		
	M. 50		310,389	--	-
Sub-Total -			620,778		
County and Market	P. 50		680,662		
	M. 50		680,662	--	-
Sub-Total -			1,361,324		
Township and Local	P. 50		476,121		
	M. 50		476,121	--	-
Sub-Total -			952,242		
Total all Roads	P.		3,369,048		
	M.		1,467,172	--	-
Sub-Total -			4,836,220	P.100	932,683
Ferries		P.100	5,653,000	P.100	92,479
Bridges		P.100	733,079	P.100	55,584
Grand Total	P.		4,107,780	--	-
	M.		1,467,172	--	-
Sub-Total -			5,574,952	P.100	1,080,746

	Total Capital	$5,574,952
	Total Maintenance	1,080,746
	Total Expenditure	$6,655,698
of which -	Provincial	5,188,526
	Municipal	1,467,172

TABLES XVI & XVII. (Cont'd)

(J)

BRITISH COLUMBIA.

	p.c.	Capital $	p.c.	Maintenance
Main Provincial Highway	P.100	4,068,192	P.100	1,793,691
Secondary Provincial Highway	P. 75 (1)	844,205	P. 75	127,375
	M. 25	281,402	M. 25	42,458
Sub-Total -		1,125,607		169,833
County and Market	P. 50 (2)	133,740	P. 40	28,115
	M. 50	133,740	M. 60	42,168
Sub-Total -		267,480		70,283
Township and Local	-	-	-	-
Total all Roads	P.	5,046,137	P.	1,949,181
	M.	415,142	M.	84,626
Sub-Total -		5,461,279		2,033,807
Ferries	-	-	P.100	153,434
Bridges	-	-	P.100	310,189
Grand Total	P.	5,046,137	P.	2,412,804
	M.	415,142	M.	84,626
Sub-Total -		5,461,279		2,497,430

Total Capital	$5,461,279
Total Maintenance	2,497,430
Total Expenditure	$7,958,709
of which - Provincial	$7,458,941
Municipal	499,768

(1) Primary Roads
(2) Secondary Roads.

TABLES XVI & XVII. (Cont'd)

(K)

(CANADA)

	Source of Expenditure	Capital	Source of Expenditure	Maintenance
Main Provincial Highway	P.	30,833,854	P.	11,522,776
	M.	3,668,905	M.	481,541
Sub-Total -		34,502,759		12,004,317
Secondary Provincial Highway	P.	9,701,155	P.	482,298
	M.	636,884	M.	52,228
Sub-Total -		10,338,039		534,526
County and Market	P.	6,670,546	P.	1,561,190
	M.	4,303,031	M.	1,293,095
Sub-Total -		10,973,377		2,854,285
Township and Local	P.	4,139,920	P.	3,972,742
	M.	4,310,729	M.	2,098,378
Sub-Total -		8,450,649		6,071,120
Total all Roads	P.	51,345,475	P.	17,539,006
	M.	12,919,549	M.	3,925,243
Sub-Total --		64,265,024		
Ferries	P.	19,887	P.	245,913
Bridges	P.	4,656,704	P.	1,303,465
	M.	1,056,618	M.	89,191
Sub-Total -		5,713,322		1,392,656
Grand Total	P.	56,022,066	P.	19,088,384
	M.	13,976,167	M.	4,014,433
Sub-Total -		69,998,233		23,102,817

Total Capital	$69,998,233
Total Maintenance -	23,102,817
Total Expenditure -	$93,101,050
of which - - Provincial -	$75,110,450
- Municipal -	17,990,600

TABLE XVIII.

PROVINCIAL HIGHWAY DEBENTURE DEBT OUTSTANDING DECEMBER 31, 1930.

Prince Edward Island	$ 1,300,000	
Nova Scotia	20,828,870	
New Brunswick	20,516,450	
Quebec	36,227,000	
Ontario	147,118,627	(1)
Manitoba	13,839,833	
Saskatchewan	28,645,587	(2)
Alberta	24,793,356	(3)
British Columbia	33,389,255	
Total for Canada	326,658,978	

(1) Total investment, 1919-1930.
(2) As at April 30,1930.
(3) Assets at March 31, 1930, (highways, bridges, ferries).

From,"The Highway and the Motor Vehicle in Canada, 1930," p. 14.

TABLE XIX.

SUMMARY OF REVENUES

(A)

	Revenues from Registration.			
	1930	1929	Increase	Per Cent Increase
	$	$	$	
Prince Edward Island	145,994	115,414	30,580	26.5
Nova Scotia	1,052,480	933,703	118,777	12.7
New Brunswick	876,987	781,834	95,153	12.2
Quebec	5,298,217	4,895,022	403,195	8.2
Ontario ϕ	5,566,200	8,025,844	-2,459,644	- 30.6
Manitoba	1,079,894	1,047,885	32,009	3.1
Saskatchewan	1,954,549	2,407,000	-452,451	-18.8
Alberta	2,014,927	2,031,627	16,700	-0.8
British Columbia	2,174,597	2,090,812	83,785	4.0
Yukon	2,438	2,296	142	6.2
Canada -	20,166,283	22,331,437	-2,165,154	-9.7

(B)

	Gasolene Tax.			
	1930	1929	Increase	Per Cent Increase.
Prince Edward Island	128,366	108,156	20,210	18.7
Nova Scotia	851,725	712,159	139,566	19.6
New Brunswick	659,797	499,907	159,890	32.0
Quebec	4,075,368	3,535,861	539,507	15.3
Ontario ϕ	10,756,836	8,497,594	2,259,242	26.6
Manitoba	1,099,778	738,800	360,978	48.9
Saskatshewan	1,538,556	1,431,809	106,747	7.5
Alberta	1,939,048	2,148,419	209,371	9.7
British Columbia	1,605,751	1,072,263	533,488	49.8
Yukon	-	-	-	-
Canada -	22,655,225	18,744,968	3,910,257	20.9

TABLE XIX. (Cont'd).-

(C)

	Total Revenues.			
	1930.	1929	Increase	Per Cent Increase
Prince Edward Island	274,360	223,570	50,790	22.7
Nova Scotia	1,904,205	1,645,862	258,343	15.7
New Brunswick	1,536,784	1,281,741	255,043	19.9
Quebec	9,373,585	8,430,883	942,702	11.2
Ontario ϕ	16,323,036	16,523,438	-200,402	-1.2
Manitoba	2,179,672	1,786,685	392,987	22.0
Saskatchewan	3,493,105	3,838,809	-345.704	-9.0
Alberta	3,953,975	4,180,046	-226,071	-5.4
British Columbia	3,780,348	3,163,075	617,273	19.5
Yukon.	2,438	2,296	142	6.2
Canada	42,821,508	41,076,405	1,745.103	4.3

ϕ Revenue figures for Ontario are for fiscal year ended October 31.

From, "The Highway and the Motor Vehicle in Canada, 1930," p. 24.

TABLE XX.

ITEMISED REVENUES, 1930.

-	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	(1)Ontario
	$	$	$	$	$
Passenger Automobiles	129,370	779,216)	625,978)		2,881,891
Motor trucks	12,285	158,839)	)		1,442.762
Motor buses	21	-)	)		-
Taxi cabs	-	-)	)		-
Motor cycles	154)	)	181,145)		11,084
Tractors	-)	4,894)	)	5,182,324	-
Trailers	28)	)	)		52,375
Road machines,flushers,etc	-	-)	)		-
Ambulances and hearses	-	-)	)		-
Chauffers'licenses	394	32,420	18,736)		156,462
Other drivers'licenses	653	46,305	38,240)		475,781
Dealers'licenses--					
Passenger	1,200)		7,662	(3)	37,299
Motor truck	)	9,211	-	(3)	5,905
Motor cycle	30)		-	(3)	132
Garage licenses	-	-	805	(3)	27,930
Gasolene station licenses	-	-	1,210	232	-
In-transit licenses	-	-	-	-	10,515
Duplicate cards & badges	-	-	-	2,446	10,406
Transfer of cars	-	10,304	-	(3)	156.086
Mileage tax on motor buses	-)		-)		155,413
Mileage tax on motor trucks	-)	1,947	-)	40,297	6,959
Fines	-	7,486	2,223	71,740	100,496
Miscellaneous	1,859	1,859	988	1,178	18,095
Operators'Instruction permits.	-	-	-	-	16,609
Total.-	145,994	1,052,480	876,987	5,298,217	5,566,200
Gasolene tax	128,366	851,725	659,797	4,075,368	10,756,836
Grand total.-	274,360	1,904,205	1,536,784	9,373,585	16,323,036

(1) Revenue figures for Ontario are for fiscal year Nov. 1,1929 to Oct.31,1930.

(3) Included with revenue from motor vehicle registrations.

TABLE XX. (Cont'd).

	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon.
Passenger automobiles	866,398	1,422,555	1,528,805	1,635,868	1,310
Motor trucks	112,585	403,535)	345,928		640
Motor buses	-)(2)	16,076)		421,852	-
Taxi cabs	-)		14,958		-
Motor cycles	2,534	1,617	2,602	7,483	27
Tractors	-	-	-	-	220
Trailers.	906	-	-	3,717	-
Road machines, flushers, etc.	-	-	-	-	10
Ambulances and hearses.	-	-	-	-	-
Chauffeurs' licenses.	25,575	11,390	12,186	30,970	-
Other drivers' licenses	42,931	-	13,111	24,268	-
Dealers' licenses--					
Passenger	14,777)		37,228	19,939	-
Motor truck	-)	42,705			-
Motor cycle	15)		-	153	-
Garage licenses	-	233	511	-	-
Gasolene station licenses	-	-	-	-	-
In-transit licenses	-	244	-	-	-
Duplicate cards and badges	-	11	1,036	1,719	-
Transfer of cars	14,173	32,654	21,353	25,485	-
Mileage tax on motor buses	-	-	13,782	-	-
Mileage tax on motor trucks	-	-	4,231	-	-
Fines	-	-	18,566	-	-
Miscellaneous	-	23,529	630	3,143	231
Operators' instruction permits	-	-	-	-	-
Total	1,079,894	1,954,549	2,014,927	2,174,597	2,438
Gasolene	1,099,778	1,538,556	1,939,048	1,605,751	-
Grand total	2,179,672	3,493,105	3,953,975	3,780,348	2,438

(2) Includes dealers' general livery.

From, "The Highway and the Motor Vehicle in Canada, 1930," p. 25.

TABLE XXI.

SUMMARY OF REGISTRATIONS, 1930.

Province.	Estimated Population 1930	Passenger Cars: Total Number	Passenger Cars: Number of persons per car 1930	Passenger Cars: Number of persons per car 1929	Total Motor Vehicles: Total number	Total Motor Vehicles: Number of persons per motor vehicle 1930	Total Motor Vehicles: Number of persons per motor vehicle 1929	Total Motor Vehicles: Increase in motor vehicle registrations in 1930. Number	Total Motor Vehicles: Increase in motor vehicle registrations in 1930. p. c.
Prince Edward Island	85,800	6,611	13.0	15.5	7,402	11.6	14.0	1,261	20.5
Nova Scotia	553,900	36,078	15.4	16.3	43,036	12.9	13.8	3,022	7.6
New Brunswick	423,400	30,318	14.0	15.0	34,833	12.2	13.2	2,981	9.4
Quebec	2,734,600	140,802	19.4	20.3	178,976	15.3	15.9	9,429	5.6
Ontario	3,313,000	491,007	6.8	6.9	564,669	5.9	6.0	20,193	3.7
Manitoba	671,500	68,550	9.8	9.7	79,308	8.5	8.5	1,468	1.9
Saskatchewan	882,000	108,161	8.2	8.0	129,861	6.8	6.7	- 368	-0.3
Alberta	660,000	85,067	7.8	7.6	102,652	6.4	6.5	3,002	3.0
British Columbia	597,000	80,766	7.4	7.6	98,943	6.0	6.2	3,296	3.4
Yukon Territory	3,700	134	27.6	22.7	208	17.7	15.2	10	5.1
Northwest Territories	9,600	-	-	-	-	-	-	-	-
Canada -	9,934,500	1,047,494	9.5	9.7	1,239,888	8.0	8.2	44,294	3.7

From, "The Highway and the Motor Vehicle in Canada, 1930," p. 16

SUPPLEMENT A.

At the annual general meeting of the Canadian Industrial Traffic League, held in the Mount Royal Hotel, Montreal, on January 28,1932, the following recommendations, as presented by the Highway Transportation Committee of the League, were adopted:

" 1. That the provinces be petitioned and requested that no further major changes be made in their present regulations affecting motor commercial Vehicles until such time as the Duff Commission has had an opportunity of completing its investigation into the railway situation in Canada.

" 2. That the operators of commercial motor vehicles on highways be subject to reasonable taxation and regulation, and that the provinces either collectively or individually endeavour to obtain through competent authority an estimate as to what amount the operators of different classes of motor vehicles should contribute to the provinces towards the construction and maintenance of highways before making effective any further regulations or taxation on said motor vehicles.

" 3. That the provinces now having regulations for operation of motor vehicles on their highways should endeavour to strictly enforce such regulations before any further regulations are proposed.

" 4. <u>That the railways further investigate the possibilities in connection with the co-ordination of rail and motor facilities</u>.

" 5. That the provincial governments be petitioned with the request that the Canadian Industrial Traffic League be permitted to have access to any future legislation respecting motor transportation before same is adopted."

The italics are my own.

From, "Industrial Canada" February 1, 1932, issue, pages 66 and 68.

SUPPLEMENT B.

TWO VIEWS OF CO-ORDINATION.

The London Daily Herald, a Labour organ, as quoted on the Editorial Page of the Montreal Daily Star of March 28, 1932, under the caption: "Link up all Traffic;" says:-

"Transport in all its forms should be regarded as a single unified service. That is the root principle which sooner or later those who wish to solve the perplexing traffic problems, now becoming acute, will have to recognize and act upon."

The Winnipeg Tribune, Independent Conservative Organ, believes that competition in Canadian transportation is bound to continue. The following editorial was republished in the "Ormstown Bulletin" of March 31, 1932:-

THE RAILWAY COMMISSION.

"The Canadian people will not permit a railway monopoly under private ownership. Neither are they in a humor at the present time to bring about a railway monopoly under public ownership. But so far no responsible public man, no responsible railway official, in fact, no one whose voice carried any weight of authority whatever, has advocated amalgamation. Mr. Bennett's last word on the subject was his well-known slogan: "Competition ever; amalgamation never." Mr. King is as vigorous in his insistence on the maintenance of both railways as independent systems.

And from Mr. Bennett and Mr. King the list of those who have expressed unqualified opposition to any such idea could be prolonged indefinitely. To suggest, therefore, that the Royal Commission is going to pick up the idea out of the thin air and present it in any form as its major recommendation for the solution of the difficulties of the railways, staggers credulity."

SUPPLEMENT C.

REGULATIONS GOVERNING MOTOR TRAINS IN THE PROVINCE OF QUEBEC.

The following is of interest in connection with the methods of taxing the trailer which we outlined in Chapter VI.:

MOTOR TRAINS LEGAL.[1]

"Motor trains will now be legal in the Province of Quebec, subject to certain conditions, for an order-in-council outlining the rules and regulations governing their operation has been assented to by the Lieutenant-Governor in Council.

"Heretofore owners of motor trucks have been allowed to attach trailers to their trucks, and entitled to load the trailer with a weight equal to one half of the load on the truck itself. They represented to the Government that the trailer really represented a second truck, motorless, and that there was no reason to limit the weight it should carry.

"The truck owners sought to have regulations established permitting them to load the trailer with a weight equal to that on the truck itself, and their request has now been granted. It is believed that this latest move is a blow at freight carrying by trains.

" In the rules and regulations it is pointed out that these "motor trains" shall not be composed of more than two units in cities and towns, and three units elsewhere, with each vehicle, whether towing or towed, counting as one unit.

---

1. From the Montreal Daily Star, April 19, 1932.

NEW REGULATIONS.

" The rules and regulations are as follows:

1.- A motor train shall not be composed of more than two units in cities and towns or of more than three units elsewhere.

2.- Each vehicle, whether towing or towed, counts as one unit.

3.- The provision of article 40 of the act respecting motor vehicles and amendments made thereto by order-in-council No. 924, of the 9th of May. 1930, apply to each unit composing a motor train.

4.- The wheels of a trailer or semi-trailer, as well as those of the tractor, must be equipped with rubber tires or with tires made of other materials having the same elasticity.

5.- Save as regards vehicles registered as trailer or a semi-trailer used for the transportation of passengers must not be attached to a motor vehicle used for the transportation of merchandise, or vice versa.

6.- If the tires on all the wheels of the units composing a motor train are pneumatic, the speed of such motor train shall not exceed 12 miles per hour, whether all or any of such units are loaded or not.

If such tires are entirely or partly non-pneumatic, the speed of such motor train shall not exceed eight miles per hour, whether all or any of such units are loaded or not.

If the trailer or semi-trailer is used for the transportation of passengers, all its wheels must be equipped with pneumatic tires.

FEES PAYABLE.

7.- "The fee payable for the registration of each trailer or semi-trailer owned in the province, and forming part of a motor train, is based on the weight of such trailer or semi-trailer and is at the same rate per 1000 pounds as that established for motor vehicles equipped for the same kind of transportation. In addition to such fee based on the weight, a fixed fee of $5.00 per motor train is payable to the province.

8.- The public highways on which, or the localities in which the motor trains may circulate,must be indicated on the permit.

9.- Each trailer or semi-trailer subject to registration shall carry a marker fixed outside on its rear.

10.- During the hours mentioned in paragraph 2 of article 27, a motor train must carry a red light at the rear of the last unit constituting such motor train.

11.- A motor vehicle or a vehicle drawn by a horse or other animal towing a motor vehicle, which, by accident, is out of running order, does not constitute a motor train.

12.- Subject to the prohibitions and restrictions imposed by the act respecting motor vehicles and subject to the modifications made to such act by the present Order-in-Council, the act respecting motor vehicles shall apply to motor trains."

SUPPLEMENT D.

FINDINGS OF THE INTERSTATE COMMERCE COMMISSION WITH RESPECT TO CO-ORDINATION OF TRANSPORTATION SERVICE.

The following interesting press report from the Montreal Gazette of April 19, 1932, was received too late to be discussed in the text:

"The United States Interstate Commerce Commission to-day recommended Government regulation of motor vehicles engaged in interstate commerce and that railroads and water lines be encouraged to use the public highways.

"The commission's decision in the form of recommendations, which are expected to be transmitted to Congress, makes the following findings:

"That transportation by motor vehicles, buses and trucks, over the public highways is, within certain distances, and in certain respects a superior service and that the rail and water lines should be encouraged in the use of this instrumentality of commerce wherever such use will promote more efficient operation or improve the public service;

"That there is substantial competition between rail and water carriers on the one hand and motor carriers on the other for the transportation of both passengers and freight and that this competition is increasing;

"That such competition is conducted under conditions of inequality particularly in regard to regulation;

"That a contributing cause aside from the general business conditions of the present unsatisfactory financial condition of the railroads is the existence of unrestrained competition by rival transportation agencies;

"That there is to-day and probably would be under normal conditions an excess of carrying capacity of existing transportation facilities;

"That unrestrained competition is an impossible solution of the present transportation problem and is incompatible with the aims of co-ordination under regulation;

"That federal legislation relating to the regulation of motor vehicles operating upon the public highways and engaged in interstate commerce is desirable in the public interest."

SUPPLEMENT E.

NEW ATTITUDE OF THE CANADIAN RAILWAYS TOWARDS CO-ORDINATION OF RAIL AND MOTOR TRANSPORT.

Since our chapters dealing with competition between rail and motor transport were written there has been a very marked change in the attitude of Canadian railwaymen towards the use of motor vehicles as adjuncts to the rail services.

In the Montreal Gazette of April 20, 1932, we have the opinions of prominent Canadians in this respect:

"Competition ought at least to be fair and when it is fair then we have got to take our chances," declared Sir Henry Thornton, president of the Canadian National Railways, to-day before the House Committee on National Railways and Shipping, during a lengthy discussion of the extent to which bus and truck and competition was eating into the revenues of the steam railways.

"We have got to the point now," said Sir Henry, with emphasis,"that the day for talking is over. We must get up and do something. For the last three or four years we have been talking and investigating and, quite frankly, the time has come to stop talking and go to work, we must try out something and find out what is going to happen. Talking is not going to cure this."

"It was made plain to the committee by Sir Henry that he would not condemn bus and truck transportation. They were necessary links in the transportation system, especially on short hauls. Bus and trucks could operate profitably on the short haul, while it was the long haul that was profitable for the steam roads.

" A shipment of freight," Sir Henry explained, "does not commence to earn money for the carrier until it is on the road on its way to destination. The yard expense and freight-house expense is merely preparatory to putting that package of freight in the position of getting on its way and earning some money for the railway. The longer the movement the less the proportion of terminal expense to the total rate. That is the reason why long haul business even at lower rates, is more profitable to the railways than short haul business. There is a certain amount of this short haul business that has gone for good, but we must take steps, and take them soon, to prevent any further encroachment upon the revenues of the company by the luring to the highways of this long haul traffic, which is our most remunerative traffic."

SPEAKS FOR BOTH LINES.

" Discussion of bus and truck competition was provoked by a question from Brig.-General John S. Stewart (Cons.,Lethbridge), and Sir Henry, in replying to General Stewart's query, made it plain that he was speaking not only for the Canadian National, but also for the Canadian Pacific Railway, that this problem was not peculiar to one road, but to all railways on this continent. Making it plain that the two railways were at work on plans to meet bus and truck competition, Sir Henry said:

" The two railways are working in accord with a view to retaining as much traffic to the rails as possible. We have tried with success the experiment of moving on local passenger trains less than car-lot freight. We have adjusted the time of certain freight trains in order to give quicker delivery and meet more effectively the highway competition. We have under consideration with the Canadian Pacific Railway still more far-reaching and important methods of dealing with the situation.

" As far as competition with highways goes, there is only one way to compete, and that is to compete. It is no good for the railways to expect to retain traffic on their lines if they offer a service which is not commensurate with the highways, so when I say that the only way is to compete, I mean by measurably meeting the character of competition with which we are confronted."

" Hon. W.D. Euler (Lib., North Waterloo): You do not necessarily mean that you might go into the same method of transportation?"

" Sir Henry Thornton: "That may be, that is exactly what I mean. One of the avenues which we are now exploring is to meet highway competition with the same character of service, both in collection and delivery."

" R.B. Hanson (Con., York-Sudbury), the chairman: "Will you not have to get the provincial jurisdictions to pass proper regulatory legislation ?"

" Sir Henry: "That is true. In meeting this situation, those who use the highways should be obliged first to pay such a charge for the use of the highway as is commensurate with the use they make of it. I see no

reason why those who use the highway should be provided, either at the expense of the province or state, with a highway free of charge. If some individual is going to use the highway for transportation purposes, he ought to pay some charge commensurate with the use he gets from it.

"Secondly, the vehicles which use the highway for commercial purposes should be limited both as to size and speed, first to prevent undue destruction of the surface of the highway and, secondly, not to interfere with the reasonable use of that highway by others, who use it. For example, the size of a truck or commercial vehicle which uses the highway should be somewhat less than one-half the width of the travelled highway in order that other vehicles may pass it with safety and convenience.

"Thirdly, the rates, both passenger and freight, which are charged by companies using the highway should be subjected to the same review as is the case with respect to steam railway rates and fares.

"Fourthly, those to whom passengers and freight are confided for movement, those who operate the vehicle on the highway, should be subjected to some reasonable examination to ascertain that their physical condition is such as permits them to use the highway with safety."

"Hon. R.J. Manion, Minister of Railways: "Is it not correct that if you do go into the motor business to a certain extent in competition that the two railways are likely to go in together in anything they do ? Are there some conversations proceeding ?"

"Sir Henry: "That is true. This is not exclusively a Canadian National problem and it is not exclusively a Canadian Pacific problem; it is a railway problem in which both railways are vitally interested, and we are endeavouring to solve this problem jointly, and to do jointly that thing which will bring to both of us a maximum of traffic with a minimum of expense."

"Answering questions by Ross W. Gray (Liberal, West Lambton) and Hon. James D. Chaplin (Conservative, Lincoln) as to what progress was being made in efforts to control the roads for bus and truck operation, Sir Henry said: "We have held converaations with the Canadian Pacific, and we have prepared a policy. We have agreed upon the representations which ought to be made to the provincial Governments and also to the federal Government. Secondly, we on the Canadian National Railways have evolved a plan for dealing with the situation. We must necessarily avoid as far as possible capital expenditure, but we have developed what we think is a reasonable and effective solution of the problem, and that has been presented to the Canadian Pacific Railway and is now under discussion between operating officials of the two railways. I have no doubt that within the next week or two something will be decided upon."

"Asked by Mr. Euler what was the extreme radius of profitable truck operation on the highway, Sir Henry said somewhere between 100 and 150 miles. "The principle we have been working upon, said Sir Henry,"is

to use the railway where it is most effective and where it can compete most effectively, namely, in long distance movements, and supplement that with some form of collection and delivery. It is not our intention to go exclusively into the highway business, but we want to use the highway in conjunction with the railway, which we already possess, making the most out of that implement which we already have. We cannot, however, meet highway competition for short distances, say, between 50 and 100 miles."

"Frank R. MacMillan (Conservative, Saskatoon): "Have you made a submission to the Royal Commission on Transport in this connection ?"

"Sir Henry: "Yes we have."

"Mr. Euler: "Would you say that the advancement being made by trucks in competition with the railways is now at its peak or is it still increasing ?"

"Sir Henry: "I think it will continue to grow unless the railways are able to check its growth by offering effective competition."

"Dr. Peter McGibbon (Conservative, Muskoka): "Can the railways successfully meet the highway rates for short hauls, for passengers and freight ?"

"Sir Henry: "I think not. I think we must make up our minds that the highway has established itself as an efficient method of transportation for short distances."

"Dr. McGibbon: "If you got the business you would probably lose money on it ? "

"Sir Henry: "The short haul business is the least remunerative."

"S.W. Fairweather, of the railway's bureau of economics, told the committee that the truck became an uneconomic means of transportation beyond a radius of 40 miles. From a national standpoint it cost money to truck on the highways. Mr. Fairweather added. He declared that the total cost of transportation in Canada, including the interest on funded debt,was about - $550,000,000 annually, while the country was spending over $900,000,000 a year on highway transport. This last figure, he added, included market roads. When this figure was divided, he said, it showed that the cost of passenger vehicles on the highways was about $750,000,000 a year. Out of that grand total of $900,000,000 the cost of the highways themselves was $103,000,000 annually."

B I B L I O G R A P H Y.

BIBLIOGRAPHY.

I

Government Publications.

The Canada Year Book, 1931. Prepared by the Dominion Bureau of Statistics and issued by the King's Printer, Ottawa.

Statistical Year Book of Quebec, 1930. Prepared by the Department of Municipal Affairs, and published by the King's Printer, Quebec.

Along Quebec Highways, Tourist Guide; issued by the Department of Highways and Mines, Quebec, 1930.

Public Accounts, Province of Quebec, 1930-31.

The Highway Traffic Act, 1930, Prince Edward Island.

The Motor Vehicle Act; Chapter 76, Revised Statutes of Nova Scotia, 1923, with amendments.

The Motor Vehicle Act; Chapter 26, Revised Statutes of New Bruncwisk, 1927, with amendments.

An Act Respecting Motor Vehicles; Chapter 35, Revised Statutes of Quebec, 1925, with amendments.

The Highway Traffic Act; Chapter 251, Revised Statutes of Ontario, 1927, with amendments.

The Highway Traffic Act; Chapter 19, Statutes of Manitoba, 1930, with amendments.

The Vehicles Act; Chapter 226, Revised Statutes of Saskatchewan, 1930, with amendments.

The Vehicles and Highway Traffic Act; Chapter 31, Statutes of Alberta, 1924, with amendments.

The Highway Act; 1930, British Columbia.

Loi Concernant la Commission des services publics de Québec; Chapitre 17, Statuts refondus de Québec, 1925, tel que modifié par la loi 16 George V, Chapitre 16.

The Public Vehicle Act; Chapter 252, Revised Statutes of Ontario, 1928, with amendments.

Regulations Respecting the Licensing of Public Commercial Vehicles; Department of Public Highways, Motor Vehicles Branch, Toronto, 1930.

The Public Vehicles Act; Chapter 227, Statutes of Saskatchewan, 1930.

Regulations Governing Truck or Freight Vehicles; Department of the Provincial Secretary, Alberta, 1931.

The Motor Carrier Act; 1927. New Brunswick.

Public Carriers; being Part V of the Highway Act, 1930, British Columbia.

The Highway and the Motor Vehicle in Canada, 1930; prepared by the Dominion Bureau of Statistics and published by the King's Printer, Ottawa, 1931.

Annual Reports of the Manitoba Tax Commission.

Reports of the Royal Commission on Transport; London.

The Interstate Commerce Commission, Co-ordination of Motor Transportation, Docket No. 23400, Testimony of Thomas H. MacDonald, Chief of the United States Bureau of Public Roads, Washington, D.C., March 5, 1931. This evidence has not yet been printed by the Commission. It was distributed in pamphlet form by the National Association of Motor Bus Operators, Washington, D.C., and our references refer to the pagination used in this pamphlet.

II

Periodicals.

Bus and Truck Transport in Canada. Published monthly by the MacLean Publishing Company, Toronto.

Bus Transportation. Published monthly by the McGraw-Hill Publishing Company, Incorporated, New York.

The Saturday Evening Post; issue of March 12, 1932.

Collier's, the National Weekly; issue of December 5, 1931, for article by John T. Flynn, 'Bootleg Gasoline.'

The Imperial Oil Review, January-February, 1932.

Industrial Canada, published by the Canadian Manufacturers' Association, Toronto. Issues of October, 1931, and February, 1932.

Le Génie Civil; Paris, France, issue of August 1, 1931, for article by G. Delanghe, "L'Adaption du Bandage Pneumatique aux automatrices ferroviaires (les Michelines)."

The Harvard Law Review, Vol. XLIV, No. 4, 1931, for "Regulation of the Contract Motor Carrier under the Constitution," by Larue Brown and Stuart N. Scott.

Society of Automotive Engineers Journal, September 1930, for "Motor Vehicle Legislation and Taxation," by Pierre Schon.

The Canadian Railway and Marine World, Toronto, October 1931, for "Co-ordination of Rail and Highway Transportation," by J.F. Deasy, Vice-President, Central Region, Pennsylvania Railroad, first given as an address before the Toronto Railway Club on September 3, 1931.

Current issues of the Montreal Daily Star, the Montreal Gazette, the Ottawa Journal and the Winnipeg Tribune.

III

General.

Economics of Transportation, by Professor W.T. Jackman, University of Toronto Press, 1926.

Public Finance, by Harley L. Lutz, Ph. D., Appleton & Company, New York, 1930.

Essays in Taxation, by Professor E.R.A. Seligman of Columbia, 9th Edition.

Bulletin of the National City Bank of New York, January, 1932.

The Railways and Commercial Highway Operation; reprinted from an address by Bernard Allen, B.Sc., Assistant Economist, Bureau of Economics, Canadian National Railways, before the Canadian Railway Club, Montreal, November 9, 1931.

The Equitable Taxation of Motor Vehicles, address by A.D. Ferguson, Bureau of Economics, Canadian National Railways, Montreal, before the General Committee of the American Railway Association, in June, 1931.

The Relation Between and Effect of Highway Motor Transportation and Transportation by Rail, an address by Arthur Y. Milam, before the Institute of Statesmanship, at Winter Park, Florida, on January 10, 1931.

Is the Competition Between Railroads and Motor Carriers Unfair ? by R.C. Fulbright, of the National Industrial Traffic League, November 20, 1930.

Circulars of the National Industrial Traffic League.

The Motor Bus Tax Burden, 1931; distributed by the National Association of Motor Bus Operators, Washington, D.C.

The Motor Bus Operators' Viewpoint, by A.M. Hill, President of the National Association of Motor Bus Operators.

Bus Facts for 1931; distributed by the National Association of Motor Bus Operators, Washington, D.C.

1931 Edition - Highway Tax Costs, by John E. Walker, distributed by the National Automobile Chamber of Commerce, New York.

Facts and Figures of the Automobile Industry, 1931 Edition; distributed by the National Automobile Chamber of Commerce, New York.

Memorandum for the Railway Commission, presented before Royal Commission on Transportation at its Montreal sitting on January 14, 1932, by W. F. Drysdale, M.E.I.C.

Memorandum for the Railway Commission, presented before the Royal Commission on Transportation at its Montreal sitting on January 14, 1932, by the Quebec Motor Highways Association.

To the following gentlemen I am indebted for valuable criticism and advice:

Mr. A.D. Ferguson, of the Bureau of Economics, Canadian National Railways, Montreal.

Mr. W.F. Drysdale and Mr. E.C. Richardson, of Drysdale and Pease, Consulting Engineers, Montreal.

Mr. François J. Leduc, Consulting Engineer, Montreal.

Mr. H.R. Mallison and Mr. Jacques Perron, of the Provincial Transport Company, Montreal.

Mr. W.M. Tuff and Mr. J.H. Thessereault, of General Motors Products of Canada, Heavy Truck Division, Montreal.

.....