

## The Effect of the Automobile on Railway Traffic\*

A FEW years ago steam railway officers were considerably exercised on account of the actual and prospective inroads on their passenger business caused by the rapid development of the net work of electric interurban railways, with their smokeless, frequent service and low fares. Many railway officers are now alarmed because of the effect of the automobile on their passenger business. While some have deemed it too insignificant or inevitable for serious consideration, others have investigated the subject and have been able to trace distinctively appreciable losses in earnings to the increasing popularity of the automobile. While difficult to measure, these losses are felt in the earnings from local, short haul business, and also in those from long haul business because many people in comfortable circumstances, who formerly took summer vacations involving railway journeys, now take their recreation either in the form of motor tours or in daily pleasure riding.

A comprehensive investigation of the subject has been made by the Union Pacific, much of whose road lies in a prosperous territory, the physical conformation of which is especially adapted to the use of the automobile. During the summer of 1911, in order to ascertain to what extent, if any, the use of automobiles was affecting local travel, Gerrit Fort, passenger traffic manager, addressed an inquiry to all agents on the Union Pacific and Oregon Short Line, and also questioned the principal wholesale houses in the territory of the two roads. This inquiry developed that exclusive of Kansas City and Omaha, but inclusive of Denver and Salt Lake City, there were 19,004 automobiles of private ownership along the two lines, 15,497 of which were on the Union Pacific and 3,507 on the Oregon Short Line. In addition there were 984 cars kept for rent. The average carrying capacity was probably five. While various other reasons were assigned for the decrease in passenger traffic experienced by the western lines that year a very large proportion of the agents of these roads mentioned automobiles as among the important contributing causes. Out of 50 replies from agents on the main line through Nebraska, 17 did not think that automobiles had affected the earnings, while 33 said that they had affected the local revenue, the estimates as to the amount of the effect varying from "slightly" to "50 per cent of the local sales." In Kansas out of 45 main line agents 14 stated that the short haul business was being seriously affected by automobiles. In Colorado 16 out of 27 agents estimated the effect from slight to one third of the local business. In Wyoming 24 out of 31 thought that automobiles had had no perceptible effect on revenue, while 7 believed that their business was reduced. On the Oregon Short Line the general opinion was that the automobiles had not yet perceptibly influenced local traffic.

The reports stated that the owners of machines used them to make short trips to neighboring towns, and carried with them people who would otherwise use the trains. An agent at a small town in western

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Nebraska said that on July 4 he sold 112 tickets to Lodge Pole, Neb., and that fully as many persons went in automobiles. As the round trip fare between these is 40 cents the company lost by automobile competition \$45 or \$50. An agent at Brighton, Colo., stated that automobiles were affecting the local revenue at his station to the extent of \$150 a month. The agent at Granite Canyon, Wyo., said that six automobiles were brought in his territory during the season, and his local sales for June dropped 35 per cent and that most of the ranchmen in his vicinity intended purchasing automobiles.

Reports from shippers showed that many houses had bought automobiles for their salesmen, and that others contemplated doing so. The agents who found their station earnings affected stated that commercial men were using automobiles extensively, and often joined together in hiring them, figuring that the difference between the cost of renting a machine and the railway fare was more than offset by their ability to cover more territory in a given time, especially in localities served by only one or two trains a day.

Even in territory where there may be several trains a day automobile owners have found that they can frequently keep appointments and transact business within a radius of 10 to 25 miles far more conveniently, and with a considerable saving in time, although, of course, at far greater expense, by auto than by train.

P. S. Eustis, passenger traffic manager of the Burlington, also canvassed his agents during the summer of 1911 for an explanation of the temporary diminution of ticket sales. While a large number ascribed it to the poor crops of that year, a large proportion were able to specify several ways in which the increasing use of the automobile was cutting into the passenger receipts. For example, one agent reported that the ticket sales from his station to a town 14 miles away during the Chautauqua meeting showed a large reduction as compared with the previous year, although the attendance at the meeting was larger. During the year the number of automobiles in his town had increased by 25.

Although the summer of 1912 was far better from the passenger traffic standpoint than that of 1911, that the effect of the automobile is rapidly and steadily increasing is demonstrated by reports gathered by the Union Pacific in August, 1912. These showed that there are now upward of 25,000 automobiles in Nebraska, 18,600 in Kansas, 18,000 in Colorado, 1,500 in Wyoming, 2,300 in Utah, and 1,500 in Idaho. That is, there is one automobile for every 47 inhabitants in Nebraska, one for every 90 in Kansas, one for every 44 in Colorado and one for every 97 in Wyoming. Undoubtedly, therefore, the passengers earnings of the railways are being, and will continue to be, more or less seriously affected. Moreover, the effect of the automobile is felt particularly in the earnings of branch lines where the traffic is hardly sufficient to justify an increase in service, and where the loss of business renders it more difficult to meet the expense of a train or two a day.

With the improvements in country roads and in the design of motor trucks there is also growing up a competition with the railways in the handling of freight for short distances, particularly in congested terminal districts. It has been shown that a Long Island firm is successfully operating motor trucks between its factory at Glen Cove and its New York warehouse, and is not only handling its own products with a saving of time and freight rates, but is carrying small shipments for others in competition with the railway. Some of the large department stores in Chicago have for several years used their own auto-trucks for the delivery of packages in the outlying suburban territory in preference to paying express rates. Many other instances have been noted where short haul freight transportation formerly handled by railway has been captured by the motor trucks. It was recently estimated that from the inception of their manufacture up to 1911 \$60,000,000 worth of motor business vehicles had been sold. In Massachusetts the records show about 3,500 commercial vehicles licensed since January 1st, 1912, and in New York the automobile bureau of the Department of State reports 8,278 registrations of commercial vehicles this year, with from 80 to 250 being added each week.

It is difficult to see how the railways can expect to meet the competition of automobiles either for freight or for passenger transportation in such circumstances as those in which its greatest development has been shown to have taken place. As far as passenger service is concerned it may be found that the use of the self-propelled motor car, which has often proved an effective offset to electric line competition, is adapted to meet the conditions; and it may also be found useful in some cases for short haul freight transportation.

The optimistic view of the whole situation, however, is that both the automobile and the motor truck are agencies of transportation that make for good roads and better conditions of living, which will ultimately be helpful to the railways as well as to others. The railways certainly are vitally interested in road improvement; they derive large earnings from the shipment of automobiles, and if the traveling salesman is able to sell more goods by their use the railways will surely profit as a result. At the same time it is not unlikely that the increased use of automobiles will have a tendency to slacken the building of interurban trolley lines. A few years ago it was thought that the extension of long distance telephone service would affect travel, but it is now generally recognized that while a telephone message very often saves a railway trip, in innumerable instances engagements are made over the telephone which cause travel or transportation which would not otherwise take place. As for motor truck freight transportation, its success as a competitor of that of the railways has been mainly determined by individual or local factors, and it has furthermore been greatest in the vicinity of the large cities where it has probably relieved the railways of some of their most expensive and least profitable traffic.

### The Economics of Water Power

#### Fixed Charges on Hydraulic Plants Often Forbidding

In these days when one hears with distressing frequency that a water-power trust is going to gobble up all the hydraulic privileges of value unless stopped by the big stick, it is not a bad idea solemnly to take account of stock and see how the water-power situation really bears on the cost of power. Analysis of power production costs on current data shows a situation radically different from that which was apparent ten or fifteen years ago. During the past decade the efficiency of power production by steam has increased as respects plants of first-class modern design by at least 25 per cent. A large modern power plant operated at load factors now attainable in electric practice will produce a kilowatt-hour on less than 15 pounds of steam where the earlier plants, also of the best design and worked at substantially the same load factors, will hardly do better than a kilowatt-hour for 20 pounds of steam. Indeed the 15-pound record has many times been broken, even in foreign practice, by small reciprocating units worked at high superheat. Of such order of magnitude, at least, is the general difference between the skilfully designed turbine plant of to-day and the compound condensing engine plants of day before yesterday. The change has been in part produced by the coming of the turbine; in part perhaps because of the vacuum and superheat that the turbine has brought with it.

As a result of this very considerable change for the better in the economy of power production based on coal, one is forced at the present time to look askance at water-

power privileges that exist under anything like adverse conditions. It is perfectly true that a good water-power plant, well loaded so as to keep down the fixed charges, can turn out power at a very low figure, but it is equally true that a modern steam plant designed for the advanced practice of 1912 can surpass, at any reasonable fuel cost, a considerable proportion of the water powers now in use. It is very doubtful, for instance, whether the great water developments for textile purposes on some of the New England streams would ever be installed under present conditions of steam generation. Some of these privileges are so good that they should show up better than steam at any recorded price, but the investments on others have been so prodigious that the real financial history of the operation would be anything but cheering. Operating costs below half a cent per kilowatt-hour are getting to be common and even with the addition of fixed charges on the plant two thirds or three fourths of a cent per kilowatt-hour is quite within reach, assuming anything like full load conditions. Now a well-situated hydraulic privilege which can be economically developed can undoubtedly better even the best of these figures. But there are very many instances in which the fixed charges on hydraulic plants are forbidding. For example, a certain small New England water power, electrically developed, has cost its owners on their own book valuations no less than \$280 per kilowatt of generating capacity. This implies a fixed charge of \$14 a year per kilowatt plus all repair and depreciation charges, all reckoned at the switchboard and with the additional handicap that the generating plant can only be worked

at its rated capacity for ten or twelve hours per day during nearly half the year.

When the facts are set down in cold blood a good many other hydraulic plants will be found in which the necessary charges aside from operation are quite as big as in this case, amounting, all things told, to \$20 or more per kilowatt-year. Under such conditions it is perfectly obvious that the only economic salvation of the system is a much more complete use of the power throughout the year than is usually found. If such a plant operated, for instance, at full load 3,000 hours per year there would be a fixed charge of two thirds of a cent per kilowatt-hour against the power generated and even this would demand 100 per cent load factor during the 3,000 hours of use. At 50 per cent load factor the situation would be equally bad at 6,000 hours use, which is far greater than would usually be attained in any working plant. Cases like these, with which every hydraulic engineer is familiar, make it pretty evident that a good deal of care must be exercised in developing a water power to make it an economical success as against a thoroughly modern steam plant. Of course, where the market is ample and the cost of fuel high the hydraulic plant wins out nearly every time even now. Where the head is low or the situation so unfavorable that the fixed charges run up as they do in the instance cited and many others like it, the balance of economy for the present tends to swing the other way. Comparisons made a decade ago are no longer valid and if the "water-power trust" is not careful it may find that it has grabbed up the privileges of deficit rather than profit.—*Engineering Record*.